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INTRODUCTION*

Compared to other developing countries, the economic record of Brazil is characterized by outstanding rates of manufactured export expansion and the accumulation of a staggering foreign debt burden. In the 1980s, debt service obligations became untenable, and misguided interventionistic government policies reinforced rather than mitigated an economic crisis reflected in declining per capita incomes and rapidly increasing rates of inflation. In the short term, the economic welfare of Brazil will substantially depend on improvements in the economic management of the country; a task which the government has acknowledged by introducing the 'Plan Cruzado' (for an evaluation, see Fischer, 1986). In the medium and long term, future economic development of Brazil hinges on the country's ability to tackle the debt problem by generating more financial resources internally. One option towards this end is to sustain high rates of export growth and, if possible, to exploit the export potential of the country even more rigorously than in the past.

In assessing the future export potential of the Brazilian economy, in particular with respect to manufactured exports, a necessary first step is an evaluation of the past and present export performance compared to the likely export potential of the country in the respective time periods. This is the focus of the present study. An attempt is made to analyse the sources of international competitiveness of Brazilian manufacturing industries, the incentive system established by the government, and the actual export performance since the early 1960s. The latter is outlined in the first chapter which provides an analysis of internal and external determinants of export success or failure.

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Since export conditions differ considerably between the Latin American market and markets in other regions due to preferential trading arrangements in the former (LAFTA, since 1980:ALADI)[1], major emphasis is placed on the direction of Brazilian exports and a differentiation of determinants for export expansion in Latin American and other markets. This overview provides the basis for evaluating the interrelations between comparative advantage, international competitiveness, economic policy, and export performance in the second chapter. Again, differences between major export markets figure prominently in the analysis, which seeks to explain the export pattern of Brazil in the past, both in terms of commodity composition and direction of trade, based on measures of revealed comparative advantage and an analysis of factor intensities prevailing in Brazilian industries. Chapter 2 provides clues as to whether the international competitiveness of Brazilian manufactured exports was due to comparative advantage in production or to artificial competitive advantages, and hence, on whether government incentives were in line or rather in conflict with comparative advantages. These results also shed some light on activities with a promising export potential in the future.

Any analysis of determinants of export performance, that is based on aggregate sectoral data is bound to overlook important features of international competitiveness as they are created and emerge at the micro level. Therefore, the sectoral analysis is supplemented by a closer look at some major differences between exporting and non-exporting firms within individual industries in Chapter 3. This is to clarify the relationship between ownership, firm size, factor endowment and discriminatory economic policies on the one hand and export performance on the other. In particular, a micro approach allows to assess the role of multinational

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[1] The Latin American Free Trade Association (LAFTA) consisted of Argentina, Brazil, Bolivia, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, Uruguay and Venezuela; the membership did not change with the transition to the Associação Latino-Americana de Integração (ALADI).

companies in the Brazilian export success which may hold some lessons for other developing countries and their attitude towards foreign investors. The micro view presented in this study largely draws on an ECLA survey and thus only touches the tip of the iceberg. Hence, conclusions drawn in the final chapter are of a preliminary nature until more detailed sector studies provide firmer ground for policy recommendations.

CHAPTER 1

MANUFACTURED EXPORTS: AN OVERVIEW

1.1. Export Performance in Different Markets

Brazilian manufactured exports have grown rapidly and in a stable fashion since the early 1960s[1]. While these exports amounted to only US$ 36 million in 1963, they reached over US$ 10 billion in 1984. In real terms, the average annual growth rate of Brazilian manufactured exports was 22 percent in 1963-84. Over the same period, world exports in manufactured goods grew at an average annual rate of about 7 percent, and manufactured exports of South and South-East Asian countries at about 15 percent (for more detailed information, see Table 1.1)[2]. The manufactured export

[1] Manufactured exports are reported in the Standard International Trade Classification (SITC) and include the following SITC-categories: 5 (chemicals), 6 (basic manufactures, excluding categories 67 and 68), 7 (mechanical and transport equipment), and 8 (miscellaneous manufactured goods). We refer to UN, Commodity Trade Statistics as the principal source for Brazilian export performance because other sources do not provide a sufficiently disaggregated picture of Brazil's exports, both in terms of commodity composition and direction of trade. A disaggregated analysis is required since export conditions can be supposed to differ considerably between different commodity groups and different markets. The analysis has to be largely concentrated on the period 1963-81 since, for subsequent years, similarly disaggregated information on Brazilian manufactured exports is not available from Commodity Trade Statistics. Thus, only some more general indications of Brazil's export performance can be presented for the most recent past. Several studies have been done on Brazilian manufactured exports; see among others, Doellinger and Dumas (1971), Tyler (1976; 1983), Rosa (1978), and Pinto (1980). Most of these studies cover the 1960s and early 1970s, a World Bank report (1983) covers the 1970s and Cardoso (1982) presents an analysis of Brazil's foreign trade over the last century.

[2] The calculation of real export growth is sensitive to the price index chosen to deflate nominal exports. Using the US wholesale price index as deflator, Dippl (1986, Table 1) computes real growth rates of 34.6 percent for 1965-73 and 13 percent for 1973-82. In comparing Brazilian export growth rates with other countries or country groups, additional distortions arise due to differences in the deflators that had to be applied (see footnote to Table 1.1). For example, real growth in manufac-

continued on p. 5

performance of Brazil was not only impressive in the period of favourable world trade conditions (1963-73) but also for the subsequent years of depressed world demand. Notwithstanding the decline in Brazilian export growth after 1973, the country still outperformed the world and even the very successful East and South-East Asian exporters.

The remarkable export performance of Brazil has been accompanied by significant changes in the product composition of manufactured exports as well as in the direction of trade. After 1973, growth of world market sales was most impressive for such non-traditional export items as plastics (44 percent per annum in nominal terms)[1], transport equipment (40 percent), non-electrical machinery (30 percent), and paper and paperboard (30 percent; see Table A1 in the statistical annex). On the other hand, more traditional export products in the basic manufactures category (e.g. leather, textiles, non-metallic mineral manufactures) as well as footwear and electrical machinery, which headed export growth in 1963-73, fell considerably behind thereafter. As a result, the structure of Brazil's manufactured exports became similar to the pattern of world exports, while in 1973 it was very close to the export structure of the group of developing countries (Table A3). The evidence indicates that the composition of Brazil's manufactured exports has moved away from that of other successful exporting nations in the Third World, as e.g. countries in Asia, and now resembles more the export bundle of an industrialized country. This impression is confirmed - at least at first glance - by factor intensities embodied in different export items. The emerging top export products are manufactured in relatively cap-

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tured exports of other developing countries is understated in periods of raw material price booms since the index of overall export unit values had to be used. Notwithstanding such distortions, Brazil's export performance relative to other country groups remains impressive. It seems safe to assume that Brazil has outperformed world export growth, considering the remarkable differences in the growth rates shown in Table 1.1.

[1] Real growth rates for individual SITC-categories cannot be calculated since information on adequate price deflators is not available (for details, see Table A1).

Table 1.1 - Growth of Manufactured Exports[a] of Brazil and Other Regions, 1963-84
(average annual percentage growth of exports in real terms)

Exports from	1963 - 67	1968 - 73	1974 - 78	1979 - 81	1982 - 84[b]	1963 - 73	1974 - 84[c]
Brazil (to)	23.0	30.0	17.9	21.4	13.3	26.8	17.6
US	23.3	27.9	18.1	10.1	..	25.8	15.0
ALADI	27.1	20.7	22.4	32.6	..	23.6	26.1
EEC + EFTA	18.3	33.2	12.2	16.0	..	26.2	13.6
Rest of the world	28.5	50.7	19.2	21.7	..	40.1	20.1
World (to)[d]	9.5	11.3	5.8	3.9	4.4	10.5	5.1
US	15.2	12.3	6.3	4.5	..	13.3	5.2
ALADI	0.3	7.5	7.2	12.2	..	4.1	8.9
EEC + EFTA	10.5	13.7	5.1	1.2	..	12.2	3.5
Rest of the world	8.9	9.5	6.8	5.7	..	8.7	6.3
Developing countries[d]	12.3	17.5	10.1	11.7	10.0	15.1	10.6
South and South-East Asian countries	12.5	21.2	12.2	13.2	10.3	17.2	12.1

[a] Manufactured goods correspond to SITC: 5+6-(67+68)+7+8. World exports of manufactured goods were deflated by export unit values of industrial countries, Brazilian manufactured exports by an index of manufactured export prices published by the Getúlio Vargas Foundation, developing countries manufactured exports by the export unit value of non-oil developing countries, and South and South-East Asian countries manufactured exports by the export unit value of Asia. - [b] Only until 1983 for developing countries and South and South-East Asian countries. - [c] Up to 1981 for Brazil and world to the US, ALADI, EEC + EFTA; and the rest of the world. - [d] Excluding Brazilian exports.

Source: Own calculations based on UN, Commodity Trade Statistics; IMF, International Financial Statistics.

ital-intensive industries while growth of many labour-intensive export categories has slowed down considerably[1].

An important reason for the changing role of different export items and the rising share of rather capital-intensive goods after 1973 becomes obvious when looking at changes of the direction of Brazilian manufactured exports. With respect to both total manufactured exports and exports of the individual SITC-groups 5-8, developed countries (mainly US and EEC) and ALADI were by far the most important markets for Brazil accounting for more than 80 percent of all exports (Table A4). This holds true even though the share of developing countries outside the ALADI region in total Brazilian manufactured exports increased by more than 10 percentage points from 5 to 16 percent between the early 1960s and the early 1980s. However, the relative importance of the two major regional markets for Brazilian manufactured exports varied considerably over time. In 1973, developed countries accounted for nearly two thirds of total manufactured exports, whereas the share of ALADI had fallen to less than a quarter. Later on, the share of developed countries dropped to 52 percent (1978) and 44 percent (1981) and ALADI gained significantly in importance (30 and 39 percent, respectively). These shifts are also reflected in real growth rates of Brazilian manufactured exports to different regions (Table 1.1). Comparing 1963-73 and 1974-81, real growth rates were nearly halved for exports to US and EEC+EFTA, mainly due to demand factors, whereas export growth to ALADI even increased after 1973[2].

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[1] Ranking Brazilian industries according to capital investment per employee, all four non-traditional industries except non-electrical machinery (on average, SITC 71 ranges in the middle) figure prominently in the top group of relatively capital-intensive industries (Table A2).

[2] Figures on world exports to different regions (also presented in Table 1.1) point to the dominant role of demand factors in explaining these remarkable differences. From world exports it is evident that the growth in total ALADI imports increased after 1973 whereas overall exports to developed countries slowed down drastically due to depressed world trade conditions.

The increasing share of ALADI markets in Brazilian manufactured exports after 1973 is most relevant in understanding the changes in commodity composition, since the bundle of products delivered to ALADI markets and markets of developed economies was distinctly different (Table 1.2; for further details, see Table A6):

- In the late 1960s and early 1970s, nearly half of Brazilian manufactured exports to developed countries fell into the basic manufactures category (SITC 6). In subsequent years, the share of products belonging to this category dropped to 30 and 23 percent. Brazilian exports to developed countries became more diversified (as indicated by the Gini coefficient which can be used as a measure of export concentration; Table A5) and two new types of exports gained in importance. Firstly, labour-intensive products of SITC 8 jumped from practically nil in 1968 to more than 20 percent in the early 1980s, due to exports of footwear in the first place. As a result, rather labour-intensive products of SITC-categories 6 and 8 continued to account for a significant share in Brazil's exports to developed economies in the 1970s and early 1980s. Secondly, the shares of non-electrical machinery and transport equipment increased remarkably after 1973. It has to be borne in mind, though, that in 1973 the shares of these items were considerably lower than in the 1960s. The rapid export expansion in these categories nevertheless suggests a substantial degree of international competitiveness.

- Brazil's manufactured exports to ALADI reveal a completely different pattern. Apart from 1968, basic manufactures merely accounted for about 20 percent. Miscellaneous products of SITC-category 8 were even less relevant. Exports to ALADI were dominated by machinery and transport equipment[1]. The share of SITC 7 which amounted to 53-55 percent in the late 1960s and early 1970s further increased to 62-63 percent later on. Looking at

[1] Consequently, the concentration in Brazilian manufactured exports to ALADI (measured by the Gini coefficient in Table A5) exceeded the corresponding figures for exports to developed countries.

Table 1.2 - Commodity Composition of Brazilian Manufactured Exports to Developed Countries and ALADI[a], 1962-81 (percent)

Destination of exports	SITC		1962	1968	1973	1978	1981
Developed countries	5	Chemicals	56	32	10	8	15
	6	Basic manufactures	26	45	46	30	23
		65 Textiles	(4)	(9)	(23)	(13)	(11)
	7	Machinery and transport equipment	16	19	17	39	40
		71 Non-electr. mach.	(1)	(13)	(7)	(19)	(19)
		72 Electr. mach.	(-)	(1)	(8)	(12)	(7)
		73 Transport equipment	(14)	(5)	(2)	(8)	(14)
	8	Misc. manufactures	2	4	27	23	21
		84 Clothing	(-)	(1)	(8)	(4)	(2)
		85 Footwear	(-)	(-)	(13)	(14)	(15)
ALADI	5	Chemicals	9	7	10	9	10
	6	Basic manufactures	17	37	22	20	18
		65 Textiles	(3)	(17)	(9)	(6)	(4)
	7	Machinery and transport equipment	72	53	55	62	63
		71 Non-electr. mach.	(11)	(40)	(27)	(31)	(26)
		72 Electr. mach.	(1)	(11)	(11)	(9)	(10)
		73 Transport equipment	(49)	(1)	(18)	(23)	(27)
	8	Misc. manufactures	3	3	13	10	10
		84 Clothing	(-)	(-)	(7)	(3)	(1)
		85 Footwear	(-)	(-)	(-)	(-)	(1)

[a]The relation between the "Nomenclatura Brasileira de Mercadorias" and SITC was taken from Silber (1983, Appendix 2). Figures in parentheses for 2-digit SITC-categories.

Source: Own calculations based on UN, Commodity Trade Statistics; Banco Central do Brasil, Boletim.

the regional distribution of Brazilian exports of SITC 7 (Table A4), the dominant role of ALADI is confirmed. Moreover, the shares lost by ALADI in the 1970s accrued to other developing countries rather than developed economies. Consequently, the Third World accounted for 60-67 percent of total Brazilian world market sales of machinery and transport equipment over the whole period under consideration. This underlines the importance of the Third World, and the Latin American market in particular, for relatively capital-intensive Brazilian exports.

For the period after 1981, similarly disaggregated information on Brazilian manufactured exports of different categories to different destinations is not available in the sources referred to in the preceding paragraphs. According to preliminary figures for 1983 (which do not cover all export categories, however), the trend of rising ALADI shares was reversed in the early 1980s. Particularly, the US market regained importance, displacing the ALADI as the most important single buyer. These shifts must largely be attributed to demand factors. With the beginning of widespread debt crises, prospects for exports to the Latin American region were deeply eroded, whereas the US entered an expansionary economic phase with import demand booming. Apparently, Brazil managed to switch to the more promising US market after 1981 in order to compensate for the slowdown in trade with ALADI, as the country had succeeded in shifting manufactured exports in the opposite direction after 1973. This indicates a remarkable flexibility of Brazilian exporters considering that export conditions and the structure of demand for Brazilian products differed significantly between both markets.

The analysis shows that export market diversification coupled with product diversification have characterized Brazil's manufactured export performance since the early 1960s. However, the potential for further diversification does not seem to be exhausted. There is still plenty of room for further export market diversification as suggested by the continuous dominance of US and ALADI markets. The same applies to product differentiation: Out of the fifteen most important export items in 1981, ten still

belonged to the non-manufactures category accounting for nearly half of total Brazilian exports. Both the search for new markets and new products could enlarge Brazil's export potential and thus helps to reduce the burden of servicing foreign debt and stimulates overall economic growth[1].

1.2. The Relevance of Demand Factors for Export Expansion

Reference has been made to demand factors influencing Brazil's export expansion. Since world or regional demand for imports cannot be influenced by the Brazilian government or by exporters of this country, the relevance of demand factors for direction and volume of exports has to be established. Only if demand factors are not dominating, supply-side effects on the competitiveness of Brazilian manufacturing industries come into focus and the behaviour of exporters as well as government policies matter.

The influence of demand factors on the export performance can be separated by constant market share analysis (CMS). In this approach, export growth is split up into a world trade effect (i.e. that increase necessary to keep the country's share in world exports constant), a commodity composition effect, a regional market concentration effect, and a residual. While the former effects represent demand factors, the residual is generally referred to as capturing supply-side effects on international competitiveness. The results of the CMS analysis for Brazil and different subperiods are presented in Table 1.3. In contrast to earlier studies[2], our analysis covers a longer time period and presents separate calculations for Brazil's major export markets. However, the principal conclusion remains the same as that of earlier studies. The results in Table 1.3 point to the supply side effect as the major source of growth of Brazil's manufactured exports. This applies to all export markets and all sub-

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[1] For an empirical analysis of the impact of export expansion on economic growth in Brazil, see Annex I "Export Expansion and Growth: The Brazilian Case, 1968-1984".

[2] See e.g. Horta (1983), Rosa (1978), Dippl (1986).

Table 1.3 - Constant Market Share Analysis of Brazilian Manufactured Exports to Different Markets in Different Subperiods, 1962-81 (world trade, commodity, market and supply-side effects as percent of actual growth of manufactured exports)

	World	Developed countries	Developing countries	ALADI	Centrally planned economies
World trade effect					
1962-67	24	31	17	17	26
1968-73	17	13	27	35	11
1974-78	50	67	36	n.a.	52
1979-81	31	46	24	23	12
Commodity effect					
1962-67	9	11	6	6	9
1968-73	1	1	2	2	1
1974-78	19	25	13	n.a.	20
1979-81	-5	-7	-4	-4	-2
Market effect					
1962-67	-2	7	-8	-22	-5
1968-73	-2	1	4	-11	-3
1974-78	5	-10	21	n.a.	-10
1979-81	20	-18	30	37	-5
Supply-side effect					
1962-67	69	50	85	99	70
1968-73	84	85	67	74	91
1974-78	27	18	30	n.a.	38
1979-81	54	79	50	44	94

Source: Own calculations based on UN, Commodity Trade Statistics.

periods investigated, except for 1974-78 when demand factors (world trade effect) dominated and the re-implementation of import substitution policies in Brazil might have negatively affected its international competitiveness. These findings provide sufficient ground to concentrate the subsequent analysis exclusively on supply factors despite some limitations of the CMS approach[1].

1.3. Determinants of Brazil's Export Performance: Some Hypotheses

Abstracting from general demand influences, Brazil's manufacturing industries may achieve international competitiveness because they enjoy a comparative advantage in the production of certain products vis-à-vis producers in other countries which accrues from the country's resource endowment, because similarities of consumer preferences in Brazil and in other (developing) countries open up markets for Brazilian exporters, or because special trading arrangements and other government interventions provide an artificial competitive advantage to domestic industries which do not necessarily possess a comparative advantage in production. From what has been said before, it is also evident that different export conditions prevailing in the ALADI region, other developing countries and developed countries must be taken into account in determining the roots of international competitiveness of different manufacturing industries.

According to standard Heckscher-Ohlin theory of international trade, a country should supply products that intensively use the abundant factors of production. In the case of Brazil, there still is a large untapped labour supply outside the formal labour markets which would suggest a comparative advantage in labour-intensive exports. However, for two different reasons, there may

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[1] The CMS approach has frequently been criticized with respect to conceptual limitations and problems in empirical application (see e.g. Bowen, Pelzman, 1984, p. 461, Leamer, Stern, 1970). The residual reflects the interaction of both demand and supply factors, rather than supply factors exclusively. Moreover, CMS results are quite sensitive to changes in the base year, level of commodity aggregation, and definition of world market.

also be a justification for more capital-intensive exports to developed economies. New products going through a product cycle finally become well established in markets and standardized in production. At this stage, human capital requirements become low and, notwithstanding a relatively high physical capital intensity, more advanced developing countries can be supposed to have comparative advantages in producing such standardized export items. Physical capital should be much less of a bottleneck than human skills, due to its international mobility (Wolter, 1975). Policy distortions stand for the second possible reason for capital-intensive exports. Misguided economic policies have often discriminated against labour-intensive activities in many developing countries and hence have favoured a too capital-intensive production and export structure as compared to what would have been adequate given the countries' factor endowment. This argument may also be of some relevance in the case of Brazil. Savasini (1978) concluded that the export promotion policy implemented since the mid-1960s has given priority to sectors that absorbed relatively little labour per unit of final demand.

In exporting to developing countries, competitiveness of Brazil vis-à-vis exporters located in developed economies may also arise from similarities in consumer preferences. Brazilian exporters can be expected to be well prepared to meet developing countries' import needs since these may be largely in line with domestic production and demand preferences in Brazil. For example, developing countries may ask for low-priced products rather than high quality standards adhered to in developed countries. Especially exports to Third World countries that have not yet reached the industrialization level of Brazil may largely consist of capital-intensive goods. Compared to other developing countries, Brazil is probably better equipped with physical capital and human skills.

As regards exports to ALADI members, additional factors must be taken into account. Although the Latin American Free Trade Association (LAFTA) did not succeed in liberalizing trade between the 11 member countries as envisaged in the 1960s, preferential trad-

ing arrangements favoured trade within LAFTA and discriminated against imports from third countries. In 1977, about 40 percent of intra-LAFTA trade flows enjoyed preferential treatment. Preference margins relative to cif-prices plus tariffs levied on non-LAFTA imports amounted to 20-30 percent in the 1970s. In this way, national import substitution policies were elevated to the regional level. Hence, Brazilian exports to the Latin American market are likely to be biased in favour of products that require large inputs of both physical and human capital (Díaz Alejandro, 1974)[1].

A further hypothesis relates to the heavy fluctuations in relative importance of Brazilian exports to the Latin American region. Presumably, it is mainly the ALADI region that serves as a temporary outlet for excess production at times of depressed domestic demand in Brazil. Furthermore, exports to ALADI may be considered to partly offset bottlenecks in selling to developed countries, due to either sluggish demand or eroded competitiveness of Brazilian exports in markets without preferential access for Brazilian suppliers.

Finally, the Latin American approach of discriminating against imports from outside the region may have led to distinctly different characteristics of exporting versus non-exporting firms in Brazil. Import substitution policies gave rise to foreign direct investment by multinational corporations which attempted to secure access to Latin American markets. Since multinationals located in Brazil will strive for serving the whole ALADI region and engage in intra-firm trade with parent companies in developed countries as well, one can assume that these companies may have been spearheads of export expansion in Brazil. Due to attempts to

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[1] Subsequently, export conditions within LAFTA were increasingly characterized and complicated by bilateral trading arrangements, especially when the overall liberalization approach was abandoned and the rather loose cooperation ALADI replaced LAFTA in 1980. The impact this trend has had on Brazil's exports can only be assessed in the context of detailed sector studies scheduled for a later phase of the research project, however.

foster intra-industry specialization among ALADI-members, participating enterprises may operate at a significantly larger scale than firms supplying domestic markets only. Moreover, since Brazil belongs to the most advanced economies within ALADI it would specialize in relatively capital-intensive productions, so that exporting and non-exporting firms may differ in terms of factor absorption as well. These hypotheses are subjected to empirical tests in the subsequent chapters.

CHAPTER 2

COMPARATIVE ADVANTAGE, ECONOMIC POLICIES AND EXPORT PERFORMANCE

2.1. Brazil's Revealed Comparative Advantages in Different Markets

In the following, the international competitiveness of Brazil's manufacturing industries is measured with export performance ratios and the concept of revealed comparative advantage[1].

- As a first approximation, the international competitiveness across industries can be compared on the basis of export performance ratios presented in Table 2.1. These ratios compare Brazil's commodity structure of manufactured exports to the corresponding structure of world exports (for the formula of calculation, see footnote to Table 2.1). The basic notion is that Brazil may possess a competitive advantage (disadvantage) if the share of an export category in Brazil's total manufactured exports is greater (smaller) than the respective share of this category in total world exports of manufactures.

- The concept of revealed comparative advantage (RCA) measures the relative competitiveness of different Brazilian industries by calculating the excess of its exports over its imports, relative to total net exports of the Brazilian manufacturing sector. Thus, the RCA analysis allows for a ranking of the different Brazilian industries with respect to their international competitive position (for the formula of calculation, see footnote to Table A7). A clear distinction has to be drawn between the RCA-concept and comparative advantages which according to the theory of international trade are assumed to determine the structure of production and thus also trade pat-

[1] For earlier studies, see for example Lowinger (1971), Tyler (1972), Rocca and de Barros (1972), Nishijima (1980), Savasini (1978); for a summarizing discussion of different measures of revealed comparative advantage, see UNIDO (1986, pp. 4 ff.).

Table 2.1 - Export Performance Ratios for Brazilian Manufactured Exports to Different Markets, 1962-81[a]

SITC	Region	1962	1967	1968	1973	1974	1978	1979	1981
5	Chemicals								
	World	3.30	1.92	1.68	0.78	0.81	0.52	0.60	0.86
	Developed ecs.	4.40	2.61	2.54	0.81	0.93	0.56	0.58	1.02
	Developing ecs.	1.04	1.08	0.84	0.67	0.59	0.49	0.61	0.72
	- ALADI	0.55	0.58	0.40	0.50	0.42	0.49	0.29	0.66
	- NICs	0.82	0.49	0.38	0.94	0.95	0.81	0.87	1.72
	Centr.planned ecs.	4.65	2.00	1.27	0.84	0.70	0.49	0.74	2.59
8+6-(67+68)	Basic and Misc. Manufactures								
	World	0.66	1.00	1.21	1.75	1.48	1.20	1.21	1.04
	Developed ecs.	0.67	1.04	1.27	1.87	1.58	1.38	1.40	1.21
	Developing ecs.	0.60	0.89	1.17	1.47	1.29	0.96	1.01	0.89
	- ALADI	0.88	1.50	1.97	1.86	1.63	1.54	1.29	1.24
	- NICs	0.27	1.06	1.39	1.14	1.01	0.66	1.29	0.87
	Centr.planned ecs.	0.83	2.70	0.90	3.25	3.24	4.06	3.56	3.00
7	Machinery and Transport Equipment								
	World	0.68	0.76	0.67	0.53	0.73	0.99	0.97	1.01
	Developed ecs.	0.36	0.55	0.38	0.36	0.56	0.82	0.81	0.83
	Developing ecs.	1.27	1.05	0.95	0.85	0.98	1.13	1.10	1.13
	- ALADI	1.16	0.94	0.85	0.89	1.04	0.98	1.06	1.00
	- NICs	0.00	1.19	0.95	0.92	1.02	1.39	0.87	1.03
	Centr.planned ecs.	0.48	0.00	0.00	0.01	0.03	0.04	0.05	0.01

[a] Export performance ratio defined as:

$$ep_{ij} = \frac{X_{ij}}{\sum_i X_{ij}} \Big/ \frac{XW_{ij}}{\sum_i XW_{ij}}$$

ep_{ij} { < 1 revealed comparative disadvantage; = 1 "normal"; > 1 revealed comparative advantage

X = value of Brazilian exports
XW = world exports
i = SITC-category (5,6+8,7)
j = region (six export markets)

Source: Own calculations based on UN, Commodity Trade Statistics.

terns. Instead of referring to factor endowments, the RCA-concept tries to evaluate the international competitiveness of industries by referring to their actual export performance. In case of serious distortions in goods and factor markets, favourable RCA-values may result from these distortions rather than from comparative advantage.

Due to the aforementioned conceptual limitations, the following analysis of export performance ratios and RCAs can only serve as a starting point in assessing the international competitiveness of Brazilian industries. It will be supplemented by applying the so-called Lary-concept in analysing factor intensities of Brazilian industries (Section 2.2) and by assessing the role of economic incentives in explaining Brazil's export performance (Section 2.3).

As was to be expected, great differences in export performance ratios exist both between SITC-groups and export markets. With shares of 10-15 percent in total Brazilian manufactured exports to developed and ALADI countries in the 1970s, chemical exports were of minor importance for Brazil. According to Table A2, this industry shows the highest capital intensity within the Brazilian manufacturing sector. Consequently, the relative international competitiveness can be expected to be rather poor, particularly in trade with developed countries. At large, export performance ratios and RCAs support this view. Export performance ratios are below one throughout the 1970s, irrespectively of the market considered. The more detailed analysis of RCAs in Table A7 shows extremely high negative values (i.e. trade deficits) for almost all subgroups of SITC 5 in trade with developed countries. In trade with ALADI and total developing countries, a less uniform picture emerges: RCAs improved during the 1970s and are significantly positive for several subgroups (explosives and plastics in particular).

Brazil seems to be most competitive in exporting products falling into the basic and miscellaneous manufactures category (SITC 6-(67+68)+8) which largely consists of relatively labour-inten-

sive goods. Export performance ratios improved considerably during the 1960s and early 1970s, probably due to the implementation of outward-looking economic policies (for details, see Dippl, 1986, pp. 3 ff.). Though still above one, ratios declined after 1973 when Brazil returned to import substitution policies. Notwithstanding that this trend applied to all major export markets, some differences are worth mentioning. Export performance ratios were higher than average in case of exports to developed countries and ALADI members, but considerably lower for non-ALADI developing countries. The favourable performance in developed country markets supports the hypothesis that Brazil is most competitive in manufacturing labour-intensive products vis-à-vis advanced economies. High performance ratios for exports of SITC 6 and 8 to ALADI may be partly attributed to discriminations against imports from outside the region. Probably, Brazil benefitted from trade diversion at the expense of Asian competitors, for example. This reasoning is consistent with the comparatively poor export performance in non-protected Third World markets.

Net trade measures of Table A7 reveal a somewhat different picture. At the overall level of basic manufactures (SITC 6), RCAs are positive for ALADI and other Third World markets but negative for the developed country market (apart from 1978). Brazil experienced a trade surplus in almost all subgroups of SITC 6 with developing countries and ALADI, except in paper and leather. In trade with developed economies, positive RCAs are concentrated on the most labour-intensive sectors (leather, wood, textiles); trade deficits prevailed in sectors like paper, metallic and non-metallic mineral products, i.e. more capital-intensive industries according to Table A2.

RCAs for miscellaneous manufactures (SITC 8) improved during the 1970s for all major export markets of Brazil. However, this trend started much earlier and was more pronounced for (net) exports to all developing countries and particularly to ALADI. Probably, it was harder to achieve competitiveness in exporting miscellaneous manufactures to developed country markets than to the protected ALADI market. Again considerable differences exist between indus-

tries at the 2-digit SITC-level. Throughout the whole period, trade performance with both developing and developed countries was most favourable for furniture and footwear. Improvements were most remarkable for travel goods and clothing, especially in trade with developed countries. On the other hand, Brazil failed to achieve trade surpluses vis-à-vis advanced economies as regards instruments and printed matter.

There is some evidence that the assessment of Brazilian export prospects would be biased to the lower side if based on RCA calculations. If traditional RCA-values are compared to an index based on production rather than trade data[1], the number of sectors with a revealed comparative advantage is greater according to the latter measure (see Table A8 for the calculation of both measures at the 4-digit SITC-level, and Table A9 for a summary presentation)[2]. This holds true for industries within SITC 8 in particular.

A similar picture emerges with respect to machinery and transport equipment (SITC 7). Whereas the so-called Bowen-index indicates favourable export prospects for many industries belonging to SITC 7, the traditional RCA-concept generally results in negative values as regards Brazil's trade with the world. However, the net trade measure (Table A7) as well as export performance ratios (Table 2.1) show significant differences between Brazil's major export markets. For markets in developed countries, RCAs are negative and export performance ratios below one throughout the whole period, but both measures improved considerably after 1973.

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[1] Bowen (1983) has proposed to reveal a country's competitive advantages through its production relative to world production. This index is considered superior to the traditional RCA-concept since it covers a much wider spectrum of commodities in which a country may achieve international competitiveness. This is so because a country produces many more goods than are actually exported. We present Bowen's index merely as an additional information since this measure cannot be calculated for separate export markets.

[2] As has been noted already, export performance ratios show a more favourable picture in case of SITC 6+8 as well.

Production may have become more standardized so that Brazil will achieve competitiveness in developed country markets if this trend continues. On the other hand, Brazil experienced surpluses in trade with total developing countries and the ALADI region. Export performance ratios were above or very close to one. The performance was most remarkable in non-electrical machinery and transport equipment. Presumably, preferential trading arrangements within ALADI gave a major impetus to Brazilian exports of these categories to the protected Latin American market. However, the success in trade with other developing countries as well supports the hypothesis that Brazil is competitive in exporting relatively capital-intensive products to less advanced economies, since it is well equipped with physical and human capital compared to the majority of developing countries. Expectations are confirmed that Brazil was better prepared than developed countries to meet developing countries' import needs due to similarities in demand. Exports of vehicles have gone almost exclusively to developing countries, for example (World Bank, 1983, p. 119). This was partly related to similar fuel conditions in the importing countries (i.e. low octane fuel) and better adaption to the typically rough road conditions in the Third World[1].

2.2. Factor Use and Export Performance of Brazilian Industries

The analysis in the preceding paragraphs has shown significant differences in Brazilian trade patterns with developed economies on the one hand and developing countries (especially ALADI-members) on the other. In trade with advanced countries, Brazil's export performance was most favourable in products generally considered as labour-intensive. This was predicted by standard Heckscher-Ohlin theory of international trade according to which the potential for export growth lies on products that intensively use the relatively abundant factor of production. In trade with developing countries, competitiveness was achieved in more capi-

[1] The export performance of Brazil was most favourable for multiple use pick-ups and utility vehicles, i.e. types of vehicles which are best adapted to rough use.

tal-intensive industries as well, which again is consistent with expectations raised in Section 1.3.

However, after 1973 Brazil considerably expanded its exports of machinery and transport equipment to developed countries as well, so that the differences in the commodity composition of Brazilian manufactured exports to its major trading partners were somewhat reduced. It is mainly this observation that requires further investigation, since conflicting hypotheses are involved. A first hypothesis suggests an explanation in terms of factor absorption in Brazilian industries. Notwithstanding high overall capital intensity, Brazil may have comparative advantage in machinery and transport equipment if products are of a highly standardized nature (product-cycle goods). On the other hand, it may be attributed to policy induced distortions (i.e. economic policies conflicting with comparative advantage) that export structures became more similar after 1973. Before discussing the role of economic policies in Section 2.3, the well-known Lary-concept is applied to test the former hypothesis. Moreover, by referring to this concept, the relationship between factor absorption and Brazilian trade patterns is reconsidered in this section.

The Lary-concept (Lary, 1968) claims that under certain assumptions value added per employee in different industries can be taken as a proxy for capital intensity[1]. A figure above the average for total manufacturing indicates relatively high capital intensity of an industry and vice versa. In contrast to the index of overall capital intensity referred to in Table A2 (based on capital investment per employee), separate measures of physical and human capital intensity can be calculated by applying the Lary-concept. This is most important in the context of the product cycle hypothesis. Standardized product-cycle goods are char-

[1] Factor intensities can only be calculated for total production rather than export production, since information on value added or wage content of exports is not available. Furthermore, results may be biased due to differences in factor and product market distortions between industries. Thus, Lary-measures provide an approximation to reality only (for a more detailed discussion, see Wolter, 1975, pp. 31 ff.).

acterized by minor human skill requirements, but may still absorb considerable amounts of physical capital. According to Lary, human capital intensity is indicated by high wage content in value added per employee and physical capital intensity by high non-wage value added per employee, respectively.

Table 2.2 presents factor intensities for 15 Brazilian manufacturing industries relative to averages for total manufacturing[1]. Three different groups of industries can be identified with respect to overall relative capital intensity:

- Footwear, wearing apparel, wood and cork products, furniture and fixtures, leather and fur products, and textiles are clearly labour-intensive, since value added per employee is significantly below average.

- Non-electrical machinery, food products, plastics, and printing and publishing range in the middle, with overall capital intensities near the average for total manufacturing industries.

- The group of relatively capital-intensive industries consists of transport equipment, paper, electrical machinery, rubber products, and other chemicals (in ascending order).

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[1] Industries are defined according to International Standard Industrial Classification (ISIC). Data are presented for all Brazilian manufacturing industries for which information is available in the 1984 edition of UNIDO, Handbook of Industrial Statistics. Tables A10-A12 provide additional information on factor intensities in Brazil relative to various country groups that stand for its major trading partners. That is because one of the crucial assumptions in deducing comparative advantage from relative factor intensities is that of non-existence of factor intensity reversals. According to correlations run for factor intensities in Brazil (value added, wages and non-wage value added per employee) on the one hand and the corresponding figures for developed market economies, high and middle income developing countries, and ALADI, respectively, on the other hand, this assumption seems to be justified. All Spearman rank correlation coefficients are significantly positive at the 3 percent level at least.

Table 2.2 - Factor Intensities in Brazilian Manufacturing Industries, 1980 (percent)[a]

ISIC		Value added per employee	Wages per employee	Non-wage value added per employee
311/2	Food products	97.1	71.4	106.5
321	Textiles	84.1	82.1	86.9
322	Wearing apparel	57.2	60.7	57.9
323	Leather, fur products	83.3	85.7	85.0
324	Footwear	49.3	64.3	46.7
331	Wood, cork products	63.8	67.9	64.5
332	Furniture, fixtures	73.2	96.4	69.2
341	Paper	129.0	107.1	138.3
342	Printing, publishing	104.3	146.4	96.3
352	Other chemicals	185.5	164.3	196.3
355	Rubber products	133.3	n.a.	n.a.
356	Plastic products	102.9	82.1	111.2
382	Non-electr. machinery	90.6	135.7	81.3
383	Electrical machinery	131.2	128.6	135.5
384	Transport equipment	118.1	128.6	118.7

[a]Relative to total manufacturing industries (= 100).

Source: UNIDO, Handbook of Industrial Statistics 1984. - Own calculations.

As regards the product cycle hypothesis, the last mentioned group is of particular interest. Comparing Brazil with average figures for developed market economies, there is indeed some evidence pointing to international competitiveness of Brazil based on standardization. Whereas physical capital intensity for the industries of this group[1] is only marginally lower in Brazil as compared to developed countries (or even higher as in electrical machinery and transport equipment), human capital intensity is 2.9 to 4.4 times higher in developed countries (Tables A11 and A12). However, all Brazilian industries with high overall capital intensity (i.e. ISIC-categories 341, 352, 383, 384) show above average human capital intensity as well, so that the standardization argument does not apply to them.

Ranking all Brazilian industries according to wages and non-wage value added per employee, a strongly positive correlation between human and physical capital intensity emerges. The Spearman coefficient of 0.65 is significant at the 1 percent level, whereas the same correlation remains insignificant in the case of developed market economies (0.30). Thus, the potential for developing countries to achieve international competitiveness via specialization in standardized product-cycle goods may well exist. However, Brazil does not seem to have grasped this opportunity to a significant extent. Only the food industry and the plastics industry, both of an average overall capital intensity, should be competitive in world markets due to relatively low human capital intensity. In the paper industry, relative human capital intensity is considerably below relative overall capital intensity, though still above the average for total manufacturing. The relative position of machinery and transport equipment in human skill requirements is even more unfavourable than with respect to overall capital intensity. Probably, the success of these industries in exporting to developed economies has to be attributed to policy induced distortions rather than to standardization.

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[1] For rubber products, the differentiation of value added into wage and non-wage components is not possible due to missing data.

This conclusion is supported by correlation analysis, relating factor absorption in Brazilian industries to export performance in different markets[1]. Table 2.3 presents Spearman and Pearson coefficients for correlations between overall, human and physical capital intensity in Brazilian industries on the one hand and the share of the respective industries in total manufactured exports of Brazil to its major markets in various years (and the change in export shares) on the other[2]. First of all, the results confirm the strict difference in export patterns of Brazil to different markets[3]. In exporting to developing countries and, particularly, to ALADI, a positive relationship between capital intensity and export shares is evident. Over the whole period under consideration, industries with the most favourable export performance in the ALADI region absorbed relatively large amounts of capital, both human and physical capital. The stability of this relationship is confirmed by the rather small and insignificant coefficients for correlations between the change in export shares in 1967-73 and 1973-81 and factor intensities.

On the other hand, a clearly negative relationship between capital intensity and export shares is shown for Brazilian exports to

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[1] The following analysis is based on a sample of 13 industries which accounted for 81 percent of total manufactured exports of Brazil in 1981. Food products (ISIC 311/2) are neglected because they are not considered as manufactured exports in Table A6; for "other chemicals" (ISIC 352), the SITC-classification does not provide a corresponding category.

[2] Data on factor intensities is for industries defined according to ISIC, whereas trade data is based on SITC-classification of industries. The relationship between industrial and trade classification has been established in a rather crude manner. For example, the calculation of export shares is based on manufactured exports exclusively, though some ISIC-categories include products belonging to SITC-groups 2 and 4 as well. Moreover, 2-digit SITC-categories are not further disaggregated so that the definition of industries is not completely consistent. Consequently, the results must be interpreted with some caution.

[3] Both Spearman rank correlations and Pearson correlations largely reveal the same results. Thus, Pearson coefficients are reported only if rank correlations show statistically significant coefficients whereas Pearson coefficients remain insignificant, and vice versa. Generally, rank correlation analysis shows better results in terms of significance.

Table 2.3 - Spearman and Pearson Coefficients for Correlations between Factor Intensities in Brazilian Industries and Brazil's Export Pattern[a]

Export pattern in different markets and periods	Value added per employee		Wages per employee		Non-wage value added per employee	
	Spearman	Pearson	Spearman	Pearson	Spearman	Pearson
World						
1967	0.07	-	0.23	-	-0.01	-
1973	-0.38*	-0.27	-0.15	-	-0.34	-
1981	0.16	-	0.36	0.49*	0.33	-
Δ1967-73[b]	-0.15	-	-0.37	-0.50**	-0.04	-
	(-0.28)	(-0.52)**	(-0.49)*	(-)	(-0.17)	(-0.46)*
Δ1973-81[b]	0.59**	-	0.62**	-	0.50**	0.34
	(0.68)***	(-)	(0.52)**	(0.26)	(0.61)**	(-)
Developed market economies						
1967	-0.27	-	0.25	-	-0.20	-
1973	-0.58**	-	-0.44*	-0.38	-0.50**	-0.38
1981	-0.10	-	0.07	-	-0.15	-
Δ1967-73	-0.23	-	-0.46*	-	-0.13	-
Δ1973-81	0.36	-	0.42*	-	0.22	-
Developing countries						
1967	0.49**	0.10	0.47*	-	0.37	-
1973	0.37	-	0.41*	-	0.33	-
1981	0.62**	0.31	0.53**	-	0.62**	0.33
Δ1967-73	-0.10	-	-0.13	-	0.14	-
Δ1973-81	0.18	-	0.24	0.42*	0.20	-
ALADI						
1967	0.53**	0.07	0.55**	-	0.40	-
1973	0.45*	0.20	0.49*	-	0.40*	0.20
1981	0.57**	0.30	0.52**	-	0.55**	0.30
Δ1967-73	-0.04	-	-0.04	-	0.20	-
Δ1973-81	0.12	-	-0.02	-	0.18	-

[a]Correlations are run between factor intensities as reported in Table 2.2 and export shares of the respective industries in total Brazilian manufactured exports to various markets as reported in Table A6. "Δ" denotes the change in export shares in percentage points. Pearson coefficients are given only if correlation results differ between both procedures, i.e. Spearman rank correlations being statistically significant and Pearson correlations remaining insignificant, and vice versa. - *** significant at the 1 percent level; ** 5 percent level; * 10 percent level. - [b]In parentheses: in percent.

Source: Tables 2.2 and A6. - Own calculations.

developed countries, which is in line with standard Heckscher-Ohlin theory of international trade. A closer look at the results for this export market reveals further interesting insights:

- Contrary to the product cycle hypothesis, correlation coefficients do not differ very much when export shares in 1967, 1973 and 1981 are related to human capital intensity on the one hand and physical capital intensity on the other. According to the standardization argument, the negative relationship between capital intensity and export shares should be stronger (rather than weaker as indicated in Table 2.3) for wages per employee than for non-wage value added per employee.

- It may still be argued that the standardization argument is relevant, considering the strongly negative correlation between human capital intensity and the change in export shares in 1967-73, when the coefficient remains insignificant for physical capital intensity. However, this interpretation conflicts with the significantly positive coefficient calculated for human capital intensity in the period 1973-81.

- Trade related economic policies of the Brazilian government seem to have influenced Brazil's export performance in world markets. Relating capital intensity to the change in export shares, coefficients are negative (though not significant at the 10 percent level in many cases) for 1967-73, i.e. when the government shifted to a more outward-oriented development approach and reduced the conflict between Brazil's comparative advantages and policy distortions arising from import substitution policies. Coefficients are positive for 1973-81, when the country returned to an active import substitution policy after the first oil price shock of 1973. Consequently, the negative relationship between capital intensity and export shares is most evident in 1973, but considerably weaker in 1967 and 1981.

- The hypothesis that the favourable export performance of Brazilian machinery and transport equipment industries in devel-

oped countries must be partly attributed to policy induced distortions is supported by correlation analysis as well. When electrical and non-electrical machinery as well as transport equipment are excluded from the analysis (Table A13), the negative relationship between capital intensity and export shares becomes considerably stronger, compared to correlation results for all industries.

2.3. Economic Policies towards Exports and Brazil's Export Performance

2.3.1. Relevance of Economic Policies: Introductory Remarks

According to the evidence presented in the preceding sections, there is enough reason to consider trade related economic policies as an important reason in explaining the favourable export performance of Brazil in the past[1]:

- The analysis of revealed comparative advantage has shown that the share of Brazilian exports from industries with positive RCA-values in total manufactured exports improved from 80 and 68 percent in 1962 for exports destined to developing countries and ALADI-members, respectively, to 97 percent for both regions in 1981 (Table A14). However, a different picture emerged with respect to exports to developed countries. In this case, the trend of rising export shares of industries with positive RCA-values (1962: 17 percent; 1973: 61 percent) was reversed after 1973 (1981: 34 percent), which may be attributed to the shift in economic policies after the first oil price shock.

- The correlation analysis between factor intensities and export performance pointed to the relevance of economic policies as

[1] For former studies that have dealt with the effect of export incentives and other trade policies on Brazilian export expansion, see Bergsman (1970), Tyler (1976, 1980, 1983), Savasini (1978), Carvalho, Haadad (1978), Musalem (1984), and Teitel, Thoumi (1986); for a review, see Braga, Markwald (1983).

well. For exports to developed countries, the (negative) relationship between capital intensity and export shares was most evident in 1973, but weakened considerably later on.

The analysis of Brazilian economic policies towards exports may have implications for the future export prospects of this country as well. It may be argued that export expansion cannot be sustained in the long run if mainly based on policy induced distortions that are in conflict with Brazil's comparative advantages. It is in two ways that economic policies affect the export performance of a country. Firstly, overall financial and monetary policies of developing countries frequently result in domestic inflation rates in excess of world market price increases. Thus, the global international competitiveness of these countries' manufacturing sectors depends on whether the exchange rate is flexible enough to correct for divergencies between the national and the international price trend. Changes in the exchange rate affect at the same rate the different branches of the manufacturing sector. In case of domestic inflation exceeding inflation abroad, a nominal depreciation of the domestic currency to the amount of the inflation differential is required to keep the real exchange rate and thus international price competitiveness constant.

Secondly, in addition to determining the global competitiveness of manufacturing by the exchange rate policy, economic policies are likely to affect the relative competitiveness of different industries. Typically, economic incentives like fiscal and financial bonuses and protectionist measures are not evenly distributed, but rather discriminate between industries. Thus, the inter-industry allocation of production factors is affected and domestic producers would concentrate on activities where the officially granted incentives are particularly high. The resulting pattern of industrial specialization may well be in conflict with the country's comparative advantages, i.e. international competitiveness of industries may be artificially created by policy induced distortions rather than based on an efficient use of factors of production according to the country's relative factor

endowments. At the prevailing exchange rate, high-cost producing firms may successfully compete in international markets because of firm- or industry-specific export subsidies, in particular.

In the following sections, the impact of major economic policy instruments on Brazilian export performance is empirically analysed. Section 2.3.2. focuses on the determinants of global competitiveness of the Brazilian manufacturing sector. Subsequently, it is discussed as to how industry-specific incentives affected the pattern of industrial specialization in Brazil.

2.3.2. Possible Determinants of Manufactured Export Growth

Previous findings based on time-series analysis suggest that the real exchange rate has been an important determinant of Brazil's export performance in the manufacturing sector. Surprisingly, however, the real effective exchange rate (i.e. accounting for export subsidies) proved to be insignificant (Dippl, 1986, pp. 16 ff.). A possible explanation of the latter result may be that Dippl's analysis failed to consider different export conditions in Brazil's major export markets[1]. Thus, separate time-series regressions are run for Brazilian manufactured exports to various destinations in the following. The underlying data base covers the period 1968-81[2].

The equation estimated for different export markets can be written as follows[3]:

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[1] Another explanation may be that the measure for export subsidies generally applied does not reflect the net effect of Brazilian trade policies on exports (see Section 2.3.3).

[2] For the calculation of real and real effective exchange rates, see Annex II.

[3] As in many other studies, the small country assumption is used, i.e. the exporting country faces a perfectly elastic demand curve. This seems adequate, as it has been shown that Brazil faces a highly though not perfectly elastic demand for its exports. In an empirical study, it was found that price elasticities ranged between -2.2 and -7.6 in the long run (Braga, Markwald, 1983). In addition, the correlation coefficient between the price indices for manufactured exports of Brazil on the one hand and industrialized countries on the other turned out to be 0.93.

$$LX = a_0 + a_1(LPXB + LEP) + a_2\, L(1+s) + a_3\, LU + a_4\, LQM$$

where:

L = logarithm;

LX = Brazilian manufactured exports in constant US$ amount (nominal value of exports in US$ to each market deflated by the index of Brazilian manufactured export prices also in US$, as published by Getúlio Vargas Foundation, Conjuntura Econômica, 1975=100); the suffix W, A, U, E and R in Table 2.4 stands for exports to the world, ALADI, US, Western Europe and rest of the world, respectively;

LPXB = index of Brazilian manufactured export prices in US$;

LEP = log (E/WP^B), where E is the index of the average nominal exchange rate between the Cruzeiro and the US$ (item rf in IMF, International Financial Statistics) and WP^B is the wholesale price index for Brazil (item 63 in IFS; 1975=100);

1+s = export subsidies (see Table A.II.2);

LU = recession-boom variable, proxied by the use of installed capacity in the Brazilian industrial sectors (Getúlio Vargas Foundation, Conjuntura Econômica; IBGE);

LQM = index of total manufactured output in real terms (1975= 100).

This equation presents the supply of exports as a function of the profitability of exports vis-à-vis the domestic market, also known as the real exchange rate for exporters. This variable is split between the real price of exports (LPXB + LEP) and export subsidies to determine the separate influence of both economic policies (i.e. exchange rate policies and export subsidies) on export performance. It is expected that the coefficients of both variables have a positive sign. The recession-boom variable captures the fact that in periods of slackening domestic demand local producers may try to sell more abroad to reduce idle capa-

Table 2.4 - Regression Results on Major Determinants of Brazilian Exports to Various Markets, 1968-81[a]

I. World

LXW = 25.0547 - 0.2923 (LPXB+LEP) + 2.9392 L(1+s) - 5.9109 LU + 2.2766 LQM
(3.3967) (-0.4839) (1.7443) (-3.9368) (5.0994)

$\bar{R}^2$ = 0.87 F(4,9) = 20.318 DW = 1.037 SER = 0.1789 ρ = 0.6872 (2)

II. ALADI

LXA = 32.1036 - 0.2116 (LPXB+LEP) + 0.7930 L(1+s) - 7.7074 LU + 2.2496 LQM
(4.4710) (-0.3397) (0.4662) (-5.2676) (5.2105)

$\bar{R}^2$ = 0.85 F(4,9) = 17.3138 DW = 1.208 SER = 0.1833 ρ = 0.6113 (2)

III. USA

LXU = 18.9330 - 0.1453 (LPXB+LEP) + 4.9319 L(1+s) - 4.9362 LU + 1.7914 LQM
(2.4669) (-0.2119) (2.6593) (-3.0810) (3.8867)

$\bar{R}^2$ = 0.70 F(4,9) = 7.5329 DW = 1.450 SER = 0.2014 ρ = 0.5684 (2)

IV. Western Europe (EEC+EFTA)

LXE = 18.8446 - 0.5802 (LPXB+LEP) + 3.8904 L(1+s) - 4.1519 LU + 2.0862 LQM
(2.2018) (-0.6979) (1.7629) (-2.3108) (4.0530)

$\bar{R}^2$ = 0.58 F(4,9) = 4.1728 DW = 1.687 SER = 0.2455 ρ = 0.4126 (2)

V. Rest of the world

LXR = 19.4691 - 0.0631 (LPXB+LEP) + 4.5133 L(1+s) - 6.2334 LU + 2.8905 LQM
(1.9009) (-0.0708) (1.8567) (-2.9859) (4.6943)

$\bar{R}^2$ = 0.51 F(4,9) = 3.9380 DW = 1.272 SER = 0.2621 ρ = 0.6074 (3)

[a]For definition of variables, see the text; t-values in parentheses beneath regression coefficients. The model was estimated through first order serial correlation of the error maximum likelihood iterative technique. Number of iterations in parentheses next to the final value of RHO.

Source: Own calculations.

city. Manufactured output is included to show that the higher overall output the higher are exports.

This approach certainly has some limitations considering the major objective of the analysis, i.e. to identify differences in export determinants between Brazil's principal export markets. This would have required a region-wise definition of explaining variables LPXB (export prices) and E (exchange rate). Moreover, it would have been more appropriate to calculate separate indices of s (export subsidies), LU (recession-boom variable) and LQM (total output) for major export markets as well, as weighted averages of sector-specific indices. However, data restrictions rendered this impossible so that a uniform definition of explaining variables had to be applied.

Probably, it is largely due to the aforementioned limitations that the regression results presented in Table 2.4 only partly confirm our expectations. This refers to coefficients of (LPXB + LEP), in particular, which turned out to be statistically insignificant for all export markets. There is additional reason why this result cannot be interpreted as if the real exchange rate is not a relevant variable to foster export expansion. Brazilian authorities have carried out an exchange rate policy during much of the period considered in our estimations that has managed to reduce real exchange rate instability and thus uncertainty for exporters[1]. This can be viewed as a necessary condition to expand exports after decades of inward-oriented development. Technically, however, the exchange rate variable did not experience enough variability to be statistically significant.

Both total output and the recession-boom variable proved to be significant for all export markets of Brazil. In all cases, coefficients have the expected sign, i.e. positive for LQM and negative for LU. The coefficient of the recession-boom variable

[1] In the mid-1960s, Brazilian authorities implemented a passive crawling peg that closely followed a purchasing power parity rule. This system was largely maintained, sometimes interrupted by maxi-devaluations, as in 1979 and 1983 for example.

is shown to be extremely high for exports to the ALADI region. Moreover, the level of significance is by far the highest in this case. This supports the hypothesis that Brazilian exporters considered ALADI as their first export outlet at times of sluggish demand in the domestic market. Special trading arrangements among Latin-American countries rendered it relatively easy to switch from domestic markets to ALADI markets. Probably, subsidiaries of multinational companies located in Brazil but producing for the whole region made use of such preferences in particular.

Export subsidies are found to be important in explaining exports of Brazilian manufactured goods as well. However, again interesting differences exist, especially between Brazil's two most important export markets, ALADI and the US. Subsidies were most relevant for exports to the US, in terms of both size and significance of the regression coefficient. On the contrary, exports to ALADI were not significantly affected by subsidies. This may be surprising since Brazilian exports to ALADI largely consisted of machinery and transport equipment, i.e. relatively capital-intensive goods. Such exports could be expected to require heavy subsidies in order to be competitive internationally. However, whereas this reasoning may hold as regards relatively capital-intensive exports to developed countries, it is hardly relevant in the case of ALADI. Within the protected ALADI market, Brazil can be assumed to be competitive in relatively capital-intensive productions since it is well advanced in terms of both physical and human capital endowment, compared to most other ALADI-members.

2.3.3. Government Incentives to Exports and Import Protection: The Net Effects

Notwithstanding that the hypothesis of policy induced exports was substantiated by regression analysis in the preceding paragraphs, some questions still remain to be settled. Brazil's recent success in exporting rather capital-intensive products even to developed countries, for example, requires a closer look at econo-

mic policies affecting exports. Most importantly, export incentives must be considered at the sectoral level (in order to account for differences between various industries and thus allocation effects) and assessed on a net basis, i.e. adjusted for export-retarding effects of import protection. This could not be done in time-series analysis due to the lack of adequate data.

Both import and export policies have an impact on the export prospects of a country. Import substitution policies are likely to negatively affect the international competitiveness of potential exporters. Government protection of import substituting activities by import tariffs and non-tariff trade barriers provides domestic suppliers with the opportunity to raise product prices beyond world market levels. In other words, national suppliers can successfully compete in domestic markets, notwithstanding that their production costs exceed the production costs of foreign producers. Import substitution policies discriminate against potential exporters of the country because, in case of import tariffs, the price of imported inputs is artificially raised (as compared to unrestricted trade conditions), and imports are not available in sufficient amount in case of quantitative restrictions. If exporters have to replace imports by domestically produced inputs, their international competitiveness is eroded because of relatively poor quality and/or higher prices of domestic supplies as compared to world market standards.

In order to compensate for direct cost disadvantages arising from import substitution policies, exporting firms may be granted privileged access to imported inputs. The government may provide duty-free imports for exporters, establish so-called free activity zones, or refund tariff payments via drawback schemes. Income tax exemptions and other export subsidies may help to reduce the anti-export bias resulting from artificially increased prices of domestic inputs. To the extent that privileges for exporters compensate for the export-retarding effects of import restrictions, they merely establish a balanced structure of economic incentives granted to exporters and producers supplying the do-

mestic market. Only if incentive rates granted to exporting firms exceed the level of import protection, the trade related policies of a country are biased in favour of exports.

In the case of Brazil, the net effect of export promotion measures is difficult to assess, due to the variety and complexity of export incentives (for a detailed presentation of export incentives and methods of quantification, see World Bank, 1983, Chapter VI). The Brazilian system of fiscal and financial incentives to manufactured exports was established during the years of economic liberalization in the mid-1960s and reinforced later on. Export incentives have been used in a rather discretionary way to compensate for exchange rate variations and to support specific industries. Fiscal incentives consisted of:

- the exemption of indirect taxes on exports;

- the drawback scheme which provided for the restitution of duties and taxes paid by exporters on imported production inputs;

- the reduction of corporate profit taxes for exporters;

- the BEFIEX-scheme (Benefícios Fiscais a Programas Especiais de Exportacão) which was established in 1972 as a system of enterprise-specific export incentive packages based on long-term export commitments;

- the export tax credit scheme (crédito prêmio) which was the most important subsidy to exports in the 1970s. Until 1979, the scheme was related to payments of sales taxes and its rates were generally identical to the sales tax rates for different products. The crédito prêmio was abolished as a general incentive in December 1979. When it was re-introduced in early 1981, the system was altered insofar as a uniform rate was set for all products, and the crédito prêmio could be used immediately for payments of all tax obligations.

In addition to fiscal incentives, two programs for the financing of manufactured exports were in operation. Under the FINEX-program (Fund for Export Financing), the foreign trade department of the Central Bank (CACEX, i.e. Carteira de Comércio Exterior) financed manufactured exports at subsidized terms in the preshipment and postshipment stages. The other main credit program directed to manufactured export financing was the so-called Resolution 674. This program "aimed at supplying working capital to the firms producing manufactured exports, but the operating procedures of this scheme, as well as the terms and conditions of the loans granted under the program, place it closer to a cash subsidy financed through the monetary budget than to an export credit" (World Bank, 1983, p. 65).

Table 2.5 indicates considerable differences in fiscal and financial export incentives granted to various Brazilian manufacturing industries in 1980. Expressed as a percentage of export sales, export incentives were concentrated on textiles, clothing and footwear (30 percent), i.e. traditional and labour-intensive export items on the one hand, and machinery and transport equipment (29-36 percent) on the other. They were considerably lower for industries like printing, tobacco, beverages, processed food, perfumery and chemicals (10-14 percent).

In order to fully capture economic policy effects on the export performance of Brazil, a simultaneous look at import protection is required. Column (4) of Table 2.5 presents an estimate of implicit nominal protection in various industries based on direct price comparisons between domestic and world market prices as of late 1980 and early 1981[1]. When domestic prices are higher (lower) than foreign prices of the same product, domestic (overseas) sales by Brazilian producers are stimulated. The dispersion

[1] Average implicit tariffs obtained from price comparisons between domestic and world market prices were adjusted for production subsidies to obtain the level of implicit nominal protection (for details, see World Bank, 1983, pp. 73 ff.). The calculation of implicit tariffs (11.9 percent for total manufacturing, on an average) revealed a remarkable degree of redundancy prevailing in the legal tariff structure.

Table 2.5 - Incentives to Exports and Domestic Sales in Brazil, 1980 (percent)

Industry[a]	Fiscal export incentives (1)	Financial export incentives (2)	Total export incentives (3)=(1)+(2)	Implicit nominal protection (4)	Anti-export bias (5)=(4)-(3)	Adjusted export incentives[b] (6)	Adjusted nominal protection[b] (7)	Adjusted anti-export bias[b] (8)=(7)-(6)	Adjusted effective incentives to domestic sales[b] (9)
Non-metallic minerals	4.0	10.1	14.1	-17.7	-31.8	-2.2	-29.5	-27.3	-31.1
Metallurgy	6.8	10.1	16.9	10.8	-6.1	0.2	-5.1	-5.3	15.0
Machinery	11.2	18.0	29.2	48.3	19.1	10.7	27.1	16.4	51.7
Electrical equipment	17.5	18.0	35.5	71.4	35.9	16.1	46.9	30.8	81.6
Transport equipment	22.7	11.4	34.1	-5.8	-39.9	14.9	-19.3	-34.2	-22.5
Wood products	7.8	11.4	19.2	-4.3	-23.5	2.1	-18.0	-20.1	0.9
Furniture	3.2	11.4	14.6	26.1	11.5	-1.8	8.1	9.9	30.8
Paper	7.5	7.8	15.3	-16.1	-31.4	-1.2	-28.1	-26.9	-30.2
Rubber	7.7	9.8	17.5	-15.4	-32.9	0.7	-27.5	-28.2	-32.6
Leather products	5.9	17.4	23.3	15.6	-7.7	5.6	-0.9	-6.5	-2.4
Chemicals	3.5	10.1	13.6	55.1	41.5	-2.6	32.9	35.5	59.7
Pharmaceuticals	8.5	10.1	18.6	97.4	78.8	1.6	63.2	67.6	85.3
Perfumes, soap	3.5	10.1	13.6	35.1	21.5	-2.6	15.8	18.4	64.2
Plastics	10.5	10.1	20.6	28.9	8.3	3.3	10.4	7.1	9.9
Textiles	8.1	21.5	29.6	25.2	-4.4	11.1	7.3	-3.8	17.1
Clothing, footwear	8.2	22.1	30.3	30.6	0.3	11.6	11.9	0.3	25.7
Processed food	3.7	10.1	13.8	-8.2	-22.0	-2.4	-21.3	-18.9	8.1
Beverages	3.3	10.1	13.4	-5.3	-18.7	-2.8	-18.9	-16.1	-15.3
Tobacco	0.2	10.1	10.3	1.3	-9.0	-5.5	-13.2	-7.7	-9.4
Printing	0.1	10.1	10.2	24.1	13.9	-5.6	6.3	11.9	13.0
Miscellaneous	4.0	10.1	14.1	91.8	77.7	-2.2	64.4	66.6	132.8
Total manufacturing	9.3	11.5	20.8	22.8	2.0	3.5	5.2	1.7	23.1

[a]Classification according to Instituto Brasileiro de Geografia e Estatística (IBGE); the definition of manufacturing is broader according to IBGE than in international statistics. - [b]In contrast to columns (1) - (5) where the comparison of incentives to exports and domestic sales is done at the prevailing exchange rate, adjusted measures take account of policy induced distortions in the exchange rate; in this latter case, the relevant world market prices are converted to Cruzeiros at the exchange rate that would have prevailed if policy distortions did not exist.

Source: World Bank (1983, Tables 36-38).

of import protection among industries was even wider than in the case of export incentives[1]. The spectrum ranged from negative nominal protection - i.e. world prices exceeding domestic prices in Brazil - in paper, rubber and non-metallic minerals, especially, to positive values of more than 90 percent of domestic sales in pharmaceuticals and miscellaneous industries. The typical structure of protection in developing countries featuring highest protection for consumer goods and lowest for capital goods, found in previous studies as well as in Brazil's nominal legal tariff rates of end-1980, is completely reversed when calculating implicit nominal protection (capital goods: 37.8 percent; intermediate products: 25.2 percent; consumer goods: 13.1 percent).

In some industries, high export incentives went along with low or even negative import protection. The most striking example in this respect was transport equipment. In many other cases, high export incentives were eroded by even higher incentives to domestic sales, however. For example, electrical equipment was granted export incentives as high as in transport equipment, but domestic prices were considerably above international levels in electrical equipment industries. Thus, the analysis of economic policies to exports should focus on the net effects of export promotion and import protection. The anti-export bias (if negative: pro-export bias) given in column (5) of Table 2.5 provides a measure of the relative incentive to sell in the export or domestic markets. The interpretation of this measure is as follows: Fiscal and financial incentives to exports averaged 20.8 percent of the export value of total manufacturing, whereas implicit nominal protection applying to domestic sales of manufactured goods amounted to 22.8 percent. Consequently, the price in Cruzeiros received by an average Brazilian exporter was 2 percent below the price of a domestic sale of the same good.

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1 This is evident from Table A15 as well, where it is shown that nominal import tariffs experienced a substantial increase from 1973 to 1980. However, differences between industries were considerable: for example, the mark-up amounted to 7 and 18 percentage points for pharmaceuticals and machinery, respectively, but more than 100 percentage points for perfumery and plastics.

Though the anti-export bias was negligible at the global level of total manufacturing, domestic prices considerably exceeded export prices (including fiscal and financial incentives) in several industries in 1980. The anti-export bias was highest in pharmaceuticals (79 percent), miscellaneous industries (78 percent), chemicals (42 percent) and electrical equipment (36 percent). A reverse situation appeared in 11 out of the 21 industries listed, where export incentives exceeded import protection. Transport equipment experienced the highest relative bias in favour of exports (anti-export bias: -40 percent), followed by rubber (-33 percent), non-metallic minerals (-32 percent) and paper (-31 percent). The dispersion of the anti-export bias among industries was as wide as implicit import protection and thus considerable policy induced effects on the allocation of production factors among industries were to be expected. Rank correlation shows that no significant relationship existed between the absolute level of export incentives received by industries (column 3) and the anti-export bias (column 5); the Spearman correlation coefficient amounted to -0.05.

The measure indicating the policy effects on exports may still be improved upon. In the preceding paragraphs, incentives to exports and domestic sales were calculated at the official exchange rate prevailing in 1980. However, policy distortions affect the exchange rate as well. Thus, exchange rate adjusted export incentive rates and protection rates provide a more accurate measure of the amount by which prices for exports and domestic sales received by Brazilian producers exceeded or fell short of world prices. To calculate adjusted incentive rates, a shadow exchange rate has to be applied which would have prevailed in the absence of policy distortions[1]. The shadow exchange rate estimated by the World Bank for 1980 is shown to be 16.7 percent above the actual rate, i.e. policy distortions resulted in an overvaluation of the Cruzeiro.

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[1] The shadow exchange rate is defined as the rate that takes into account the impact of taxes, subsidies and other policy measures on the exchange rate but does not require the balance of payments to be in equilibrium (for alternative definitions of the shadow exchange rate and methods of calculation, see World Bank, 1983, p. 78 and Annex 2).

Columns (6) - (8) in Table 2.5 present estimates of incentive rates by adjusting the figures of columns (3) - (5) for the aforementioned exchange rate effects. When accounting for the overvaluation of the Cruzeiro, both average export incentives and nominal protection granted to total manufacturing are considerably reduced, i.e. the incentives can be largely viewed as compensation for policy induced distortions in the exchange rate. However, the wide dispersion of incentives among industries remains untouched. Moreover, the average anti-export bias does not change significantly. The changes in the anti-export bias at the industry level are also very small and the ranking of industries according to the adjusted anti-export bias is the same as above.

The measurement of policy effects on exports may be further improved if effective rather than nominal incentives to exports and domestic sales are compared. In case of nominal incentives, the focus is on differences between the price for exports (including subsidies) and domestic sales received by Brazilian producers on the one hand and the world price on the other. However, effective incentives received depend not only on the price of the product but also on the prices paid for the inputs used in the production process. Effective incentive rates to domestic sales are presented in column (9) of Table 2.5. Attempts have also been made to estimate effective export promotion in Brazil (see e.g. Tyler, 1981b), but they are subject to considerable limitations[1]. The results obtained are largely consistent with the estimates of nominal export incentives, both in terms of absolute amount and distribution among industries (World Bank, 1983, p. 87). Thus, it seems adequate to refer to anti-export bias calculations based on nominal incentives in the following analysis.

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[1] In Tyler's estimations (presently not available for the public), BEFIEX (special program of fiscal incentives for exporters) and drawback incentives are excluded. Furthermore, the calculation of financial incentives is based on legal rates rather than actual amounts of financing. Export incentives received through reductions in the price of imported inputs under the BEFIEX and drawback schemes are taken into account in the nominal calculation, however. Only the differences in domestic prices of inputs produced in Brazil with respect to their world prices are not considered.

2.3.4. Anti-Export Bias and Export Performance

The calculations presented above have shown an enormous dispersion of protection and export incentive rates among industries which "goes well beyond what would be desirable on the basis of a limited number of well established priorities for industrial and export development" (World Bank, 1983, p. 89). Policy measures were adopted on grounds other than clearly defined industrial priorities and included many discretionary elements. This may have resulted in additional price distortions and inefficiencies due to the misallocation of production factors. Probably, the rather complex system of incentives gave rise to unintended side-effects or even contradictory policies. This may apply to the electrical equipment industry, for example, which received an extremely high level of import protection but was granted top priority in export promotion, simultaneously.

Some of the large differences in net incentives to exports may reflect Brazilian policy priorities, however. The striking reversal of the traditional structure of import protection, i.e. capital goods industries receiving the highest and consumer goods industries the lowest level of protection in 1980, may be attributed to infant industry arguments and the success of more traditional industries in achieving international competitiveness, for example. Notwithstanding the discretionary and contradictory policy elements, there is thus reason to raise the question where the major thrust of export promotion in Brazil was placed. It is most interesting to know whether the recent success in exporting rather capital-intensive products to other than the protected ALADI markets was related to an economic policy bias towards capital-intensive exports.

In previous studies, it has been shown that specific export incentives discriminated against labour-intensive industries. This applied to the export tax credit scheme (crédito prêmio), in particular (Pastore, Savasini, Rosa, 1978). The following analysis explores the relationship between overall incentives to

exports of various industries, relative to domestic sales, and factor intensities[1]. As incentive rate, the adjusted anti-export bias is considered in the first place; factor absorption is for overall, human and physical capital.

Table 2.6 indicates that export promotion policies in Brazil were somewhat biased towards rather capital-intensive productions. An adjusted negative anti-export bias (i.e. pro-export bias) went along with relatively high value added per employee, i.e. overall capital intensity. The policy discrimination against labour-intensive industries seems to be relatively strong when industries with positive net incentive rates to exports are compared

Table 2.6 - The Relationship between Policy Incentives and Factor Intensities in Brazilian Industries, 1980[a]

Incentive rate (percent)		Value added per employee	Wages per employee	Non-wage value added per employee
		(thousands of US$)		
Adjusted anti-export bias				
negative	(-19.9)	15.1 (5)	2.8 (4)	11.5 (4)
positive	(13.8)	12.2 (7)	2.9 (7)	9.3 (7)
Adjusted effective incentives to domestic sales				
negative	(-21.9)	16.0 (4)	3.0 (3)	12.2 (3)
low	(10.2)	12.3 (4)	2.7 (4)	9.6 (4)
high	(47.5)	12.0 (4)	3.0 (4)	9.1 (4)

[a]Unweighted averages; in parentheses: number of industries.

Source: Tables 2.2 and 2.5

[1] Factor intensities are those calculated in Table 2.2, i.e. on the basis of ISIC-classification of industries, whereas information on incentives in Table 2.5 is according to IBGE industrial classification. Moreover, the comparison of factor intensities and incentive rates could be done for only 12 industries out of 21 sectors listed in Table 2.5, due to data limitations as regards factor intensities and reasons of comparison between ISIC- and IBGE-classifications. Thus, the results present rather crude indications and should be interpreted with some caution.

to industries where incentives to domestic sales exceeded export incentives. However, the differences in capital intensity among industries granted different degrees of positive effective incentives to domestic sales are very small. Moreover, the bias of export promotion towards capital-intensive productions applied to physical capital intensity only, whereas human capital intensity was largely the same in industry groups of different protection levels.

Rank correlation analysis indicates as well that policy induced discriminations against labour-intensive goods were not strong enough to be statistically significant, when different industrial sectors are compared (Table A16). Relating overall and physical capital intensity to the adjusted anti-export bias, correlation coefficients are negative, but insignificant at the 10 percent level of confidence. Probably, this is partly due to the aforementioned inconsistencies in economic policies. Moreover, Brazilian export promotion schemes, to a large degree, were enterprise-specific rather than sector-specific. This refers to the BEFIEX-scheme, particularly, which provided a specially tailored system of incentive packages based on long-term export commitments of individual firms. Consequently, policy discriminations may be significant at the firm-level rather than between industries, so that a further disaggregated analysis seems to be required (for a more detailed discussion, see Chapter 3).

At the global level of total manufacturing, it has been argued elsewhere (for a summary of major arguments, see Balassa, 1979), that the policy shift towards stronger world market orientation after 1964 appeared to be an important element in the improved economic performance of Brazil between 1968 and 1973. The reduction in import protection, introduction of export incentive schemes, simplification of administrative procedures and the publicly stated policy of a stable real exchange rate were considered the major determinants of both high output and export growth in this period. After the first oil price shock, trade policy continued focusing on the expansion of manufactured exports, but the major thrust of economic policies returned to

import substitution policies. As has been shown before, net incentives to exports relative to domestic sales varied remarkably between different industries, and probably also between different enterprises or different types of enterprises, so that the policy impact on exports in the 1970s must be explored at a disaggregated level[1].

Even in cross-section analysis, i.e. differentiating between industries, the inconsistencies in incentive policies towards exports and domestic sales as well as the enterprise-specific orientation of export promotion policies in Brazil seem to have weakened, though not completely eroded, the policy impact on export performance. In the late 1970s, all industries with positive anti-export bias were characterized by very low export ratios, with the exception of chemical products[2]. However, the relationship between export incentives and export performance of manufacturing industries of Brazil is shown to be rather weak when applying rank correlation analysis (Table 2.7). Although a positive relationship is revealed between total nominal export incentives on the one hand and export ratios in 1979 and the change in export ratios in 1970-79 on the other, Spearman correlation coefficients are significant at the 10 percent level or better only if a rather narrow definition of manufacturing is applied, i.e. considering 15 industries out of the 21 industries

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[1] The need to assess the net effect of economic policies at a disaggregated level is also stressed by the development of import and export ratios (i.e. imports and exports relative to total domestic production) of various industries (Table A17). Notwithstanding that both import and export ratios increased in most industries from 1963 to 1973, import substitution continued in some important industries, mechanical equipment and transport equipment standing for the most remarkable cases in this respect. After 1973, import ratios declined for most of the industries, whereas export ratios further increased in most cases. But again there were notable exceptions: wood products, leather and pharmaceuticals as regards the former; wood products as well as clothing and footwear, in particular, as regards the latter.

[2] The increase in the export ratio of chemicals (1970: 5.7 percent; 1979: 11.4 percent) was largely due to the very large increase in exports of vegetable oils, most of which are classified under chemicals in the IBGE-classification (World Bank, 1983, p. 84)

Table 2.7 - The Relationship between Policy Incentives and Export Performance of Brazilian Industries: Rank Correlation Results[a]

Export performance indicators	Incentive rates[b]				
	Fiscal export incentives	Financial export incentives	Total export incentives	Adjusted anti-export bias	Adjusted effective incentives to domestic sales
Export ratio[c], 1979					
All manufacturing industries[d]	0.15 (0.26)	0.23 (0.16)	0.19 (0.21)	-0.19 (0.20)	-0.10 (0.33)
15 manufacturing industries[e]	0.28 (0.16)	0.34 (0.11)	0.41 (0.06)	-0.26 (0.17)	-0.20 (0.24)
Change in export ratio, 1970-79					
All manufacturing industries[d]	0.23 (0.15)	0.13 (0.29)	0.20 (0.19)	-0.17 (0.23)	-0.14 (0.27)
15 manufacturing industries[e]	0.39 (0.08)	0.16 (0.28)	0.39 (0.08)	-0.26 (0.17)	-0.23 (0.21)
Nominal export growth, 1974-81[f]	0.62 (0.02)	-0.24 (0.23)	0.21 (0.25)	-0.33 (0.15)	-0.41 (0.10)

[a] In parentheses: level of significance of Spearman correlation coefficients.
[b] For the definition of incentive rates, see Table 2.5.
[c] Share of exports in total output of industries.
[d] All 21 industries listed in Table 2.5.
[e] The following out of the 21 industries were excluded: non-metallic minerals, metallurgy, processed food, beverages, tobacco and miscellaneous industries. The remaining list of industries refers to a narrower definition of manufacturing as compared to the IBGE definition.
[f] On the basis of 12 manufacturing industries for which data on nominal export growth and incentive rates is roughly comparable, notwithstanding different industrial classifications in Table A1 (SITC) and 2.5 (IBGE); non-metallic mineral products excluded.

Source: Tables 2.5 and A1; World Bank (1983). - Own calculations.

of the IBGE-classification. The impact of net incentives to exports relative to domestic sales on the degree of world market orientation of Brazilian industries remains insignificant as well, though all coefficients show the expected negative signs.

Notwithstanding that a significantly positive relationship between export incentives and export performance of Brazilian industries could not be established by cross-section analysis, the relevance of net incentives to exports is underlined when looking at specific industries. This can be exemplified by referring to transport equipment on the one hand and the electrical equipment industry on the other. For the former, characterized by the highest pro-export bias (Table 2.5), the share of exports in total output jumped from 0.7 percent in 1970 to 10 percent in 1979. The increase in export shares was considerably smaller with a strong anti-export bias in the case of electrical equipment (1970: 1.4 percent; 1979: 4.4 percent). In sum, the analysis of this section suggests a second step of disaggregation, i.e. looking at major characteristics of enterprises or different types of enterprises in explaining Brazil's export performance[1].

[1] The need for further disaggregation is also evident from the evidence presented by Tyler (1983). Tyler calculated sectoral export growth rates in constant US$ terms for the periods 1970-74 and 1973-77 on the one hand and the changes in the nominal anti-export bias between 1973 and 1977 on the other, both for 58 Brazilian industries at the 3-digit IBGE sector classification. Regression analysis shows that, at this level of disaggregation, the inter-industry variation in the changes in real export growth rates between the two periods were significantly related to changes in the anti-export bias. Though accounting for only 9 percent of the inter-industry variance in the export growth changes, the regression coefficient is statistically significant at the 1 percent level, indicating that for each percentage point increase in the nominal anti-export bias the real export growth rate fell by 8.5 percent.

CHAPTER 3

EXPORT PERFORMANCE AT THE FIRM LEVEL: MAJOR CHARACTERISTICS OF EXPORTING FIRMS AS POSSIBLE DETERMINANTS

3.1. The Relevance of Firm-Specific Analysis

In the cross-section analysis of the preceding paragraphs, it was implicitly assumed that production patterns are homogeneous within Brazilian industries. However, the discussion of trade related economic policies of the Brazilian government provided some indication of intra-industry differences that are likely to influence the export performance of Brazilian enterprises. If the direction and degree of export incentives varies not only between different industries, but also between different enterprises or different types of enterprise, the allocation of production factors within industries is affected by the government as well. At the enterprise level, policy measures may discriminate against relatively small producers, or favour foreign companies vis-à-vis domestic enterprises in order to attract foreign investors, for example. Such biases in economic policies would artificially improve the international competitiveness of the privileged enterprises, both relative to other domestic firms and to foreign competitors, and create different export conditions for various types of enterprise within industries which are masked in cross-section analysis.

In addition to firm-specific policy distortions, the international competitiveness of enterprises may be determined by other firm characteristics as well. Enterprises within specific industries may differ with respect to ownership, size and factor use, for example. This can be supposed as important in explaining Brazilian export performance, since such differences are likely to be related to the degree of world market orientation of firms:

- As regards ownership, the subsidiaries of multinational companies can be supposed to be the spearheads of export expansion

in Brazil. Multinationals located in Brazil will strive for serving the whole ALADI region and engage in intra-firm trade with their parent companies in developed countries as well. Due to strong technological and financial links to their parent companies, foreign-owned firms in Brazil are likely to have competitive advantages as compared to national Brazilian firms and to successfully compete in world markets.

- With respect to firm size, it can be hypothesized that given considerable fixed costs of entering overseas markets, the larger the firm the greater is the probability of exporting. With increasing size, such fixed costs can be spread over a larger volume of sales. Moreover, to successfully stand the competition of foreign suppliers in world markets, it may be crucially important to make use of economies of scale. Presumably, this is most relevant in the case of standardized product-cycle goods.

- The product cycle hypothesis may be relevant in the context of enterprise-specific export performance and the firms' factor use as well. Whereas traditional Heckscher-Ohlin theory of international trade predicts a negative relationship between capital-intensive production patterns of firms in developing countries and their export performance, the product cycle hypothesis suggests comparative advantages of Third World suppliers operating at relatively high levels of physical capital intensity, if the products manufactured by them are of a standardized nature. Though, in cross-section analysis, this hypothesis could not explain Brazil's export performance at the sectoral level, it may well have some explanatory power at the enterprise level.

To subject these hypotheses to an empirical test, comprehensive firm-specific information on the characteristics of exporting and non-exporting Brazilian firms is required. Moreover, the competitiveness of Brazilian exporters has to be compared to the most important competitors of other countries. Only two major recently

published studies are known to us which follow a firm-specific approach to explain Brazilian export performance. The analysis presented by Silber (1983) is based on a total number of more than 19000 firms, about 1200 of which were exporting firms. The comparison of characteristics between exporting and non-exporting firms is largely restricted to four major industries (metallurgy, textiles, transport equipment, food) and data are for 1974 only. More recent data based on a total number of about 12400 firms (exporters: 3345) are presented in a study prepared by the ECLAC office in Brazil (ECLA, 1985). The information given there for 1978 is much broader, in terms of sectoral coverage, the number of relevant characteristical items analysed and the quality of data. Thus, the presentation in Sections 3.2. and 3.3. primarily relies on the latter source. In Section 3.4., major results on export determinants at the firm level achieved by logit and regression analysis are summarized. Finally, an outline for further research is drafted by referring to major questions left open by previous analyses. It is argued that it is necessary to proceed on a disaggregated level, i.e. to analyse more closely the differences between exporting and non-exporting firms in specific Brazilian industries. Moreover, further research should concentrate on the international competitiveness of Brazilian producers relative to foreign suppliers, in order to reveal the future export prospects of Brazilian industries.

3.2. Policy Discrimination against Small Exporters

Notwithstanding that, due to data limitations, the net incentives granted by the Brazilian government to exports relative to domestic sales (anti-export bias) cannot be calculated for individual enterprises, some indications exist that economic policies favoured relatively large enterprises. Indirectly, the administrative complexity of protection and incentive systems created such a bias, since "smaller firms ... do not have the resources to be fully informed of the complexities of the system, to process the applications for incentives and to find their way through the bureaucratic mechanisms" (World Bank, 1983, p. XII). It is thus

not surprising, that one of the main fiscal incentives to exports, the BEFIEX-scheme, has been used by a small number of large exporters mainly. About 20 percent of industrial exports during 1978-80 were performed within BEFIEX, but only 59 enterprises maintained BEFIEX-agreements until 1979 (World Bank, 1983, p. 58)[1].

The relationship between firm size and (fiscal) export subsidies is further accentuated by available information on 3345 exporting firms (ECLA, 1985, pp. 26-28). A number of 523 exporters received no fiscal incentive at all in 1978, i.e. neither income tax reductions nor exports credits. In all industries but one (chemicals), unsubsidized exporters tended to be much smaller than subsidized exporters (size indicated by average sales). Moreover, rank correlation analysis reveals highly significant and positive Spearman coefficients between export volume (as a measure of average size of exporters) and the rate of export subsidies (relative to export revenues; Table 3.1). For all industries except non-ferrous metals, it is shown that the smaller the exporter, the smaller was the export subsidy rate. Thus, it was mainly the international competitiveness of large enterprises which was artificially raised by export subsidies granted by the Brazilian government.

3.3. A Comparison of Exporting and Non-Exporting Firms in the Manufacturing Industry of Brazil

Biases in export promotion policies can be considered as one major reason why exporting firms show distinctly different characteristics as compared to non-exporting enterprises. Another reason may be that theoretical trade models simplify the rather complex reality, for example by assuming perfect competition, constant returns to scale and identical production functions for

[1] This number rose to 100 during 1980 and 115 by July 1981. BEFIEX sectoral programs were largely concentrated on transport equipment which accounted for nearly half of total export commitments in 1980.

Table 3.1 - Spearman Coefficients for Rank Correlations between Export Volume and Rate of Fiscal Export Subsidy[a], 1978

	Total fiscal export subsidies	Export credit	Income tax exemption
Total	0.202**	0.195**	0.176**
Non-metallic minerals	0.320**	0.249*	0.294**
Basic iron and steel	0.302**	0.229*	0.248**
Basic non-ferrous metals	-0.132	-0.176	0.071
Metal products	0.314**	0.312**	0.214**
Machinery	0.228**	0.239**	0.110*
Electrical equipment	0.232**	0.207**	0.149*
Transport equipment	0.338**	0.323**	0.223**
Wood	0.178*	0.050	0.304**
Furniture	0.125	0.143	0.050
Pulp and paper	0.332**	0.421**	-0.012
Rubber products	0.309*	0.243	0.397**
Leather and leather goods	0.343**	0.361**	0.221**
Chemicals	0.163*	0.149*	0.191**
Pharmaceuticals and cosmetics	0.263*	0.236*	0.302**
Plastics	0.352**	0.301**	0.332**
Textiles	0.186**	0.149**	0.177**
Clothing	0.272**	0.227*	0.419**
Footwear	0.538**	0.377**	0.314**
Food, beverages, tobacco	0.117*	0.085	0.229**
Printing	0.481*	0.573*	0.114
Other manufactures	0.208*	0.162	0.233**

[a]Subsidy rates are defined as the ratio of subsidies to subsidy-inclusive export revenues. Export volume is taken as an indicator of the size of exporting enterprises.
*Statistically significant at the 5 percent level (two-tailed test); **1 percent level.

Source: ECLA (1985, p. 27, Table 7).

all firms within specific industries. Actually, various goods are produced at the sectoral level and most enterprises supply a whole bundle of products as well. It is common use to allocate each firm to the industry which accounts for the largest proportion of its total sales. Generally, it is not known to which extent a firm supplies products outside its main industry and, particularly, to which extent the industrial classification based on total sales truly reflects the distribution of sales in overseas markets. Consequently, homogeneity of firm characteristics within industries is rather unlikely to persist.

Firm characteristics of exporting enterprises may differ in various respects from non-exporting firms. Available firm-specific information for Brazilian enterprises allows comparisons with respect to firm size, ownership and factor absorption (ECLA, 1985; Silber, 1983). As regards firm size, it has been hypothesized that given considerable fixed costs of entering overseas markets, the larger the firm the greater is the probability of exporting, since fixed costs can be spread over a larger volume of total sales (for the case of Brazil, see also Tyler, 1976, pp. 254-260). Actually, the percentage of Brazilian firms which exported in 1978 increased with larger size. Allocating sample firms to different size classes, the percentage of exporters amounted to less than 1 percent in the smallest size class, 4 - 26 percent in the middle range and 62 percent in the top group of enterprises with more than Cruzeiro 100 million in total sales (Table 3.2). The clear tendency of larger size increasing the probability that a firm will export is present in each of the 21 industries.

However, once the decision to export has been taken, large firms tended to export a smaller proportion of their total sales than relatively small firms. In 19 out of 21 industries listed in Table 3.3, Spearman coefficients for correlations between the amount of domestic sales of Brazilian exporting firms and export ratios are negative, 10 of which are significant at the 5 percent level or better. This pattern may be explained as follows: A

Table 3.2 - Percentage of Exporting Firms by Size and Industries[a], 1978

	Size class:							
	I	II	III	IV	V	VI	VII	VIII
Total	0.6	2.1	4.2	7.4	14.9	25.9	39.8	61.9
Non-metallic minerals	0	0	4.0	14.3	19.0	23.2	31.7	48.7
Basic iron and steel	0	0	16.7	0	15.0	32.0	32.7	67.3
Basic non-ferrous	0	0	0	0	6.9	6.7	36.7	54.5
Metal products	0.9	3.4	7.7	4.0	11.0	17.8	40.7	61.9
Machinery	2.0	4.0	6.2	15.3	28.3	41.5	57.6	84.0
Electrical equipment	0	6.3	5.9	5.0	21.0	28.9	55.6	74.2
Transport equipment	0	20.0	7.7	8.3	38.2	38.0	42.9	76.6
Wood	0	4.8	4.0	3.9	14.0	28.6	52.3	71.2
Furniture	2.7	0	5.9	2.8	2.5	21.0	35.2	61.0
Pulp and paper	0.7	0	0	1.4	6.9	12.0	25.8	49.5
Rubber products	0	0	2.9	6.8	13.0	30.6	29.4	74.2
Leather, leather goods	0.5	1.3	6.9	21.4	20.6	56.4	92.1	94.1
Chemicals	12.5	23.1	10.5	8.3	15.4	16.9	40.0	52.6
Pharm., cosmetics	0	1.0	2.7	5.3	6.5	17.2	27.1	53.3
Plastics	0	0	11.1	9.7	10.5	11.6	23.5	54.8
Textiles	0	0	5.0	13.3	12.4	26.8	48.4	74.9
Clothing	0	8.0	2.0	6.2	10.6	20.9	27.8	47.7
Footwear	0	0	8.3	25.0	36.2	64.5	69.4	81.1
Food, tobacco	0.8	0	2.2	4.3	12.9	12.5	20.5	44.3
Printing	0	0	0	0	4.7	0	4.3	35.1
Other manufactures	0	0	10.0	12.5	31.1	39.5	48.5	75.0

[a]Size classes are defined as follows:
I Less than 2 million Cruzeiros in sales;
II 2-4 million Cruzeiros;
III 4-8 million Cruzeiros;
IV 8-12 million Cruzeiros;
V 12-25 million Cruzeiros;
VI 25-50 million Cruzeiros;
VII 50-100 million Cruzeiros;
VIII More than 100 million Cruzeiros.

Source: ECLA (1985, p. 23, Table 4).

Table 3.3 - Spearman Coefficients for Rank Correlations between Firm Size and Export Performance[a], 1978

Total	-0.232**	Rubber products	-0.081
Non-metallic minerals	-0.189	Leather	-0.186*
Basic iron and steel	-0.191*	Chemicals	-0.524**
Basic non-ferrous metals	-0.161	Pharmaceuticals, cosmetics	-0.157
Metal products	-0.061	Plastics	-0.131
Machinery	-0.018	Textiles	-0.174**
Electrical equipment	-0.016	Clothing	-0.219*
Transport equipment	0.171*	Footwear	-0.671**
Wood	-0.440**	Food, beverages, tobacco	-0.461**
Furniture	-0.233*	Printing	0.071
Pulp and paper	-0.143	Other manufactures	-0.200*

[a]Rank correlation is based on a total number of 3345 Brazilian exporters. Firm size measured by domestic sales, export performance by export ratios, i.e. exports relative to total sales. *Statistically significant at the 5 percent level; **1 percent level.

Source: ECLA (1985, p. 25, Table 6)

minimum size may be required to become competitive in international markets at all; but once a firm has decided to export and has incurred the fixed costs of entering overseas markets, exporters operating in relatively narrow domestic markets have the most to gain from exports as regards cost reductions by making use of scale economies (see also Glejser et al., 1980; Teitel, Thoumi, 1986).

Within the group of large enterprises operating in Brazil, the subsidiaries of multinational corporations figured prominently. Multinationals were concentrated in the most modern and dynamic manufacturing industries, like mechanical and electrical equipment, transport equipment, plastics and pharmaceuticals (Table A18). Thus, multinationals can be expected to be the spearheads of Brazilian exports as well.

Actually, the subsidiaries of foreign enterprises accounted for about 40 percent of total Brazilian industrial exports in 1967 and almost total exports of electrical equipment, transport equipment, plastics and pharmaceuticals. In 1978, the share of multinationals in total manufactured exports of Brazil again amounted to almost 40 percent, notwithstanding some changes in various industries (Table A19). The export share of foreign-owned firms exceeded their share in total domestic sales of manufacturing industries (33 percent) by 6 percentage points. In all but seven of the 21 industries, export participation of multinationals was higher than participation in domestic sales.

There is some tendency that multinationals received stronger export incentives than national firms in Brazil. Nearly half of subsidized export credits were granted to foreign-owned firms (as compared to an export share of 39 percent), whereas their share in export subsidies provided by income tax exemption was slightly below their export share. However, the former result may be largely due to the aforementioned bias in export promotion policies towards larger enterprises rather than outright privileges granted to multinationals.

In most Brazilian industries, foreign-owned enterprises accounted for a considerably larger share in value added than in employment (total manufacturing: 36 percent and 26 percent, respectively). The tendency towards relatively capital-intensive production by multinationals in Brazil is probably due to various reasons. The bias in Brazilian export promotion in favour of large enterprises and capital-intensive industries may be of some relevance. However, large enterprises (most of the Brazilian subsidiaries of multinationals belonged to this category) are generally known to use rather capital- and skill-intensive techniques compared to smaller firms. Moreover, multinationals figured most prominently in rather capital-intensive industries, like electrical equipment, transport equipment and rubber products (Tables A18 and 2.2). Due to strong ties to their parent companies in developed economies, the relatively poor endowment of Brazil as regards human skills and, though to a lesser extent, physical capital did

not constrain the multinationals' choice of production techniques as much as it might have done for national producers.

Permanent inflows of technical know-how and physical capital associated with the operations of multinationals in Brazil may have induced more capital-intensive exports. Most interestingly, in 1974 the share of exports to LAFTA (which can be considered as relatively capital-intensive) in total exports was more than twice as high for multinationals than for domestic firms (Silber, 1983, p. 91). But also the capital intensity of exports by national firms was likely to be positively affected by the multinationals' operations in Brazil. Probably, domestic producers made use of the know-how embodied in products supplied by foreign-owned enterprises.

The comparison of factor intensities between exporting and non-exporting Brazilian enterprises in Table 3.4 is based on the Lary-concept (for an explanation, see Section 2.2). Estimates of overall, physical and human capital intensities are presented, measured by value added per employee, non-wage value added per employee and wages per employee, respectively. Exporters clearly applied more capital-intensive techniques than non-exporters. With only one exception (footwear), both physical and human capital intensity were higher for exporting enterprises. However, it cannot be concluded that higher capital intensity necessarily had a positive impact on the probability of exporting: "Firms that export may be relatively capital-intensive not by virtue of the fact that they sell part of their output to foreign markets, but rather because they are large" (ECLA, 1985, pp. 31-32). The correlation coefficient between size and overall capital intensity is significantly positive (0.46).

Differences in capital intensity between exporting and non-exporting firms are in effect considerably narrowed if comparisons are normalized by size. This can be done on the basis of data on electricity consumption and average wages in four Brazilian industries presented by Silber (1983, Tables 14, 16 and the statis-

Table 3.4 - Capital Intensity[a] of Exporting and Non-Exporting Brazilian Firms by Industry, 1978 (thousands of Cruzeiros)

		Value added per employee	Non-wage value added per employee	Wages per employee			Value added per employee	Non-wage value added per employee	Wages per employee
Total	non-exporters	175.8	93.7	52.5	Rubber products	non-exporters	158.1	81.0	45.6
	exporters	234.5	142.1	73.6		exporters	214.3	135.3	73.8
Non-metallic minerals	non-exporters	165.7	87.0	52.8	Leather	non-exporters	108.6	32.9	32.9
	exporters	202.0	126.0	66.9		exporters	162.6	46.8	46.8
Basic iron and steel	non-exporters	195.8	67.0	71.0	Chemicals	non-exporters	403.9	244.3	95.5
	exporters	249.2	145.1	79.4		exporters	457.3	298.6	108.3
Basic non-ferrous	non-exporters	216.9	128.4	63.9	Pharmaceuticals, cosmet.	non-exporters	183.3	100.6	47.0
	exporters	285.5	185.2	90.0		exporters	314.9	203.4	104.0
Metal products	non-exporters	184.4	99.5	59.7	Plastics	non-exporters	176.1	93.4	56.2
	exporters	219.0	131.5	78.2		exporters	243.3	145.9	71.6
Machinery	non-exporters	261.5	122.1	85.6	Textiles	non-exporters	175.8	97.7	51.2
	exporters	286.6	161.5	105.2		exporters	198.0	128.2	57.8
Electr. equipment	non-exporters	232.3	120.5	72.4	Clothing	non-exporters	144.5	80.1	43.7
	exporters	250.4	145.2	86.7		exporters	157.9	91.1	52.1
Transport equipment	non-exporters	196.2	102.2	71.8	Footwear	non-exporters	114.2	60.7	41.2
	exporters	229.3	123.1	84.3		exporters	103.0	58.3	42.2
Wood	non-exporters	133.8	75.5	38.4	Food and tobacco	non-exporters	176.7	90.8	46.7
	exporters	173.7	113.6	44.7		exporters	284.9	185.0	69.2
Furniture	non-exporters	132.5	76.9	44.5	Printing	non-exporters	191.4	107.9	67.5
	exporters	175.3	114.0	55.2		exporters	290.7	174.4	107.2
Pulp and paper	non-exporters	134.2	68.3	43.6	Other manufactures	non-exporters	233.3	143.1	61.9
	exporters	251.7	158.1	81.3		exporters	246.2	150.4	71.3

[a]Value added per employee, non-wage value added per employee and wages per employee indicate overall, physical and human capital intensity, respectively. Calculated as means on the basis of data for a total number of about 12 400 sample firms; transformed from natural logarithms presented in the source. It may be due to both factors that figures for non-wage value added per employee plus wages per employee do not add up to total value added per employee.

Source: ECLA (1985, pp. 77-78, Table C-1).

tical appendix to Chapter 4)[1]. According to Table 3.5, exporting sample firms, on average, consumed about twice as much electricity per employee and paid considerably higher wages than non-exporting firms[2]. However, the picture changes drastically when exporters and non-exporters of similar size are compared. For the four selected manufacturing industries as a whole, the differences in both measures are significantly reduced. Exporters in transport equipment industries consumed less rather than more electricity than non-exporters, when the comparison is normalized by size. Wage differentials in this industry drop from 89 percent to less than 20 percent in the most important size classes. In textiles, the reduction in wage differentials is somewhat smaller; figures on electricity consumption in the three lower size groups (which include more than 75 percent of both textile exporters and non-exporters) indicate that physical capital intensity was only marginally higher or even lower (101-200 employees) for exporters.

3.4. Major Determinants of Export Performance at the Firm Level: A Summary of Previous Research and Open Questions

The results presented above confirm that an isolated comparison of capital intensity in exporting and non-exporting enterprises is misleading. To determine the independent effect of capital intensity and other variables on the probability of exporting and on export performance requires a multivariate approach. As regards the probability of exporting, logit analysis has been applied where Y_i is a dichotomous variable (which takes the value of 1 if firm i exports and 0 if it does not) and P_i stands for the estimated probabilities (0-1 intervall; for a detailed pre-

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[1] In contrast to the Lary-measures presented above, Silber considers consumption of electricity per employee as an indicator of physical capital intensity and average wages paid as an indicator of human capital intensity.

[2] The figures must be interpreted with some caution, however, since the way of calculation remains somewhat dubious in the source; see footnote to Table 3.5 as well.

Table 3.5 - Comparison of Exporting and Non-Exporting Brazilian Firms as regards Electricity Consumption and Wages Paid[a]: Selected Industries by Firm Size, 1974

Industry/ Size class[b]	Consumption of electricity per employee (1000 kilowatt per year)			Average wage (1000 Cruzeiros)		
	Exporters (1)	Non-exporters (2)	Difference (3) $= \frac{(1)-(2)}{(2)} \cdot 100$	Exporters (4)	Non-exporters (5)	Difference (6) $= \frac{(4)-(5)}{(5)} \cdot 100$
Four manufacturing industries[c]						
Total	12.9 (1226)	6.2 (17955)	108.1	18.8	12.1	55.4
0-100	3.8 (546)	2.7 (17098)	40.7	11.9	9.6	24.0
101-200	4.8 (193)	4.0 (456)	20.0	13.2	11.8	11.9
201-500	8.3 (239)	7.9 (294)	5.1	13.0	12.3	5.7
501-1000	12.1 (138)	10.0 (79)	21.0	13.4	13.1	2.3
1001-2000	10.1 (74)	16.4 (19)	-38.4	16.8	15.2	10.5
2001 and more	18.0 (36)	10.8 (9)	66.7	25.4	20.8	22.1
Transport equipment						
Total	8.4 (162)	4.2 (1702)	100.0	26.8	14.2	88.7
0-100	1.9 (64)	2.0 (1586)	-5.0	12.0	10.4	15.4
101-200	2.7 (21)	2.9 (64)	-6.9	14.8	13.7	8.0
201-500	3.0 (36)	3.4 (39)	-11.8	16.2	15.6	3.8
501-1000	4.9 (12)	5.6 (10)	-12.5	19.6	16.9	16.0
1001-2000	4.6 (14)	4.0 (2)	15.0	24.3	20.1	20.9
2001 and more	10.0 (15)	17.4 (1)	-42.5	29.2	21.4	36.4
Textiles						
Total	8.9 (477)	4.7 (3798)	89.4	12.3	8.8	39.8
0-100	3.1 (208)	3.0 (3536)	3.3	10.7	7.8	37.2
101-200	3.5 (77)	4.3 (128)	-18.6	10.8	9.4	14.9
201-500	5.7 (89)	5.4 (105)	5.6	10.1	9.0	12.2
501-1000	8.2 (56)	6.9 (23)	18.8	10.5	9.4	11.7
1001-2000	8.3 (38)	8.4 (6)	-1.2	10.7	10.7	0.0
2001 and more	16.0 (9)	- (0)	-	18.8	-	-

[a]Consumption of electricity per employee as an indicator of physical capital intensity; average wages paid as an indicator of human capital intensity. In parentheses: number of firms in the respective category. The way of calculating the measures for the total number of firms on the one hand and different size classes on the other is not explained in the source. Thus, it is not completely clear why figures for the totals differ considerably from both weighted and unweighted averages for the size classes.

[b]Size classes according to the number of employees.

[c]Metallurgy, textiles, transport equipment and food, with a total number of 19181 firms of which 1226 were exporters.

Source: Silber (1983, Tables 14, 16 and the statistical appendix to Chapter 4).

sentation, see ECLA, 1985, Chapter IV):

$$Y_i = P_i + u_i$$

$$P_i = 1/(1+e^{-Z_i})$$

$$Z_i = b_0 + b_1 \ln S_i + b_2 \ln K_i + b_3 ADV_i + b_4 STATE_i + b_5 LIC_i + b_6 FoR_i$$

where:

ln S: firm size as measured by the natural logarithm of sales;

ln K: capital intensity, defined as the natural logarithm of value added per employee; K is split into HK and PHK, i.e. human and physical capital intensity, measured according to the Lary-concept;

ADV: ratio of advertising expenditures to domestic sales;

STATE[1]: dummy variable, which takes the value of unity if the government holds equity in the firm, and zero otherwise;

LIC[1]: dummy variable, which is equal to one if a national Brazilian firm has a licensing agreement with a foreign firm, and zero otherwise;

FoR[1]: dummy variable, which is equal to one if foreigners hold more than 10 percent of the equity of a firm, and zero otherwise.

Estimation of the logit model for all sample firms reveals the following regression coefficients, all of which except STATE are significant at the 1 percent level of confidence (STATE: 5 percent level; for industry -specific results, see Table A20):

[1] In industry-specific estimates, LIC and FoR are combined to LICFoR, and STATE is deleted due to an insufficient number of public enterprises in the sample (Table A20).

(1) $Z = -12.6 + 0.90 \ln S - 0.35 \ln K + 5.2 ADV - 1.4 STATE + 0.58 LIC + 0.94 FoR$

(2) $Z = -13.5 + 0.88 \ln S - 0.19 \ln HK - 0.09 \ln PHK + 5.0 ADV - 1.4 STATE + 0.58 LIC + 0.93 FoR$

The most interesting findings are the following:

- The coefficient of the size variable (ln S) is positive. A 10 percent increase in firm size was associated with a 9 percent increase in the odds of exporting. In all industry-specific regressions, the size variable is significantly positive as well.

- The coefficient of ln K, i.e. overall capital intensity is negative as suggested by standard theory of international trade. The probability of exporting increased for enterprises applying rather labour-intensive techniques. This result holds for 19 out of 21 industry-specific regressions as well, but only 9 coefficients are significant at the 5 percent level. Both physical and human capital intensity were negatively related to the probability of exporting. However, the considerably larger value of the coefficient of HK indicates that variations in human capital intensity had a much greater impact on the probability of exporting than did variations in physical capital intensity. This provides some support to the product cycle hypothesis.

- Public enterprises were less likely to export than privately owned firms, as indicated by the negative coefficient of STATE. In contrast, foreign participation both in the form of direct investment and licensing increased the probability of exporting. This is in line with expectations that multinationals operating in Brazil were the spearheads of exporting.

In a second step, regression analysis has been applied in order to address the question as to what determined the allocation of output between domestic and overseas sales, once the decision to

export has been taken[1]. Export performance is measured by the ratio of exports to domestic sales. Major results can be summarized as follows:

- In accordance with rank correlations presented in Table 3.3, regression analysis shows that large firms in terms of domestic sales tended to export a relatively small proportion of their output.

- In contrast to results for the probability to export at all, export ratios increased with higher (overall) capital intensity. However, the significance of the coefficient of ln K is solely attributable to variations in physical capital, whereas the human capital variable is not significantly different from zero[2]. The positive impact of physical capital intensity on export ratios may be explained as follows: "A firm with a large investment in plant and equipment requires a larger volume of exports to reduce average costs to a minimum than does a firm with the same volume of domestic sales but less capital-intensive production techniques" (ECLA, 1985, p. 46).

- Economic policy variables generally show the expected signs: Higher implicit tariff protection was associated with lower export ratios. The presence of export subsidies improved export performance, although the results are somewhat ambiguous as regards variations in subsidy rates granted by the export tax credit scheme. The drawback scheme which provided for duty-free imports was most valuable for exporters relying heavily on foreign suppliers of inputs. This may explain why export per-

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[1] Thus, in contrast to logit analysis, the regressions are based on data for exporting firms (3345) exclusively. In addition to the independent variables considered in logit analysis, some additional variables entered regression analysis; for details, see ECLA (1985, Chapter V).

[2] In contrast, Silber (1983, pp. 104-106) found the skill factor to be significantly positive and physical capital intensity positive but insignificant. However, the Lary-measure applied by ECLA is clearly superior to consumption of electricity which was taken by Silber as a measure of physical capital intensity.

formance was found to be relatively poor for more vertically integrated Brazilian firms. The latter result may also indicate an important bottleneck to future export growth of Brazilian enterprises. If Brazilian exporters are required to buy most of their inputs from national sources and if domestic suppliers are less efficient in terms of product prices and product quality as compared to world markets, the international competitiveness of Brazilian exporters is likely to be negatively affected.

- As concerns ownership characteristics, foreign participation in the form of both direct investment and licensing had a positive impact on export performance[1]. The same was true for state ownership; the latter result may be rather arbitrary, however, since only eight sample exporters were public enterprises.

The results presented in the preceding paragraphs underline the relevance of a fairly disaggregated analysis in order to identify the major determinants of Brazilian export performance in the past and to evaluate the future export prospects of this country. The question of relative efficiency of different types of enterprise and the relevance of scale economies in achieving competitiveness in world markets can be accurately dealt with in the context of in-depth studies on specific industries only. It would be most important to obtain cost data for the firms and to compare them internationally in order to carefully assess their future export prospects. This would also help to answer the question about the export strength of industries that are given priority by the Brazilian government, once privileges are phased out.

Until then, one has to rely on indirect evidence. For example, direct price comparisons indicate that the Brazilian automobile industry has become increasingly efficient as it expanded (World

[1] This result conflicts with the finding of Silber (1983, pp. 104-106) who concluded that export ratios were scaled down by the presence of multinationals.

Bank, 1983, pp. 116-125). In the early 1980s, the prices of Brazilian vehicles were considerably below those of similar foreign vehicles. To some extent, this may be traced to lower prices for iron and steel inputs, compared to international standards. Moreover, car prices in Brazil fell relative to the general Brazilian price index, and some evidence suggests that this decline was closely linked with economies of scale. On the other side, however, some material costs have been considerably higher than in the competing countries and automobile prices are controlled by the government. Thus, whether the automobile industry is likely to be found at the forefront of Brazilian manufactured exports in the future as well can only be judged on the background of a more detailed sector study.

The automobile industry stands for an interesting example of technological development based on foreign companies as well. It has been shown that subsidiaries of multinational corporations in Brazil played a major role in exporting manufactured goods. Probably, this cannot be attributed to greater export incentives granted to them and economies of scale due to size alone. International competitiveness might have been improved by greater cost efficiency among the local suppliers of parts and components. Foreign automobile producers successfully developed their local suppliers by providing finance, training and technical assistance. In this way, technological development in backward industries was stimulated by the operations of foreign enterprises. Consequently, favourable export prospects are likely to exist in industries with direct foreign participation and in sectors that indirectly derive benefit from foreign enterprises' operations, provided that the Brazilian government will continue to welcome technology transfers via foreign direct investment in the future.

Because of considerable differences between Brazilian industries, both in terms of export performance and economic incentives, further research should be concentrated on specific industries and their position in the international division of labour. Measures have to be applied which indicate the net policy effects on exports. Net effective incentive rates to exports and domestic

sales would be best suited in this respect, insofar as they embrace the effects of both import protection and export promotion and consider exchange rate effects as well. This would help to clarify the discussion on the effectiveness of economic incentives in Brazil, which is characterized by alternative hypotheses. On the one hand, it is argued that a reduction in the anti-export bias would induce Brazilian industries to operate at efficiency levels closer to international standards (see, for example, Tyler, 1983). On the other hand, the view has been expressed that Brazilian industries have achieved a high degree of competitiveness in spite of anti-export biases in economic policies (see, for example, Teitel, Thoumi, 1986). It is stressed that the performance of manufacturing during the 1970s showed increasing competitiveness and efficiency with respect to international standards as well as high output and export growth, notwithstanding that the average level of protection of domestic sales and incentives to exports were moderate for the manufacturing sector as a whole (World Bank, 1983, p. 87). As regards consumer goods industries, the World Bank concluded (p. 77): "With a very large domestic market, fast growing domestic demand, increasing exports, and generally small minimum efficient size plants, the lack of foreign competition resulting from high tariff and non-tariff barriers was apparently compensated by a considerable degree of domestic competition".

However, the question of improved international competitiveness as a result of larger production runs enabled by fast growing domestic markets and/or policy incentives to exports should be addressed at a more disaggregated level. This is because economic incentive rates varied drastically between industries as well as between different types of enterprise, and future export prospects of Brazilian industries cannot be accurately assessed without comparing the structure of production costs of Brazil relative to its major competitors in the world economy.

SUMMARY AND CONCLUSIONS

Notwithstanding that Brazil's export performance until the mid-1980s was most impressive, both in terms of absolute growth and relative to other world market suppliers, considerable room for further export expansion, in particular with respect to manufactured exports, still exists. First, the potential for further export market diversification does not seem to be exhausted as suggested by the continuous dominance of US and ALADI markets. Second, there is still plenty of room for further product differentiation: Out of the fifteen most important export items in 1981, ten still belonged to the non-manufactures category accounting for nearly half of total Brazilian exports. Third, the export ratio of most manufacturing industries continued to be considerably below 10 percent in the early 1980s. Finally, the absolute volume of Brazilian manufactured exports was not such that further export expansion faces serious external constraints; the Brazilian share in world exports was still rather small.

Brazil can still be supposed to be relatively well equipped with (unskilled) labour, whereas capital stands for the relatively scarce production factor, especially in the form of human capital. Hence, the country's comparative advantages in the international division of labour are concentrated on relatively labour-intensive products in the first place. As actual export performance shows, labour-intensive exports continued to account for a significant share in Brazilian sales to developed country markets. However, more capital-intensive products dominated exports to the ALADI region, particularly, and gained significantly in importance in exports to developed countries in the more recent past.

As regards ALADI, the Brazilian export pattern of the 1970s was influenced by attempts to continue import substitution policies at the regional level. Capital-intensive supplies to the Latin American market by the most advanced ALADI-members like Brazil were favoured by discriminations against imports from outside ALADI. In the meanwhile, the regional approach towards free trade

has been largely abandoned and replaced by a great number of bilateral trading arrangements. Trade conditions within the ALADI region may thus be complicated in the 1980s. Although it is to be expected that Brazil's exports to neighbouring Latin American countries will remain rather capital-intensive, major adjustments may be required at the sectoral level. For example, Brazilian supplies of machinery and transport equipment will be negatively affected if other ALADI-members insist on greater shares in the production of such industries. This issue is most important as concerns Brazil's export prospects; it has to be dealt with in more detail in industry-specific studies.

The rising share of more capital-intensive products in Brazilian exports to developed countries can be attributed to different factors. First of all, the product cycle hypothesis may apply, according to which developing countries have comparative advantages in producing standardized goods, which may be capital-intensive in terms of physical capital but do not require considerable inputs of highly skilled labour (human capital). Especially in the case of Brazil, constraints in the availability of physical capital were not very strong until the early 1980s: the country could easily approach international capital markets and was given priority by multinational corporations as regards foreign direct investment.

Notwithstanding the impressive export performance in sectors like transport equipment, there is some evidence for the 1970s that Brazil has not yet made use of its comparative advantage in supplying standardized product-cycle goods as significantly as might be expected. Generally, Brazilian industries of relatively high physical capital intensity were characterized by relatively high skill intensity as well. The position of machinery and transport equipment in human skill requirements (relative to total manufacturing) was even more unfavourable than with respect to overall capital intensity, for example. Moreover, the negative relationship between capital intensity and export performance of Brazilian industries turned out to be slightly weaker, rather than stronger for human capital as compared to physical capital.

However, when economic policies in Brazil could be supposed to be largely in line with the country's comparative advantage (i.e. in the second half of the 1960s and early 1970s), the improvement in export performance was most striking in industries with rather low skill requirements. This result may be taken as an indication of the future potential of standardized exports of Brazil, provided that economic policies would help this process and persisting problems in servicing foreign debt will not result in serious constraints in attracting further financial inflows from abroad.

Economic policy incentives stand for the second possible reason responsible for the increasing share of capital-intensive Brazilian exports to developed countries. Export subsidies were found to be positively related to Brazil's export performance in the US and other developed economies. Brazilian trade policies seem to be somewhat biased towards rather capital-intensive industries, notwithstanding the inconsistencies in incentive policies towards exports and domestic sales that are likely to have weakened the policy impact on exports. In contrast to the traditionally cascading structure of protection in developing countries, in Brazil the highest levels of protection were granted to capital goods industries and the lowest levels to consumer goods industries in 1980.

The favourable treatment of sectors like transport equipment may be justified on the basis of infant industry arguments. It has clearly helped the priority sectors to expand their overseas sales. However, Brazil's trade policies give rise to several problems as well, especially as concerns the country's future prospects in exporting:

- Economic policies discriminating against traditional export items may negatively affect future export performance in one of Brazil's principal export domains, i.e. relatively labour-intensive products. Probably, the traditional sectors to a great extent have to bear the considerable fiscal costs arising from high levels of nominal incentives granted to priority sectors.

- The wide dispersion of economic incentives between industries and the considerable complexity of the incentive schemes are likely to result in unintended side-effects which may hamper further export expansion in the future. The World Bank (1983, p. 89) concludes that the enormous dispersion of protection and export incentive rates "is bound to generate misallocation of resources, to maintain pockets of inefficiency within the industrial sector and, in the medium and long run, to constrain industrial growth".

- It is open to question whether priority sectors are prepared to compete successfully in world markets, if privileges granted to them are reduced when they can no longer be considered infant industries.

As regards the two first-mentioned issues, it is most noteworthy that firm-specific data pointed to policy discriminations at the firm level as well, especially with respect to firm size. Export subsidy rates granted by the Brazilian government increased with the size of the exporting firms. Probably, this policy bias has further reduced the probability of exporting in the case of relatively small enterprises. However, once the decision to export has been taken, firm size was negatively related to export performance. Alternative explanations may apply, the validity of which must be explored by more detailed analyses at the sectoral level. It may be argued that smaller firms operating in rather narrow domestic markets show better export performance because selling to overseas markets provides the only way to them to make use of scale economies. This would imply that exporting is considered a "second-best solution" to achieve cost reductions by increasing the scale of production. Consequently, future export expansion of Brazil may slow down in industries where promising prospects in the development of domestic demand allow Brazilian suppliers to operate at optimal levels of production. Actually, the volume of Brazilian exports was negatively related to the degree of capacity utilization by domestic sales. Alternatively, the favourable export performance of smaller enterprises may be attributed to higher efficiency and higher flexibility in re-

sponding to changes in world demand. In this case, the policy bias against small firms poses a serious threat to further export expansion of Brazil, since it may deeply erode the export potential based on the relative strengths of small enterprises.

The results presented underline the relevance of a fairly disaggregated analysis in order to identify the major determinants of Brazilian export performance in the past and to evaluate the future export prospects of the country. Especially as regards the Brazilian export prospects, some crucial questions are left open by previous analyses so that further research activities should be devoted to this issue. Most importantly, a closer look at the structure of production costs of Brazilian exporters relative to major competitors in the world economy is urgently needed, in order to be able to assess the international competitiveness of Brazilian enterprises vis-à-vis foreign suppliers. In determining the relative competitive position of Brazilian firms in world markets, it is also necessary to identify possible internal and external bottlenecks to continuous export growth.

- As concerns internal factors that may hamper export growth, the question of an efficient domestic supply of inputs has to be addressed. Furthermore, recent changes in economic policies, as the so-called 'Plan Cruzado' (Fischer, 1986), must be evaluated with respect to the consequences they may have for Brazil's export prospects.

- As concerns possible external bottlenecks, the analysis of supply factors in Brazil has to be supplemented by a tentative assessment of major developments in world markets. The international demand for Brazil's exports critically hinges on changes in the demand conditions in the country's principal overseas markets. It has been shown that it is crucially important to differentiate between Brazil's major export markets, because of completely different export conditions. As regards ALADI markets, for example, it is striking that multinational corporations located in Brazil devoted a considerably larger share of total exports to ALADI-members in the mid-1970s than

did national enterprises. Probably, the export products of multinationals enjoyed relatively high trade preferences in the Latin American market. However, ALADI has become a rather loose association, and bilateral trading arrangements between ALADI-members have replaced the regional approach towards freer trade to a significant extent. This is likely to affect the level of protection vis-à-vis suppliers from outside the ALADI region and, consequently, the destination and commodity structure of Brazilian exports.

Continued high growth in manufactured exports seems to be the prerequisite of sustainable economic development of Brazil in the 1980s. This may be difficult to achieve under the policy framework that prevailed during most of the 1970s (see also World Bank, 1983, pp. 87-93). Most importantly, exchange rate policy must be flexible enough to avoid overvaluation, the dispersion in incentive rates among industries should be reduced, incentive schemes have to be simplified and applied less discriminatory to smaller firms, and the access to imported inputs and technology for export production should be improved in order to reduce considerable anti-export biases in many industries. Provided that economic policies encourage industrial development in line with Brazil's comparative advantages, the expansion of Brazilian manufactured exports is most likely to continue.

ANNEX I

Export Expansion and Economic Growth: The Brazilian Case, 1969-1984

Various studies have been carried out to determine the role of exports for economic growth in developing countries [e.g., see Balassa (1978), Michaely (1977), Krueger (1978), Tyler (1981a), Kavoussi (1984)]. Most of them have used a cross-country sample and confirmed a positive and strong association between export performance and GNP growth. Our purpose here is to examine whether this was also true for Brazil for the period 1969-84.

Our theoretical approach is similar to Ram (1985), i.e. the aggregate production function was defined as follows:

(1) $Y = f(L, K, X)$

where:
Y = aggregate real output
L = labour input
K = capital input
X = exports.

Ram treats exports as an input in the production function. This specification is fairly standard and common in the literature. The equation finally estimated has the following form:

(2) $\dot{Y} = a_0 + a_1 \dot{L} + a_2 \frac{I}{Y} + a_3 \dot{X}$

The variables are expressed in rates of growth. Since the rate of growth of capital input (K) was not known, the investment-income ratio (I/Y), as suggested by Ram, is used as a proxy. Equation (2) is estimated using annual data for the period 1969-84. Until 1981 the data is only taken from World Bank, World Tables and thereafter from IMF, International Financial Statistics. Two dif-

ferent dependent variables are used: total output growth ($\dot{Y}$), and total manufactured output growth ($\dot{MI}$). Therefore, we also use two measures of exports: total and manufactured exports.

Table A.I.1 shows the econometric results of equation (2) for different definitions of the dependent variable:

- In case of $\dot{MI}$, labour force growth proved to be statistically insignificant. In all the equations, the manufactured export growth variable shows large and statistically significant coefficients. The investment variable is statistically significant as well.

- In case of $\dot{Y}$, the results differ from above. While the investment variable is statistically significant in practically all regression equations, the same is not true for the export variable. Only when the latter is defined as manufactured export growth, it becomes important, otherwise it turned out to be insignificant.

In sum, we can conclude that manufactured exports and investment had both a positive and significant impact on industrial output growth. However, the investment variable (I/Y) was more relevant when the dependent variable was total output growth. The fact that manufactured exports were statistically significant for total output emphasizes that export growth may have a dynamic and multiplier effect in the economy as a whole, independently of their origin. Therefore, export expansion has had a positive and significant impact in Brazil, particularly in the industrial sector.

Table A.I.1 - Export Expansion and Economic Growth: Regression Results for Brazil[a]

Period	Dependent variable	Constant	Export growth $\dot{XM}$	Export growth $\dot{XT}$	Investment I/Y	Labour force growth $\dot{L}$	$\bar{R}^2$	SER	F	DW	Rho[b]
1969-1984	$\dot{MI}$	-35.0841 (-4.7538)	0.3630 (5.3252)	-	1.3190 (4.8137)	-	0.7368	4.6215	20.302 (2.13)	2.760	-0.553 [3]
	$\dot{MI}$	-2.6853 (-0.0291)	0.3457 (4.1966)	-	1.3260 (4.6492)	-11.5530 (-0.3516)	0.7164	4.7867	13.632 (3.12)	2.703	-0.549 [3]
1969-1984	$\dot{Y}$	28.4097 (-5.0659)	0.2619 (5.0756)	-	1.1304 (5.4292)	-	0.7507	3.4301	21.769 (2.13)	2.632	-0.5143 [4]
	$\dot{Y}$	-7.8905 (-0.1128)	0.2518 (4.0097)	-	1.1349 (5.2190)	-7.3128 (-0.2940)	0.7296	3.5580	14.493 (3.12)	2.584	-0.5072 [4]
	$\dot{Y}$	-14.7533 (-1.1449)	-	0.0245 (0.3381)	0.8296 (1.6656)	-	0.1017	4.1715	1.707 (2.13)	2.041	0.3752 [3]
	$\dot{Y}$	74.3138 (0.7401)	-	0.0387 (0.5030)	0.9609 (2.1262)	-33.2216 (-0.9162)	0.1434	4.2567	1.837 (3.12)	1.991	0.2277 [4]

$\dot{MI}$ = average annual rate of growth of total manufacturing (as defined by Brazilian statistics: e.g. it also includes food, beverages, and tobacco) in real terms (percent).

$\dot{L}$ = average annual rate of growth of the labour force (percent).

I = total gross domestic investment in nominal terms.

Y = total output (GDP) in nominal terms.

$\dot{XM}$ = average annual rate of growth of manufactured exports in real terms (percent).

$\dot{XT}$ = average annual rate of growth of total exports in real terms (percent).

$\dot{Y}$ = average annual rate of growth of total output in real terms (percent).

[a] First order serial correlation of the error maximum likelihood iterative technique was used to estimate the regressions; t-values in parentheses - [b] Number of iterations needed to achieve convergence of Rho is shown between brackets.

Source: World Bank, World Tables; IMF, International Financial Statistics. - Own calclulations.

ANNEX II

Real Exchange Rates and Export Growth in Brazil

The exchange rate and export subsidies are generally considered to be important policy instruments in determining export performance. A positive relationship is to be expected between export growth on the one hand and a depreciating real exchange rate and rising export subsidies on the other, other things being equal. This is so because changes in the exchange rate and export subsidies bring about changes in domestic relative prices between tradeable and non-tradeable goods.

Different measures of policy induced competitiveness were calculated as follows:

$$E_1 = WP^B/WP_1^*$$

$$E_2 = WP^B/WP_2^*$$

$$E_3 = WP^B/WP^{US}$$

$$PRS = [P_x^{iB} \cdot E_3 \ (1+s)/WP^B]$$

where:

WP^B = Brazilian wholesale price index (item 63 in IMF, International Financial Statistics (IFS);

WP^{US} = US wholesale price index (item 63 IFS);

WP_1^* = moving weighted average of wholesale price indices of nine countries[1];

s = export subsidies;

E_1 = moving weighted average of exchange rate indices between Brazil and nine countries (item rf in IFS)[1];

[1] The weight of the year 1967 was used in the 1962-69 period; 1970 in 1970-74; 1975 in 1975-78; 1979 in 1979-81; and 1982 in 1982-84.

WP_2^* = moving weighted average of wholesale price indices for the main twelve trading partners[1];

E_2 = moving weighted average of exchange rate indices between Brazil and twelve countries[1];

E_3 = exchange rate index between the Cruzeiro and the US$ (item rf in IFS);

P_x^{iB} = Brazilian manufactured export price index in US$ (Getúlio Vargas Foundation, Conjuntura Econômica);

PRS = profitability of exports.

The first three measures represent a real exchange rate concept as approximated by the purchasing power parity. The weights for WP_1^* and E_1 correspond to the share in world manufactured exports of the US, Argentina, Mexico, South Korea, West Germany, the UK, Italy, the Netherlands, and Japan. These countries were considered the main competitors of Brazil. These (partial) multilateral trade weights are usually used to capture export competition in third markets[2]. On the other hand, the weights for WP_2^* and E_2 correspond to the share of the US, Argentina, Colombia, Mexico, Paraguay, Chile, West Germany, the UK, Italy, the Netherlands, Japan, and Venezuela in total Brazilian manufactured exports. The last measure (PRS) determines the profitability of exports vis-à-vis the domestic market and is generally known as the real US$ exchange rate for exporters. An increase in export subsidies, a devaluation or a rise in the foreign price of Brazilian exports encourage local producers to sell abroad rather than in the domestic market, other things being equal.

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[1] The weight of the year 1962 was used in the period 1962-66; 1967 in 1967-69; 1970 in 1970-74; 1975 in 1975-78; 1979 in 1979-81; and 1982 in 1982-84.

[2] See Gutierrez-Camara, Huß (1983).

Tables A.II.1 and A.II.2 present results for E_1, E_2 and E_3 as well as PRS. For reasons of comparison, indices calculated in previous studies are added. All three measures of real exchange rates show a depreciation in the period of rapid export growth (1968-73), which amounted to an annual average of 2.1 percent (E_1), 8.3 percent (E_2) and 0.4 percent (E_3), respectively. The annual average depreciation slowed down considerably in 1974-78. However, sluggish world demand rather than the exchange rate must be considered the main reason of the relatively unfavourable export growth during the period between the two oil price shocks. After the maxi-devaluation of 1979, any of the three real exchange rate measures experienced a decline, i.e. real appreciation: in 1981, they were below the base year. In the last subperiod considered (i.e. 1982-84), all the indices indicate an improvement in Brazil's competitiveness until 1983, when another maxi-devaluation took place. As regards the real US$ exchange rate for exporters or profitability of exports (PRS), Table A.II.2 shows an improvement of 9.3 percent per annum on average in 1963-74. After the first oil price shock and until 1984, profitability experienced an average annual decline of 1.2 percent.

Figure A.II.1 depicts the indices of real exchange rates E_2 and E_3 and profitability of manufactured exports on the one hand and Brazilian manufactured exports to the world, the US, and ALADI on the other. As regards PRS, a positive relationship to export growth is evident at least until 1974. Generally, however, the relationship between real exchange rates and export growth is obscured, probably mainly due to demand factors. Especially after 1973, the fluctuations in world demand increased considerably compared to the relatively stable demand conditions in the 1960s and early 1970s, so that demand factors dominated the impact of real exchange rates and profitability of exports.

Table A.II.1 - Brazil: Different Measures of the Real Exchange Rate[a], 1963-84

Year	E_1 (1975=100)	ΔE_1 (percent)	E_2 (1975=100)	ΔE_2 (percent)	E_3 (1975=100)	ΔE_3 (percent)	Cardoso's indices[b] E_2	Cardoso's indices[b] E_3	Dippl's index[c] E_2
1963	80.00	-	84.38	-	82.81	-	90.5	94.7	-
1964	116.92	46.15	113.11	34.04	109.57	32.31	107.8	109.2	-
1965	111.66	-4.50	100.23	-11.39	112.45	2.63	107.4	109.6	117.4
1966	86.54	-22.50	84.92	-15.27	86.18	-23.36	93.8	97.2	102.4
1967	91.61	5.86	64.14	-24.47	93.12	8.05	87.7	93.3	100.6
1968	98.82	7.87	71.23	11.06	101.95	9.48	90.6	98.2	100.4
1969	102.11	3.33	72.50	1.78	101.31	-0.63	93.5	101.9	105.9
1970	95.65	-6.33	92.80	28.08	92.83	-8.37	90.6	97.3	100.6
1971	98.88	3.37	97.09	4.56	96.48	3.93	92.3	96.5	102.2
1972	100.36	1.50	95.63	-1.51	95.93	-0.57	93.9	95.4	102.8
1973	103.20	2.83	101.10	5.73	97.11	1.23	98.1	95.4	95.8
1974	99.21	-3.87	96.94	-4.11	99.11	2.06	100.6	97.3	96.4
1975	100.00	0.80	100.00	3.16	100.00	0.90	100.0	100.0	100.0
1976	91.44	-8.56	99.95	-0.07	93.09	-6.91	96.6	95.9	93.3
1977	99.66	8.99	98.42	-1.52	96.00	3.13	96.1	94.6	95.7
1978	103.99	4.35	104.94	6.62	97.36	1.42	102.8	94.7	99.5
1979	104.85	0.82	119.24	13.63	101.05	3.79	114.4	101.8	110.7
1980	103.74	-1.05	115.10	-3.47	108.91	7.78	124.4	110.2	122.5
1981	79.22	-23.63	90.74	-21.16	89.94	-17.42	-	-	108.2
1982	93.51	18.03	89.71	-1.15	99.56	10.70	-	-	107.3
1983	113.37	21.25	112.88	25.84	117.97	18.49	-	-	126.5
1984	89.95	-20.66	87.34	-22.62	94.80	-19.64	-	-	-

[a]For the definition of E_1, E_2 and E_3, see the text; above 100 = real depreciation; below 100 = real appreciation.

[b]Cardoso (1982, Table 6.A); 1975 = 100.

[c]Dippl (1986, Table 7, p. 17 (column 5)); index recalculated based on 1975 = 100.

Source: Own calculations based on IMF, International Financial Statistics; Banco Central do Brasil, Boletim; Cardoso (1982); Dippl (1986).

Table A.II.2 - Brazil: Profitability of Exports vis-à-vis the Domestic Market, 1962-84

Year	P_x^{iB}	E	WP^B	$(1+s)^a$	PRS	ΔPRS (percent)	PRS (1975=100)	$(P_x^{iB}.E)/WP^B$	Cardoso PRS^b	Horta PRS^c	Dippl PRS^d
1962	31.6	4.2	2.3	1.000	57.70	-	38.7	57.70	-	-	-
1963	35.6	6.4	4.1	1.000	55.57	-3.69	37.3	55.57	63.5	-	-
1964	39.2	13.7	7.8	1.004	69.13	24.40	46.4	68.50	73.6	-	-
1965	35.2	23.3	11.7	1.050	73.60	6.47	49.4	70.10	77.3	-	75.9
1966	36.7	27.3	16.0	1.050	65.75	-10.67	44.1	62.62	68.5	-	66.2
1967	35.9	32.8	20.1	1.216	71.24	8.35	47.8	58.58	76.3	-	75.3
1968	37.1	41.6	24.9	1.265	78.41	10.06	52.6	61.98	83.4	-	78.1
1969	38.8	50.1	29.9	1.316	85.56	9.12	57.4	65.01	90.0	-	87.4
1970	41.0	56.5	36.6	1.389	87.91	2.75	59.0	63.29	89.4	-	89.2
1971	45.5	65.1	43.9	1.413	95.35	8.46	64.0	67.47	91.6	59.8	92.9
1972	50.8	73.0	52.1	1.421	101.14	6.07	67.8	71.18	91.2	65.0	94.1
1973	71.7	75.4	60.9	1.434	127.30	25.87	85.4	88.77	91.8	83.5	88.8
1974	100.8	83.5	78.6	1.470	157.41	23.65	105.6	107.08	96.0	102.0	90.5
1975	100.0	100.0	100.0	1.491	149.10	-5.28	100.0	100.00	100.0	100.0	100.0
1976	95.5	131.3	143.4	1.506	131.69	-11.68	88.3	87.44	96.1	98.3	100.1
1977	107.0	174.0	204.2	1.500	136.76	3.85	91.7	91.18	95.6	103.4	100.7
1978	107.0	222.3	280.9	1.513	128.12	-6.32	85.9	84.68	95.8	98.3	106.4
1979	119.8	319.8	437.1	1.460	127.97	-0.12	85.8	87.65	102.8	101.4	113.4
1980	130.7	648.4	903.1	1.387	130.15	1.70	87.3	93.84	74.0	101.7	119.7
1981	128.6	1145.5	1880.2	1.459	114.31	-12.17	76.7	78.35	-	88.1	111.2
1982	116.8	2208.3	3610.4	1.535	109.66	-4.07	73.5	71.44	-	-	-
1983	108.5	7098.5	9685.3	1.615	128.43	17.12	86.1	79.52	-	-	-
1984	113.2	22734.0	32557.8	1.699	134.30	4.57	90.1	79.04	-	-	-

For the definition of variables, see the text.

[a] From 1982 until 1984, an annual increase in subsidies of 5.2 percent was assumed, which was equal to the increase from 1980 to 1981. Subsidy rates were taken from Cardoso (1980) and Horta (1983).

[b] Real US$ exchange rate for exporters (DW) was calculated by Cardoso (1982) as follows: $DW = \frac{P_{US} \cdot Ix}{P}$ where Ix is the rate of Cruzeiros received for one US$ of exported goods (including subsidies).

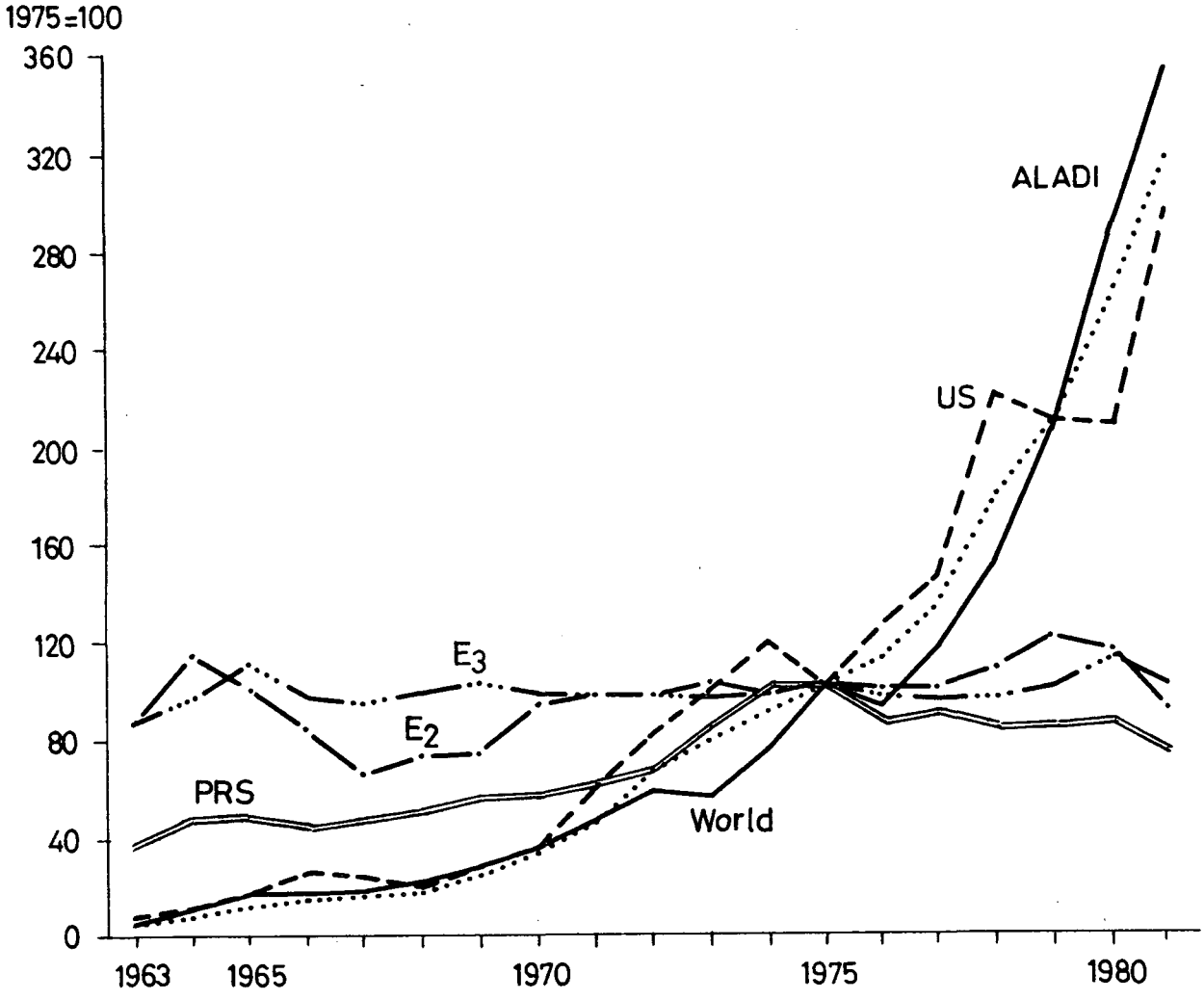
[c] Horta (1983, Table 10, p. 532); index recalculated with base 1975 = 100.

[d] Dippl (1986, Table 7, column 6); index recalculated with base 1975 = 100. Dippl used a trade-weighted real exchange rate.

Source: Own calculations based on IMF, International Financial Statistics; Getúlio Vargas Foundation, Conjuntura Econômica; Cardoso (1980; 1982); Horta (1983); Dippl (1986).

Figure A.II.1

Indices of Real Exchange Rates, Profitability of Exports and Brazilian Manufactured Exports to the World, US and ALADI, 1963-81



Source: Own calculations based on UN, Commodity Trade Statistics; IMF, International Financial Statistics.

Table A1 - Brazil's Nominal Export Growth in Different SITC-Categories[a], 1963-81 (percent)

SITC		1963-73	1974-81	SITC		1963-73	1974-81
Total manufacturing		40	24	66	Non-metal mineral manufactures	50	21
5	Chemicals	8	23	7	Machinery and transport equipment	39	31
541	Medicinal products	25	24	71	Non-electrical machinery	39	30
55	Perfume, soap	21	9	72	Electrical machinery	56	18
581	Plastics	-	44	73	Transport equipment	33	40
6-(67+68)	Basic manufactures	42	19	8	Miscellaneous manufactures	73	18
61	Leather	45	19	84	Clothing	-	1
63	Wood, wood products	5	20	851	Footwear	98	25
64	Paper, paperboard	-	30	892	Printed matter	-	10
65	Textiles	50	12				

[a]Annual averages. Real growth rates for individual SITC-categories could not be calculated since information on adequate price deflators was not available.

Source: UN, Commodity Trade Statistics; own calculations.

Table A2 - Classification of Brazilian Industries According to Capital Investment per Employee[a], 1960-79

SITC	1960	1968	1970	1974	1979
58	Plastics	Chemicals	Chemicals	Chemicals	Chemicals
5	Chemicals	Trans. equip.	Trans. equip.	Trans. equip.	Paper
73	Trans. equip.	Plastics	Paper	Paper	Trans. equip.
64	Paper	Non-metallics	Plastics	Plastics	Plastics
71	Mechanics	Paper	Non-metallics	Mechanics	Pharmaceuticals
72	Electr. equip.	Perfumery	Electr. equip.	Non-metallics	Perfumery
66	Non-metallics	Electr. equip.	Pharmaceuticals	Perfumery	Mechanics
55	Perfumery	Mechanics	Perfumery	Textiles	Non-metallics
54	Pharmaceuticals	Printed matter	Mechanics	Pharmaceuticals	Electr. equip.
89	Printed matter	Pharmaceuticals	Textiles	Wood	Printed matter
65	Textiles	Wood	Printed matter	Printed matter	Wood
63	Wood	Textiles	Wood	Electr. equip.	Textiles
61	Leather	Leather	Leather	Leather	Leather
84-85	Cloth., footwear	Cloth., footwear	Cloth., footwear	Cloth., footwear	Cloth., footwear

[a] Reading from top down, the industries are becoming less capital-intensive.

Source: Own calculations based on IBGE, Anuário Estatístico do Brasil.

Table A3 - Manufactured Export Structure of Different Regions and Brazil, 1965-81 (percent of total manufactured exports of each region)

	SITC	1965	1970	1973	1978	1981
World	5	13	13	13	13	14
	6+8-(67+68)	38	35	36	34	34
	7	49	52	51	53	52
Developing countries	5	13	11	9	9	10
	6+8	77	72	70	65	62
	7	10	16	21	26	29
South and South-East Asian countries	5	6	5	4	4	5
	6+8	85	80	76	70	66
	7	9	15	20	26	28
Brazil	5	19	15	10	7	12
	6+8	45	49	63	42	36
	7	36	37	27	52	52

Source: Own calculations based on UNCTAD, Handbook of International Trade and Development Statistics.

Table A4 - Regional Distribution of Brazilian Manufactured Exports at 1-Digit SITC-Level, 1962-81 (percent)

SITC/Destination	1962	1967	1973	1978	1981
Total manufactured exports					
USA	30.0	29.3	25.6	25.2	18.8
rest of developed ecs.	32.0	22.3	37.9	26.8	24.8
EEC+EFTA	22.6	19.6	26.0	20.2	17.6
ALADI	30.2	38.5	24.3	29.6	38.6
centrally planned ecs.	3.1	2.9	2.1	1.0	1.9
other countries[a]	5.0	7.1	9.7	17.3	16.0
5 Chemicals					
USA	46.4	38.8	22.1	18.6	18.0
rest of developed ecs.	37.7	26.8	40.9	37.7	34.8
ALADI	8.8	15.4	24.1	36.2	31.2
centrally planned ecs.	3.3	2.8	2.0	0.9	2.2
other countries[a]	3.8	16.2	10.9	6.6	13.8
6- Basic manufactures (67+68)					
USA	38.8	36.7	14.7	18.4	14.2
rest of developed ecs.	28.6	21.9	57.5	41.7	32.8
ALADI	24.0	34.2	13.7	22.1	30.5
centrally planned ecs.	3.9	6.6	4.5	3.4	4.9
other countries[a]	4.7	0.6	9.6	14.4	17.6
7 Machinery and transport equipment					
USA	3.7	16.9	25.2	22.5	14.5
rest of developed ecs.	26.5	18.9	14.9	17.2	19.2
ALADI	66.1	58.3	49.2	35.7	46.5
centrally planned ecs.	2.4	-	-	-	-
other countries[a]	1.3	5.9	10.7	24.6	19.8
8 Misc. manufactured goods					
USA	24.9	20.4	47.6	49.1	43.3
rest of developed ecs.	13.7	27.0	29.2	28.9	23.6
ALADI	59.1	49.9	14.8	19.2	27.8
centrally planned ecs.	-	-	-	0.4	0.5
other countries[a]	2.3	2.7	8.4	2.4	4.8

[a]Includes developing Africa, Asia, and Oceania, Malta, Spain, Yugoslavia, Caribbean, and rest of developing America.

Source: Own calculations based on UN, Commodity Trade Statistics.

Table A5 - Gini Coefficients of Brazilian Manufactured Export Concentration in Different Export Markets, 1962-81[a]

	World	Developed countries	Developing countries	ALADI	NICs[b]	Centrally planned economies
1962	0.4025	0.4626	0.4754	0.5040	0.7220	0.4754
1967	0.3521	0.3421	0.4359	0.4637	0.4483	0.7649
1979	0.3450	0.3286	0.4099	0.3886	0.3536	0.6950
1981	0.3564	0.3332	0.4182	0.4025	0.3550	0.5675
1962-1981[c]	-11.5	-28.0	-12.0	-20.1	-51.9	19.4
1962-1973[c]	-23.4	-29.3	-27.8	-27.4	-49.1	83.6
1973-1981[c]	+15.6	+2.0	21.8	9.9	-3.4	-35.0

[a]The Gini coefficient was calculated as follows:

$$\left[\sum_{j=1}^{n} (X_{ij}/X_{im})^2 \right]^{\frac{1}{2}} \qquad \begin{array}{l} j = 1 \ldots 26 \text{ (SITC at 2-digit level)} \\ i = 1 \ldots 6 \text{ (export markets)} \end{array}$$

where

X_{ij} = exports of industrial sector 'j' to market 'i'.

X_{im} = total manufactured exports to market 'i'.

[b] Argentina, Hong Kong, South Korea, Singapore and Taiwan.

[c] Percentage change of the Gini coefficient in the period.

Source: Own calculations based on UN, Commodity Trade Statistics.

Table A6 - Structure of Brazilian Manufactured Exports at 2-Digit SITC-Level, 1962-81
(share of various SITC-categories in total manufactured exports to the region in percent)

SITC	Region	1962	1967	1968	1973	1974	1978	1979	1981
5	Chemicals								
	World	41.0	25.3	22.0	9.9	12.6	6.9	8.7	12.1
	Developed ecs.	55.8	32.9	32.0	9.8	14.3	7.5	8.4	14.7
	Developing ecs.	14.7	16.7	12.9	10.1	10.1	6.3	9.0	9.3
	- ALADI	8.6	10.1	7.0	9.6	10.3	8.5	10.8	9.8
	- NICs	13.7	9.8	7.3	16.7	22.1	12.8	17.0	18.8
	Centr.planned ecs.	44.0	25.3	38.4	9.5	9.8	6.2	9.7	32.6
51	Organic chemicals								
	World	27.8	15.5	12.0	4.0	6.1	2.4	3.4	6.7
	Developed ecs.	39.6	19.6	17.8	4.7	7.6	2.9	3.8	10.8
	Developing ecs.	7.9	11.4	6.3	2.8	3.8	2.0	3.0	3.0
	- ALADI	3.7	4.4	2.6	2.0	3.8	2.8	3.9	3.3
	- NICs	-	5.1	3.6	7.3	13.5	6.2	8.2	6.1
	Centr.planned ecs.	17.9	6.9	8.9	1.0	1.7	-	-	16.7
53	Dyes, colour, tanning								
	World	0.6	1.4	1.8	0.4	0.3	0.4	0.4	0.4
	Developed ecs.	-	1.5	2.3	0.2	0.1	0.2	0.2	0.2
	Developing ecs.	-	1.1	1.1	0.5	0.5	0.7	0.5	0.5
	- ALADI	-	0.3	-	0.5	0.6	0.6	0.6	0.6
	- NICs	-	-	-	0.3	1.1	0.3	0.3	0.3
	Centr.planned ecs.	17.0	4.1	10.6	4.6	5.3	3.7	3.6	1.4
54	Medicinal products								
	World	2.3	2.2	1.8	0.8	0.7	0.6	0.7	0.7
	Developed ecs.	1.6	2.7	1.2	0.5	0.6	0.6	0.6	0.6
	Developing ecs.	3.6	1.7	2.4	1.3	0.9	0.7	0.8	0.7
	- ALADI	1.5	0.9	0.6	1.4	0.7	0.8	0.9	0.8
	- NICs	-	1.2	1.6	1.2	0.3	0.5	0.6	0.9
	Centr.planned ecs.	-	-	-	3.2	2.7	1.4	2.2	1.0
55	Perfume, cleaning								
	World	9.5	4.9	4.9	1.9	2.3	0.8	1.0	0.9
	Developed ecs.	14.2	7.6	8.7	2.0	3.0	1.1	1.1	0.9
	Developing ecs.	1.2	1.1	0.8	1.7	1.4	0.6	0.9	0.9
	- ALADI	-	0.3	0.3	0.7	0.8	0.8	1.0	0.8
	- NICs	-	0.6	-	-	1.1	0.4	0.3	0.4
	Centr.planned ecs.	9.1	14.3	18.9	0.7	-	-	-	0.1
56	Fertilizers								
	World	-	-	-	0.2	0.1	0.04	0.1	0.1
	Developed ecs.	-	-	-	-	-	-	-	-
	Developing ecs.	-	-	-	0.6	0.2	0.09	0.2	0.1
	- ALADI	-	-	-	0.8	0.3	0.15	0.2	0.1
	- NICs	-	-	-	-	-	0.5	0.5	0.2
	Centr.planned ecs.	-	-	-	-	-	-	-	-
57	Explosives, pyrotechnical products								
	World	-	0.3	0.2	0.1	0.1	0.1	0.4	0.2
	Developed ecs.	-	-	-	-	0.1	0.1	0.1	0.04
	Developing ecs.	-	0.7	0.4	0.3	0.2	0.2	0.7	0.2
	- ALADI	-	0.8	0.3	0.4	0.2	0.3	0.9	0.2
	- NICs	-	-	-	0.3	-	0.1	0.1	0.4
	Centr.planned ecs.	-	-	-	-	-	-	-	-
58	Plastics								
	World	-	0.3	0.3	0.5	0.7	0.4	0.9	1.9
	Developed ecs.	-	-	-	0.4	0.5	0.3	0.3	0.6
	Developing ecs.	-	0.8	.05	0.9	0.9	0.6	1.5	2.6
	- ALADI	-	0.8	0.5	1.2	1.2	0.9	1.9	2.8
	- NICs	-	-	1.0	1.1	1.4	1.4	4.2	8.2
	Centr.planned ecs.	-	-	-	-	-	-	1.7	12.8
59	Chemical materials, NES								
	World	-	0.8	1.2	2.1	2.3	2.0	2.0	1.3
	Developed ecs.	-	1.5	2.0	2.1	2.4	2.5	2.4	1.5
	Developing ecs.	-	-	0.4	2.1	2.2	1.5	1.4	1.1
	- ALADI	-	-	-	2.7	2.8	2.0	1.5	1.1
	- NICs	-	-	-	6.1	4.6	3.4	2.9	2.4
	Centr.planned ecs.	-	-	-	-	-	0.9	2.2	0.5
6-(67+68)	Basic manufactures								
	World	23.0	32.9	39.9	40.4	31.0	26.1	28.1	22.3
	Developed ecs.	26.3	37.3	45.3	46.0	35.8	30.2	32.6	22.7
	Developing ecs.	16.8	25.1	33.7	27.3	22.0	20.3	22.1	19.5
	- ALADI	16.6	29.5	36.8	22.4	18.9	19.5	21.1	17.7
	- NICs	6.1	37.3	48.0	37.3	21.9	21.3	31.4	21.1
	Centr.planned ecs.	29.5	74.7	61.6	88.6	86.9	85.0	84.2	63.1

Table A6 cont.

SITC	Region	1962	1967	1968	1973	1974	1978	1979	1981
61	Leather								
	World	5.3	6.5	4.8	3.8	2.3	3.1	3.8	1.7
	Developed ecs.	7.0	8.3	8.0	5.9	3.7	5.6	7.2	0.4
	Developing ecs.	-	0.2	0.2	0.3	0.2	0.2	0.2	0.2
	- ALADI	-	-	-	0.1	0.1	0.04	0.1	0.1
	- NICs	-	-	-	0.5	0.4	1.3	1.1	0.4
	Centr.planned ecs.	29.5	74.7	61.0	-	-	10.4	8.3	2.6
62	Rubber								
	World	0.8	0.7	0.5	0.6	0.7	1.3	1.4	1.2
	Developed ecs.	-	-	-	0.3	0.6	0.8	0.8	0.7
	Developing ecs.	2.1	1.5	0.9	1.2	1.0	1.9	2.1	1.6
	- ALADI	2.2	1.6	0.7	1.5	1.1	2.2	1.7	1.7
	- NICs	2.0	3.5	1.3	0.6	0.5	0.9	1.6	1.1
	Centr.planned ecs.	-	-	-	1.0	-	-	0.4	1.2
63	Wood								
	World	7.0	7.1	11.5	5.8	2.9	2.4	2.4	2.2
	Developed ecs.	9.4	12.7	22.2	8.8	4.4	3.9	3.9	3.5
	Developing ecs.	3.0	1.2	1.5	0.7	0.6	0.7	0.9	1.3
	- ALADI	2.8	1.1	1.2	0.7	0.6	0.8	1.0	0.9
	- NICs	-	0.6	0.9	1.0	0.4	0.3	1.3	1.2
	Centr.planned ecs.	-	-	-	-	-	-	-	0.4
64	Paper, paperboard								
	World	-	0.2	-	2.3	1.9	2.4	2.6	2.7
	Developed ecs.	-	-	-	1.8	1.8	2.0	2.1	1.0
	Developing ecs.	-	0.3	-	3.2	2.3	2.8	3.2	4.1
	- ALADI	-	0.4	-	1.9	1.5	1.4	1.9	2.5
	- NICs	-	-	-	8.7	3.9	6.0	6.5	3.3
	Centr.planned ecs.	-	-	-	-	-	-	-	-
65	Textiles								
	World	5.7	9.6	12.3	20.7	17.4	11.2	12.2	8.2
	Developed ecs.	3.5	10.0	9.2	22.9	20.8	13.4	14.6	11.1
	Developing ecs.	9.1	9.9	15.4	12.6	10.2	7.4	8.4	4.5
	- ALADI	2.9	7.7	16.8	8.8	7.5	6.1	8.1	3.7
	- NICs	-	16.6	25.7	9.0	5.6	6.2	12.4	6.7
	Centr.planned ecs.	-	-	-	87.1	86.4	69.0	68.5	52.3
66	Non-metal minerals, NES								
	World	2.5	6.4	8.2	5.2	3.4	3.0	2.8	2.9
	Developed ecs.	3.9	5.4	4.6	5.1	3.2	2.9	2.5	3.0
	Developing ecs.	-	8.0	11.8	5.5	4.0	3.1	3.2	2.9
	- ALADI	-	8.9	12.3	4.8	3.9	4.4	4.0	3.3
	- NICs	-	11.0	16.6	15.2	8.9	4.3	5.4	3.3
	Centr.planned ecs.	-	-	-	-	-	4.9	3.6	2.3
69	Metal manufactures								
	World	0.3	2.4	2.6	2.1	2.3	2.8	2.8	3.4
	Developed ecs.	-	1.0	1.4	1.2	1.4	1.6	1.5	1.4
	Developing ecs.	1.0	4.1	3.8	3.9	3.8	4.2	4.2	4.9
	- ALADI	-	4.5	3.9	4.6	4.3	4.7	4.3	5.5
	- NICs	-	5.0	3.0	1.8	2.1	2.2	3.1	3.2
	Centr.planned ecs.	-	-	-	-	-	0.6	3.4	4.4
7	Machines, transport equipment								
	World	33.4	38.2	34.2	27.5	36.6	51.6	49.0	52.1
	Developed ecs.	16.3	26.5	18.5	17.3	25.9	39.3	37.8	40.4
	Developing ecs.	64.0	53.9	50.0	47.8	54.2	66.3	61.5	63.2
	- ALADI	72.1	56.4	53.1	54.6	58.8	62.1	59.3	62.8
	- NICs	-	50.0	42.5	42.7	48.3	60.6	42.9	51.8
	Centr.planned ecs.	26.4	-	-	0.6	2.0	2.5	3.4	0.7
71	Machinery, non-electric								
	World	7.1	25.4	25.7	12.0	16.0	22.5	21.7	21.6
	Developed ecs.	1.2	15.9	13.1	7.2	10.4	19.4	19.8	19.3
	Developing ecs.	15.5	37.9	38.1	21.5	25.1	26.3	24.0	24.2
	- ALADI	11.0	42.9	40.0	26.7	29.3	30.7	27.6	26.2
	- NICs	-	37.0	32.3	26.8	28.6	43.0	27.9	26.7
	Centr.planned ecs.	26.4	-	-	-	1.0	2.3	3.3	0.4
72	Electrical machinery								
	World	1.5	4.7	5.4	7.9	10.7	9.2	7.6	7.3
	Developed ecs.	-	0.5	0.7	7.9	12.0	11.8	8.0	7.4
	Developing ecs.	3.6	9.8	10.0	8.2	8.9	6.6	7.3	7.5
	- ALADI	1.0	11.0	10.9	10.3	10.6	8.8	9.0	9.5
	- NICs	2.6	12.8	9.6	10.7	12.6	5.4	8.4	10.4
	Centr.planned ecs.	-	-	-	-	1.0	-	-	0.1
73	Transport equipment								
	World	24.1	8.0	3.2	7.6	10.0	19.9	19.7	23.2
	Developed ecs.	14.4	10.0	4.7	2.2	3.6	8.1	10.0	13.7
	Developing ecs.	42.8	6.2	1.8	18.1	20.2	33.5	30.1	31.6
	- ALADI	48.8	1.9	1.2	17.7	19.0	22.6	22.7	27.1
	- NICs	72.2	-	0.6	4.7	7.0	12.1	6.6	14.7
	Centr.planned ecs.	-	-	-	-	-	-	-	0.2

Table A6 cont.

SITC	Region	1962	1967	1968	1973	1974	1978	1979	1981
8	Misc. manufactures								
	World	2.6	3.7	3.9	22.2	19.8	15.3	14.2	13.5
	Developed ecs.	1.6	3.4	4.2	26.9	24.0	23.0	21.2	20.8
	Developing ecs.	4.5	4.2	3.6	14.9	13.8	7.0	7.5	8.0
	- ALADI	2.7	4.0	3.1	13.3	11.9	9.9	8.9	9.7
	- NICs	1.9	2.9	2.3	3.4	7.7	5.3	8.7	8.3
	Centr.planned ecs.	-	-	-	1.2	1.4	6.3	2.8	3.7
81	Plumbing, heating, lighting equipment								
	World	-	0.1	0.2	0.1	0.2	0.2	0.2	0.2
	Developed ecs.	-	-	-	-	0.1	0.1	0.1	0.04
	Developing ecs.	-	0.2	0.3	0.2	0.3	0.4	0.3	0.4
	- ALADI	-	-	-	-	0.3	0.5	0.5	0.5
	- NICs	-	-	-	-	-	0.1	0.4	0.5
	Centr.planned ecs.	-	-	-	-	-	-	-	-
82	Furniture								
	World	-	0.2	0.4	0.9	0.8	0.5	0.4	0.4
	Developed ecs.	-	0.3	0.8	1.3	1.1	0.6	0.4	0.3
	Developing ecs.	-	-	-	0.4	0.3	0.4	0.4	0.5
	- ALADI	-	-	-	0.4	0.3	0.5	0.5	0.6
	- NICs	-	-	-	-	-	-	0.1	0.3
	Centr.planned ecs.	-	-	-	-	-	-	-	0.1
83	Travel goods								
	World	-	-	-	0.7	0.8	0.6	0.5	0.6
	Developed ecs.	-	-	-	1.1	1.2	1.1	1.0	1.2
	Developing ecs.	-	-	-	0.1	0.5	0.1	0.1	0.1
	- ALADI	-	-	-	-	0.1	0.1	0.1	0.1
	- NICs	-	-	-	-	-	-	-	0.1
	Centr.planned ecs.	-	-	-	-	-	-	-	-
84	Clothing								
	World	0.3	0.4	0.4	8.0	7.0	3.4	2.4	1.7
	Developed ecs.	-	0.2	0.5	8.1	6.6	4.4	3.4	2.3
	Developing ecs.	0.8	0.5	0.3	8.3	7.7	2.2	1.4	1.1
	- ALADI	-	0.4	0.2	6.5	5.6	3.4	1.8	1.4
	- NICs	-	-	-	-	1.4	0.1	1.3	1.0
	Centr.planned ecs.	-	-	-	1.0	1.2	2.6	2.1	2.5
85	Footwear								
	World	0.4	0.3	0.4	8.5	6.8	7.5	7.1	7.0
	Developed ecs.	0.6	0.5	-	13.1	10.8	14.0	13.9	14.6
	Developing ecs.	-	-	-	0.3	0.7	0.3	0.3	1.0
	- ALADI	-	-	-	0.2	0.6	0.4	0.3	1.0
	- NICs	-	-	-	-	-	0.1	0.2	0.2
	Centr.planned ecs.	-	-	-	-	-	3.6	-	0.9
86	Instruments,watches,clocks								
	World	0.5	0.4	0.4	0.7	0.7	1.2	1.5	1.7
	Developed ecs.	-	-	-	0.3	0.4	0.5	0.6	0.7
	Developing ecs.	1.0	0.6	0.6	1.3	1.3	1.9	2.5	2.6
	- ALADI	-	0.3	0.3	1.7	1.4	2.7	2.6	3.5
	- NICs	-	-	-	0.7	0.7	2.2	2.6	2.5
	Centr.planned ecs.	-	-	-	-	-	-	-	-
89	Printed matter								
	World	0.3	2.3	2.1	3.3	3.6	2.0	2.2	2.0
	Developed ecs.	-	2.1	2.1	3.0	3.7	2.2	1.8	1.7
	Developing ecs.	-	2.7	2.2	4.2	3.5	1.8	2.5	2.4
	- ALADI	-	2.3	2.0	4.4	3.8	2.4	3.0	2.6
	- NICs	-	2.8	2.2	2.5	5.2	2.7	4.1	3.8
	Centr.planned ecs.	-	-	-	-	-	-	0.6	0.1

Source: Own calculations based on UN, Commodity Trade Statistics.

Table A7 - Brazil - Revealed Comparative Advantage, 1962-81[a]

SITC	Region[b]	1962	1967	1968	1973	1974	1978	1979	1981
5	Chemicals								
	World	-83.33	-77.69	-84.94	-80.76	-81.63	-78.73	-73.35	-39.65
	Developed ecs.	-84.88	-83.04	-88.11	-86.31	-85.84	-86.15	-84.46	-57.47
	Developing ecs.	-51.73	-22.24	-49.59	-35.11	-43.75	-22.82	-9.61	23.44
	- ALADI	-61.50	-37.90	-49.49	-35.13	-22.65	-18.09	-1.03	18.13
	- NICs	-14.46	-27.41	-31.62	-19.14	-2.58	-2.59	12.12	40.81
	Centr.planned ecs.	-81.49	-79.15	-84.15	-63.75	-89.21	-88.28	-85.11	-30.09
51	Organic chemicals								
	World	-77.84	-72.25	-82.04	-81.31	-78.50	-84.06	-78.87	-35.14
	Developed ecs.	-79.22	-79.18	-85.74	-84.64	-82.08	-88.94	-85.83	-43.48
	Developing ecs.	-20.87	-3.99	-30.53	-40.48	-40.17	-46.32	-38.52	-4.02
	- ALADI	-44.73	-50.71	-65.43	-57.83	-35.05	-41.94	-26.04	-10.48
	- NICs	-100.00	-46.22	-51.05	-15.28	11.84	-10.68	-5.61	8.14
	Centr.planned ecs.	-86.97	-88.83	-91.32	-90.31	-92.99	-100.00	-100.00	23.07
53	Dyes, colour, tanning								
	World	-95.42	-70.89	-80.78	-87.60	-88.94	-61.25	-64.53	-44.95
	Developed ecs.	-100.00	-82.68	-87.48	-95.29	-97.07	-88.53	-88.19	-79.61
	Developing ecs.	-100.00	100.00	41.34	12.64	21.16	5.94	-10.03	22.62
	- ALADI	-100.00	100.00	-100.00	0.61	16.22	-19.63	-25.45	14.65
	- NICs	-100.00	0.00	-100.00	-70.71	-14.79	-73.92	-65.49	-4.32
	Centr.planned ecs.	-43.37	-3.86	-17.67	-38.68	5.76	48.48	53.87	16.17
54	Medicinal products								
	World	-86.52	-70.63	-79.91	-80.84	-77.99	-67.90	-62.83	-45.43
	Developed ecs.	-93.00	-77.57	-91.96	-91.30	-86.59	-81.67	-80.74	-71.48
	Developing ecs.	-47.73	-27.11	-26.21	-36.65	-35.94	-2.30	12.15	44.89
	- ALADI	-40.96	0.12	-17.99	44.86	13.41	26.70	34.83	76.99
	- NICs	-100.00	4.80	29.65	-31.19	-72.35	-63.50	-42.99	33.50
	Centr.planned ecs.	-100.00	-100.00	-100.00	-41.16	-43.05	-46.65	-26.15	-14.54
55	Perfume, cleaning								
	World	-4.78	3.38	-17.18	-7.38	-3.00	-0.60	7.90	35.68
	Developed ecs.	-8.17	-6.61	-23.81	-22.29	-6.85	-5.56	-5.05	16.65
	Developing ecs.	100.00	100.00	100.00	53.30	12.77	-11.51	31.0	56.41
	- ALADI	0.00	100.00	100.00	-3.46	-29.71	-7.39	23.23	40.32
	- NICs	0.00	100.00	0.00	-100.00	-33.13	27.97	26.72	63.36
	Centr.planned ecs.	100.00	100.00	100.00	100.00	0.00	0.00	0.00	100.00
56	Fertilizers								
	World	-100.00	-100.00	-100.00	-97.31	-99.49	-99.10	-98.58	-98.09
	Developed ecs.	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00
	Developing ecs.	-100.00	-100.00	-100.00	-81.76	-95.37	-70.14	-56.07	-73.21
	- ALADI	-100.00	-100.00	100.00	-70.04	-38.08	-66.52	-54.24	-72.75
	- NICs	0.00	0.00	0.00	0.00	0.00	19.66	-100.00	-100.00
	Centr.planned ecs.								
57	Explosives, pyrotechnical products								
	World	0.00	100.00	18.96	83.95	49.06	92.23	85.16	91.74
	Developed ecs.	0.00	0.00	-100.00	-100.00	-1.38	71.82	9.83	45.84
	Developing ecs.	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	- ALADI	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	- NICs	0.00	0.00	0.00	100.00	0.00	100.00	100.00	100.00
	Centr.planned ecs.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
58	Plastics								
	World	-100.00	-95.27	-97.97	-88.87	-93.04	-86.47	-72.51	-9.00
	Developed ecs.	-100.00	-100.00	-100.00	-94.83	-96.58	-94.60	-94.52	-79.31
	Developing ecs.	0.00	47.83	20.23	13.85	-35.79	0.22	49.71	92.47
	- ALADI	0.00	100.00	100.00	12.38	-9.63	1.89	53.40	94.68
	- NICs	0.00	0.00	100.00	-49.96	-35.49	74.62	85.48	98.99
	Centr.planned ecs.	0.00	-100.00	-100.00	-100.00	-100.00	-100.00	-61.64	82.17
59	Chemical materials, NES								
	World	-100.00	-94.79	-94.20	-75.24	-70.11	-58.57	-49.36	-41.87
	Developed ecs.	-100.00	-94.77	-94.93	-81.60	-78.39	-69.49	-60.79	-59.99
	Developing ecs.	-100.00	-100.00	-77.55	-27.82	-13.80	-1.60	5.04	10.07
	- ALADI	-100.00	-100.00	-100.00	29.47	-13.85	16.49	15.68	12.39
	- NICs	-100.00	-100.00	-100.00	6.60	4.42	49.07	57.08	17.39
	Centr.planned ecs.	0.00	-100.00	-100.00	-100.00	-100.00	-51.43	-69.58	-31.35
6	Basic manufactures								
	World	-83.04	-39.05	-45.24	8.29	-15.42	27.91	-73.35	-39.65
	Developed ecs.	-87.13	-52.98	-58.86	-1.39	-26.29	13.02	-84.46	-57.47
	Developing ecs.	24.60	33.26	14.19	45.12	27.81	57.28	-9.61	23.44
	- ALADI	16.46	33.73	24.98	26.09	13.21	40.28	-1.03	18.13
	- NICs	21.46	77.84	75.55	7.93	-25.95	20.48	12.12	40.81
	Centr.planned ecs.	-83.37	-49.98	-80.83	46.87	23.83	90.89	-85.11	-30.09

Table A7 cont.

SITC	Region	1962	1967	1968	1973	1974	1978	1979	1981
61	Leather								
	World	79.33	91.39	84.07	82.40	75.30	78.08	80.24	69.62
	Developed ecs.	77.08	91.10	85.14	94.43	93.20	98.32	98.10	83.26
	Developing ecs.	0.00	0.46	-2.36	-50.04	-59.08	-57.72	-54.25	-45.70
	- ALADI	0.00	0.00	0.00	-78.79	-83.78	-92.90	-89.92	-83.28
	- NICs	0.00	0.00	0.00	-71.29	-66.30	-62.19	-61.66	-79.46
	Centr.planned ecs.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
62	Rubber								
	World	-50.32	-40.97	-63.49	-52.97	-63.48	4.24	17.00	13.63
	Developed ecs.	-100.00	-100.00	-100.00	-83.50	-77.28	-41.35	-36.86	-39.56
	Developing ecs.	100.00	100.00	100.00	39.92	-16.09	67.63	72.59	59.08
	- ALADI	100.00	100.00	100.00	33.66	18.90	57.94	55.16	48.34
	- NICs	100.00	100.00	100.00	-0.98	-82.62	100.00	96.44	88.80
	Centr.planned ecs.	0.00	0.00	0.00	100.00	-100.00	0.00	41.85	57.55
63	Wood								
	World	70.79	90.04	88.00	94.15	84.58	82.59	842.8	84.05
	Developed ecs.	65.87	89.33	87.69	85.41	87.94	93.23	95.48	94.98
	Developing ecs.	100.00	100.00	100.00	67.47	54.17	38.60	45.97	63.69
	- ALADI	100.00	100.00	100.00	63.64	41.95	20.46	38.03	39.98
	- NICs	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	Centr.planned ecs.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
64	Paper, paperboard								
	World	-100.00	-98.71	-100.00	-58.77	-73.52	-29.19	-21.20	7.51
	Developed ecs.	-100.00	-100.00	-100.00	-74.18	-82.13	-56.89	-54.77	-65.49
	Developing ecs.	-100.00	-86.94	-100.00	-15.84	-36.22	48.44	55.47	84.48
	- ALADI	-100.00	-87.58	-100.00	-23.99	-63.37	-4.70	19.00	66.74
	- NICs	0.00	0.00	0.00	10.38	-59.50	87.62	93.88	98.49
	Centr.planned ecs.	0.00	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00	0.00
65	Textiles								
	World	4.72	46.72	-11.35	53.23	37.20	66.52	78.55	79.81
	Developed ecs.	-34.80	23.60	-47.38	45.05	27.01	57.31	73.84	71.20
	Developing ecs.	100.00	93.36	47.09	70.40	68.17	81.57	83.42	90.83
	- ALADI	100.00	100.00	98.86	57.73	57.18	70.56	83.08	85.42
	- NICs	0.00	100.00	100.00	30.14	24.01	88.62	92.42	91.58
	Centr.planned ecs.	-100.00	-100.00	-100.00	94.45	95.99	100.00	100.00	100.00
66	Non-metal minerals, NES								
	World	-86.69	-24.50	-38.94	-2.69	-27.96	-0.25	-1.70	9.51
	Developed ecs.	-86.66	-45.85	-62.80	-15.06	-47.72	-17.04	-29.53	-26.04
	Developing ecs.	-100.00	23.18	6.42	37.87	39.61	23.93	41.71	77.49
	- ALADI	-100.00	21.37	4.18	18.46	27.70	18.06	36.87	73.07
	- NICs	0.00	100.00	100.00	46.12	53.23	-19.84	24.91	45.54
	Centr.planned ecs.	-100.00	-100.00	-100.00	-100.00	-100.00	65.68	53.04	59.11
69	Metal manufactures								
	World	-99.47	-87.71	-85.99	-69.00	-67.60	-8.49	-8.34	-2.52
	Developed ecs.	-100.00	-96.71	-95.47	-86.66	-85.87	-56.97	-61.21	-67.79
	Developing ecs.	2.13	25.49	6.94	33.47	35.82	81.59	81.13	85.02
	- ALADI	0.00	23.48	11.93	31.92	37.80	83.00	79.46	83.59
	- NICs	0.00	7.65	-28.50	-70.39	-58.55	23.79	45.67	79.12
	Centr.planned ecs.	-100.00	-100.00	-100.00	-100.00	-100.00	-591.6	13.07	13.08
7	Machinery and transport equipment								
	World	-95.37	-83.18	-88.27	-77.06	-68.24	-33.66	-26.74	-2.56
	Developed ecs.	-98.53	-93.29	-96.57	-89.58	-84.39	-65.30	-61.18	-49.75
	Developing ecs.	85.08	56.87	35.57	43.91	53.49	74.16	72.07	90.36
	- ALADI	87.31	59.39	49.95	46.35	55.09	65.31	72.90	89.20
	- NICs	-100.00	35.06	25.65	-23.72	-9.44	23.01	6.84	63.26
	Centr.planned ecs.	-96.64	-100.00	-100.00	-99.48	-98.70	-97.31	-95.25	-96.32
71	Machinery, non-electric								
	World	-98.18	-79.52	-84.12	-83.03	-76.21	-43.66	-39.06	-17.62
	Developed ecs.	-99.81	-92.59	-95.56	-92.80	-89.47	-68.49	-65.15	-55.77
	Developing ecs.	100.00	67.26	56.24	33.07	48.88	72.32	77.52	90.90
	- ALADI	100.00	68.24	54.97	31.62	46.78	67.54	75.25	90.14
	- NICs	0.00	35.33	22.54	-29.35	-15.31	28.59	38.07	65.59
	Centr.planned ecs.	-95.38	-100.00	-100.00	-100.00	-99.15	-96.24	-93.55	-97.71
72	Electrical machinery								
	World	-98.88	-89.88	-91.25	-73.77	-63.27	-52.36	-54.91	-39.63
	Developed ecs.	-100.00	-99.37	-99.37	-81.41	-72.00	-62.98	-71.50	-66.67
	Developing ecs.	3.56	24.54	-10.91	-79.22	12.40	19.76	37.53	70.29
	- ALADI	-45.93	35.22	37.61	32.39	32.42	23.50	43.07	77.88
	- NICs	-39.27	33.65	34.29	-22.38	-14.62	-26.22	16.22	57.35
	Centr.planned ecs.	-100.00	-100.00	-100.00	-100.00	-95.87	-100.00	-100.00	-94.81

Table A7 cont.

SITC	Region	1962	1967	1968	1973	1974	1978	1979	1981
73	Transport equipment								
	World	-87.62	-85.69	-95.38	-60.30	-47.67	7.51	36.23	52.95
	Developed ecs.	-95.23	-89.83	-96.43	-90.64	-85.53	-59.06	-19.85	-5.93
	Developing ecs.	100.00	62.07	52.85	92.30	92.00	92.99	78.65	95.37
	- ALADI	100.00	45.83	37.47	90.06	89.87	86.35	85.21	92.55
	- NICs	100.00	0.00	100.00	18.95	52.65	43.45	-48.18	63.41
	Centr.planned ecs.	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00	-67.66
8	Misc. manufactures								
	World	-94.79	-87.30	-89.76	-14.91	-11.10	9.59	8.70	36.36
	Developed ecs.	-97.94	-93.08	-93.46	-20.66	-20.25	6.82	3.80	27.35
	Developing ecs.	-8.86	-30.60	-95.53	15.81	32.64	23.28	28.58	62.94
	- ALADI	-32.18	-33.35	-27.80	45.90	58.40	32.79	33.09	-35.59
	- NICs	-45.50	-68.44	-65.02	-77.81	-37.76	-33.40	11.31	47.88
	Centr.planned ecs.	-100.00	-100.00	-100.00	-85.44	-89.64	-42.60	-66.07	-35.38
81	Plumbing, heating, lighting equipment								
	World	0.00	3.01	-36.86	-23.72	6.66	68.76	81.99	87.57
	Developed ecs.	-	-100.00	-100.00	-64.63	-25.52	37.41	31.80	11.97
	Developing ecs.	-	100.00	8.78	31.76	57.13	83.23	94.38	98.68
	- ALADI	-	0.00	0.00	100.00	84.96	85.10	100.00	100.00
	- NICs	-	0.00	0.00	-100.00	-100.00	100.00	100.00	100.00
	Centr.planned ecs.	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
82	Furniture								
	World	0.00	44.35	51.89	87.94	74.58	69.45	72.30	86.79
	Developed ecs.	-	28.87	60.74	87.41	72.17	60.97	57.77	95.67
	Developing ecs.	-	0.00	0.00	100.00	90.59	82.85	89.91	97.47
	- ALADI	-	0.00	0.00	100.00	100.00	78.40	90.11	97.57
	- NICs	-	0.00	0.00	0.00	0.00	-100.00	38.02	100.00
	Centr.planned ecs.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
83	Travel goods								
	World	0.00	0.00	-100.00	73.93	78.13	80.64	82.15	93.15
	Developed ecs.	-	-	-100.00	79.84	83.96	81.83	86.31	95.48
	Developing ecs.	-	-	-100.00	6.33	-21.81	66.28	43.63	60.22
	- ALADI	-	-	0.00	0.00	100.00	100.00	100.00	100.00
	- NICs	-	-	0.00	-100.00	-100.00	0.00	-100.00	-2.22
	Centr.planned ecs.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
84	Clothing								
	World	100.00	0.64	-68.75	82.33	87.89	92.30	87.49	91.30
	Developed ecs.	0.00	-37.70	-66.32	82.45	86.52	90.84	85.18	89.82
	Developing ecs.	100.00	36.48	-71.41	82.01	89.70	95.40	93.20	93.09
	- ALADI	0.00	100.00	100.00	92.19	94.17	98.40	98.01	97.98
	- NICs	0.00	0.00	0.00	-100.00	27.54	14.9	90.55	82.15
	Centr.planned ecs.	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00
85	Footwear								
	World	100.00	100.00	57.35	99.37	99.46	99.54	99.36	99.28
	Developed ecs.	100.00	100.00	0.00	99.51	99.61	99.67	99.65	99.49
	Developing ecs.	0.00	0.00	0.00	100.00	100.00	93.63	86.37	96.89
	- ALADI	0.00	0.00	0.00	100.00	100.00	93.96	86.99	96.98
	- NICs	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00
	Centr.planned ecs.	0.00	0.00	-100.00	0.00	0.00	100.00	0.00	100.00
86	Instruments,watches,clocks								
	World	-98.69	-97.97	-98.41	-93.62	-91.68	-76.94	-69.62	-44.55
	Developed ecs.	-100.00	-100.00	-100.00	-97.91	-97.12	-92.38	-91.81	-84.83
	Developing ecs.	100.00	-44.41	-76.52	-60.53	-48.24	-29.55	-13.45	27.13
	- ALADI	0.00	-52.26	-44.12	-19.74	-13.32	-18.46	-15.94	32.56
	- NICs	0.00	-100.00	-100.00	-89.82	-85.93	-57.16	-30.92	5.73
	Centr.planned ecs.	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00
89	Printed matter								
	World	-97.40	-79.03	-83.17	-46.49	-36.40	-26.75	-20.87	8.44
	Developed ecs.	-100.00	-87.79	-89.80	-60.41	-49.24	-45.47	-52.58	-36.54
	Developing ecs.	-100.00	-39.20	-57.35	-1.21	10.81	38.37	52.47	80.08
	- ALADI	-100.00	-49.39	-38.55	34.26	52.58	45.05	61.12	84.40
	- NICs	-100.00	-63.76	-55.71	-64.47	-7.22	10.27	38.73	73.96
	Centr.planned ecs.	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00	42.97	-13.44

[a] RCA calculated as:

$$e_{ij} = \frac{(X_{ij} - M_{ij})}{(X_{ij} + M_{ij})} \times 100 \qquad \text{if } e_{ij} = \begin{cases} -100.00\text{: all M} & \text{— } X_{ij} = 0 \\ +100.00\text{: all X} & \text{— } M_{ij} = 0 \\ 0.00\text{: } X_{ij} = M_{ij} \end{cases}$$

[b] Classification of countries according to UNCTAD, Handbook of International Trade and Development Statistics, 1984. NICs include: Argentina, Hong Kong, South Korea, Singapore, Taiwan.

Source: Own calculations based on UN, Commodity Trade Statistics.

Table A8 - Brazil: A Comparison of Different Indices of Revealed Comparative Advantage for Manufacturing Industries at 4-Digit SITC-Level, 1964-80[a]

SITC	SECTOR	1964			1967			1970			1973			1976			1978			1980		
		Bowen Index	Trad. Index	Clas. fic.[b]																		
		BI	TI	C	BI	TI	C	BI	TI	C	BI	TI	C	BI	TI	C	BI	TI	C	BI	TI	C
512.1	Hydrocarbons	-0.97	-100	CD	-0.85	-100	CD	-0.86	-100	CD	-0.52	-100	CD	-0.41	-99	CD	-0.15	-92	CD	0.00	-77	?
512.2	Alcohols	-0.47	-8	CD	-0.51	25	?	-0.54	-19	CD	-0.32	-2	CD	-0.27	-35	CD	-0.07	-22	CD	0.18	25	CA
512.3	Ethers	..	-100	..	..	-100	..	..	-100	..	-0.49	-94	CD	-0.48	-96	CD	-0.49	-48	CD	-0.51	-13	CD
512.4	Compounds	..	-100	..	..	-100	..	-0.59	-100	CD	-0.78	-93	CD	0.44	-95	?	0.25	-93	?	0.65	-89	?
512.5	Acids	-0.50	-94	CD	-0.50	-93	CD	-0.36	-90	CD	-0.57	-92	CD	-0.02	-95	CD	-0.08	-57	CD	-0.01	-62	CD
512.7	Nitrogen	..	..	..	..	-97	..	..	-98	..	0.52	-94	?	1.84	-96	?	0.85	-85	?	..	-70	..
513.2	Chemical nes	-0.02	-100	CD	0.04	-100	?	0.44	-91	?	-0.53	-84	?	-0.24	-59	CD	0.28	-83	?	0.38	-53	?
513.3	Inorganic Acid	-0.09	-100	CD	-0.32	-100	CD	0.10	-100	?	-0.78	-100	CD	-0.25	-100	CD	-0.23	-99	CD	-0.13	-100	CD
513.4	Compounds	-0.01	-100	CD	0.82	0	?	0.75	-100	?	0.40	-100	?	1.26	-100	?	2.01	-100	?	2.08	-100	?
513.5	Met. Oxids	..	-100	..	..	-100	..	-0.16	-100	CD	1.25	-95	?	0.70	-76	?	0.94	-75	?	1.55	-53	?
513.6	Other "	-0.74	-97	CD	-0.48	-96	CD	-0.79	-94	CD	-0.59	-92	CD	-0.52	-92	CD	-0.28	-76	CD	-0.02	-55	CD
514.2	Metal. Salts	-0.49	-100	CD	-0.48	-100	CD	-0.43	-98	CD	-0.79	-100	CD	-0.43	-99	CD	-0.76	-97	CD	..	-96	..
554.1	Soaps	3.24	0	?	3.01	-100	?	3.32	0	?	1.60	-38	?	2.52	42	CA	1.98	-100	?	..	90	..
554.2	Surface-act.Agents	-0.72	-100	CD	0.01	-100	?	0.33	-100	?	-0.28	-100	CD	0.11	-100	?	0.90	0	?	..	-23	..
561.1	Nitrog. Fert.	-0.93	-100	CD	-0.97	-100	CD	-0.98	-100	CD	-0.81	-100	CD	-0.74	-100	CD	-0.74	100	?	-0.69	-100	CD
561.2	Phosph. Fert.	-0.43	-100	CD	-0.51	-100	CD	-0.38	-100	CD	-0.08	-96	CD	1.01	-100	?	0.81	-95	?	..	-98	..
581.2	Prod. Polymer.	0.51	-100	?	-0.37	-100	CD	-0.47	-100	CD	-0.18	-90	CD	0.07	-94	?	0.12	-89	?	0.27	-50	?
599.2	Insecticides	1.22	-100	?	2.24	-100	?	5.79	0	?	-0.37	-92	CD	-0.63	-90	CD	-0.05	-85	CD	0.21	-6	?
611.3	Calf Leather	1.21	-100	?	..	-100	..	2.65	-100	?	..	-100	..	3.02	95	CA	3.40	98	CA	..	..	..
629.1	Rubber Tyres	..	92	..	..	33	..	..	45	..	0.67	19	CA	1.16	39	CA	1.10	69	CA	0.58	57	CA
631.1	Venner Sheets	..	100	..	..	100	..	..	100	..	1.84	98	CA	1.20	88	CA	1.28	58	CA	1.10	45	CA
631.2	Plywood	..	100	..	..	100	..	..	100	..	1.18	98	CA	0.58	100	CA	2.40	93	CA	-0.13	100	?

Table A8 (Cont.)

SITC	SECTOR	1964 Bowen Index (BI)	1964 Trad. Index (TI)	1964 Clas. fic. (C)	1967 BI	1967 TI	1967 C	1970 BI	1970 TI	1970 C	1973 BI	1973 TI	1973 C	1976 BI	1976 TI	1976 C	1978 BI	1978 TI	1978 C	1980 BI	1980 TI	1980 C
631.4	Improved Wood	..	100	..	..	100	..	..	100	..	-0.39	100	?	-0.27	69	?	-0.34	100	?	-0.32	89	?
641.1	Newspr. Paper	-0.31	-100	CD	-0.47	-100	CD	-0.52	-100	CD	-0.65	..	..	-0.66	-100	CD	-0.76	-100	CD	-0.81	-95	CD
641.2	Other " "	-0.19	-100	CD	-0.32	-100	CD	-0.19	..	..	-0.30	-100	CD	-0.27	-35	CD	-0.13	57	?	0.75	74	?
641.3	Kraft Paper	-0.58	..	..	-0.57	-100	CD	-0.39	-100	CD	0.17	..	..	0.58	-97	?	0.78	-84	?	0.57	-74	?
641.4	Cigarr."	10.05	..	..	6.60	-100	?	7.22	..	..	6.01	-90	..	5.89	-100	?	1.55	-100	?	6.25	-100	?
641.5	Mach.-made "	..	-100	..	..	-100	..	..	-100	..	-0.62	-81	CD	-0.72	-95	CD	-0.62	-42	CD	-0.69	-2	CD
641.6	Fireb. of Wood	..	..	..	..	..	..	..	..	..	0.55	100	CA	1.42	100	CA	1.40	100	CA	1.53	..	..
651.3	Cotton Yard	10.97	100	CA	..	..	..	..	100	..	-0.48	100	?	-0.39	100	?	..	100	..	..	100	..
651.5	Yarn of Flax	..	-100	..	..	..	..	..	100	..	-0.33	100	?	-0.53	100	?	-0.58	-100	CD	..	100	..
651.6	Yarn Synt.	-0.15	..	..	-0.34	-100	CD	-0.01	-97	CD	-0.01	-73	CD	0.27	-45	?	..	14	..	..	40	..
652.1	Cotton Fabr.	5.87	100	CA	2.11	100	CA	2.08	100	CA	0.16	99	CA	0.65	100	CA	0.67	100	CA	..	100	..
653.1	Silk Fabr.	..	..	..	..	..	..	..	..	..	-0.69	100	?	-0.88	100	?	-0.82	97	?	-0.05	100	?
653.2	Woolen Fabr.	0.80	..	..	-0.56	..	..	-0.54	0	?	-0.72	58	?	-0.77	-53	CD	-0.87	-51	CD	..	-8	..
653.4	Jute Fabr.	..	100	..	..	100	..	..	100	..	-0.16	100	?	0.70	100	CA	0.20	100	CA	..	100	..
653.5	Fabr. Synt.	0.29	..	..	0.92	..	..	1.25	-56	..	1.86	48	CA	1.90	-25	?	..	8	..	..	56	..
655.6	Cordage	..	100	..	..	100	..	..	89	..	1.92	97	CA	1.07	99	CA	0.94	98	CA	..	98	..
656.6	Blankets	..	..	..	..	..	..	..	-100	..	5.31	100	CA	5.05	56	CA	4.72	23	CA	..	48	..
656.9	Art. of Text. Mat.nes	..	..	..	..	..	..	..	62	..	7.17	95	CA	3.65	96	CA	2.36	97	CA	..	98	..
661.2	Cement	..	-100	..	..	-72	..	..	-100	..	0.17	-47	?	0.38	-78	?	0.36	23	CA	0.19	69	CA
694.0	Nails	..	-100	..	..	-100	..	..	-94	..	..	-98	..	3.64	-61	?	2.92	-39	?	..	-43	..
697.0	Household. Equip. of Base Met.	..	..	..	..	..	..	..	51	..	1.15	67	CA	1.48	92	CA	2.41	89	CA	..	97	..
711.5	Engine	1.39	-89	?	1.13	-97	?	3.30	-92	?	3.03	-72	?	3.25	-31	?	1.97	28	CA	..	36	..
712.1	Ag.M-Prep.	6.14	-5	?	2.62	-41	?	11.23	-60	?	4.35	43	CA	3.04	51	CA	4.91	76	CA	1.66	91	CA
712.2	Ag.M-Harv.	-0.09	-100	CD	1.34	-92	?	1.03	-92	?	7.80	-84	?	-0.19	-46	CD	-0.20	30	?	5.64	59	CA

Table A8 (Cont.)

SITC	SECTOR	Bowen Index (BI)	1964 Trad. Index (TI)	Clas. fic. (C)	1967 BI	1967 TI	1967 C	1970 BI	1970 TI	1970 C	1973 BI	1973 TI	1973 C	1976 BI	1976 TI	1976 C	1978 BI	1978 TI	1978 C	1980 BI	1980 TI	1980 C
712.5	Tractors	-0.40	-100	CD	-0.63	-91	CD	-0.66	27	?	0.09	-90	?	0.17	-82	?	-0.17	34	?	-0.02	64	?
714.1	Typewrit.	..	-54	..	..	2	..	..	49	..	0.77	10	CA	-0.71	40	?	1.44	49	CA	2.65	83	CA
714.2	Calculat.	..	-92	..	..	-89	..	..	-88	..	-0.92	-77	CD	-0.09	-74	CD	-0.10	-25	CD	0.10	63	CA
715.1	Mach.-Tools	..	-84	..	2.42	-90	?	2.10	-84	?	..	-94	..	4.24	-93	?	2.38	-84	?	..	-49	..
717.1	Text. Mach.	..	-96	..	..	-93	..	..	-95	..	..	-96	..	4.07	-93	?	2.17	-85	?	2.02	-86	?
717.3	Sew. Mach.	2.31	22	CA	0.39	-7	?	2.54	-23	?	2.56	-16	?	3.24	-10	?	5.99	-10	?	6.49	7	CA
718.4	Constr. "	0.22	-98	?	0.45	-92	?	1.64	-69	?	..	-77	..	2.32	-55	?	1.65	-26	?	-0.68	-12	CD
718.5	Min.Crush.	..	-85	..	..	-93	..	..	-87	..	..	-85	..	0.86	-82	?	0.59	-42	?	..	22	..
719.2	Pumps	-0.46	-93	..	..	-82	..	0.12	-80	?	-0.62	-86	CD	0.06	-91	?	0.30	-79	?	0.99	-49	?
719.4	Dom. Appl.	0.23	100	CA	0.34	..	..	0.74	..	..	0.77	84	CA	1.00	100	CA	0.95	100	CA	2.81	-7	?
719.6	Other "	..	-90	..	..	-85	..	..	-87	..	-0.41	-89	CD	-0.08	-76	CD	-0.68	-48	CD	-0.60	-26	CD
722.1	Elec. Mach.	3.96	-100	?	2.84	-96	?	4.29	-98	?	-0.63	-89	CD	-0.09	-81	CD	0.26	-81	?	-0.36	-69	CD
724.1	T.V.	-0.02	-100	CD	0.13	..	..	0.39	-100	?	0.73	3	CA	0.89	42	CA	0.95	22	CA	0.27	91	CA
724.2	Radio	-0.21	-100	CD	-0.34	-100	CD	-0.08	-91	CD	-0.38	-17	CD	-0.69	54	?	1.60	70	CA	..	63	..
724.9	Telec. nes	-0.62	-96	CD	-0.57	-97	CD	0.09	-84	?	-0.14	-84	CD	0.94	-88	?	0.23	-65	?	0.75	-39	?
725.0	Dom. Elec.	0.52	-28	?	0.62	-15	?	1.19	2	CA	0.31	-26	?	1.07	21	CA	0.96	30	CA	2.99	59	CA
729.1	Batteries	-0.26	-57	CD	-0.24	46	?	-0.07	76	?	0.96	-38	?	..	4	..	..	11	..	-0.16	10	?
729.2	Elec. Lamps	..	-73	..	..	-69	..	..	-82	..	-0.16	-83	CD	0.14	-71	?	0.17	-57	?	0.50	-28	?
729.3	Valves,tubes	..	-93	..	..	-75	..	..	-72	..	-0.99	-69	CD	-0.62	-79	CD	-0.40	-63	CD	-0.59	-51	CD
729.9	Elecs. nes	..	-95	..	..	-87	..	..	-68	..	..	-80	..	1.03	-81	?	0.04	-79	?	2.00	-65	?
731.5	Rail. cars	-0.67	..	..	-0.53	..	..	-0.17	..	..	-0.34	..	..	-0.27	-100	CD	-0.48	-100	CD	-0.74	-100	CD
732.1	Passg. "	-0.38	-53	CD	-0.37	-87	CD	0.02	-58	?	0.01	20	CA	0.01	96	CA	-0.09	100	?	0.00	100	..
732.2	Busses	0.51	100	CA	0.32	100	CA	1.31	100	CA	0.99	100	CA	1.82	100	CA	-0.50	100	?	-0.56	100	?

Table A8 (Cont.)

SITC	SECTOR	Bowen Index (BI)	1964 Trad. Index (TI)	Clas. fic. (C)	1967 BI	1967 TI	1967 C	1970 BI	1970 TI	1970 C	1973 BI	1973 TI	1973 C	1976 BI	1976 TI	1976 C	1978 BI	1978 TI	1978 C	1980 BI	1980 TI	1980 C
732.3	Lorries	..	-100	..	..	-100	..	..	-89	..	..	22	..	..	60	..	1.56	97	CA	1.58	98	CA
732.9	Motorcycl.	..	..	..	..	..	..	..	-100	..	-0.97	-100	CD	..	-100	..	-0.82	-95	CD	-0.47	-82	CD
733.1	Bicycles	-0.04	-100	CD	-0.50	..	..	0.12	-100	?	0.45	-31	?	0.55	-21	?	0.31	38	CA	0.87	6	CA
734.1	Aircrafts	..	-47	..	-0.98	-92	CD	-0.48	-99	CD	-0.55	-99	CD	0.55	-56	?	0.30	59	CA	0.08	-66	?
735.3	Ships	-0.54	100	?	-0.60	-100	CD	-0.29	-67	CD	-0.61	6	?	-0.29	5	?	0.84	66	CA	0.33	53	CA
841.1	Clothing	0.63	..	..	1.12	25	CA	1.64	-57	?	0.80	81	CA	5.79	69	CA	3.60	87	CA	..	76	..
851.0	Footwear	1.00	100	CA	0.87	100	CA	1.81	100	CA	-0.22	99	?	0.54	100	CA	1.17	100	CA	2.37	99	CA
861.4	Photoc.	..	-100	..	..	-100	..	..	-100	..	-0.36	-100	CD	0.52	-68	?	1.11	-55	?	1.63	-17	?
864.1	Watches	..	-100	..	..	-100	..	..	-100	..	..	-100	..	-0.92	-95	CD	-0.90	-95	CD	-0.61	-69	CD
864.2	Clocks	..	-100	..	..	-100	..	..	-100	..	..	-73	..	0.89	-73	?	1.87	-88	?	..	-97	..
891.1	Tape Rec.	..	-100	..	..	-89	..	..	-100	..	-0.86	-93	CD	-0.92	-63	CD	-0.82	-82	CD	4.70	-89	?
891.2	Rec.Tapes	..	-100	..	..	-100	..	..	-100	..	..	-92	..	2.38	-88	?	1.42	-70	?	2.38	-36	?
891.4	Pianos	..	..	..	..	100	..	..	29	..	-0.73	77	?	-0.72	40	?	-0.83	40	?	-0.82	30	?
895.2	Pens, Penc.	..	..	..	..	-100	..	..	-100	..	4.26	-75	?	5.83	-51	?	0.98	-30	?	..	-8	..

[a] When Bowen's index (BI) is equal to: 0 = comparative advantage is undetermined, BI < 0 = comparative disadvantage and BI > 0 = comparative advantage. In the case of traditional index: TI > 0 = comparative advantage, TI < 0 = comparative disvadvantage. TI is based on Brazilian imports from and exports to the world.
.. information not available.

[b] ? must be interpreted as a conflict between both indices in classifying a sector with or without comparative advantage.

Source: Own calculations based on UN, Commodity Trade Statistics; IBGE, Censo Industrial; UN, Industrial Statistics Yearbook; World Bank, World Tables.

Table A 9 - Brazil - A Comparison of the Traditional Concept of Revealed Comparative Advantage and Bowen's Index for Manufacturing Industries and Various Markets, 1964-80[a]

Year	Total number of sectors	Bowen index[b]		Revealed comparative advantage[c] (No. of sectors)				Revealed comparative disadvantage[c] (No. of sectors)			
		No. of sectors with advantage	No. of sectors with disadvantage	World	US	Rest of developed countries	ALADI	World	US	Rest of developed countries	ALADI
1964	12	5	7	3	-	-	10	9	10	12	1
		(13.0)	(12.0)	(3)			(4)	(7)	(7)	(7)	(0)
				(100)			(40)	(78)	(70)	(58)	(0)
1967	16	8	8	4	-	-	9	12	13	15	2
		(13.1)	(20.8)	(2)			(5)	(6)	(6)	(8)	(0)
				(50)			(56)	(50)	(46)	(53)	(0)
1970	24	14	10	4	3	3	12	20	19	21	6
		(17.9)	(10.1)	(2)	(1)	(2)	(7)	(9)	(8)	(9)	(2)
				(50)	(33)	(67)	(58)	(45)	(42)	(43)	(33)
1973	55	30	25	16	15	15	26	39	36	40	22
		(29.4)	(26.5)	(12)	(12)	(11)	(18)	(21)	(22)	(21)	(12)
				(75)	(80)	(73)	(69)	(54)	(61)	(53)	(55)
1976	69	49	20	26	20	20	44	43	41	47	21
		(40.0)	(14.5)	(22)	(17)	(16)	(34)	(17)	(15)	(15)	(7)
				(85)	(85)	(80)	(77)	(40)	(36)	(32)	(33)
1978	72	50	22	38	27	28	51	34	39	44	20
		(46.9)	(13.3)	(28)	(20)	(18)	(36)	(12)	(13)	(12)	(7)
				(74)	(74)	(64)	(71)	(35)	(33)	(27)	(35)
1980	48	32	16	25	13	16	39	23	30	32	8
		(28.6)	(9.9)	(17)	(11)	(12)	(28)	(8)	(11)	(12)	(4)
				(68)	(85)	(75)	(72)	(35)	(37)	(38)	(50)

[a]In 1976, for example, the Bowen index indicates comparative advantage for 49 Brazilian industries, whereas 26 sectors had a comparative advantage according to the RCA-concept (in case of trade with the world); 22 sectors out of these 26 sectors are also classified as sectors having a comparative advantage according to Bowen, i.e. a coincidence of 85 percent between both indices. - [b]The disaggregation was done at the 4-digit SITC-level. Figures in parentheses beneath Bowen's index represent exports of those sectors as a percentage of total manufactured exports. - [c]First figure in parentheses represent the number of sectors which coincide between both indices, the second figure indicates the degree of coincidence in percent.

Source: Own calculations based on UN, Commodity Trade Statistics.

Table A10 - Value Added per Employee in Industries in Brazil and Various Country Groups[a], 1980[b] (thousands of US$)

ISIC		Brazil	Developed market economies	Middle income developing countries	High income developing countries	ALADI
311/2	Food products	13.4	30.2	9.8	13.1	13.9
321	Textiles	11.6	18.7	7.2	10.6	10.9
322	Wearing apparel	7.9	14.3	4.8	8.1	7.4
323	Leather, fur products	11.5	18.1	7.3	10.8	10.4
324	Footwear	6.8	16.4	6.5	7.9	7.3
331	Wood, cork products	8.8	20.3	7.2	8.2	9.6
332	Furniture, fixtures	10.1	18.1	5.3	9.1	8.5
341	Paper	17.8	29.6	11.6	17.7	21.0
342	Printing, publishing	14.4	25.8	9.3	13.2	13.9
352	Other chemicals	25.6	36.9	18.8	21.3	22.9
355	Rubber products	18.4	24.1	11.3	14.6	17.9
356	Plastic products	14.2	23.4	9.0	12.9	12.9
382	Non-electr. machinery	12.5	25.4	8.3	13.7	13.8
383	Electrical machinery	18.1	24.9	9.6	14.0	15.9
384	Transport equipment	16.3	23.9	9.3	17.6	19.2
Total industries[c]		13.8	23.3	9.0	12.9	13.7

[a]Unweighted averages for all countries included in a specific country group. Country groups defined as in the source. - [b]In several cases, data is for 1979 or 1981. - [c]Unweighted averages for all industries listed.

Source: UNIDO, Handbook of Industrial Statistics 1984. - Own calculations.

Table A11 - Wages per Employee in Industries in Brazil and Various Country Groups[a], 1980[b] (thousands of US$)

ISIC[c]		Brazil	Developed market economies	Middle income developing countries	High income developing countries	ALADI
311/2	Food products	2.0	17.7	2.7	4.7	3.8
321	Textiles	2.3	9.7	2.7	4.7	3.7
322	Wearing apparel	1.7	7.9	2.0	3.6	2.7
323	Leather, fur products	2.4	14.3	2.4	4.5	3.0
324	Footwear	1.8	8.4	2.6	3.7	2.7
331	Wood, cork products	1.9	9.8	2.3	4.0	3.2
332	Furniture, fixtures	2.7	9.3	2.2	3.9	2.9
341	Paper	3.0	13.1	3.5	5.7	4.8
342	Printing, publishing	4.1	13.2	3.6	6.1	4.8
352	Other chemicals	4.6	13.4	3.7	6.8	6.2
356	Plastic products	2.3	10.9	2.7	5.0	3.7
382	Non-electr. machinery	3.8	13.5	3.7	5.9	5.0
383	Electrical machinery	3.6	13.0	3.2	5.5	4.6
384	Transport equipment	3.6	13.9	3.5	7.1	5.3
Total industries[d]		2.8	12.0	2.9	5.1	4.1

[a]Unweighted averages for all countries included in a specific country group. Country groups defined as in the source. - [b]In several cases, data is for 1979 or 1981. - [c]A differentiation of value added per employee into wage and non-wage components is not available for rubber products. - [d]Unweighted averages for all industries listed.

Source: UNIDO, Handbook of Industrial Statistics 1984. - Own calculations.

Table A12 - Non-Wage Value Added per Employee in Industries in Brazil and Various Country Groups[a], 1980[b] (thousands of US$)

ISIC[c]		Brazil	Developed market economies	Middle income developing countries	High income developing countries	ALADI
311/2	Food products	11.4	10.6	7.1	8.4	9.7
321	Textiles	9.3	8.6	4.5	5.9	7.0
322	Wearing apparel	6.2	6.1	2.8	4.4	4.5
323	Leather, fur products	9.1	3.7	4.8	6.1	7.1
324	Footwear	5.0	8.8	3.9	4.0	4.6
331	Wood, cork products	6.9	10.3	4.8	4.4	6.2
332	Furniture, fixtures	7.4	7.6	3.0	5.1	5.3
341	Paper	14.8	16.0	7.9	11.8	15.8
342	Printing, publishing	10.3	12.6	5.6	7.3	9.0
352	Other chemicals	21.0	24.2	14.7	14.7	16.4
355	Plastic products	11.9	12.3	6.4	7.8	9.1
382	Non-electr. machinery	8.7	11.3	4.4	7.8	8.7
383	Electrical machinery	14.5	11.9	6.3	8.4	11.1
384	Transport equipment	12.7	9.5	5.5	10.7	13.9
Total industries[d]		10.7	11.0	5.8	7.6	9.2

[a]Unweighted averages for all countries included in a specific country group. Country groups defined as in the source. - [b]In several cases, data is for 1979 or 1981. - [c]A differentiation of value added per employee into wage and non-wage components is not available for rubber products. - [d]Unweighted averages for all industries listed.

Source: UNIDO, Handbook of Industrial Statistics 1984. - Own calculations.

Table A13 - Spearman and Pearson Coefficients for Correlations between Factor Intensities in Brazilian Industries and Brazil's Export Pattern[a], without Machinery and Transport Equipment

Export pattern in different markets and periods	Value added per employee		Wages per employee		Non-wage value added per employee	
	Spearman	Pearson	Spearman	Pearson	Spearman	Pearson
World						
1967	-0.02	-	-0.24	-	-0.15	-
1973	-0.62**	-0.41	-0.59**	-0.33	-0.58**	-0.29
1981	-0.11	-	-0.12	-	0.11	-
Δ1967-73[b]	-0.21	-	-0.25	-	-0.15	-
	(-0.37)	(-0.50)*	(-0.36)	(-)	(-0.32)	(-)
Δ1973-81[b]	0.60**	0.42	0.54*	0.31	0.55*	0.31
	(0.62)**	(-)	(0.44)	(-)	(0.58)**	(-)
Developed market economies						
1967	-0.45*	-0.30	-0.11	-	-0.34	-
1973	-0.65**	-	-0.55*	-0.42	-0.57*	-0.41
1981	-0.39	-0.51*	-0.58*	-0.39	-0.43	-
Δ1967-73	-0.24	-	-0.23	-	-0.17	-
Δ1973-81	0.21	-	0.14	-	0.12	-
Developing countries						
1967	0.50*	0.07	0.07	-	0.38	-
1973	0.37	-	0.03	-	0.35	-
1981	0.60**	-	0.17	-	0.63**	-
Δ1967-73	-0.04	-	0.10	-	0.14	-
Δ1973-81	0.14	-	0.07	-	0.25	-
ALADI						
1967	0.52*	0.11	0.10	-	0.40	-
1973	0.35	-	0.00	-	0.32	-
1981	0.53*	-	0.08	-	0.53*	-
Δ1967-73	0.07	-	0.20	-	0.30	-
Δ1973-81	0.08	-	0.03	-	0.16	-

[a]Correlations are run between factor intensities as reported in Table 2.2 and export shares of the respective industries in total Brazilian manufactured exports to various markets as reported in Table A6. "Δ" denotes the change in export shares in percentage points. Pearson coefficients are given only if correlation results differ between both procedures, i.e. Spearman rank correlations being statistically significant and Pearson correlations remaining insignificant, and vice versa. - ** significant at the 5 percent level; - *10 percent level. - [b]In parentheses: change in export shares in percent.

Source: Tables 2.2 and A6. - Own calculations.

Table A14 - Evolution of Revealed Comparative (Dis)Advantage of Brazilian Manufactured Exports Classified by Export Market at 2-Digit SITC-Level, 1962-81 (number of sectors)[a]

Year	Revealed comparative advantage					Revealed comparative disadvantage				
		Markets					Markets			
	World	Developed ecs.	Developing ecs.	ALADI	Centr. planned ecs.	World	Developed ecs.	Developing ecs.	ALADI	Centr. planned ecs.
1962	5 (18.6)	3 (16.9)	10 (80.0)	5 (67.7)	7 (74.2)	16 (77.4)	17 (78.4)	8 (11.6)	9 (6.2)	6 (2.5)
1967	9 (29.3)	5 (31.7)	15 (83.0)	14 (83.0)	9 (88.4)	15 (70.8)	18 (67.9)	7 (16.7)	6 (7.4)	4 (7.9)
1968	5 (17.3)	3 (30.9)	13 (76.2)	12 (88.3)	9 (89.5)	20 (82.6)	21 (68.1)	10 (22.5)	8 (5.4)	6 (8.8)
1973	8 (48.6)	7 (61.2)	18 (79.2)	18 (92.7)	7 (45.0)	17 (51.4)	18 (38.8)	8 (20.8)	6 (7.2)	15 (53.4)
1974	9 (38.0)	7 (48.7)	15 (87.3)	18 (88.3)	7 (41.3)	16 (62.0)	18 (51.3)	10 (12.7)	8 (11.7)	14 (57.9)
1978	11 (50.2)	9 (43.2)	18 (93.7)	19 (92.3)	16 (79.4)	14 (49.8)	18 (56.8)	6 (6.3)	6 (7.7)	8 (20.1)
1979	12 (51.5)	9 (44.6)	20 (93.6)	20 (92.6)	18 (80.6)	13 (48.5)	16 (55.4)	5 (6.4)	5 (7.4)	7 (19.2)
1981	15 (55.1)	10 (34.3)	22 (96.7)	22 (96.5)	22 (99.2)	10 (44.9)	15 (62.6)	3 (3.3)	3 (3.5)	3 (0.8)

[a]Numbers in parentheses represent total exports of those sectors as a percentage of total manufactured exports to the region.

Source: Table A7.

Table A15 - Average Rates of Nominal Tariff Protection in Brazil, 1966-80 (percent)

	June 1966	April 1967	Jan. 1969	Nov. 1973	1978	1980
Mining	27	14	n.a.	22	n.a.	27
Non-metallic minerals	79	40	51	52	52	109
Metallurgy	54	34	47	40	n.a.	77
Machinery	48	34	44	38	46-60	56
Electrical and com. equipment	114	57	71	56	48-177	95
Transport equipment	108	57	91	43	82-129	102
Lumber and wood	45	23	67	66	79	125
Furniture	132	68	87	76	148	148
Paper	93	48	58	49	14-43	120
Leather	108	66	86	73	139	157
Chemicals	53	34	n.a.	22	23-60	48
Pharmaceuticals	48	37	29	21	26	28
Perfumery	192	94	n.a.	48	156	161
Plastic	122	81	n.a.	44	205	204
Textiles	181	48	122	91	200	167
Apparel and shoes	226	103	176	106	120-170	181
Food	82	27	40	73	n.a.	108
Beverages	205	83	183	131	182	179
Tobacco	193	78	167	141	183	185
Printing and publishing	122	59	44	35	n.a.	86
Miscellaneous	104	58	60	42	73	87
Manufacturing average	99	48	66	57	n.a.	99
Agriculture	36-137	10-17	n.a.	34	n.a.	54

n.a. = not available.

Source: Tyler (1976, Table VII-10, p. 239); World Bank (1983).

Table A16 - The Relationship between Policy Incentives and Factor Intensities in Brazilian Industries: Rank Correlation Results, 1980[a]

Incentive rates[b]	Value added per employee		Wages per employee		Non-wage value added per employee	
Fiscal export incentives	0.18	(0.29)	0.04	(0.45)	0.25	(0.23)
Financial export incentives	-0.54	(0.04)	-0.30	(0.19)	-0.48	(0.07)
Total export incentives	-0.01	(0.49)	-0.10	(0.38)	0.12	(0.37)
Implicit nominal protection	-0.28	(0.19)	0.02	(0.47)	-0.24	(0.24)
Adjusted anti-export bias	-0.27	(0.20)	0.14	(0.34)	-0.27	(0.21)
Adjusted effective incentives to domestic sales	-0.33	(0.15)	0.13	(0.35)	-0.32	(0.17)

[a] In parentheses: level of significance of Spearman correlation coefficients; number of observations: 12 in case of value added per employee, 11 in case of wages and non-wage value added per employee.
[b] For the definition of incentive rates, see Table 2.5.

Source: Tables 2.2 and 2.5. - Own calculations.

Table A17 - The Openness of Different Brazilian Industries, 1963-80 (percent)[a]

	1963		1967		1973		1980	
SITC	X/Q	M/Q	X/Q	M/Q	X/Q	M/Q	X/Q	M/Q
66 Non-metallic mineral products	0.1	2.6	1.2	1.9	3.2	3.4	2.7	2.0
71 Mechanical equipment	1.4	67.6	5.2	45.6	3.5	38.0	11.1	18.5
72 Electrical and communication material	0.1	11.8	0.7	13.2	3.4	22.5	5.3	15.2
73 Transport equipment	0.4	8.5	0.7	9.5	1.8	7.4	9.7	6.1
243,63 Wood and furniture	8.5	0.1	13.3	0.1	7.7	0.1	6.2	0.7
25,64 Paper & paper products	0.1	9.4	0.4	7.5	3.4	9.2	10.6	4.8
61,831 Leather	1.1	0.3	5.9	0.3	10.7	0.9	19.2	1.2
231.2,266,42,43,5 Chemicals	3.6	14.0	4.1	15.3	4.9	17.4	4.2	10.6
541 Pharmaceutical products	0.3	3.9	0.6	3.7	0.8	7.9	2.1	8.1
55 Perfumery, soap	2.2	2.6	2.7	2.3	3.5	4.0	4.5	2.7
267,65 Textiles	0.2	0.2	0.8	0.4	4.8	1.5	5.3	0.7
84,851 Clothing & footwear	0.03	0.0	0.2	0.1	10.1	0.5	8.4	0.2
892,895 Printed matter	0.0	3.4	0.0	4.7	1.1	2.8	1.1	2.4

[a]The export and import data was translated to Cruzeiros according to the following exchange rates, as published by the IMF, International Financial Statistics (item rf): 0.521 Cr. per US$ in 1963, 2.669 in 1967, 6.126 in 1973, and 52.71 in 1980. X stands for exports, M for imports, and Q for production. The relationship between SITC-categories and the Brazilian classification was taken from Silber (1983, Table 25, p. 134).

Source: Own calculations based on IBGE, Anuário Estatístico do Brasil; UN, Commodity Trade Statistics.

Table A18 - Relative Importance of Different Types of Firms in Industrial Sectors of Brazil, 1972 (percent)[a]

Industrial sector	Public firms	Type of private firms	
		National	Multinational
Non-metallic mineral products	-	40.2	59.7
Metallurgy	52.5	21.0	26.5
Mechanical equipment	-	25.4	74.6
Electrical and communication material	-	23.8	76.2
Transport equipment	-	3.6	96.4
Wood and wood products	-	82.4	17.6
Paper and paper products	-	63.0	37.0
Furniture	-	100.0	-
Leather	-	n.a.	n.a.
Chemicals	13.3	35.6	51.1
Plastics	-	30.0	70.0
Pharmaceuticals	-	7.0	93.0
Perfumery, soap	-	96.7	3.3
Textiles	-	62.1	37.9
Clothing and footwear	-	50.1	49.7
Printed matter	-	99.0	1.0
Food	-	46.2	53.8
Beverages	-	85.4	14.7
Tobacco	-	0.1	99.9
Total	20.7	24.0	55.3

[a]Classification according to total sales (faturamento)

Source: Doellinger, Cavalvanti (1975, Table III.8, p. 39).

Table A19 - Participation of Foreign-Owned Firms[a] in Total Employment, Value Added, Domestic Sales, Exports and Export Subsidies in Brazil, 1978 (percent)

	Employ-ment	Value added	Domestic sales	Export sales	Export subsidies: Export credit	Export subsidies: Income tax exemption
Total manufacturing	26.1	35.9	33.0	38.8	47.5	33.5
Non-metallic minerals	22.4	29.2	28.4	32.3	41.1	40.4
Basic iron and steel	26.4	37.1	34.9	18.7	21.3	17.8
Basic non-ferrous	18.2	24.1	22.4	38.2	51.1	23.7
Metal products	19.1	30.8	25.4	43.7	34.8	37.6
Machinery	34.8	47.1	43.5	59.5	52.1	44.8
Electrical equipment	54.7	66.5	62.4	80.0	81.4	58.6
Transport equipment	53.7	60.0	69.0	67.2	75.2	48.2
Wood	5.9	5.3	3.3	14.8	18.1	9.0
Furniture	4.9	6.3	5.3	3.1	3.4	4.5
Pulp and paper	14.6	21.4	19.1	22.7	23.2	32.2
Rubber products	45.1	67.8	70.7	83.0	84.4	88.3
Leather and goods	9.6	13.9	11.9	21.1	17.2	4.9
Chemicals	32.0	25.1	20.3	9.2	24.3	18.4
Pharm., cosmetics	46.9	59.0	54.3	57.9	48.9	57.8
Plastics	11.9	17.8	17.9	20.0	25.9	12.2
Textiles	19.5	27.2	27.4	36.6	36.2	45.3
Clothing	3.1	5.6	5.1	6.9	10.2	0.8
Footwear	2.9	2.7	4.0	0.9	1.7	0.0
Food and tobacco	12.6	20.6	20.4	30.1	32.5	28.2
Printing	4.7	5.6	4.9	0.1	0.9	1.7
Other manufactures	27.1	39.9	34.0	24.7	36.5	47.1

[a]Defined as firms in which non-residents controlled more than 10 percent of equity. Thus, 841 out of 12 435 sample firms were labelled foreign-owned firms.

Source: ECLA (1985, p. 21, Table 2).

Table A20 - Logit Analysis of the Probability of Exporting in Brazilian Industries[a]

	Regression coefficients[b]				
	Constant	lnS	lnK	ADV	LICFOR
Non-metallic minerals	-8.823**	0.825**	-0.588*	24.769*	0.253
	(2.414)	(0.121)	(0.227)	(9.771)	(0.427)
Basic iron and steel	-12.790**	0.861**	-0.298	97.242**	0.614
	(3.171)	(0.138)	(0.251)	(33.610)	(0.493)
Basic non-ferrous metals	-19.586**	1.438**	-0.653	85.768**	0.580
	(5.016)	(0.275)	(0.367)	(31.877)	(0.672)
Metal products	-11.988**	1.044**	-0.633**	29.660**	1.396**
	(2.034)	(0.090)	(0.157)	(8.909)	(0.312)
Machinery	-13.650**	1.162**	-0.581**	25.647**	0.721**
	(1.999)	(0.092)	(0.137)	(6.165)	(0.218)
Electrical equipment	-12.457**	1.029**	-0.526**	16.777**	0.697*
	(2.616)	(0.115)	(0.182)	(5.342)	(0.280)
Transport equipment	-10.106**	0.735**	-0.272	6.950	0.668
	(2.768)	(0.111)	(0.207)	(10.379)	(0.396)
Wood	-18.443**	1.288**	-0.408*	13.675	0.952
	(2.858)	(0.138)	(0.197)	(7.147)	(0.862)
Furniture	-18.517**	1.114**	-0.197	7.560	0.410
	(4.070)	(0.163)	(0.341)	(9.836)	(0.715)
Pulp and paper	-28.402**	1.012**	0.704**	38.564	0.753
	(3.250)	(0.113)	(0.220)	(22.517)	(0.544)
Rubber	-18.247**	1.230**	-0.337	-46.528	0.013
	(4.021)	(0.175)	(0.285)	(34.540)	(0.819)
Leather	-27.980**	1.931**	-0.435	50.256	-1.283
	(3.693)	(0.192)	(0.288)	(26.652)	(0.938)
Chemicals	-6.860**	0.473**	-0.207*	8.427	0.871**
	(1.580)	(0.075)	(0.105)	(4.817)	(0.243)
Pharm., cosmetics	-15.459**	0.898**	-0.179	2.144	0.776*
	(3.048)	(0.110)	(0.256)	(2.519)	(0.356)
Plastics	-17.724**	0.844**	0.091	14.339	1.963**
	(3.412)	(0.137)	(0.252)	(9.612)	(0.507)
Textiles	-19.328**	1.202**	-0.219	39.629**	0.247
	(2.047)	(0.098)	(0.115)	(14.530)	(0.320)
Clothing	-12.240**	0.844**	-0.347	33.255**	0.097
	(2.659)	(0.116)	(0.188)	(10.742)	(0.693)
Footwear	6.271	1.671**	-3.006**	-3.742	-3.686**
	(4.720)	(0.228)	(0.521)	(11.085)	(1.294)
Food, tobacco	-14.697**	0.857**	-0.174**	0.002	0.177
	(1.094)	(0.056)	(0.066)	(2.294)	(0.318)
Printing	-18.648**	1.279**	-0.616	-5.701	2.967**
	(6.508)	(0.282)	(0.479)	(20.553)	(0.742)
Other manufactures	-9.856**	0.986**	-0.651**	16.937**	0.688
	(2.849)	(0.131)	(0.190)	(5.917)	(0.410)

[a] In parentheses: asymptotic standard errors; ** indicates significance at the 1 percent level; * 5 percent level. - [b] S: firm size, measured by the natural logarithm of value of sales; K: capital intensity defined as value added per employee; ADV: ratio of advertising expenditures to domestic sales; LICFOR: dummy variable which is equal to one in case of foreign participation in the form of direct investment or licensing agreement, and zero otherwise.

Source: ECLA (1985, p. 36, Table 12).

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