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AN APPRAISAL OF INTRA-FIRM EXPORTS FROM BRAZIL IN 1980 AND 1990

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I. INTRODUCTION

INTRA-firm trade remains an unexplored subject in the literature about Brazilian foreign trade, as it is in most countries. Moreover, this is a relatively recent phenomenon.[1] The availability of specific data at the firm level is certainly one of the major constraints.

Arguments in support of research efforts in this direction are varied. One might refer, for instance, to the growing stream of analysts who argue that one of the reasons behind Japan's persistent trade surplus with the United States is directly linked to intra-firm operations: overseas subsidiaries of Japanese companies in the United States import vastly more from their factories and suppliers in Japan than they export from the United States. This has led to renewed attention to the removal of structural barriers to trade and investment in wholesale or distributional activities.

Other reasons to go into an analysis at the micro level would follow from the consequences that a high participation of intra-firm transactions in the total trade of a given country might have on the effectiveness of domestic policy. The list of effects may be of any size but would certainly comprise transfer pricing and the consequent difficulties to be met by customs officials, and lower sensitivity of trade flows to relative price changes (like exchange rate devaluations), since decisions would be taken with regard to the internal strategies of the trading firm, and not necessarily (at least for some time) as reactions to macroeconomic variables and constraints on bilateral trade negotiations, among others.

Some analysts who have looked at the recent performance of Brazilian exports tend to put emphasis in structural, non-price factors that seem to have predominantly influenced export growth. It might be argued that among these factors one should also include the new features that are bound to affect the performance of a trade bill predominantly composed of industrial products.

This article aims at contributing to that debate by presenting estimates of exports going from affiliates based in Brazil to their parent companies, as an

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[1] Except, perhaps, if one considers the historical precedents of barter trade and some imperial monopolies trading with colonies.

approximation of intra-firm trade in 1980 and 1990,[2] based on primary data at the firm and product levels. The next section presents a brief overview of the analyses concerning some basic features of Brazilian trade, followed by a presentation of the methodology adopted for the estimation of intra-firm trade transactions. Section III presents the empirical results, and the last section summarizes the main findings and makes some inferences with regard to the importance of these indicators for policymaking.

II. SOME RELEVANT FEATURES OF BRAZILIAN EXTERNAL TRADE

The Brazilian experience with export promotion is often referred to as a successful example. Not only have total exports grown at very remarkable rates in the period between the mid-1960s and the early 1990s (total export value increased from U.S.$2.6 billion in 1970 to U.S.$31.6 billion in 1991), but efforts to promote nontraditional products, which most countries have often aimed to increase, have shown positive results (exports of industrialized products increased from 41 per cent of total exports in 1979 to 70 per cent in 1990).

Furthermore, it is worth noting that Brazilian exports have reached a degree of diversification in composition unmatched by other Latin American countries. Consider, for instance, an indicator such as the share of the five main products in total export value. Between 1970 and 1987 that share has fallen from 81 per cent to about 57 per cent. This means a far more diversified list of exports than those of other important exporters like Argentina, Mexico, Colombia, and Chile, where the same indicator in 1987 ranged between 72 per cent for Argentina and 88 per cent for Chile [3].

Geographic diversification in the destination of markets for exports has also been another remarkable feature of the Brazilian experience. In 1970 more than 73 per cent of Brazilian trade relations (exports plus imports) were with the United States and Western Europe. Aggressive market diversification strategies helped reduce that share to about 45 per cent by the beginning of the 1980s, although one decade later that figure increased to more than 55 per cent [4].[3] Nevertheless this still means that Brazil has a far more diversified geographic range of trade flows than other Latin American countries, it can be argued that—at least for some manufactures—exports did not go to the more dynamic markets so that from the mid-1980s the "destination effect" seems to have had a negative contribution to the overall growth of manufactured exports.[4]

Most econometric analyses of the determinants of growth of Brazilian exports

[2] 1990 was the last year for which information was available, at the time of processing the data; 1980 was chosen as a reference year, because it pictures the situation at the beginning of the decade, it includes the effect of the large basic inputs producing plants installed in the late 1970s and it is representative of the period before the external debt crisis.

[3] Recent (post-1986) movements towards more intense regional integration with other Latin American partners might lead to significant changes in the coming years, as witnessed by the growth of trade flows within Mercosul.

[4] See in this regard Mandeng [10] and Bonelli [8].

point to the predominant effect of world demand growth, but also stress the significant contribution of relative prices. In fact, it has been shown that the value of incentives to the export sector was quite substantial from the late 1970s up to the mid-1980s. Braumann [2] has estimated that for 1982 the aggregate value of all export incentives[5] (including those provided under BEFIEX's[6] special export programs) reached 76.6 per cent of the FOB value of manufactured exports, 10.3 per cent referring to benefits associated with drawback operations, 21.7 per cent to subsidized credit, and the rest (44.6 per cent) stemming from tax reductions.

High as these figures might seem, their appraisal requires that one takes into account the fact that they have always been officially presented as compensatory devices to offset the cost pressures derived from the tariff structure [1]. The basic assumption was that structural pressures on the balance of payments called for (mainly trade) barriers, which had to be neutralized by these incentives so as to reduce or eliminate any anti-export bias.

Fiscal constraints, coupled to external reactions by trade partners, and the generalized view shared by most economic agents that protection against imports had reached unsustainable levels, forced the redefinition of the whole trade policy in the late 1980s. Most export incentives were to be replaced by sustained real devaluation.[7] This, together with the existence of idle capacity in the manufacturing sector, contributed to boost export values.

Despite the impressive export performance, however, it is remarkable that export growth since the mid-1980s has been achieved in spite of a substantial deterioration in every indicator of competitiveness [8].[8] It has been argued that non-price factors have become one of the major explanatory factors of export performance in recent years. More specifically, it is suggested that some type of "hysteresis effect" of export quantities—where a delay in reacting to sudden and sharp real exchange rate fluctuations may be due to the existence of nonrecoverable costs that firms incur in order to penetrate external markets—might explain a good deal of the recent low sensitivity of Brazilian exports to price variation [9].

A different—but complementary—set of explanations to this lower sensitivity of trade flows to relative price variations might follow from the consideration of the new features of trade. In particular, the presence of increasingly important trade within the same industries calls for the analysis of other determining factors.

[5] These estimates refer to potential rather than actual figures. That is, they comprise all the benefits that could accrue to an exporter of a manufactured product if he satisfied all the preconditions required for each incentive. It is important to stress that the 1982 figures correspond to a peak for the period 1968–88, and that they comprise both subsidies (strictly speaking) and other universally adopted incentives, such as tax rebates.

[6] BEFIEX means Comissão para Concessão de Incentivos Fiscais a Programas Especiais de Exportação. This is a committee linked to the Ministry of Industry, Trade and Tourism, Brazil.

[7] The reduction of trade barriers emptied the "compensatory" argument favoring export incentives.

[8] Bonelli [7] presents empirical tests of four measures of competitiveness: the real effective exchange rate, the wage-exchange rate ratio, a purchasing-power measure of ratio between domestic and foreign price indices and unit labor costs.

One of the puzzling aspects of trade among industrial countries is the high level of exchange in products belonging to the same classification. To the extent that developing countries diversify their trade towards greater participation of industrial exports, it might be expected that a similar phenomenon would occur, and in fact it has been shown [5] that during the 1980s bilateral trade flows between Latin America and other regions have become increasingly of the intra-industry type. Brazil is no exception, and there are indications that by 1988 over 20 per cent of its trade with North America and more than 30 per cent of its trade with other Latin American countries took place within given industries.

Another piece to be added to this puzzle is the very fact that the Brazilian industrialization process presents among other peculiar features a high participation of foreign capital, unmatched by other developing economies. Estimates of foreign-owned firms accounting for over 30 per cent of total sales in the industrial sector are very common in Brazil. By a similar token, the participation of foreign firms in industrial exports is quite significant. For example, an analysis of the one thousand largest firms exporting industrialized products in 1980 and 1990[9] indicates that the participation of foreign-owned firms in the exports of those products was 38 per cent in 1980 and 44 per cent in 1990.

Indicators of such magnitude with regard to intra-industry trade, coupled with high participation of foreign-owned trading firms and to the geographic orientation of trade flows as mentioned previously allow for the expectation that a number of transactions might take place among the several branches of multinational enterprises.

What these apparently loose pieces of evidence add up to is that part of the explanation for the reduced sensitivity of Brazilian exports to relative price variation observed in recent years might be related to these new features of external trade. The remaining sections of this article present a tentative quantification of the importance of intra-firm exports from Brazil which can contribute to the mapping of these new features.

III. METHODOLOGICAL PROCEDURES

The primary sources for the estimations of intra-firm trade were special listings of the one thousand largest exporters from Brazil in 1980 and in 1990, using primary data from DECEX.[10] These two samples corresponded to over 90 per cent of total Brazilian exports in each of those years. Export values in 1980 refer to the eight-digit classification according to the Nomenclatura Brasileira de Mercadorias, compatible with the SITC classification. Figures for 1990 refer to

[9] See Bielschowsky [6].

[10] Every export operation in Brazil has to be registered at Departamento de Comércio Exterior (DECEX) (Ministry of Industry, Trade and Tourism, Brazil). Primary data thus comprise the exporters' names, the products exported (ten-digit classification, according to the Harmonized System), the volume and amount of each operation and the market of destination for each product. For this study we were able to process this primary information for the one thousand largest exporting firms in 1980 and 1990.

the ten-digit classification of the Harmonized System adopted by Brazil in January 1989.

The first step of the analysis was the identification of capital ownership of each exporting firm and the home country of the main investors. This was done using a number of publications, such as the interinvest guide, *Quem é quem* (published yearly by *Revista visão*), *500 maiores* (published yearly by *Conjuntura econômica*), and other sources. The basic criterion was to consider either a participation in equity capital equal to or higher than 25 per cent or the control over the board's decisions in each case.

The second step consisted of the identification of the main export products by firm, and the corresponding classification of each product.[11] The third step included the identification of the main market of destination for the exported products. The criterion was to isolate those countries that corresponded to the most important markets for the exports of each product. For the main export product we retained the classification according to SITC (1980) or the Harmonized System (1990).

The fourth step was obviously the analysis of the exports of the foreign-owned firms, isolating each group of firms by home country of the main investor and identifying the main market of destination for the two principal export products.[12]

It was assumed that for a firm owned by citizens of a given country X, if a significant share of the firm's exports from Brazil were shipped to country X, it was likely that most of it consisted either of intra-firm trade transactions or sales to be channeled via the parent company or its distribution network.

This is not what is often conceived as "intra-firm trade" strictly speaking, but it is the only possible approximation allowed by the available information.

Notice that the definition of intra-firm trade comprises transactions among affiliates within the same multinational company, as well as trade between each affiliate and the matrix company. One might expect the latter to be more significant than the former, but this remains an untested hypothesis. It should be clear that the present study allows for an approximation of only part of the trade between affiliates and their matrix companies. In other words, what this study provides are estimates of intra-firm exports from subsidiaries of foreign firms operating in Brazil. The concept of intra-firm trade requires that these be matched with corresponding information relative to imports by these subsidiaries of products exported from their matrix companies.[13]

[11] The first steps of this work—data collection, homogenization of product classifications, identification of capital ownership, and others—were done by José Mauro de Morais, from the Ministry of Planning, Brazil.

[12] The processing of data relative to the principal export products, capital ownership of the exporting firms, and market of destination was done by Jaime Lopez, from the Economic Commission for Latin America and the Caribbean (ECLAC).

[13] A somewhat more elastic concept of intra-firm trade would take into account the recent tendency among large companies not to care about keeping subsidiaries abroad; instead, they provide technology and equipment to subcontracting firms that belong to third parties. It has been argued that trade between these two sets of enterprises might also be considered as intra-firm trade (see Mattar-Schatan [11]).

TABLE I

INTRA-FIRM EXPORTS FROM BRAZIL: RELATIVE IMPORTANCE IN RELATION TO TOTAL AND MANUFACTURED EXPORTS, 1980 AND 1990

(%)

	1980	1990
Percentage of total exports:		
Principal product	3	6
Two main products	4	7
Percentage of manufactured exports	5	9

Source: Estimates based on primary data from Departamento de Comércio Exterior (DECEX).

It can be argued, however, on the basis of information from other countries, that the distortions of the analysis may not be as big as they seem if firms behave in the same way as U.S. companies. The already-mentioned study by Organisation for Economic Co-operation and Development (OECD) has found that "intra-firm trade within OECD countries is overwhelmingly composed of parent's sales to affiliates rather than the other way around. On the other hand, U.S. firms established in LDCs tend to buy more from affiliates than sell to them" [12, p. 13].

The analysis was carried on the basis of the "sectoral classification" of the "principal" export product for each firm and its most important market of destination.

In order to allow for an approximation of the overall "magnitude" of intra-firm transactions (as previously defined), the analysis was not restricted to the main export product. In some cases it was possible also to identify exports to the home country of more than one product by each selected firm. This was considered to satisfy the previous assumption, and the exports of the second product in importance were added to the exports of the main product.

IV. EMPIRICAL RESULTS

The analyses that focus on the globalization of productive processes tend to assume a positive relation between the growth of foreign investment—as well as trade liberalization measures—and the relative importance of intra-firm trade flows between multinational parents and their affiliates in developing countries.

The above-mentioned evidence regarding the high participation of foreign-owned firms in the Brazilian export sector, as well as the indicators of the rising importance of intra-sectoral flows would suggest that the phenomenon of intra-firm trade might be as important in Brazil as in other countries.

Figures for 1980 and 1990 presented in Table I suggest however that this does not seem to be true. The relative importance of intra-firm exports from Brazil has increased significantly during the last decade, but this type of trade still accounts for a very limited part of the overall figures, even if one considers only manufactured products.

TABLE
ESTIMATES OF INTRA-FIRM

Home Country	Number of Firms	Total Exports (U.S.$ Million)	% of Sample[a] Exports	Number of Firms[b]	(D)/(B) (%)
(A)	(B)	(C)		(D)	(E)
Italy	12	541	3	6	50
USA	108	2,179	12	23	21
German	50	1,059	6	10	20
Japan	44	527	3	11	25
UK	15	456	2	2	13
Belgium	8	177	1	2	25
Netherlands	13	138	1	2	15
Canada	7	212	1	1	14
Switzerland	14	156	1	3	21
France	13	107	1	4	31
Total	284	5,552	30	64	22

Source: Estimates based on primary data from DECEX.
[a] Exports by the one thousand largest exporting firms.
[b] Those for which the principal market for the main export product is the home country.

Comparative figures for other countries are obviously very difficult to obtain, given the limited access to primary data that allow for such calculation. The only approximation that could be found relates to U.S. Department of Commerce statistics, as reported in OECD [12]. Intra-firm trade accounted in 1989 for about one-third of U.S. exports, and there is no evidence of a significant increase in the relative importance of this type of trade in the last decade. That is, one finds indication of a high but stable pattern of intra-film trade. Figures in Table I indicate a quite different result for Brazil, with low but increasing shares of trade of this type.

A comparison of the indices of intra-sectoral trade obtained for Brazil with those for the OECD would indicate a very similar pattern—high and stable indices for the latter and low but sharply increasing indices for the former [5].

These two sets of evidence relative to new forms of trade suggest that foreign trade in Latin American countries—Brazil in particular—might at some time in the future come closer to the pattern found in industrial countries, as far as the increasing importance of the new features is concerned.

This is not the place to argue about the factors that determine such convergence of indicators. Changes in the composition of trade flows are likely to explain a good deal of this phenomenon.[14] The remaining sections of this article concentrate on the discussion of the available evidence of intra-firm exports from Brazil in 1980 and 1990.

[14] Universal characteristics of trade in some industries are probably one of the most important determining factors.

II

EXPORTS FROM BRAZIL, 1980

Intra-Firm Exports					
		Exports to the Home Country			
Total Exports (U.S.$ Million) (F)	(F)/(C) (%) (G)	Main Product (U.S.$ Million) (H)	(H)/(F) (%) (I)	Four Main Products (U.S.$ Million) (J)	(J)/(F) (%) (K)
409	76	168	41	229	58
484	22	179	37	220	46
305	29	121	40	179	59
186	35	128	69	130	70
25	5	8	33	8	33
47	27	32	68	33	69
18	13	10	56	14	76
64	30	37	56	37	58
19	13	11	56	12	62
30	29	13	43	16	51
1,587	29	707	43	878	54

As described in Section III, it was possible to build some indicators of intra-firm exports based on samples of the one thousand largest exporting firms in those two years, and assuming that if a foreign-owned firm exported a significant amount to the home country of the parent company, then it was likely that it was either a transaction internal to the firm or that the goods were channeled using the parent firm distribution network. From the available data it is not possible to isolate how much of these exports are purely intra-firm transactions, but they give a rough idea of the relevant magnitudes.

Tables II and III summarize the basic indicators. The analysis is centered on data for 284 foreign-owned firms in 1980 and 294 firms in 1990, accounting for 30 and 38 per cent respectively of the total amount exported by the one thousand largest exporters in those two years. From the data there is evidence that the home country of the parent companies was the principal market for the main export product for 64 firms in 1980 and 98 firms in 1990, representing 29 and 42 per cent respectively of the total value exported by these foreign-owned firms.

The indicators of intra-firm trade obtained here refer to those products imported by the home country of the parent company. It can be seen that whenever this type of trade occurs, it accounts for a very important share of the firm's activities in the external market. The last columns in Tables II and III indicate that if the two main export products in each firm are considered, this type of trade would correspond to over half the total amount exported by these firms (or about 44 per cent, if only the main export product is considered). This seems to suggest some kind of geographical pattern of specialization for some firms.

TABLE
ESTIMATES OF INTRA-FIRM

Home Country	Number of Firms	Total Exports (U.S.$ Million)	% of Sample[a] Exports	Number of Firms[b]	(D)/(B) (%)
(A)	(B)	(C)		(D)	(E)
Italy	12	955	3	6	50
USA	99	3,899	13	49	49
Germany	54	1,837	6	11	20
Japan	46	1,565	5	14	30
UK	21	761	3	4	19
Belgium	10	360	1	2	20
Netherlands	10	407	1	1	10
Canada	4	239	1	2	50
Sweden	8	224	1	1	12
Switzerland	11	245	1	3	27
France	17	403	1	4	23
Spain	2	89	0	1	50
Total	294	10,984	38	98	33

Source: Estimates based on primary data from DECEX.
[a] Exports by the one thousand largest exporting firms.
[b] Those for which the principal market for the main export product is the home country.

It is also interesting to note, in these two tables, that the indicators of intra-firm trade are rather concentrated in companies where the majority of capital belongs to investors from ten countries in 1980 and twelve countries in 1990. All of them are industrialized countries.

This means that there is no evidence of intra-firm trade occurring on a South-South basis.[15] Intra-firm transactions require the identification of the comparative advantages of each productive unit in different countries. Labor costs and the endowment of natural resources would seem to explain a significant part of the differences in the comparative advantages among countries. One would therefore expect that investment from one developing country into another (presumably with similar endowments of labor and natural resources) be determined by other factors, such as trade barriers. Direct (nonfinancial) investment of the "tariff jumping" type would probably duplicate the productive structure of the home country, therefore reducing the margin for intra-firm trade transactions.[16]

[15] Note that this does not eliminate the possibility of internal operations among affiliates within the same multinational enterprise. Unfortunately the methodology adopted here (determined by the availability of data) does not allow for the appraisal of such trade flows.

[16] The appraisal on intra-firm operations is an important issue for the analysis of regional integration processes; intra-firm verticalization of production processes might affect several aspects of the integration process, like the phasing out of tariff rates, among others.

III

EXPORTS FROM BRAZIL. 1990

Intra-Firms Exports					
		Exports to the Home Country			
Total Exports (U.S.$ Million) (F)	(F)/(C) (%) (G)	Main Product (U.S.$ Million) (H)	(H)/(F) (%) (I)	Four Main Products (U.S.$ Million) (J)	(J)/(F) (%) (K)
811	85	284	35	371	46
2,182	56	930	43	1,089	50
348	19	143	41	172	49
744	48	433	58	444	60
37	5	16	74	19	84
82	23	47	58	50	62
18	4	18	99	18	99
157	66	57	36	57	36
77	34	15	20	15	20
26	10	13	52	16	64
45	11	19	41	19	41
74	83	53	71	53	71
4,601	42	2,028	44	2,323	51

At the individual country level, figures in Tables II and III are not strictly comparable, as they refer to different samples.[17] But on the whole they would seem to confirm the overall indication of an increasing importance of intra-firm trade. For each country, the relative importance of those firms for which there is indication of this type of trade in 1990 is much higher in terms of the total sample than in 1980 (42 per cent as against 29 per cent).

This might affect the bilateral trade relations between Brazil and these countries, among other things to the extent that complementarity in productive processes might affect (reduce) the probability of one country imposing barriers to trade with the other country and hence allow for less unstable anticipated foreign exchange revenue. Tables IV and V show the relative importance of intra-firm trade as defined here in the total exports from Brazil to these twelve countries. These tables take into account the indicators of trade with the home country comprising the two most important products exported by each firm.

One first remark is that the figures for the Netherlands are somewhat misleading, because—as is well known—a substantial amount of imports into that country actually consist of goods destined for other European markets. This reduces significantly the relative weight of exports by Dutch firms from Brazil when compared to the total value registered as exports to that country. But the available

[17] Although a large number of firms are common to the two lists.

TABLE IV
SHARE OF INTRA-FIRM TRADE IN TOTAL EXPORTS FROM BRAZIL TO SELECTED COUNTRIES, 1980

(U.S.$ million)

	Intra-Firm (A)	Total Exports (B)	(A)/(B) (%)
Italy	229	980	23.4
USA	220	3,510	6.3
Germany	179	1,337	13.4
Japan	130	1,232	10.6
UK	8	550	1.5
Belgium	33	356	9.3
Netherlands	14	1,150	1.2
Canada	37	243	15.2
Switzerland	12	120	10.0
France	16	822	1.9

Source: Estimates based on primary data from DECEX.

data does not allow for a more detailed level of information as required for the analysis.

Tables IV and V indicate that in 1990 some 15–20 per cent of the exports from Brazil to Italy, the United States, and Japan were of the type considered here as intra-firm. When compared to 1980 that share had risen quite markedly for the United States and Japan. It remained constant for Italy, but at a very significant level; nearly one-fourth of the Brazilian exports to that country in those two years consisted of intra-firm transactions.

The relative share of intra-firm transactions in the exports to Germany, Belgium, the Netherlands, Canada, Switzerland, the United Kingdom, and France either remained rather constant (the latter two) or fell during the decade due to sharper increases in total bilateral exports.[18]

Figures for 1990 also comprise significant indicators of intra-firm trade transactions for Sweden and Spain, which should be added to the 1980 list.

Table V suggests therefore three groups of countries, as far as the relative importance of intra-firm transactions in bilateral trade is concerned: a first group with indicators ranging between 14 per cent and 23 per cent (Italy, the United States, and Japan), a second group with indicators around 7 per cent (Germany, Canada, Sweden, Switzerland, and Spain), and a third group where the indicators are less than 2 per cent (the United Kingdom, the Netherlands, and France). Topics for further research would include the relation between this ranking of indicators and the sectoral composition of investment and of trade flows between these countries and Brazil.

Table I has shown that intra-firm trade accounted in 1980 and in 1990 for a rather limited portion of Brazilian exports, although the four other tables have

[18] Germany is the only country to present a small reduction (U.S.$179 million to U.S.$172 million) in the estimated value of intra-firm exports.

TABLE V

SHARE OF INTRA-FIRM TRADE IN TOTAL EXPORTS FROM BRAZIL TO SELECTED COUNTRIES, 1990

(U.S.$ million)

	Intra-Firm (A)	Total Exports (B)	(A)/(B) (%)
Italy	371	1,585	23.4
USA	1,089	7,551	14.4
Germany	172	2,128	8.1
Japan	457	2,671	17.1
UK	19	1,107	1.7
Belgium	50	794	6.3
Netherlands	18	1,938	0.9
Canada	57	733	7.8
Sweden	15	192	7.9
Switzerland	16	220	7.3
France	19	1,142	1.6
Spain	53	746	7.1

Source: Estimates based on primary data from DECEX.

indicated that this is an increasingly relevant topic at the firm level as well as for bilateral trade flows. We now need to explore its relative importance for each sector.

Brazilian trade statistics for 1980 are presented in Table VI in accordance with a domestic product classification (Nomenclatura Brasileira de Mercadorias, NBM), and that is how the primary data for each firm has been processed. For 1990 data shown in Table VII, products are classified by the more universal Harmonized System. This is why Tables VI and VII are set forth in accordance with these two different criteria of product grouping.

Table VI indicates that most of the intra-firm trade in 1980 took place in metalliferous (essentially iron) ore, followed by coffee, pulp, other semimanufactures like cocoa paste, fruit juices, tobacco, and a number of manufactured goods, mainly electrical machinery, road motor vehicles, and ferro alloys.

It is interesting to note, however, that this ranking of importance in terms of the absolute value of intra-firm operations has a very low correlation with the corresponding ranking of the share of intra-firm exports on total sectoral exports. In fact, for the product groups listed above it was only for electrical machinery that this type of trade corresponded to a significant share of total sectoral exports.[19]

In relative terms, the product groups for which intra-firm exports accounted in 1980 for significant shares of total exports comprise ramie yarn (70 per cent), propylene (69 per cent), electrical machinery and apparatus (65 per cent), rutin (53 per cent), wheat (50 per cent), machine tools (48 per cent), and television transmitters and receivers (44 per cent).

[19] One of the reasons is, of course, the very fact that multinational companies have a very low participation (if at all) in the exports of these products.

TABLE VI

INTRA-FIRM EXPORTS FROM BRAZIL BY PRODUCT GROUPS, 1980

(U.S. million)

NBM[a]		Intra-Firm Trade (A)	Total Exports by NBM[a] (B)	(A)/(B) (%)
02.01	Meat and meat preparations	3	78	3.3
03.03	Crustaceans and molluscs	2	90	1.9
09.01	Coffee and coffee substitutes	86	2,486	3.5
09.02	Tea	2	12	16.2
10.07	Wheat	2	5	49.6
15.07	Vegetable oils	5	671	.0.7
16.02	Other meat preparations	5	234	1.9
18.03	Cocoa paste	23	244	9.3
20.07	Fruit juices	22	364	6.0
21.02	Extracts or essences of coffee	11	287	4.0
24.01	Tobacco, unmanufactured	24	290	8.4
24.02	Tobacco, manufactured	1	5	21.6
26.01	Metalliferous ores	199	1,722	11.5
29.09	Propylene	9	13	68.6
29.41	Rutin	2	4	53.3
29.42	Natural alkaline compounds	1	6	12.8
38.11	Disinfectants, insecticides	6	27	20.5
39.06	Other high polymers, resins	2	7	31.2
40.11	Rubber tires, tire cases	5	99	4.8
47.01	Pulp	70	364	19.2
50.04	Silk yarn	3	28	10.4
53.05	Yarn of wool	1	60	2.3
54.02	Flax or ramie yarn	5	7	69.8
64.05	Footwear parts	4	20	21.9
73.02	Ferro-alloys	27	181	15.0
84.06	Internal combustion engines	12	353	3.3
84.11	Air, vacuum pumps	2	40	3.9
84.41	Sewing machines	2	38	5.4
84.47	Machine tools	8	16	47.9
84.59	Mechanical machinery, n.e.s.	2	47	4.9
85.13	Telecommunications equipment	9	31	29.6
85.15	TV transmitters, receivers	50	113	44.0
85.21	Electrical machinery, apparatus	40	62	65.2
87.02	Road motor vehicles	54	744	7.2
87.06	Parts, accessories of vehicles	4	211	2.0
90.17	Professional instruments	3	12	24.0
93.04	Firearms	1	29	4.2
93.06	Parts, accessories of firearms	2	8	24.3

Source: Estimates based on primary data from DECEX.

[a] Brazilian product classification.

The above paragraphs would indicate that in 1980 a good deal of intra-firm exports from Brazil had a strong component of exploiting the advantages the country has in natural-resources-based products.

They also indicate, however, that some of the manufactured product groups with significant amounts of intra-firm transactions (electrical machinery and road

motor vehicles) are related to consumer goods. These are also the industries with intra-firm transactions concentrated mostly in the United States and Japan, according to OECD [12].

In 1990, figures in Table VII indicate that iron ores, fruit juices, and coffee accounted for most of the intra-firm exports, followed by aluminium, pulp, tobacco, and parts and accessories for road vehicles. This is very similar to the figures obtained for 1980.

As with the situation in 1980, these were not necessarily the product groups for which intra-firm transactions accounted for most of the country's exports. For a number of other groups in Table VII, intra-firm exports accounted in 1990 for over half of total sectoral exports, and these comprised industries as varied as medicinal and pharmaceutical products (like amine-function compounds and glycosides), natural fibers, nonmetallic manufactures (sanitary fixtures of ceramic materials and laboratory glassware), capital goods (such as vapor-generating boilers and internal-combustion piston engines), as well as electronic devices and others.

To allow for a better comparison of the structures in both years, a correlation was made of the 1980 data in Table VI with the Harmonized System (not shown here). It turns out that in 1980 and in 1990 there was evidence of intra-firm exports for forty-two and seventy four-digit product groups, respectively,[20] with twenty-five product groups common to the two sets. If anything, this simultaneity would be indicative of a relatively stable sectoral structure of intra-firm trade, whatever the relative weight of these transactions in comparison to the country's total exports.

From this common set of product groups it follows that both at the beginning and by the end of the decade there was evidence of intra-firm transactions in the exports of seven types of products: primary goods (crustaceans and mollusks, coffee); semimanufactures (meat preparations, fruit juices, extracts of coffee, tea and mate, tobacco, iron ore, yarns of silk and jute); miscellaneous manufactured products (tires, pulp and paper, footwear and parts, ferro-alloys, dental instruments and appliances); chemical and pharmaceutical products (propylene, glycosides, organotherapeutic glands); nonelectrical capital goods (internal-combustion piston engines, air pumps, sewing machines); electronic products (radio-broadcast receivers, diodes and transistors, electronic microcircuits); and transportation equipment (road vehicles, parts and accessories for road vehicles).

This is a quite varied list of sectors, and one can identify explanatory attributes ranging from the intensity of natural resources to forms of commercialization. The difficulties in isolating a predominant pattern are similar to those found in the analysis of the country's trade structure, as already mentioned.

Be that as it may, what these lists of product groups seem to suggest is that intra-firm transactions are likely to have become sufficiently important in sectoral terms so as to be worth some consideration in the analyses of recent trade performance and the contribution of trade to growth. As a rough indicator, take for instance the sectoral rates of export and product growth during the 1980s

[20] Out of over one thousand groups in the product classification.

TABLE VII

INTRA-FIRM EXPORTS FROM BRAZIL BY PRODUCT GROUPS, 1990

(U.S. million)

Harmonized System (HS)	Product	Intra-Firm Trade (A)	Total Exports by HS Division (B)	(A)/(B) (%)
02.07	Poultry and edible offals thereof	4	339	1.10
03.06	Crustaceans and molluscs, frozen	1	111	1.31
09.01	Coffee	19	1,106	1.72
13.02	Vegetable extracts; pectic substances	2	13	18.93
15.15	Fixed vegetable oils	4	41	8.85
16.02	Meat preparations	7	135	5.37
17.04	Sugar confectionery, sugar preparations	3	42	6.45
18.03	Cocoa paste	3	72	4.02
18.04	Cocoa butter and cocoa paste	9	136	6.58
20.09	Fruit juices	59	1,503	3.96
21.01	Extracts, essences of coffee, tea, mate	2	176	1.32
24.01	Tobacco, unmanufactured	19	565	3.32
26.01	Iron ores and concentrates	378	2,407	15.70
26.06	Aluminium ores and concentrates	49	149	32.54
28.04	Oxygen, hydrogen, nitrogen, rare gases	2	117	1.50
28.49	Carbides, other than calcium carbide	0	11	4.21
29.10	Propylene	4	26	17.26
29.18	Carboxylic acids and their derivatives	1	31	4.60
29.22	Oxygen-function amino-compounds	5	67	7.10
29.24	Amine-function compounds	10	15	66.89
29.38	Glycosides; glands and other organs	8	9	90.44
30.01	Organo-therapeutic glands	4	15	28.96
38.23	Other chemical products	5	44	11.19
39.01	Polyethylene	8	154	5.12
39.03	Polystyrene and its copolymers	3	23	11.34
39.04	Copolymers of vinyl chloride	7	103	6.36
39.10	Silicones	3	5	55.42
39.20	Plates, sheets, film or foil of plastics	7	41	17.48
40.11	Tyres	20	224	9.14
42.06	Articles made from gut, bladders, tendons	4	7	52.89
47.03	Pulp and paper	92	592	15.49
50.04	Silk yarn	10	66	14.44

TABLE VII (Continued)

Harmonized System (HS)	Product	Intra-Firm Trade (A)	Total Exports by HS Division (B)	(A)/(B) (%)
53.05	Yarn of jute or other vegetable fibres	4	5	34.57
63.05	Sacks & bags, of textile materials	8	17	45.35
64.06	Footwear and parts	6	77	7.50
68.04	Mineral manufactures, n.e.s.	4	10	35.55
69.10	Sanitary fixtures of ceramic materials	14	20	68.18
70.13	Glassware	5	21	23.37
70.17	Laboratory, pharmacuetical glassware	3	4	77.91
72.02	Ferro-silicon and other ferro-alloys	23	380	5.95
73.11	Containers of iron or steel for gas	4	9	42.04
76.01	Aluminium	167	957	17.43
82.02	Hand tools and machine tools	1	7	19.38
84.07	Internal-combustion piston engines	101	176	57.50
84.08	Steam, other vapour generating boilers	214	312	68.58
84.13	Pumps for liquids	6	80	7.75
84.14	Air pumps, vacuum pumps	77	236	32.62
84.15	Air conditioning machines	48	62	77.95
84.18	Refrigerators and refrigerating equip.	8	58	14.06
84.29	Civil engineering equipment	3	150	1.91
84.31	Parts, construction and mining machinery	5	40	11.57
84.39	Parts of paper and pulp mill machinery	11	64	17.53
84.52	Sewing machines	25	90	26.12
84.58	Lathes, metalworking	3	29	9.13
84.65	Machine tools for working wood	1	9	14.67
84.69	Typewriters	3	24	14.44
84.71	Data processing machines	6	53	11.97
84.81	Taps, cocks, valves, similar appliances	3	39	8.84
85.05	Electro-magnets	1	11	7.93
85.11	Electrical equipment for engines	3	35	9.43
85.16	Electro-thermic appliances	14	24	58.95
85.27	Radio-broadcast receivers	171	313	54.81
85.41	Diodes, transistors and similar devices	2	7	28.92
85.42	Electronic microcircuits	22	36	60.77

TABLE VII (Continued)

Harmonized System (HS)	Product	Intra-Firm Trade (A)	Total Exports by HS Division (B)	(A)/(B) (%)
85.44	Equipment for distributing electricity	15	78	19.41
87.03	Road vehicles	181	417	43.51
87.04	Passenger motor cars	24	452	5.36
87.08	Parts and accessories for road vehicles	75	532	14.15
90.09	Parts, accessories for office machines	11	22	50.38
90.18	Dental instruments and appliances	2	14	15.08

Source: Estimates based on primary data from DECEX.

[8, Table 10]. The sectors where exporting was a major contributor to the overall sectoral growth rate in 1985–89 are mineral extraction, basic metals, transportation equipment, paper and pulp, and chemicals. It goes without saying that this listing is quite similar to the sectoral concentration of the indicators of intra-firm exports in 1980 and 1990 reported previously. The point to stress can be better illustrated by the figures in Table VIII.

In order to build Table VIII, the original product data for each firm of the samples of main exporters were reclassified according to their corresponding economic activity. This was done with the help of the 1985 input-output matrix for Brazil, leading to the identification of each activity, and then making the correspondence to the ISIC (International Standard Industrial Classification) three-digit classification.[21] The sectoral data thus obtained were compared to original estimates of sectoral exports built from primary data using ECLAC's Badecel Database, according to the ISIC classification.[22]

Figures in Table VIII illustrate the relatively intense rhythm of growth of intra-firm transactions, as defined for the present purposes. As one would have expected, this kind of trade was particularly intense for industrial products, almost doubling its participation in the total exports of this type of goods between 1980 and 1990.

At the sectoral level, these figures also indicate an increasing importance of intra-firm trade, and more specifically in those industries for which there is evidence that exports have accounted for most of the sectoral dynamism in recent years. Figures in Table VIII show that—except for the paper industry—in those industries where the rate of product growth depended most upon the external market, the estimated amount of intra-firm exports varied more sharply than total sectoral exports.

[21] This part of the work is also undertaken by José Mauro de Morais.
[22] Estimates kindly made available by R. Bielschowsky [6].

TABLE VIII

GROWTH OF INTRA-FIRM EXPORTS FROM BRAZIL IN COMPARISON TO SELECTED AGGREGATE AND SECTORAL INDICATORS IN 1980 AND 1990

A. Selected Aggregate in 1980 and 1990

(U.S.$ million)

	1980	1990	Average Annual Growth (%)
Total intra-firm	878	2,323	16.5
Total exports	20,132	31,414	5.6
Intra-firm —Industrial products	613	1,998	22.6
Total —Industrial products	11,738	22,119	8.8

B. Average Annual Growth Rates for Some Sectoral Exports, 1980–90

(%)

	Total	Intra-Firm
Metal ore mining	5.5	13.3
Paper manufacturing	12.8	3.1
Industrial chemicals	35.0	84.9
Other chemical products	2.9	15.2
Transportation equipment	4.7	66.4

Sources: See text.
Note: Growth rates from current dollar values.

V. SUMMARY AND POSSIBLE IMPLICATIONS

The methodology adopted here was conditioned by the availability of data referring only to exports, and required the assumption that sales to the home country are directly or indirectly linked to the parent company, thus allowing for an approximation of intra-firm transactions. The lack of more precise data at the firm level as well as the nonexistence of a corresponding tabulation of import data are obvious limiting factors.

The first point to stress from the evidence presented in this article is that the overall magnitude of intra-firm trade seems to be rather limited in Brazil.

However, this should not be viewed as making the subject irrelevant. It was shown that the importance of intra-firm transactions has increased sharply in the last decade, and that it accounted in 1990 for very significant shares of exports in some industries.

This study has shown that for some industries there is evidence of intra-firm exports in both 1980 and 1990, indicating a relatively stable structure throughout the decade. These comprise a broad range of sectors, as diverse as primary

products, chemicals, light manufactures, capital goods, electronic products, and transportation equipment. The main determining characteristic of this set is not immediately identifiable.

Whatever the reasons for this sectoral distribution, however, the industries involved are the same for which previous studies have found that export performance explains most of the dynamism in recent years. It would seem that a number of features are involved here that might affect economic policies. Those industries that have relied most on the dynamism of the external market in recent years are the same ones for which there are indications of intra-firm exports. At the same time, it was shown that for the firms with internal export transactions, this type of trade comprises most of their export activities, and it is well known that—at least in the short run—intra-firm trade is likely to be more responsive to market strategies than to variables external to the firm.

One obvious outcome of this reasoning is a speculative hypothesis about whether these particular features might be responsible for part of the lower price-sensitivity of Brazilian exports in recent periods—as found in other studies—in spite of the relatively low weight of this type of trade activity in the country's overall trade.

A first set of implications from these results should be of interest for both academics and policymakers: the existence of intra-firm trade may call for qualifications in the simulated distributive effects of export growth which are often estimated on the basis of factor contents derived from intra-industry technical coefficients. The more significant the share of intra-sectoral and intra-firm trade, the less clearly identifiable the effects of trade on factors income.

Other policy implications follow from the very possibility that internal transactions between parent firms and their affiliates may facilitate the dissimulation of transmission prices, with consequences both for customs valuation and for tax purposes. Needless to say, this may also bring about effects over domestic competition and the effectiveness of such measures like anti-dumping, countervailing duties, and others. Bilateral negotiations should consider also these new features.

A third set of consequences follows from the former two, and has to do with the links between trade liberalization, trade growth and the links between trade and economic growth. One could in principle expect a positive relationship between trade liberalization and intra-firm operations, but since decisions to export and import become a function of parameters that correspond to the market strategy of the firm, at least in the short to medium-run, price elasticities of trade flows might differ from what one would expect based on previous experience. By the same token, the links between trade and investment decisions become even less clear than in the absence of such transactions. Evidence provided here and elsewhere [5] of rapidly rising trade of the intra-sectoral and intra-firm types suggests that Brazilian policymakers should take these new features increasingly into consideration.

Fourthly, at least two other normative inferences would follow from the evidence of increasing, sectorally concentrated intra-firm exports. The first has to do with the exploitation of natural resources. The indication of intra-firm transactions involving primary products calls for the discussion about the appropriation of

rents. It might be wise to design a tax policy that allows the state to maximize its gains from such activity. This would seem particularly worth considering, given that recent experience has shown that in Brazil—as different from Mexico and Chile—exporting might have negative fiscal effects.

A second normative inference has to do with the indirect indication that larger intra-firm transactions might lead to relatively lower price-sensitivity of exports. A policy recommendation would be to implement direct negotiation mechanisms with the relevant firms, involving performance requirements.[23] This would, however, require a better knowledge of the corresponding information relative to intra-firm imports, not available at the time this study was written.

This article would not be complete without strong recommendations that further research be carried out on intra-firm trade in Brazil. Suggested lines of action would be similar, complementary investigation based on import figures and/or specific enquiries at the firm level. It is hoped that the present results might be useful as a guide for the identification of some relevant sectors.

[23] Without the fiscal and administrative costs of similar programs implemented in the past.

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