

SPECIALIZATION AND COMPETITIVENESS IN BRAZILIAN FOREIGN TRADE

OTAVIANO CANUTO & CLÉSIO L. XAVIER *

Abstract

This paper approaches the effects of patterns of specialization on Brazilian foreign trade. By applying a Constant–Market–Share Analysis to the Brazilian export and import bills between early–80s and mid–90s, we attempt to assess the quantitative weights of structural effects, allocation effects and competitiveness effects along that period. Our results point out to a substantial negative role played by prevailing patterns of specialization with respect to the attainment of trade balances compatible with domestic high growth.

Key words: patterns of specialization; balance of payments constraints to growth; Brazil; Constant–market–share analysis.

Clasificación JEL: F43;F12;F14

Recibido: 16 de julio de 2001.

Enviado a dictamen: 20 de agosto de 2001.

Aceptado: 29 de noviembre de 2001.

Introduction

This paper approaches the effects of *patterns of specialization* on Brazilian foreign trade in the period between early–80s and mid–90s. Patterns of specialization are here defined as the sector structure of its exports *vis-à-vis* the sector composition of world trade, as well as the sector structure of imports as compared to the sector composition of domestic aggregate demand. The paper presents an assessment of the quantitative weight of patterns of specialization upon export and import growth along that period, also comparing that weight with the role played by changes in competitiveness.

Section 1 revisits the method of Constant–Market–Share (CMS) analysis, through which one may be able to decompose the evolution of exports and imports into several determinants. Notwithstanding the fact that CMS presents some known limitations, it still may be useful as a first approximation to discriminate effects from sector and geographical specialization, as well as the effects of changes in competitiveness. We also point out some advantages of adding the well–known “competitiveness matrix” developed by the Economic Commission for Latin America and Caribbean (ECLAC) to the analysis.

Section 2 applies CMS and the “competitiveness matrix” approach to Brazilian exports and imports. One of the highlighted aspects is the sensitiveness of results depending on which version of CMS method is utilized. As shown in the case of exports, results change substantially once the so–called “allocation effects” are taken into account in the unbundling of determinants of foreign trade growth. The weight of patterns of specialization is substantially altered when those allocation effects are introduced. In any case, our assessment of structural and allocation effects—that is, effects of prevailing patterns of specialization—suggest their strong relevance in the case of Brazilian exports and imports along the period.

* Respectively, professors of economics at Unicamp and Unip. The first is the corresponding author: ocanuto@eco.unicamp.br. Otaviano canuto also thanks CNPq for a research scholarship. An earlier version of this paper was discussed at the RIO 2000 – TRIPLE HELIX INTERNATIONAL CONFERENCE, Rio de Janeiro, April 26–29, 2000. The authors thank all comments by their participants as well as by two anonymous referees to this journal. Usual caveats apply.



Currently, there is an on-going convergence towards the idea that “specialization matters” with respect to questions of economic growth or welfare [Dallum *et al*, 1996], [Meliciani, 1998]. Traditional trade theories have focused on the origins of diversity among national patterns of specialization, and have paid less attention to growth or welfare implications of that diversity. On the other hand, evolutionary and Keynesian approaches to trade and growth have often called attention upon the possibility that differing patterns of specialization might imply divergence in income levels and growth among countries, either through balance-of-payments constraints to growth and/or by associated patterns of technological evolution [Dosi *et al*, 1990], [McCombie & Thirlwall, 1994] [Canuto & Cimoli, 1998]. In their turn, some of the new endogenous growth models have also recognized that possibility [Grossman & Helpman, 1991]. Conclusions obtained from our exercise of cms analysis suggest that those implications might be very significant in the Brazilian case.

Constant-market-shares analysis revisited

Constant-market-share analysis of a country’s (or a region’s) exports corresponds to a method by which one can approach the evolution of sales abroad, along a certain period, as a synthesis of four determinants:

- i) **Market Growth Effect (ME)**. It corresponds to the increase in exports which should (notionally) come merely from growth of world trade in case of no variation in the country’s market-share. As long as there occurs no alteration in the country’s competitiveness *vis-à-vis* the rest-of-the-world, as well as the sector composition of exports coincides with the world average, the rate of growth of exports equals the rate at the world trade level. The country’s market-share in the global market would remain constant throughout the period;
- ii) **Sector Structure Effect (SE)**. Growth of world trade is the weighted average of different sector-specific market increases. Whatever be the reasons behind these sector-specific growth rates, they will manifest themselves as distinct sector-specific elasticities of demand. There will usually be no coincidence between, on the one hand, the sector composition in the country’s export bill and, on the other, the corresponding sector parcels of world trade. In this case, the economy’s foreign sales will be subject to a Sector Structure Effect: apart from changes in sector or general changes in competitiveness, exports will grow above (or below) the pace at world level depending on whether its sector composition is mostly comprised by high-growth (or low-growth) sectors;
- iii) **Geographic Structure Effect (GE)**. Growth of world trade is also the weighted average of country-specific imports increases. As long as there is no coincidence between the country’s exports destinations and the world’s geographic composition of imports, there will exist a Geographic Structure Effect: apart again from changes in competitiveness, exports will rise faster (or slower) than world trade depending on whether foreign sales are mainly directed towards high-growth (or low-growth) countries; and
- iv) **Competitiveness Effect (CE)**. Changes in competitiveness relative to the world—at both sector-specific and country levels—will also be partially responsible for the trajectory of exports. Competitiveness Effects with a broad width and/or a general nature are those typically derived from macroeconomic variables (exchange rates, interest rates, nominal wage rates, tax burden, etc.) as well as systemic variables (infrastructure, general labor qualification, transaction costs, etc.). In both general and sector-specific cases of changes in competitiveness, they will materialize in different intensities at each sector level, not only because of the sector-specific features of competition, but also because the weights of macroeconomic and systemic factors differ among sectors [Canuto, 1995], y [Canuto & Cimoli, 1998].

Even though cms is most often applied to exports, there is no reason why it cannot be adapted to the case of imports. Given the fact that intra-industry trade has increased through time, in both developed and newly

industrializing economies, trade analyses should not restrain themselves to sales abroad. Otherwise the picture of patterns of specialization might come out quite elusive. Increasing geographic specialization among intermediate activities in productive chains, implying imports and exports of semi-finished goods, may not be captured with the sole examination of sales abroad.

In the case of imports, a cms could discriminate between:

- (i) ME*: the increase of imports that would (notionally) follow from the growth of domestic markets, if the sector structure of imports coincides with the sector composition of domestic aggregate demand, as well as if there is no change in competitiveness *vis-à-vis* foreign production;
- (ii) SE*: the effect derived from the larger or smaller presence in the imports bill of sectors with domestic market growth higher than the aggregate demand growth;
- (iii) CE*: symmetrically to the export side.

The unbundling of effects can be directly derived from a manipulation and rearrangement of exports and imports data [Richardson, 1971]. Let us begin with the exports side. Define:

s = market share of local exports in the global market;
 q and X = respectively, national and world exports; and
 $i = 1, \dots, n$ sectors and $j = 1, \dots, m$ countries.

$$\dot{q} = \sum_i \sum_j s_{ij} \cdot \dot{X}_{ij} + \sum_i \sum_j \dot{s}_{ij} \cdot X_{ij} \quad [1]$$

Then (with a dot \cdot on the variable designating it as a time derivative):

The first right-side term corresponds to the Growth Effect whereas the second one is a measure of the Competi-

tiveness Effect. By simultaneous adding and subtracting of identical terms, the above identity can be extended to:

$$\dot{q} \equiv s \cdot \dot{X} - s \cdot \dot{X} + \sum_i s_i \cdot \dot{X}_i - \sum_i s_i \cdot \dot{X}_i + \sum_i \sum_j s_{ij} \cdot \dot{X}_{ij} + \sum_i \sum_j X_{ij} \cdot \dot{s}_{ij} \quad [2]$$

Rearranging terms:

$$\dot{q} \equiv s \cdot \dot{X} + \left[\sum_i s_i \cdot \dot{X}_i - s \cdot \dot{X} \right] + \left[\sum_i \sum_j s_{ij} \cdot \dot{X}_{ij} - \sum_i s_i \cdot \dot{X}_i \right] + \sum_i \sum_j X_{ij} \cdot \dot{s}_{ij} \quad [3]$$

The first term at right-hand side reflects the Growth Effect of world trade, whereas the second and third, respectively, capture the Sector Structure Effect and the Geographic Structure Effect. The last right-hand side term reflects the sector-specific and geographically-specific different Competitiveness Effects.

The Sector Structure Effect (SE)-i.e the second term in identity (3)-can be translated in terms of Revealed Comparative (Dis)Advantages in exports. Since $s = q / X$ and $s_i = q_i / X_i$, the second term equals to:

$$SE \equiv \left[\sum_i \frac{q_i}{X_i} \cdot \dot{X}_i - \frac{q}{X} \cdot \dot{X} \right] \quad [4]$$

Multiplying the first term in (4) by q_i / q_i and the second term by X_i / X_i as well as recalling that

$$\dot{X} \equiv \sum_i \dot{X}_i$$

one obtains the SE as:

$$SE \equiv q \left[\sum_i \frac{\dot{X}_i}{X_i} \frac{q_i}{q} - \frac{X_i}{X} \right] \quad [5]$$

The term between brackets in (5) reflects the Revealed Comparative (Dis) Advantages (RCAs) of the country, assuming positive (negative) values in the sector cases of advantages (disadvantages). If the composition of exports



matches exactly the one at world level, SE equals to zero. Conversely, if there is specialization—and thereby sector cases in which the terms within brackets assume positive and negative values—the SE will be positive (or negative) depending on whether the sectors with positive bracket terms are mainly those with world market growth above (below) average.

Following a similar procedure with respect to the Geographical Effect—i.e the fourth right-side term of (3) —we also get to GE in terms of RCAs:

$$GE \equiv q \left[\sum_J \frac{X_J}{X_J} \frac{q_J}{q} - \frac{X_J}{X} \right] \quad [6]$$

EG is positive (negative) when the structure of destination of exports contains a geographical specialization in foreign countries with above-average (below-average) growth of imports.

Let us now see the imports side. Define:

m and m_i = total and sector-specific imports by the country;

Y and v = domestic aggregate demand and the country's imports/aggregate-demand ratio; and

y_i e v_i = sector-specific domestic demand and imports/ domestic demand at the sector level.

Then:

$$\dot{m} \equiv \sum_i v_i \cdot \dot{y}_i + \sum_i y_i \cdot \dot{v}_i \quad [7]$$

Adding and subtracting the term that corresponds to the i Growth Effect:

$$\dot{m} \equiv v \cdot \dot{Y} + \left[\sum_i v_i \cdot \dot{y}_i - v \cdot \dot{Y} \right] + \sum_i y_i \cdot \dot{v}_i \quad [8]$$

The first term at the right-hand side is the domestic Growth Effect on imports growth (ME^*), whereas the second and third terms correspond respectively to SE^* and to CE^* .

SE^* can also be translated in terms of Revealed Comparative (Dis) Advantages of local production relative to foreign suppliers. Since $v_i = m_i / y_i$ and $v = m / Y$, we obtain:

$$SE^* \equiv \sum_i \frac{m_i}{y_i} \cdot \dot{y}_i - \frac{m}{Y} \cdot \dot{Y} \quad [9]$$

Multiplying the first term by m / m and the second by y_i / y_i , as well as recalling that:

$$\dot{Y} \equiv \sum_i \dot{y}_i$$

$$SE^* \equiv m \left[\sum_i \frac{\dot{y}_i}{y_i} \left(\frac{m_i}{m} - \frac{y_i}{y} \right) \right] \quad [10]$$

we get to:

The term between brackets will be positive (negative) when imports at the sector-specific level are relatively higher (lower) than the coefficient of imports in local aggregate demand. SE^* becomes positive (negative) when the sector structure of imports predominantly contains sectors with domestic market growth higher (lower) than average. When it comes to Sector Structure Effects, predominance of relative comparative disadvantages in dynamic sectors imply declining exports and rising imports.

It is worth recalling some factors leading to an imperfect identification between RCAs at the exports and imports sides:

- natural protection differs substantially among sectors due to national differences in tastes and preferences, freight and insurance costs etc.;
- the same applies to tax structures, protection and subsidies; and
- there is some aggregation of heterogeneous activities even at highly disaggregate data about trade and industry, so that imports and exports items might not refer to



similar production activities. This fact becomes particularly relevant when one uses aggregate levels of industry and trade classification.

It is also worth stressing that observed Sector and Geographic Structure Effects refer to a *state* of the structure, that is to say, to a position of specialization of the local productive structure with respect to more or less growth-dynamic sectors and markets. During a focused period one may credit to higher or lower concentration of specialization in dynamic sectors some partial responsibility for increases in exports and imports.

On the other hand, Competitiveness Effects refer to *changes* of focus in the structure of exports and imports. However, CES will also reflect the weight of structure, given that the variation of the general position of the country in the global market will be accounted as an weighted summation of sector-specific changes of competitiveness according to these sectors' corresponding shares in exports and imports bills along the period under observation. Thus a more precise demarcation between the effects of competitiveness changes *vis-à-vis* structural effects should somehow eliminate the structure component within the former.

Here we will adapt the suggestion adopted by some regional studies—see originally [Esteban-Marquillas, 1972] e [Herzog & Olsen, 1979]—, namely, to estimate the (notional) Competitiveness Effects that would appear if imports and exports structures were respectively identical to the sector compositions of domestic aggregate demand and world trade. In the case of sector specialization, for example, the difference between that *Notional Competitiveness Effect* (NCE e NCE* respectively for exports and imports) and the residual Competitiveness Effect obtained in the previous accounting identities would correspond to a structure effect coming from the prevailing pattern of specialization in the country. EC and EC* would each then split in two distinct components, one of which in fact derived from structure.

Notice also that a similar procedure should be followed with respect to Geographical Structure Effects embedded

in Competitiveness Effects at both imports and exports sides. Preferential trade links and/or geographical proximity with foreign economies which are competitively above (below) world average tend to exhibit larger (smaller) imports than would be the case of a geographical distribution of import sources similar to the one at the global level. The same factors also apply in the case of exports destination.

Let us illustrate the argument about the structure component of competitiveness effects with the example of sector structures. One can obtain the (notional) vectors of imports (**nm**) and exports (**nq**) that would prevail in the cases of identical structures with respect to respectively domestic aggregate demand and world trade by calculating:

$$qn_i = q \cdot \frac{X_i}{X} \quad [11]$$

$$mn_i = m \cdot \frac{y_i}{Y} \quad [12]$$

NCE and NCE* would then amount to:

$$NCE = \dot{s} \cdot \sum_i qn_i \quad [13]$$

$$NCE^* = \dot{v} \cdot \sum_i mn_i \quad [14]$$

The differences between CE and NCE as well as between CE* e NCE* may be interpreted as the outcome of the differences between the local structure and the rest-of-the-world's. Following [Esteban-Marquillas, 1972] and [Herzog & Olsen, 1977], we call those differences as *Allocation Effects* (EA and EA*), in the sense that they reflect discrepancies between local and rest-of-the-world's resource allocation among sectors.

Therefore:

$$\dot{q} = ME + SE + GE + NCE + AE \quad [15]$$



$$\dot{m} = ME + SE^* + NCE^* + AE^* \quad [16]$$

Insofar as exports and imports of any given economy, through identities (15) and (16) one is able to approximate the relevance of the Sector and Geographic Structure Effects implied by the prevailing pattern of specialization, as well as the effects of the evolution of the country in terms of competitiveness.

Nonetheless, concrete applications of the method necessarily face some difficulties:

- A) identities (15) and (16) aggregate effects coming from states (structure) with dynamic effects (changes in market shares) along a certain period. Any exposition in terms of differentials in order to simplify—such as ours—tends to hide those stark differences in the nature of those effects;
- B) concrete applications of the method refer to variations in discrete time. Thus, it has to face an unsolvable “problem of index numbers” about which moment of the structure should serve as the reference. [Richardson, 1971] suggests a simultaneous application of various possible combinations when building the index numbers, since any choice is necessarily arbitrary. For example, he proposes to combine Laspeyres indexes for structure effects and Paasche indexes for differentials effects or vice-versa. Alternatively, one might use weighted averages between both types of index when measuring each effect. There is also the possibility of using either Laspeyres or Paasche, cases in which there would remain an unexplained residual effect. There is no perfect solution to the problem because the local pattern of specialization and the structure of world trade will both be undergoing changes along the period under observation;¹
- C) assessment of the effects is made in terms of value. However, relative prices will also be moving along the period and, therefore, the effects measured in nominal

values will be reflecting changes in both volume and relative prices. Depending on the elasticities of substitution and on the corresponding changes in nominal values due to variation in relative prices, a gain in relative cost (price) competitiveness within the pattern of specialization may manifest itself as a negative contribution to the country’s market share in the global trade. On the other hand, this is a minor problem when the CMS analysis is primarily addressed to nominal values of proceeds and expenditures in hard currencies by the country, case in which the effects of elasticities of substitution are themselves to be included as part of the outcome under scrutiny. This occurs, e.g., when the pattern of specialization is approached as a possible source of balance-of-payments restrictions to growth [Canuto & Cimoli, 1998]. Anyway, aggregates such as CE or NCE are syntheses resulting from determinants at various levels (macroeconomic, systemic, sector-specific etc.) and their measurement does not correspond to a study of factors of competitiveness. They appear rather as a residual obtained in such a way as to permit a highlight on the structure effects exerted by the pattern of specialization upon the trajectory of the country’s foreign trade; and

- D) The use of world market as a benchmark or reference zone for exports is only justified when the country is a global trader, even if the GE is not null; and
- E) The assessment of effects which were derived from rearrangement of identities does not imply by itself any interpretation of causes and consequences. In fact they are compatible with many theoretical explanations. In any case, they provide a starting point with respect to establishing whether or not the pattern of specialization matters.

The next section presents an exercise of application of CMS Analysis to the Brazilian foreign trade.

CMS analysis is developed at a very aggregate level, leaving behind some useful observations that may be obtained from observation of data at an industry level. In order to widen our approach to the Brazilian foreign trade,

¹ See [Fagerberg & Sollie, 1987] for an argument in favor of using Laspeyres indexes in CMS analyses.



we also applied the ECLAC's "competitiveness matrix" approach.

We divided Brazilian exports by 4 groups, combining changes in Revealed Comparative Advantages (vcrs) and world demand growth, at a 194-item level of ISIC disaggregation. We kept their denomination as established in ECLAC's approach:

- "Rising stars": increase in vcr and world demand growth above average
- "Lost opportunities": decrease in vcr and world demand growth above average
- "Backwards": decrease in vcr and world demand growth below average
- "Waning stars": increase in vcr and world demand growth below average.

An application of CMS analysis to Brazilian foreign trade

By observing aggregate amounts of exports and imports in Brazil's foreign trade, from 1971 to 1998, one can clearly notice three distinct periods as well as two corresponding inflexion points (see Graph 1):

- rising exports and imports in the 70s, with (relatively small) trade deficits that directly reflected external shocks (particularly oil price hikes);
- in the 80s, the external debt crisis led to a government policy aimed at raising export coefficients in the Brazilian economy, whereas imports were kept at low levels (via depreciated real exchange rates and via tariff and non-tariff barriers);
- in the first half of the 90s, the new feature was a high increase of the imports coefficient after the start of the trade opening process, with that augmentation going further with the beginning of the Real Plan in 1994-5; and

- as we shall see, one can observe the presence of distinct patterns of specialization in each of those periods [Gonçalves, *et al*, 1998].

Graph 1
Brazilian Foreign Trade



Exports and imports flows presented significant changes in their compositions during 1980-1998. Basic products (iron ore, soya beans, raw coffee, tobacco, chicken meat, sugar, etc.) comprised 42% of the export bill in 1980, whereas they only represented 25.4% in 1998. In turn, manufactures goods (automobiles, orange juice, autoparts, pumps and compressors, tires, soluble coffee, paper, motors and generators, refined sugar, cigarettes and cigars, furniture, chemical products, steel, textiles and footwear, etc.) moved from 45% to 57.5% along the same period. Finally, semi-manufactures (pulp, basic products of iron and steel, raw aluminum, non-refined sugar, raw soya beans oil, leather and furs etc.) grew from 12% in 1980 to 15.9% in 1998.

Within the imports bill, crude oil fell from the peak of US\$ 10.6 billions in 1981 to US\$ 2.6 billions in 1995. Total imports of combustibles and lubricants were of US\$ 4.1 billions in 1998, a declining amount as compared to



US\$ 5.8 billions in the previous year, partly due to a fall in international prices of those products.

In the 90s, the outstanding feature in the imports side was the increasing amount of machinery and metal products as well as electronic goods, with both categories reflecting purchases of durable consumer and capital goods. Automobile purchases abroad reached US\$ 2.7 billions in 1998. Capital goods imports amounted to US\$ 16 billions–27.9% of the bill–in the same year, whereas durable consumer goods (exc. automobiles) were responsible for 4.4% of the bill (US\$ 2.5 billions). Raw materials and intermediate products comprised the largest item: US\$ 26.7 billions or 46.4% of the imports bill.

The Brazilian economy presents nowadays a general pattern of trade in which, on the exports side, natural-resource based manufactured and semi-manufactured goods show increasing competitiveness and expansion. Dependence on basic products has diminished but there occurred an increasing specialization into manufactured goods characterized by low aggregate values and relatively simple technological contents.

On the imports side, trade openness along the first half of the decade provoked a generalized adoption of rationalization programs by Brazilian enterprises, leading to increases in productivity as manifested in rising ratios of added values by employed workers. Insofar as product lines and production stages, specialization led to a leaner and more competitive structure of production. As a byproduct of that process, the coefficient of more technologically intensive imports of products, components and inputs has augmented as a proportion of GDP.

A strong devaluation of the local currency *vis-à-vis* the dollar in 1999 has tended to gradually reverse the balance of trade without apparently sparking significant changes in the pattern of specialization. Anyway, it seems to us that an application of cms analysis to the Brazilian experience might be useful in order to check out whether prevailing patterns of specialization have played any relevant influence on the evolution of trade balances. In case of strong negative or positive effects associated with

the structure, one could at least obtain some rough idea about how hard has been–or tends to be–the task of competitiveness changes in order to guarantee balanced trade.

Geographical direction of trade has also been changing. One must notice that the Brazilian pattern of specialization is strongly accentuated or flattened depending on the region with which trade occurs. European Union, the largest single importer of Brazilian products, has recently widened its purchases of basic products. In the United States, the single largest Brazilian product is footwear, competing with East Asia suppliers (particularly China). Pacific Asia and East Europe have become increasing markets for soya products, raw sugar, leather and furs, besides traditional items such as orange juice and semi-manufactures of iron and steel. Conversely, vehicles, auto-parts and motors are the main items in the case of Mercosur (Argentina, Uruguay and Paraguay).

Our exercise of application of cms analysis to Brazil referred to the averages of the following moments:

Exports: 1983–1984 and 1993–1995.

Imports: 1989–1991 and 1993–1995.

Adapting one of the suggestions offered by [Richardson, 1971, 234–235], we used the following indicators:

Exports:

$$\begin{aligned}
 SE &= \sum S_i^o \cdot \Delta Q_i - S^o \Delta Q \\
 GE &= \sum_i \sum_j S_{ij}^o \cdot \Delta Q_{ij} - \sum_i S_{ij}^o \Delta Q_i \\
 CE &= \sum_i \sum_j Q_{ij} \cdot \Delta S_{ij} \\
 AE &= \sum_i \sum_j [Q_{ij}^o - Q_{iw}^o] \cdot \Delta S_{ij}
 \end{aligned}$$

where:

- S_i^o = Brazilian sector market-share during 1983–1984.
- S^o = Brazilian total market-share during 1983–1984.
- S_{ij}^o = Brazilian sector market-share in specific market “j”, namely: NAFTA, European Union, Asia, other Mercosur countries and rest of the world.

ΔS_{ij} = Difference between sector market-shares of Brazil in specific market “j” in two periods: 1993–95 minus 1983–84.

Q_{ij} = Sector exports by the world to specific markets “j”.

ΔQ_{ij} = Difference between sector exports of Brazil to specific markets “j” in the two moments.

ΔQ = Difference between total world exports in the two periods.

Q_{iw}^o = Sector composition of world exports in the initial period.

Imports: ²

$$ME^* = V \cdot (Y_2 - Y_1)$$

$$SE^* = M \cdot \{ \sum_i [(Y_2 - Y_1) \div Y_i] \cdot [(M_i \div M) - (Y_i \div Y)] \}$$

$$CE^* = \sum_i [(V_{i2} - V_{i1}) \cdot Y_i]$$

Where:

M = Average of total imports in both periods (1989–1991 and 1993–1995).

M_i = Sector imports in the base period.

Y = Average of total gross value of production in the two periods.

Y_i = Sector gross value of production in the base period.

$(Y_2 - Y_1)$ = Difference between gross value of production in both periods.

V = M/Y , i.e average share of total imports in total value of production.

V_i = M_i/Y_i , i.e average share of sector imports in sector value of production.

Exports data were obtained from the foreign trade databank made available by the United Nations Organization. Those data contained information about

trade flows at the world level as well as with respect to Brazil and specific regions (NAFTA, European Union, other Mercosur countries and rest of the world) in a 10–chapters classification of SITC (Standard International Trade Classification). Imports data were extracted from secondary data about total and sector gross values of production and imports in the sector–matrix of [Moreira & Correa, 1996].

Tables 1 and 2 present the results of the exercise. In each table, columns to the right refer to the year averages used as the bases for the index definitions for structure effects. We applied both Laspeyres and Paasche indexes.

Table 1
Constant–market–share analysis of exports
1983–1984 and 1993–1995 (US\$ 1,000)

| | Base periods | 1983–1984 | 1993–1995 |
|---------------------------------|--------------|-------------|-------------|
| Effects | | | |
| Sector Structure Effect | | -3,638,994 | -559,673 |
| Geographic Structure Effect | | 11,105,754 | -663,953 |
| Competitiveness Effect | | -26,491,960 | -6,581,078 |
| Allocation Effect | | -62,979,210 | -16,803,471 |
| Notional Competitiveness Effect | | 36,487,250 | 10,222,393 |

Source: Own calculations based on UNO data on exports.

Table 2
Constant–market–share analysis of imports
1989–1991 and 1993–1995 (US\$1,000)

| | Base periods | 1989–1991 | 1993–1995 |
|--------------------------|--------------|------------|------------|
| Sectors | | | |
| Sector Structure Effects | | -49,933 | -4,423 |
| Competitiveness Effects | | 12,825,201 | 12,907,295 |

Source: Own calculations upon data from Moreira & Correa [1996].

Tables 1 and 2 allow us to reach among others the following observations, in the Brazilian case at the least:

1. it makes sense the methodological prescriptions made by [Richardson, 1971] in favor of simultaneous use and comparison of both Laspeyres and Paasche indexes—in some way against the emphasis on Laspeyres indexes

² Difficulties to obtain data on the sector composition of Brazilian GDP and sector production values which could be compatible with trade data hindered us to estimate the allocation effect in the imports side. Further, difficulties to access detailed data at sector level for the whole period also explain why we used different periods for imports and exports.



stressed by [Fagerberg & Sollie, 1987]. Differences of results with the two indexes point to that direction. An average of the two indexes tends to be significantly less biased than the use of either the beginning or the end moments of the period as the base;

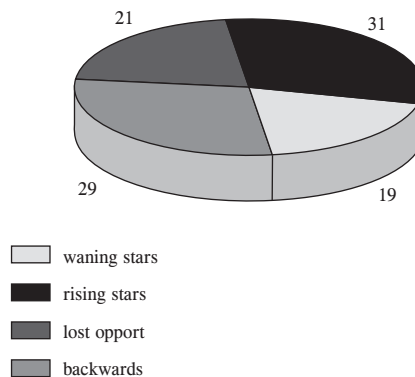
2. in the Brazilian exports along the period, the negative values of the Sector Structure Effect reflect a concentration of the pattern of specialization into sectors with market growth below the average at the world level;
3. the Geographic Structure Effect on exports changes of sign when the adopted base is the end of the period, what indicates that the country's exports relatively departed from the higher-growth tier of countries along the period;
4. the Notional Competitiveness Effects with respect to exports are positive in both cases of indexes. The magnitude of the negative Allocation Effect is responsible for the difference between NCE and CE. Not considering the Allocation Effect might lead to an under-estimation of the role played by the structures associated with the pattern of specialization.;
5. in the imports side, the Sector Structure Effect revealed itself as not much significant. However the measured Competitiveness Effects may be over-estimated because of the missing assessment of Allocation Effects; and
6. both tables strengthen the hypothesis that the characteristics of the Brazilian pattern of specialization have played a significant role in the evolution of the trade balance. The negative Structure Effects suggest that a strong accomplishment had to be obtained in terms of Competitiveness Effects in order to halt soaring trade deficits along the period.

Graph 2 complements our analysis by presenting our results with respect to the “competitiveness matrix” of exports for the same period as the one observed in the case of CMS. One can observe a low proportion of “rising stars” to “waning stars” as well as a large proportion of “lost opportunities” to “backward” industries. Definitely,

the evolution of specialization was not favourable in terms of trade balances along the analyzed period.

Taking Keynesian and Evolutionary analyses of trade and growth as the interpretative references for the relations between specialization and balance-of-payments constrained growth, one can infer that price-and income-elasticities of exports and imports were not favorable to Brazil's trade along the period. Competitiveness effects –either “benign”, such as increases of productivity, or “malign”, such as declining nominal wage-exchange rate ratios–have had to be used as a resort in order to circumvent unfavorable trends in trade balances and constraints to growth, particularly because foreign capital inflows were scarce at the period [Gonçalves *et. al.*, 1998]. In any case, government policies directed at changing the Brazilian patterns of specialization should thus deserve attention in the future.

Graph 2
Competitiveness Matrix (Brazil)



References

- Canuto, O. [1995]. “Competition and endogenous technological change: an evolutionary model”, *Revista Brasileira de Economia*, vol.49, num. 1, jan/mar., (pp. 21–33).
- Canuto, O. & M. Cimoli [1998]. “Patterns of specialization, economic growth and the balance-of-payments constraint”, *Revista Ciência e Tecnologia – Recitec*, vol. 2, num. 2, (pp. 1–14).



- Dalum, B.; K. Laursen, & B. Verspagen [1996]. *Does specialization matter for growth?*, Maastricht, Merit, (mimeo.).
- Dosi, G.; K. Pavitt & L. Soete [1990]. *The economics of technical change and international trade*. Brighton: Wheatsheaf.
- Esteban-Marquillas, J.M. [1972]. "A reinterpretation of shift-share analysis", *Regional and Urban Economics*, vol. 2, num. 3, (pp. 249-55).
- Fagerberg, J. & G. Sollie [1987]. "The method of constant market shares analysis reconsidered", *Applied Economics*, vol. 19, (pp. 1571-83).
- Gonçalves, R. *et al.* [1998]. *A nova economia internacional: uma perspectiva brasileira*. Rio de Janeiro: Campus.
- Grossman, H. & E. Helpman [1991]. *Innovation and growth in the global economy*. Cambridge, Mass.: The MIT Press.
- Herzog, H.W. & R.J. Olsen [1977]. "Shift-share analysis revisited: the allocation effect and the stability of regional structure: a reply", *Journal of Regional Science*, vol. 17, num. 3, (pp. 441-54).
- McCombie, & A.P. Thirlwall [1994]. *Economic growth and the balance-of-payments constraint*. London: Macmillan.
- Meliciani, V. [1998]. *The impact of technological specialisation on national performance in a Balance-of-payments constrained growth model*. ETIC Conference 1998, Strassburg, october pp. 16-17.
- Moreira, M.M. & P.G. Correa [1996]. *Abertura comercial e indústria: o que se pode esperar e o que se vem obtendo*, Texto para Discussão BNDES, núm. 49, october.
- Richardson, J.D. [1971]. "Constant-market-shares analysis of export growth", *Journal of International Economics*, vol. 1, (pp. 227-239).

