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**A STUDY ON THE IMPACT OF ECONOMIC LIBERALIZATION IN BRAZIL:
1995-2002**

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CHAPTER 2

MADE IN BRAZIL:

INDUSTRIAL COMPETITIVENESS 10 YEARS AFTER ECONOMIC LIBERALISATION

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¹ This article is dedicated to our late partner, Lia Haguener. We will always miss her companionship, professionalism and personal integrity. Our writings will never again be so sharp and clear.

² From GIC-IE/UFRJ

1. INTRODUCTION

In 1996, we published, in Portuguese, with Lia Haguenaer, the book “Made in Brazil: competitive challenges for the industry” (Ed. Campus). This was a major work where, departing from an analytical framework we developed at the Instituto de Economia, Universidade Federal do Rio de Janeiro, we analysed a massive amount of original data and articles produced by a large number of sectoral specialists, in a major research project, co-ordinated our partners from UNICAMP, headed by Prof. Luciano Coutinho, and us. This was an analysis of the competitiveness of the Brazilian industry in the turn of the decade. Made in Brazil had a major impact on specialised circles because of its wideness and thoroughness.

Since then we have been willing to follow the lead of the 1996 book, to further improve the analytical framework and to update the analysis of competitiveness. Now we have a unique chance to get close to our wishes, but relying, once more, on a major research co-ordinated in 2001/2 by our partner, Luciano Coutinho, and produced for the Brazilian Ministry of Development, Industry and International Trade (MDIC), with funding from FINEP, an agency from the Brazilian Science and Technology Ministry.

Sectoral reports for the project “**Estudo da Competitividade de Cadeias Integradas no Brasil**” were used, once again, as the basic input for the present analysis. We used data and information on sectoral reports to provide our interpretation on the competitive changes in the Brazilian industry, between 1990 and 2003. The following sectors were analysed: in the commodity industrial group, steel, pulp and paper and citrus; in durable, consumer electronics and automotive; in traditional industries, shoe and textile and garments, in innovation carriers: mechanical engineering capital goods, telequipment and the computer industry.³

During this period the Brazilian economy went through a major institutional change: rules governing relations among economic agents changed in tow respects. First, and structurally most important, economic liberalisation is the central feature of the national regime of incentives and regulations. Secondly, price stabilisation has been, as never before, a major target of macroeconomic policies. To what extent institutional changes implied corresponding structural changes in industry? Are competitive pressures greater? The relative importance among industrial groups have changed? New activities emerged? Which ones cease to exist? Are firms more competitive? Which ones? Are they relying on those competences –i.e. innovation capabilities- that are widely known as conforming a the basis for sustained or expanded market shares?

These are the questions guiding us in this article. In the first section we will update the 1996 discussion on patterns of competition and competitiveness. It will be seen that we still rely, strongly, on the very same analytical framework. Still, we believe that around the space of competition is where the dynamics of the capitalist machine is fully revealed. The second section provides an account of the most important institutional changes and an aggregate overview of the industry’s evolution between 1990 and the early 2000s. Following from there the next four sections analyse competitiveness in each of the four industrial groups of the early 1990s: commodities, durable goods industries, traditional industries and innovation carriers industries. The last section provides an overall balance, indicating commonalities and differences among them.

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2. METHODOLOGICAL REMARKS: PATTERNS OF COMPETITION AS A TOOL FOR ANALYZING COMPETITIVENESS

2.1. ON THE NOTION OF COMPETITIVENESS

Traditional analysis of competitiveness can be classified into macro and micro approaches. The macro approach focuses on allocative efficiency: if an economy has the right prices, it would automatically produce the correct investment, leading to best advantageous specialisation. From a microeconomic approach, competitiveness is associated to technical efficiency: the adoption of best practices implies adequate productivity levels, which are automatically transferred into better market shares. As argued by Haguenaer (1989), these approaches are not sufficient; they assume automatic transmission mechanisms and lack of information failures, which are seldom found in the daily operations of businesses.

Market shares are conquered as a result of a productive performance that incorporates efficiency in product and process developments. These, in turn, are derived from accumulated resources mobilised by past strategic decisions. These are based on anticipating demand expansion and other economic expectations as well as similar actions taken by competitors. Thus, to overcome the weaknesses of traditional approaches while, at the same time, drawing on specific contributions that are valuable, such as the notion of efficiency and market shares, it is necessary to develop an approach closer to what is known as structural approach, where competitiveness is perceived as an interactive process between firm, industry and macro determinants. (Kupfer, 1993)

In this text, competitive firms are those capable of formulating and implementing strategies leading to sustained or expanded market position in the segment of industry where it operates. A couple of remarks on this basic definition are necessary.

Firstly, it is necessary to distinguish different aggregation levels of analysis. Competitiveness must be defined at firm level, referring to specific markets, which could be associated to segments of industries. A firm is competitive if its strategies, capabilities and performance are coherent with the critical factors of success in the activity it operates. Nonetheless, it is necessary to emphasise the notion of the space of competition. If the competitive process is fully revealed in specific markets, the aggregation proxy for segments of industrial sectors is formed by a set of firms operating in similar markets. This group of firms conforms an industrial segment and standardised sectoral industrial classifications aggregate them in a number of segments or sub-sectors. By aggregation, in a given moment of time, it is possible to consider a sector competitive if the majority of its production is derived from competitive firms, operating in the sector's various segments. At this level firms are aggregated by market similarity.

Secondly, competitiveness must be viewed as a dynamic concept in a double dimension. In the first dimension, competitiveness is related to a firm's accumulated capacity, in itself a dynamic notion, since present capacity results from past strategic decisions on where financial resources should have been allocated. The *ex-post* performance of a firm – higher or lower market-share – reveals whether past strategies and capacities were competitively adequate or not. Thus present market position does not necessarily ensure future competitiveness. The second dimension is related to changing market conditions, derived from strategies adopted by other firms that cause changes in relevant competitive drivers in that industry. This consideration leads to another central concept – patterns of competition or a set of competitive drivers. Competitiveness stems out of the adequacy of individual firms' strategies to the specific drivers prevailing in each market.

2.2. PATTERNS OF COMPETITION

Patterns of competition are defined as the collection of key factors (drivers) required for competitive success in each industry. Given the large number of possible intervening drivers, it is necessary to organise them under some type of criteria. A simple and operational criteria is one in which factors are organised according to the capacity of a single firm to influence

their direction and evolution.

Thus, a collection of determinant factors, representing the results of its past and present strategies, lay within the boundaries of the firm (internal factors), where it has complete control. Another collection of factors is industry specific (structural factors). They have equal importance to firms operating in similar market segments. In general, individual firms have only limited and indirect control over structural factors. Finally, there is a collection of drivers (macro factors) that are associated to the political and economic environment of a country and placed well beyond the influences of individual firms. Thus, a competitive process has a systemic character, determined not only by individual firm's efforts, but also by the nature of the industry in which it operates and by economic/institutional aspects.

Internal factors refer to decisions, accumulated capacities and performance in the areas of management (entrepreneurship, strategic planning, finance), sales efforts (marketing), production (equipment and process technologies, organisational techniques, quality management), and innovation (product and process innovation, technology flows). In all these areas human resources are essential, requiring skills corresponding to specific functions. Firms must be efficient in most areas to be competitive but, in different patterns of competition, necessary skills, competences and specific drivers, critical for competitiveness, may differ.

Structural factors are those that shape competition rules and conditions under which every firm has to operate, within the same industrial segment. They can be divided into three categories: market and demand, industrial configuration and regimes of incentives and regulation. As in the case of internal factors, different industries define different competitive drivers at the structural level.

Demand/market drivers can be described according to volume and growth rates of demand; access to national and international markets; geographical and income descriptors of a market; price, quality, technological level and other attributes of products. Generically, growing markets and diversified consumer requirements in terms of price, quality, sophistication, technology and other attributes allow for greater market segmentation and lower tolerance against less competitive products.

An industrial configuration can be described in terms of technical and firm level economies of scale and scope; technological trajectories of products and processes; access conditions to equipment, inputs, services and technology, including the nature of relations between firms, clients and suppliers, services and infrastructure. Again, generically, an industrial configuration may contribute to competitiveness if size of firms and productive integration are sufficiently high, where horizontal and vertical clusters abound and where the available infrastructure and services allow for minimum external down time.

The regime of incentives and regulation defines specific institutional rules under which firms of a certain industry must operate. Incentives are those associated with lowering the cost of investments and running production (credit, taxes, fiscal incentives, etc). Regulations are related to rules that define for economic agents the degree of freedom of operations, including legislation on property consumer, environment, competition, etc. Generically a pro-competitive regime induces high levels of rivalry among competitors and is capable of lowering capital costs to levels similar to those prevailing in other markets.

The third level where competitive drivers are located refers to framework conditions. They can be divided into:

- **political-institutional:** political stability, institutional development;
- **economic:** exchange, interest and wage; tax and tariff policies, supply of credit, and other variables related to overall performance of the economy;
- **infrastructure:** availability, quality and cost of energy, transport, telecommunications,

- **social:** education and vocational training system, social security;
- **international:** capital, technology and trade flows.

Economic and institutional determinants of investment and production are a *sine qua non* condition of competitiveness; they define the contours within which firms are able to compete in markets for goods, services and capital. The potential competitiveness of a country's firms relies on its macroeconomic performance, on its institutional framework, on its insertion into international trade and finance, on the availability of adequate human resources.

Successful economies have combined a certain degree of openness with policies that are conducive to investment, macroeconomic stability and strong institutional arrangements. Stability facilitates the emergence of clusters of capabilities that are necessary to bring about coherence and consistency of pro-competitive actions by the private sector, in the long run. Likewise, competitive economies are likely to be those where public authorities have implemented a whole set of policies not only well but also simultaneously.

When the macroeconomic environment is unstable, usually firms and institutions follow adaptive strategies not conducive to competitiveness and sustained development. Unstable paths of fundamental macroeconomic variables, as for instance, low investment during long periods of time, influence the structure of production through the election of activities, technologies and assets by firms, operating in condition of limited valuation of economic risk and low capital efficiency. In such context, considerations about industrial linkages, technological opportunities, organisational practices and the introduction of new products and processes are left behind due to the burden of short-term economic instability and the unpredictability of future economic policies.

2.3. DEFINING PATTERNS OF COMPETITION AND COMPETITIVE DRIVERS

The analysis of competition requires the identification of competitive drivers in different market segments. Porter (1980), drawing on classical industrial organisation literature proposes two generic business strategies –cost and differentiation- with two other corresponding strategies for more focused business orientations. Drawing on the literature on industrial organisation and market structures, and on empirical evaluation undertaken in Brazil, it is possible to suggest the existence of four different orientations for competitive strategies, each associated with specific sources of advantages, at the level of the firm and the industrial structure.

Firms can be successful by offering: (i) cost advantages, (ii) product differentiation, (iii) responsiveness or, (iv) technologically sophisticated products. Very few firms can achieve excellence, simultaneously, in every source of competitive advantage. Competitive firms are those that focus and develop coherent strategies, capabilities and performance on the relevant factors concerning the pattern of competition that prevails in the specific industry they intend to operate.

As shown in Table 1, as firms focus specific strategies, they are bound to develop and rely on corresponding sources of competitive strategies.⁴

Price/cost competition is typically the case of standard commodity market segments. Since these commodities are intrinsically undifferentiated, competitive firms are those which manage to have low unit costs and high production volume, ensuring production efficiency, mainly by operating capital intensive plants that yield high economies of scale, as well as developing efficient logistics systems, thus reducing inputs and distribution costs.

Product differentiation can be achieved by technology, quality, price and marketing activities. It requires a wide span of capacities and resources. Most advanced firms try to concentrate in design and marketing functions while production is extensively sub-contracted. Thus the

⁴ Macro determinants, being generic, were not considered in this classification, although it is possible to suggest that the impact of macro determinants is differentiated by sectors.

mobilisation and supervision of partners is an essential source of competitive advantage.

Responsiveness is a strategy strongly associated with production flexibility. Firms target market niches aiming at specific consumers, stratified by income, age, peculiar interests, customs, etc. Others direct their efforts toward delivery, taking advantage of their proximity to clients and/or suppliers and adopting techniques like quick response. Capacity requirements are less strict than in other patterns, but it is important to have management and supervisory skills, as well as product quality levels acceptable to a particular market niche.

Innovation is the source of competitiveness in technologically sophisticated market segments, like precision instruments or aeronautical equipment. Firms must have strong technological capacities, highly skilled R&D technicians and access to updated science and technology laboratories.

In summary, a pattern of competition arises from competitive rivalry, from efforts by competing firms. Once a pattern of competition and competitive drivers are established as standards, strategies of all firms must follow suit. In most industries a very finite or only one pattern of competition prevail. However, where geography and income differences abound or in industries where families of similar products may co-exist, firms pursuing different patterns of competition can survive and prosper.

TABLE 1
 PATTERNS OF COMPETITION: STRATEGIES AND SOURCES OF COMPETITIVE ADVANTAGES

| SOURCES OF COMPETITIVE ADVANTAGES | COMMODITIES (COST STRATEGY) | DURABLES (DIFFERENTIATION STRATEGY) | TRADITIONALS (RESPONSIVENESS STRATEGY) | INNOVATION CARRIERS (INNOVATION STRATEGY) |
|-------------------------------------|---|---|--|--|
| INTERNAL FACTORS | | | | |
| MANAGEMENT | process control | organisational flexibility | workers and entrepreneurial skills | R&D-production-marketing integration |
| PRODUCTION | mass flow & energy efficiency | assembly and supply-chain coordination capabilities | quality control | design for manufacturing |
| SALES | access to distribution channels | brand image | market information | market creation & business to business marketing |
| INNOVATION | process technology | product & components design | embodied technology, learning by doing | R&D + <i>design</i> |
| STRUCTURAL FACTORS | | | | |
| MARKET | standardisation price, technical conformity access to international trade | segmentation by quality and marketing price, brand, technological content, technical assistance regional & global trade | segmentation by levels of income & type of product price, brand, delivery times, customer orientation local & international trade | segmentation by technical needs attendance to client specifications local & regional trade |
| CONFIGURATION OF INDUSTRY | plant level economies of scale access to raw materials & transport logistics specialised technical services | firm and plant level economies of scale & scope articulation assembler-supplier, distribution metrology & standardisation | economies of agglomeration and networking horizontal & vertical networks metrology, standardisation, certification & accreditation; market & technical information; training | economies of specialisation interaction with users science & technology systems |
| REGIME OF REGULATION AND INCENTIVES | anti-dumping & commercial policy environmental protection cost of capital | property rights consumer legislation consumer credit fiscal incentives | anti-dumping competition & consumer policies support for SME tax system | intellectual property rights selective protection risk support credit for users state purchasing power |

3. 10 YEARS OF INSTITUTIONAL CHANGE AND INDUSTRIAL PERFORMANCE

3.1. A BRIEF SKETCH OF THE MAIN INSTITUTIONAL REFORMS: THE BRAZILIAN INDUSTRY UNDER TRADE LIBERALIZATION PRESSURE

The 1980s were a period of great technological advance on the industrialised countries in general, and on the newly industrialised countries (NICs) in South East Asia in particular. Inversely, during the same period the Brazilian industry underwent significant tensions due to the macroeconomic instability and the institutional transition derived from the exhaustion of the import substitution model as the basic reference for its national development. As a result, the technological gap, once reduced by the catch-up of the 1970's, was again expanded. Although the Brazilian industry survived the lost decade, maintaining a complete and integrated industrial structure, by the end of 80s it presented significant deficiencies in terms of process and product technologies, and production organisation.

In the 1990s, the global context was delineated by a strong competition between firms and countries, by the commercial and cross-borders capital flows, and by the diffusion of new technologies, specially information technologies. The USA and Europe have both consolidated the liberalisation process of their foreign exchange policy and financial sector regulation, thereby enhancing the capital mobility between different economies.

In Brazil, the first years of the 1990s were a period depicted by two consecutive shocks on the competitive context – the economic liberalisation in 1990 and the monetary stabilisation resulted from the Real Plan in 1994. The subsequent changes were induced by structural reforms on the external sector, the international financial sector integration, and the state owned firms which implied the development of new growth strategies from the leading firms, and by a redefinition of the inter and intra relationship between those firms and the State.

The most relevant microeconomic features of these reforms were: (i) the economic deregulating process, which included the exclusion of price control mechanisms for goods and services and the removal of “protected market zones” and other regulatory requirements for investments in Brazil; ii) the trade and financial liberalisation process, trough the reduction of tariffs and non-tariffs barriers and the deregulation of the foreign capital flows; iii) the privatisation process, in order to redefine the State role in the economy. The Brazilian privatisation process had a double bottom line, the national industry modernisation, and the reduction of the fiscal debts.

The commercial liberalisation process of the 1990s was surely the most consistent of all the economic and institutional policies promoted in Brazil since the 1980s. Following a significant tariff reduction schedule, the mean value of the nominal tariff was diminished from 32,2% (with interval 0-105% and standard deviation of 19,5) to 14,9% (with interval 0-40% and standard deviation of 10,7) in July 1993 (Kume, 1996).

Although not so widely discussed, the measures concerning the patrimonial structure were also important to define a new institutional regime. The main target of these measures was to equalise the rules of the game between foreign and national firms, thereby stimulating the inflow of foreign capital. As a counterpart, it was expected that the foreign capital would increase the competitive pressure on the national scenario, and would ease the access to new technologies and open new investment financing sources.

Among the measures that equalised the rules between foreign and locally owned firms, the most outstanding are: extinction, in 1991, of the restrictions to the foreign firms entry in the technologies of information sector; elimination, in October 1993, on the imposed limits to the foreign capital participation in the privatisation process; elimination, by a constitutional emend of 1994, of the established legal differentiation between national and foreign firms, that made possible the access to official credit agencies, subsidies and incentives to foreign firms; exemption of income tax for profit and dividends remittances by the foreign affiliates

in the country; elimination, decided by Congress vote in 1995, of several restrictions to industrial property, mainly the prohibition of patents registration of drugs and biotechnology based products; extinction by an act, of the prohibition in remitting royalties payment for brands and patents in multinational firms; removal, by the constitutional reform of 1995, of the sector restrictions to the foreign capital participation in the services sector (more notably in the financial sector), extractive activities (end of the State monopoly over petroleum) and telecommunications; and financial liberalisation that created more favourable conditions for the transnational firms established in the country, eliminating the restrictions to the use of national financial system and thus access to the BNDES funding.

The macroeconomic changes were intimately associated with the monetary reform issued by the Real Plan in 1994 and also with the subsequent return of capital inflows. The Real Plan successfully decreased the inflation spiral⁵, and promoted a significant increase of demand due to the growth of real wages and the renaissance of consumption-credit of durable goods. On the other hand, the return of capital inflows was important to cover current account deficits and to finance fixed capital investment. The overvaluation of the national currency during the 1994-1999 period was a natural consequence, which was pushed even further by a set of specific policies defined by the Central Bank to reinforce it.

In fact, with the Real Plan in 1994, a new phase in the industry path began. Appreciated exchange rate and high interest rates, the two pillars of the macroeconomic stabilisation plan, together with bringing forward the end of the initial schedule of the tariff reduction to December 1994 and the adoption of the *Mercosur* External Tariff were the main characteristics of the new competitive environment established in the country. In practice, these measures are responsible to the deepening of the international exposure of the Brazilian industry, where began the effective openness of the economy, that continue up to the exchange rate devaluation in the early 1999. The impacts of the local currency evaluation and tariff reduction after the *Plano Real* exacerbate the competition with the imported goods, resulting in a rapid deterioration of the trade balance, in deficit from 1995. The resume of the external capital influx permitted the financing of the trade deficit, however, of short breath regarding the risk of vulnerability of the external accounts. The current trade maintained its expansion until 1997, where suffers a sudden reverse, indicating that the competitive regime implemented during this period become exhausted.

This internal and external environment posed new challenges to Brazil: the need to preserve the solvency of the financial system and to maintain sound macroeconomic foundations. During the 1990s, the Brazilian economy faced a positive net capital inflow, of unprecedented magnitude, which was extremely dependent on a particular set of favourable external circumstances. As a result, the foreign expenditure and the current account deficits increased to levels not compatible with macroeconomic stability. Actually, the abundant entry of financial resources exerted negative effects on monetary supply and on exchange rates. Exports were affected; imports expanded significantly and Brazilian economy became very vulnerable to possible changes in the international context. Therefore, the government was forced to sterilise the monetary effects of foreign capital, by increasing interest rates. Consequently, the counter face of external financial dependence was revealed not only in a weak growth of expansion-related investments, but also in an insufficient GDP growth during all the 1990s.

In this context, the next section analyse the Brazilian industry performance in the 1990s, focusing on four main dimensions: industrial production and employment; productive and ownership structures; external trade pattern; and fixed capital and R&D investments strategies.

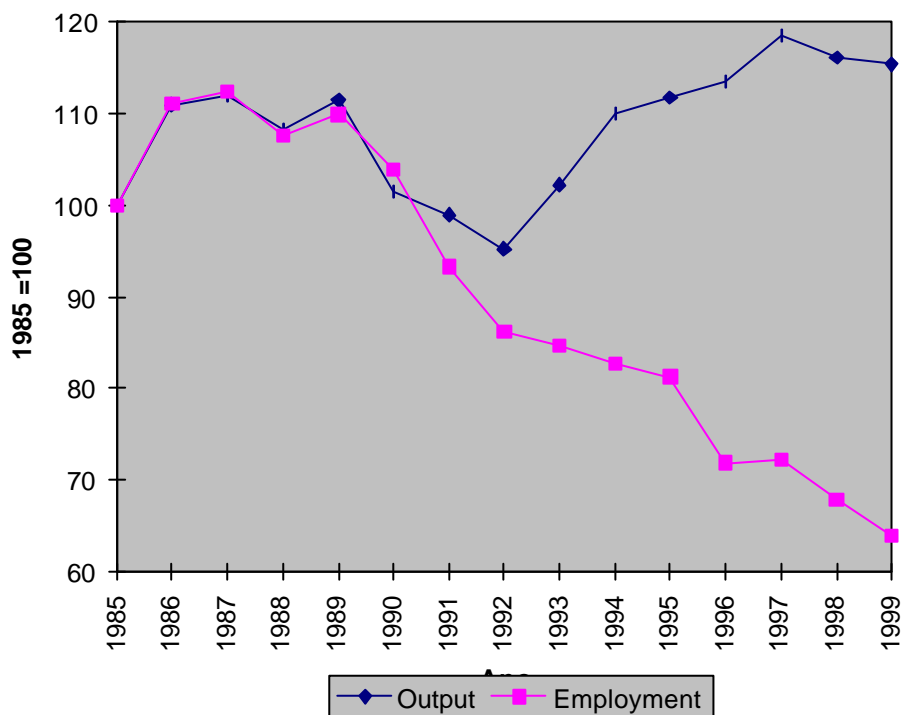
⁵ Inflation rates decreased from more than 1000% in 1993 to 20% in 1995 and 5% in 1997.

3.2. THE EFFECTS OF LIBERALIZATION AND DEREGULATION DURING THE 90'S

3.2.1. More production with less workers

In the 1980s, the employment level experienced fluctuations following the path of erratic production level changes. However, from the beginning of the 1990s, the productions and employment series start to follow opposite trends. The Figure 1 shows a clear divergence between these series, particularly after 1993.

FIGURE 1
OUTPUT AND EMPLOYMENT IN BRAZILIAN MANUFACTURING INDUSTRY, 1985-1999



Source: IBGE – Monthly Industrial Survey and Monthly Employment Survey

Many economists, as Gonzaga (1996), identify the beginning of the 1990s as a structural break point on the relation between production level and employment. Today, this interpretation is well accepted, but this subject was vastly debated after 1991. For authors as Gonzaga (1996), Amadeo and Soares (1996), Bonelli (1996), the clear divergence between product and employment series in the 90s could be regarded as evidence that significant technological changes – in production process and/or in production organisation – were carried out. This explanation tries to shed light on the microeconomic transformations developed inside the firms. The commercial liberalisation and the economic deregulation would have bring about new parameters on decision process of firms which was trying to achieve productive efficiency.

Other authors, such as Silva et alli (1994), sustained the interpretation that there was no evidence that the economy was coming through a general structural adjustment. For these analysts, the economy was simply facing a recessive adjustment.

It is important to remark that a significant part of the satisfactory performance of production must not be taken as a clear effect of a modernisation process, but as a statistical effect concerning the data, which was based on series of production value, not on ideal series of value added⁶.

Nevertheless, though there was not a consensual interpretation among the analysts on this point, all of them have recognised a clear trend of productivity growth, at least in the beginning of the 1990s. The growth of the industrial production level in 1993 was followed by an acceleration of productivity indexes. This productivity performance was regarded as a clear indication that a fast and general modernisation process was being developed. At a first sight, it was these new facts, not new analysis that have finished the debate.

3.2.2. The same productive structure but with different owners

Several studies (e.g. Kupfer, 1998) conclude that no important change had occurred in the sector distribution of the industrial production during the 1990s. Considering all production activities, the participation of the industrial sector to the GDP remained unchanged from 1991 to 2001 (Table 2). The manufacturing industry, after the initial expansion during the first phase of the trade openness (until 1993) started a fast falling trajectory just after 1994, when the effects of the Real appreciation due to Real Plan deepened the degree of the real openness of the Brazilian economy.

TABLE 2
GDP STRUCTURAL COMPOSITION, 1991 A 2001, SELECTED YEARS, (%)

| Sector | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Agriculture | 7,8 | 7,7 | 7,6 | 9,9 | 9,0 | 8,3 | 8,0 | 8,2 | 8,2 | 7,7 | 8,0 |
| Industry | 36,2 | 38,7 | 41,6 | 40,0 | 36,7 | 34,7 | 35,2 | 34,6 | 35,6 | 37,5 | 35,8 |
| Manufacturing | 24,9 | 26,4 | 29,0 | 26,8 | 23,9 | 21,5 | 21,6 | 21,0 | 21,5 | 22,5 | 21,1 |
| Services | 56,0 | 53,6 | 50,8 | 50,1 | 54,3 | 57,0 | 56,8 | 57,1 | 56,2 | 55,0 | 56,2 |
| Total | 100,0 | 100,0 | 100,0 | 100,0 | 100,0 | 100,0 | 100,0 | 100,0 | 100,1 | 100,3 | 100,0 |

Source: IBGE/DECNA

From the data on the evolution of the different industrial groups output, showed in Table 3, can be evaluated the differences in the intra-industrial dynamics. Industrial commodities, durable goods industries, and food and beverages were the sectors that revealed a superior evolution to the mean of industry, and agricultural commodities, traditional industries except food/beverages and innovation carriers industries maintained almost the same production level through 1991 to 2000.

⁶ About the difficulties to compute productivity data in this period see, for instance, Salm, Sabóia and Carvalho (1997) or Amadeo and Soares (1996)

TABLE 3
INDEX NUMBER OF INDUSTRIAL OUTPUT (1991 = 100), 1991 A 2000

| | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Industrial Commodities | 100,0 | 99,7 | 103,7 | 109,5 | 109,6 | 115,9 | 122,8 | 126,8 | 130,3 | 138,2 |
| Agriculture Commodities | 100,0 | 101,9 | 98,4 | 94,4 | 97,2 | 100,6 | 104,0 | 101,2 | 105,4 | 98,9 |
| Traditional industry except Food/beverages | 100,0 | 93,4 | 101,4 | 105,3 | 104,8 | 103,6 | 104,1 | 101,3 | 100,0 | 104,3 |
| Food/beverages | 100,0 | 95,7 | 98,9 | 107,2 | 121,6 | 127,0 | 127,3 | 128,9 | 128,9 | 130,5 |
| Innovation Carriers | 100,0 | 94,7 | 102,0 | 123,3 | 120,0 | 107,8 | 105,2 | 105,6 | 98,3 | 108,2 |
| Durable Goods | 100,0 | 89,8 | 115,2 | 133,0 | 147,6 | 153,4 | 165,8 | 133,9 | 123,1 | 148,6 |
| Manufacturing Industry | 100,0 | 96,3 | 103,5 | 111,4 | 113,4 | 115,4 | 119,9 | 117,4 | 116,7 | 124,2 |

Source: IBGE - Industrial Monthly Survey (Special Tabulation)

Contrary to sector distribution, the composition of the firms' revenue per capital origin suffered a deep transformation in the period under analysis. According to Rocha and Kupfer (2002), in a study with the 300 biggest Brazilian firms (in liquid revenue), the market-share of the leading state owned, multinational and private national firms evolve during the 1990s, as follows:

- State owned firms – reduce the participation from 44.6 per cent in 1991 to 24.3% in 1999, where the major part of that fall (15.2 per cent) occurred between 1991 and 1996 and a minor part (5.3 per cent) between 1996 and 1999.
- Multinationals - grew its participation from 14.8 per cent to 36.4 per cent between 1991 and 1999, homogeneously through the two periods (11.6 and 10 per cent, respectively).
- Private nationals – maintained the share without big changes between 1991 and 1999 (40.6 and 39.3 per cent respectively) albeit the small share increase of 3.5 per cent between 1991 and 1996 and a little higher through 1996 to 1999 (4.8 per cent).

Data suggests that changes in the ownership structure of the leading firms occurred in a two phase process. During first phase, corresponding to 1991-1996 period, there was transference of the revenues of the state owned firms to the private firms, independently from their nationality. This was the of privatisation phase. In the second phase, corresponding to 1996-1999 period, occurred revenue transference from national firms, independently if they were private or public run, to multinational firms. This was the denationalisation phase.

The analysis of the mergers and acquisitions processes and of the role of the foreign capital investments and the privatisation permit a better understanding of the extension of the changes that occurred during the decade.

Operations involving changes in the corporate control of firms increased through this period. According to KPMG Consulting, 2353 M&A transactions occurred between 1991 and 2000, where were concentrated after 1996. A significant part of these transactions, especially concerning the values involved, was associated to the selling of state owned firms. According to BNDES, the revenues from the privatisation process surpassed US\$100 billions from the beginning of 1991 through 2002, 2/3 of which were federal government run firms and the rest state run firms. In the first phase of the privatisation process (1991-1995) the steelworks, mining and petrochemical sectors were exceptionally relevant and later the electrical power, finance services and telecommunications sectors. The last sector was, alone, responsible for US\$ 30 billions in government revenues.

At the same time, inward foreign direct investments, that were minimal since the late 1980s, assist to an exponential growth from 1995 to 2000, as a result of a higher international

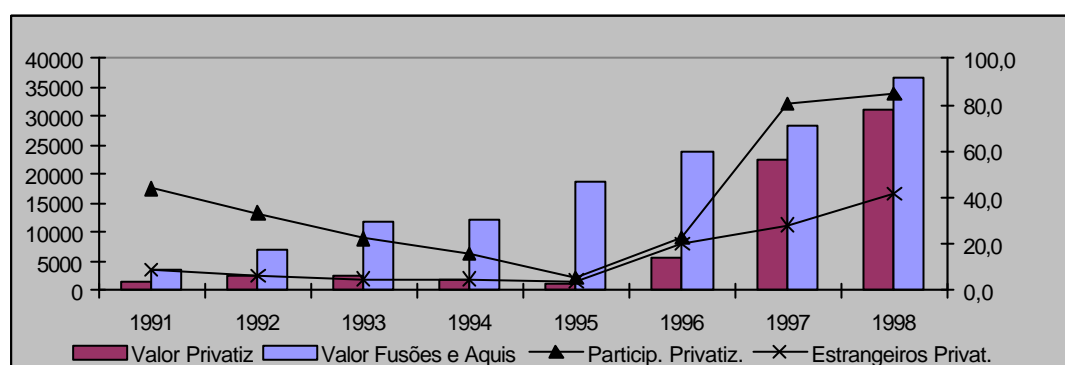
liquidity and of the country attractiveness just after the stabilisation of the economy. A considerable part of this capital was re-directed to the acquisition of state owned assets, as shown in Table 4. Figure 2 shows the same trend. From 1996 on, the privatisation program had a new role with the entering of multinational firms, being responsible for an increase of the share of the take in operations.

TABLE 4
FLOW OF EXTERNAL CAPITAL FOR PRIVATISATION AND OTHER USES

| Year | Inflow | | | Outflow | Net Flow |
|------|---------------|--------|--------|---------|----------|
| | Privatisation | Others | Total | | |
| 1995 | ... | 5.475 | 5.475 | 1.237 | 4.238 |
| 1996 | 2.645 | 7.851 | 10.496 | 603 | 9.893 |
| 1997 | 5.249 | 13.512 | 18.761 | 1.944 | 16.817 |
| 1998 | 6.121 | 22.359 | 28.480 | 3.002 | 25.478 |
| 1999 | 8.786 | 22.586 | 31.372 | 1.389 | 29.983 |
| 2000 | 6.677 | 26.726 | 33.403 | 3.387 | 30.016 |
| 2001 | 1.079 | 20.193 | 21.272 | 2.328 | 18.944 |

Source: BNDES (www.bndes.gov.br)

FIGURE 2
MERGERS AND ACQUISITIONS, PRIVATIZATION, AND SHARE OF EXTERNAL DIRECT INVESTMENT –US\$ MILLIONS AND %



Source: Sieffert Filho and Silva (1999) and KPMG in Diniz and Boschi (2001)

As a result of the privatisation program implemented by the Brazilian government in early 1990s, particularly for the commodities industry, there was a significant change of ownership of the leading firms. According to Rocha and Kupfer (2002), state owned firms, responsible for 42 per cent of the 1991 revenues, decreased their participation to 22.6 per cent in 1996, that is from the twelve state owned firms remained only Petrobras. This decline was followed by an increase of the share of the national firms that from 36.5 per cent share in the revenues were responsible for almost half of the total revenues for 1996. However, this share was not sustained after 1996. At the same time, is interesting to see that multinational firms move forward in the commodities production arriving to 1999 with a market share very close to that of national firms.

During the 1990s we assist to a confirmation of the considerable role of foreign capital to the industry responsible for technological diffusion. Multinational firms, that controlled 60 per cent of the total revenue in 1991, continue to growth its importance and achieved 86 per

cent market share by 1999. National firms suffered a reverse tendency decreasing its participation from 40 per cent in 1991 to 13.1 per cent in 1999, revealing loss of competitiveness. State owned firms, through Embraer were responsible for a mere 1 per cent to total revenues in 1991, left this market completely.

In addition, in the traditional industry, the multinational firms grew its role, from half of the national firms' revenues in 1991 to achieving almost the same market share by the end of the decade.

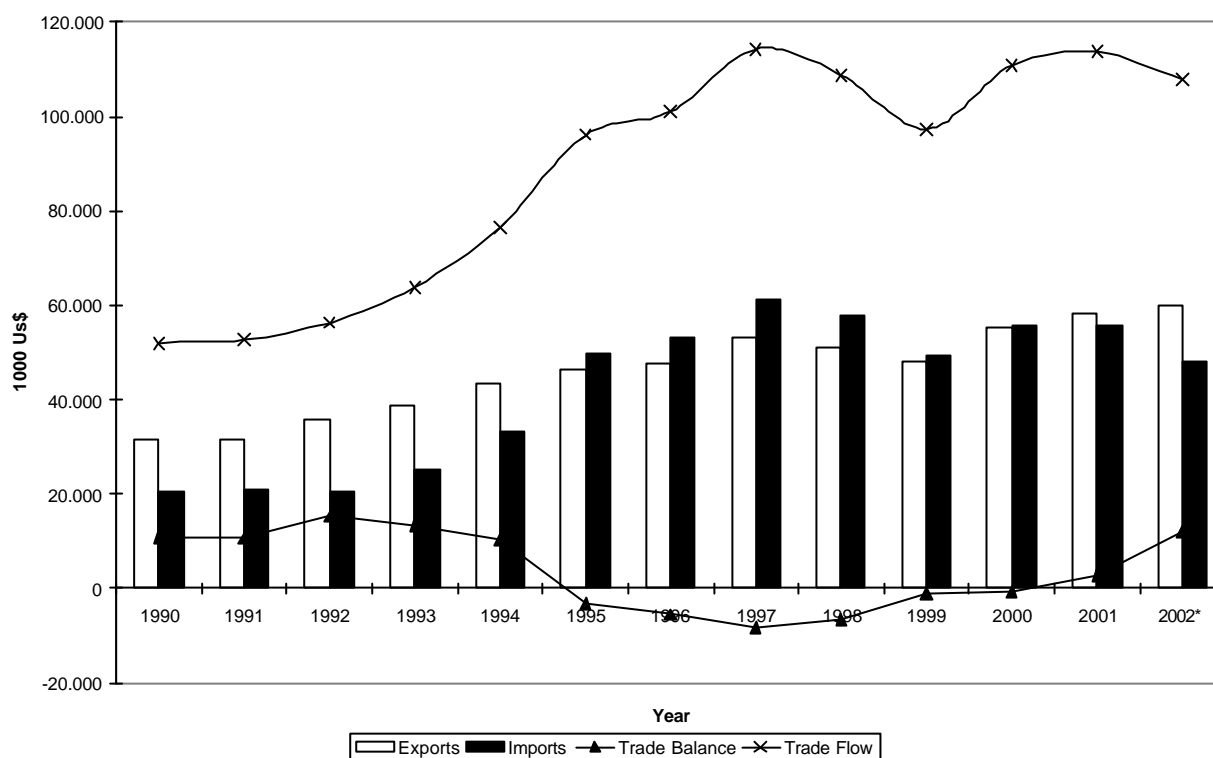
As final statement, the observed pattern of changes suggests that the loss of competitiveness of national firms started in the period 1996-1999. Contrary some analysts' arguments, this was truth for the whole industry and not only for technologically intensive industries. In this period, we assist to transference of the activities of the leading national firms to infra-structure services activities. Certainly, the privatisation of that sector opened a new space and opportunities for those firms exit industrial activities.

3.2.3. Regressive specialisation trend in the trade pattern

The external insertion of the Brazilian economy during the 1990s was characterised by a raise in the exports and imports. The imports rose faster than the exports provoking a reduction in the trade balance. Figure 3, shows the evolution of exports, imports, trade balance and trade flow for Brazil from 1980 to 2002, and permits to clearly verify the effects of the different competitive regimes on the trade balance, during the 1990s. Between 1990 and 1993 the trade flow and the trade balance remained unchanged. This behaviour suggests that the tariff reform had had small impact in the international insertion of the industry (Kupfer, 1998).

Immediately after the Real Plan in 1994, as has been said, went together with an acute overvaluation of the Real, comes into our attention the raise of the trade flow due to the rapid expansion of the imports. As the exports rose at moderate levels, most of the times at a lower level than the world exports, the imports duplicate from 1993 to 1995 (or triplicate from 1990 to 1997). As result the trade balance deteriorate to deficit levels by 1995, after 14 years of superavit results, being in the red by US\$ 8.2 billions in 1997. Only after the predictable exchange rate crisis in January 1999, that result in a depreciation of the Real and the return to a fluctuate exchange rate system, started the reversion of this trade balance deficit. However, the trade flow remained stable, suggesting that the openness of the trade system achieve its limits.

FIGURE 3
BRAZILIAN FOREIGN TRADE: 1980-2002*



* Annualised from data until october/2002
Source: Alice Database

The changes in the external insertion of the industry were shown in different dimensions. First the increase of the Mercosur participation in the trade flow, but only until 1998. Table 5 shows the destination of the exports and the origin of the Brazilian imports for selected years during the 1990s. The growth of Mercosur role in the share of Brazilian exports is due to: (i) a certain diversification of export markets with the reduction of the EU weight in the exports and inversely (ii) a concentration of the imports from US and EU.

TABLE 5
DESTINATION AND SOURCE OF BRAZILIAN EXTERNAL TRADE
1990-2002 – SELECTED YEARS –%

| | Exports Destiny | | | | | Imports Source | | | | |
|------|-----------------|----------|------|-------|--------|----------------|----------|------|-------|--------|
| | USA | Mercosul | EU | Japan | Others | USA | Mercosul | EU | Japan | Others |
| 1990 | 24,6 | 4,2 | 32,5 | 7,5 | 31,2 | 20,4 | 11,2 | 22,6 | 7,2 | 38,7 |
| 1993 | 20,7 | 14,0 | 26,4 | 6,0 | 32,9 | 20,4 | 13,4 | 23,5 | 7,6 | 35,0 |
| 1996 | 19,5 | 15,3 | 26,9 | 6,4 | 31,9 | 22,4 | 15,6 | 26,7 | 5,2 | 30,1 |
| 1998 | 19,3 | 17,4 | 28,8 | 4,3 | 30,2 | 23,7 | 16,3 | 29,2 | 5,7 | 25,1 |
| 1999 | 22,6 | 14,1 | 28,6 | 4,6 | 30,1 | 24,1 | 13,6 | 30,5 | 5,2 | 26,5 |
| 2000 | 24,3 | 14,0 | 26,8 | 4,5 | 30,4 | 23,3 | 14,0 | 25,2 | 5,3 | 32,2 |
| 2001 | 24,7 | 10,9 | 25,5 | 3,4 | 35,4 | 23,5 | 12,6 | 26,7 | 5,5 | 31,7 |
| 2002 | 25,7 | 5,5 | 25,0 | 3,5 | 40,3 | 22,1 | 11,9 | 27,7 | 5,0 | 33,3 |

Source: Alice Database

In addition, there was a divergent tendency in the evolution of the mix of export and import

goods. From the exports side (Table 6) between 1990 and 2000 we can see a small reduction on the participation of basic products (e.g. iron, soya flour, row coffee beans, triturerated soya and tobacco leaves) and semi-manufacture products (e.g. pulp, row steel, row aluminium, soya oil, iron steel, crystal sugar) and to an increase of the manufactured products. After 2000, there was a reverse in this tendency, returning to the 1990 values. From the imports side (Table 7) there was a consistent increase of the intermediary products participation, as a consequence of natural adjustment in the productive processes (subcontracting, outsourcing) implemented by the a large number of firms almost in all industrial sectors. Regarding the other imported items, the weight of imports oscillated cyclically. The contraction of participation in the consumption goods in the imports share after 1999 reflects the change in the exchange rate regime.

TABLE 6
 COMPOSITION OF EXPORTS
 1990-2002 – SELECTED YEARS - %

| | 1990 | 1993 | 1996 | 1998 | 1999 | 2000 | 2001 | 2002 |
|------------------------|------|------|------|------|------|------|------|------|
| Basic Goods | 27,8 | 24,3 | 24,9 | 25,4 | 24,6 | 22,8 | 26,4 | 28,1 |
| Semi-manufacture Goods | 16,3 | 14,1 | 18 | 15,9 | 16,6 | 15,4 | 14,2 | 14,8 |
| Manufacture Goods | 54,2 | 60,8 | 55,3 | 57,5 | 56,9 | 59,0 | 56,5 | 54,7 |

Source: Alice Database

TABLE 7
 COMPOSITION OF IMPORTS
 1994-2001 – SELECTED YEARS - %

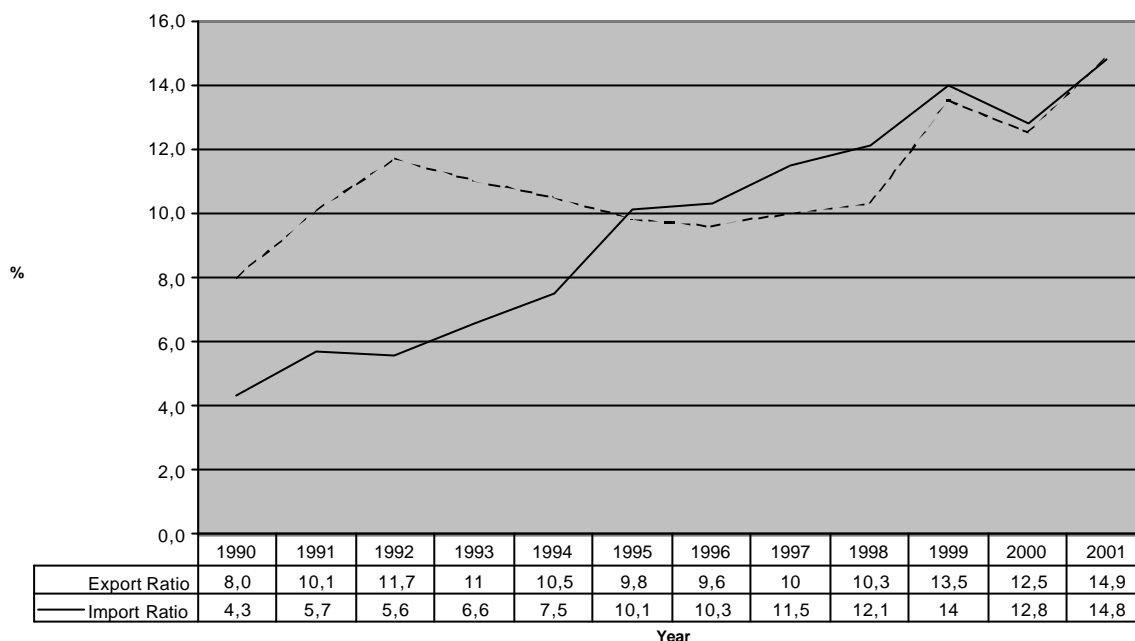
| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|--------------------|------|------|------|------|------|------|------|------|
| Intermediate Goods | 41,2 | 45,0 | 46,1 | 43,5 | 46,4 | 48,8 | 51,0 | 49,3 |
| Consumer Goods | 16,1 | 21,8 | 18,3 | 18,8 | 18,6 | 15,1 | 13,2 | 12,8 |
| Oil and | 13,1 | 10,4 | 11,7 | 9,7 | 7,1 | 8,6 | 11,4 | 11,3 |
| Capital Goods | 29,6 | 22,7 | 23,9 | 27,9 | 27,9 | 27,5 | 24,4 | 26,6 |

Source: Alice Database

A more accurate measure of the change in the pattern of international insertion of the Brazilian industry is the relation between trade flow and the variables associated to the country' size, such as production output. Two measures are defined: exports coefficient (ratio of value of exports to gross output) and imports coefficient (ratio of value of imports to gross output).

Figure 4 shows the evolution of the exports and imports coefficients during the 1990s, for transformation industry. The values confirm the previous analysis. Table 8 shows both coefficients for selected sectors, those of more business volume. Two features claim our attention: the rapid evolution of the imports coefficient for those sectors of more value added and technologically more advanced, as electronic and electrical equipment, auto-parts and pharmaceuticals; and of the exports coefficient in those sectors of low added-value and low technological incorporation as shoes and leather, sugar, wood and furniture, and vegetal oils, however, automobiles and auto-parts are also responsible for a rapid increase of the exports coefficient.

FIGURE 4
MANUFACTURING INDUSTRY: EXPORT AND IMPORT RATIOS (%), 1990-2001



Note: Export Ratio – export / gross output

Import Ratio – import / gross output

Source: Ribeiro e Pourchet (2002)

TABLE 8
MANUFACTURING INDUSTRY: EXPORT AND IMPORT RATIOS (%), 1990-2001

| Industries | 1990 | 1993 | 1996 | 1998 | 1999 | 2000 | 2001 |
|---------------------------|------|------|------|------|------|-------|-------|
| Export Ratio | | | | | | | |
| Calçados, couros e peles | 23,8 | 43,3 | 38,5 | 42,9 | 53,8 | 61,0 | 74,9 |
| Açúcar | 13,8 | 20,1 | 27,1 | 31,2 | 44,0 | 24,1 | 46,0 |
| Peças e outros veículos | 16,2 | 21,1 | 18,6 | 26,5 | 39,5 | 41,0 | 45,0 |
| Equipamentos eletrônicos | 5,7 | 8,9 | 5,9 | 9,4 | 20,8 | 29,2 | 38,5 |
| Óleos vegetais | 29,2 | 26,8 | 25,9 | 20,5 | 23,7 | 20,9 | 27,6 |
| Madeira e mobiliário | 4,4 | 12,1 | 10,5 | 11,8 | 19,5 | 19,6 | 24,1 |
| Veículos automotores | 9,3 | 15,8 | 7,2 | 17,2 | 18,5 | 18,9 | 23,1 |
| Import ratio | | | | | | | |
| Equipamentos eletrônicos | 13,9 | 31,0 | 40,1 | 57,5 | 98,6 | 103,8 | 122,7 |
| Material elétrico | 9,0 | 11,7 | 18,4 | 24,1 | 33,9 | 28,5 | 40,3 |
| Peças e outros veículos | 8,9 | 13,7 | 18,9 | 28,5 | 39,2 | 31,6 | 34,5 |
| Farmacêutica e perfumaria | 7,9 | 9,5 | 17,0 | 18,1 | 27,6 | 22,9 | 30,1 |
| Máquinas e tratores | 11,3 | 12,9 | 26,1 | 31,4 | 36,0 | 23,3 | 28,4 |

Note: Export Ratio – export / gross output

Import Ratio – import / gross output

Source: Ribeiro e Pourchet (2002)

The data presented in this section suggest that the international insertion of the Brazilian industry changed a lot after the post-openness period. The decisive years for this imports “explosive” trajectory were 1994 and 1995, concurrent with the transition period and the post- Real Plan. By the end of 1998, the financing model of the Brazilian balance of payments become unsustainable, inaugurating a new recession phase and successive local currency devaluation. After 2001 the balance trade recovered and presented positive values, reflecting a period of moderate exports increase and a contraction on the imports.

The depreciation of the Real occurred by the beginning of the 1999, brought expectations on a rapid growth returning of the Brazilian exports. However, after three years this did not occur. To some specialists, the feeble performance of the exports in recent years can be explained by the international unfavourable cycle of the prices of mining and agricultural commodities, establish in the international markets. To others, the explanations are less related to conjuncture factors but more with the trade restrictions to Brazilian products, as well issues related with the commercial policy, emphasising the importance of the negotiation strategies adopted by Brazil in the multilateral and regional efforts to a better positioning of country' exports.

Although the above listed causes are pertinent, some structural factors should be incorporated to the analysis. The exports and imports dynamics of a country depend on two conjugated effects: the competitiveness effect that explains part of the variation of the trade flow which is related with the change in the market share of a country to the total of world trade flows; and the positioning effect, that explains the part of the variation of the trade flow which is related to the relative share of a sector in the world trade flows. Kupfer (2002) calculated the contribution of these effects in the EU and US markets, the more relevant markets for Brazilian exports for 1995-1999. In the case of US, only a third of the exports value presents competitiveness and positioning positive effects. For the EU market this number decreases to only 18 per cent.

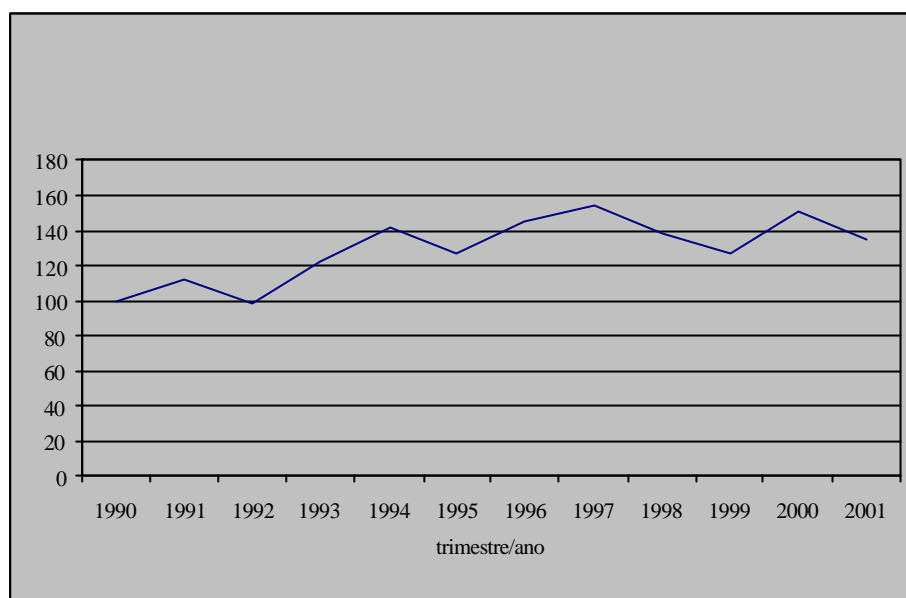
The 2002 US\$ 10 billions trade balance was close to the values of the 1984-1987 period. Although based on a similar list of exported products, the imported products list was quite different, and more intensive in dynamic products. Therefore, the commercial reforms were not capable of changing the competitiveness of Brazilian industry. By the way, the relative participation of Brazil in the international trade flows decreased from 1.4 per cent in the mid 1980s to the current 0.7 per cent.

3.2.4. Capital and R&D investment strategy are still the same:

One of the most critical conditions to the sustainable evolution of industrial competitiveness is the investments in fixed capital. These investments can congregate new productive capacity, and become an important factor of generating economies of scale and scope and incorporation of new technologies.

However, during the 1990s this was not the case for the Brazilian economy. The period is characterised by a lack of any tendency of expansion of the gross fixed capital accumulation, as we can see in Figure 5.

FIGURE 5
 GROSS CAPITAL ACCUMULATION IN BRAZILIAN ECONOMY
 INDEX NUMBER 1990=100



Source: IBGE/DECNA

Albeit this general tendency, from the mid 1990s it is possible to observe some recovery in the rates of investment in the Brazilian industry to the GDP, surpassing the rates of the early 1990s, that were the lower of the last decade, as we can see in Table 9.

TABLE 9
 INDUSTRIAL INVESTMENT / GDP RATIO
 CONSTANT PRICES OF 1980

| | |
|-----------|-----|
| 1972-1980 | 4,5 |
| 1981-1988 | 3,2 |
| 1988-1993 | 2,2 |
| 1995-1997 | 3,2 |

Source: Bielschowsky (1998)

According to Bielschowsky (1998) forecast, the yearly investment level for 1995-97 would be, in absolute terms, 82 per cent above the mean for 1992-93. Nevertheless, these rates are far below those registered for the investment peak reached in the 1970s and are closer to the values observed during the 1980s. These comparatively low investments can show a resume on the investments in the industry, during the 1990s. Bielschowsky (1998) presents a basic argument to justify the superior quality of the recent investments in the industry. According to a research conducted by CNI/ECLAC with 730 firms (see Table 10), the goals of the firms fixed investments planned and that took place during the 1990s, besides being related with the productive modernisation (especially concerned with costs reduction) was possible to detect an expressive growth of the expansion investments (particularly those related with new products launch in the market).

TABLE 10
 MAIN GOALS OF FIRMS' CAPITAL INVESTMENT 1992-94, 1995-96 E 1997-98
 (% OF FIRMS BY GOAL INDICATED AS DOMINANT)

| Goal | 1992-94 | 1995-96 | 1997-99 |
|------------------------|---------|---------|---------|
| Cost reduction | 52,2 | 61,9 | 54,0 |
| Equipment substitution | 57,3 | 55,2 | 49,0 |
| Unbottlenecks | 30,2 | 43,4 | 32,9 |
| Plant expansion | 33,3 | 41,7 | 47,4 |
| New products | 27,1 | 39,2 | 57,3 |
| New plants | 11,4 | 20,4 | 32,9 |

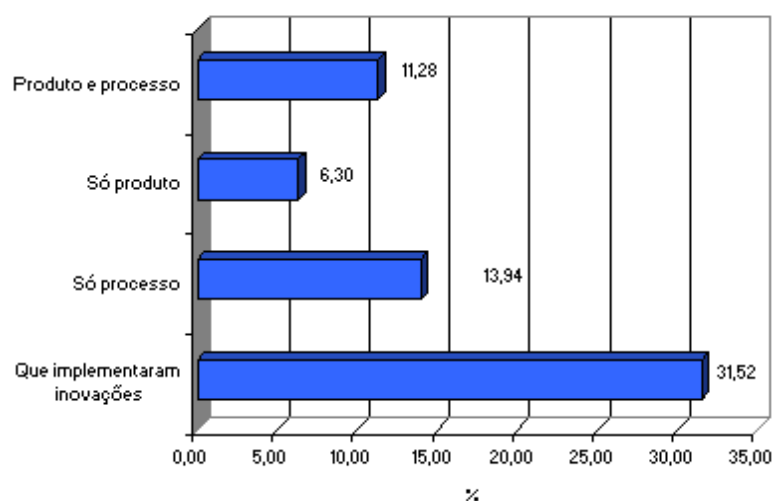
Source: Bielschowsky (1998)

The tendency related with the resume of the pace of investment in the industry observed in the past years, must be, however, better defined regarding industrial sector specificities. The industry has been having a different reaction to the impacts of these investments in the transformation of the competitive environment.

The second issue to be analysed is the technological behaviour of the Brazilian firms during the 1990s. Even if working with aggregated data, it is possible to characterise quite precisely the local innovative efforts achieved by the industry (PINTEC/IBGE – Industrial Survey on Technological Innovation, 2000). This recent research, scrutinise the innovation efforts of the Brazilian firms as: (a) external acquisition of R&D and other knowledge; (b) launch of technological innovations in the market; (c) internal activities of R&D; (d) development of industrial projects or other technical procedures; (e) training of its members and (f) acquisition of machinery and equipments.

In this enlarged view, the Brazilian firms showed an active but budding innovation effort. By the end of 1990s, as shows Figure 6, only a third of the industrial Brazilian firms implemented some type of innovation. From a total of 70 thousand firms (with ten or more employees) for the period 1998-2000, merely 31.5 per cent implemented product and/or process innovations - 22.7 thousand firms. This 31.5 per cent innovation rate can be divided as: 6.3 per cent of firms only introduced product innovations, 13.9 per cent process innovations and 11.3 per cent both product and process innovations.

FIGURE 6
 SHARE OF INNOVATING COMPANIES IN THE TOTAL SAMPLE, 1998/2000

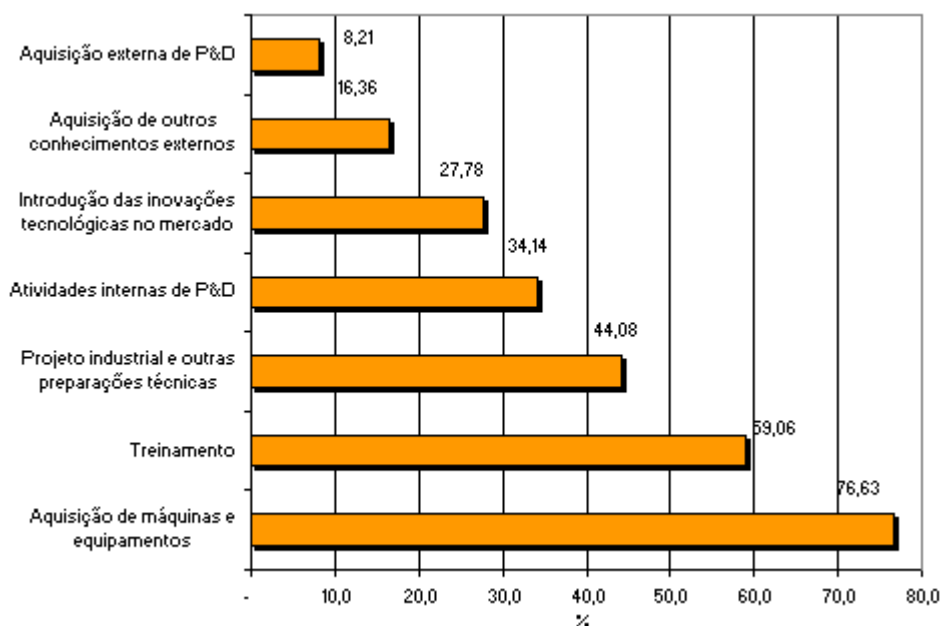


Source: IBGE, Industrial Survey on Technological Innovation, 2000

Figure 7 shows firms' perception of the scale of importance of several types of innovation

efforts. Clearly, the majority perceives innovation through acquisition of machinery and equipment as the most innovative activity (76.63 per cent) and through training (59.06 per cent). The first category is associated to technologies incorporated in the machinery thus, a sign of process modernisation. The second category of innovation efforts - training – can only be considered indirectly. Although, workers competencies improve by training, not all training activities end up in innovation activities. The most important fact is that a third of the Brazilian industrial firms consider vital the engagement in internal R&D activities.

FIGURE 7
DEGREE OF IMPORTANCE OF INNOVATIVE ACTIVITIES EFFORTS, 1998/2000



Source: IBGE, Industrial Survey on Technological Innovation, 2000

Table 11 shows of what is been said. From the 72 thousands industrial firms, with total sales of R\$ 582 billions in 2003, just 19 thousand spent R\$22 billions on innovation expenditures, that is 3.8 per cent of total income. From this value, 2 per cent was allocated to machinery and equipment by 15 thousand firms. In 2000, this value corresponded to R\$ 11.6 billions, which is half of the innovation expenditure. As for R&D expenditure, merely 7.412 firms spend 0.64 per cent of its liquid income, R\$ 3.7 billions. In these R&D activities, 31.4 thousand professionals work full time and another 32.9 thousand professionals work part-time.

TABLE 11
NET REVENUE AND EXPENDITURE IN INNOVATIVES ACTIVITIES, 2000

| Number of Firms | Net Revenue (R\$ 10 ⁶) (1) | Expenditure in Innovative Activities | | | | | |
|-----------------|--|--------------------------------------|------------------------------|-------------------------|------------------------------|--------------------------|------------------------------|
| | | Total | | Internal R&D Activities | | Acquisition of Equipment | |
| | | Number of Firms | Value (R\$ 10 ⁶) | Number of Firms | Value (R\$ 10 ⁶) | Number of Firms | Value (R\$ 10 ⁶) |
| 72.005 | 582.406,1 | 19.165 | 22.343,8 | 7.412 | 3.741,6 | 15.540 | 11.667,3 |

Source: IBGE, Industrial Survey on Technological Innovation, 2000

Even among the restrict group of firms that are engaged in innovation efforts, prevail important differences. Table 12 clearly shows that the bigger the firm, the greater is its innovation engagement. Less than half of the firms that have R&D expenditures do it in a

regular base. However, this group is responsible for 90 per cent of national expenditure in R&D. In the same way, the bigger the firm, the bigger are its efforts in R&D, only 27.78 per cent of the small firms showed R&D expenditures against 79.88 per cent for firms with more than 500 employees.

TABLE 12
DISTRIBUTION OF NUMBER OF FIRMS AND EXPENDITURES IN PERMANENT AND EPISODIC R&D ACTIVITIES BY SIZE, 2000

| Size (in Number of Employees) | Permanent R&D Activities | | Episodic R&D Activities | |
|-------------------------------------|-----------------------------|-------------------|----------------------------|-------------------|
| | No. of Firms % | Expenditures % | No. of Firms % | Expenditures % |
| Total | 42,87 | 90,04 | 57,13 | 9,96 |
| 10 to 29 | 27,78 | 31,96 | 72,22 | 68,04 |
| 30 to 49 | 31,56 | 53,9 | 68,44 | 46,1 |
| 50 to 99 | 45,26 | 65,67 | 54,74 | 34,33 |
| 100 to 249 | 55,31 | 78,47 | 44,69 | 21,53 |
| 250 to 499 | 65,56 | 86,95 | 34,44 | 13,05 |
| 500 or more | 79,88 | 96,12 | 20,12 | 3,88 |

Source: IBGE, Industrial Survey on Technological Innovation, 2000

The innovation efforts have been incipient and of low qualification and besides that, firms do not consider partnerships to increase their technological efforts intensity. Table 13 shows that only 11.04 per cent of the Brazilian firms co-operate with other firms. Again, the collaboration intensity increases with firm's size: from 7.43 per cent of firms with 10 to 29 employees to 37.80 per cent for bigger firms.

TABLE 13
SHARE OF NUMBER OF FIRMS WITH COOPERATIVE R&D EFFORTS IN THE TOTAL NUMBER OF INNOVATIVE FIRMS BY SIZE, 1998/2000

| Size (in Number of Employees) | Share of Firms with Co-operative R&D Efforts (%) |
|----------------------------------|--|
| Total | 11,04 |
| 10 to 29 | 7,43 |
| 30 to 49 | 8,78 |
| 50 to 99 | 11,19 |
| 100 to 249 | 16,52 |
| 250 to 499 | 20,25 |
| 500 or more | 37,80 |

Source: IBGE, Industrial Survey on Technological Innovation, 2000

3.3. SHIFTS IN THE PATTERNS OF COMPETITION DURING DE 90'S: SOME STYLISED FACTS

The institutional transition towards a new paradigm "lead by the market" – trade liberalisation, deregulation and privatisation – was very difficult, taking in account the low credibility of the role of government and absence or inappropriate use of the structural and systemic pre-conditions (technological and physic infra-structure, loans, etc). Probably, the most important source of uncertainty was the unknown effects of the open market regarding the potential of penetration of imported goods into the Brazilian market. The result of this uncertainty, is the loss of capacity by firms to forecast the real size for its current markets, leading to a reduction on the pre-existent microeconomic degree of confidence.

The environment structurally hostile to competitive restructuration faced additional constraints due to the recession trend experienced in the Brazilian economy that restricted the investment decisions. It is not clear the extension of the openness effects in promoting

an acceleration of the investments in expansion or industrial modernisation. However, conjoined with the recession effects we could not expect a lot from the response capacity of firms.

Looking forward, some stylised facts can be derived from the Brazilian recent institutional transition, each of them implying important changes in the patterns of competition of the local industry. There are:

- Trade liberalisation in an unstable macroeconomic environment led the Brazilian industrial sector to a regressive specialisation, that is, the adjustment was concentrated on downsizing and out-sourcing products and services.
- There was a once-for-all increase in productivity indexes instead of an increase in productivity growth. The lack of favourable structural conditions for long-run investment in R&D and output expansion led to a concentration on cost-minimising strategies and mergers and acquisitions.
- Trade liberalisation without efficient export-promoting policies resulted in structural trade deficit, which in its turn tended to intensify the foreign-exchange constraint on economic growth.
- Multinational enterprises increased their market share in industrial sectors of high technological content. As a consequence, intra-firm trade and sub-contracting increased in importance in these sectors and the degree of domestic competition decreased.

The next sections will explore this implication through a more detailed analysis of the restructuring of some of the main branches of the Brazilian industrial structure.

4. COMMODITIES: A DUAL TRACK STRATEGY: LOW COST FOR EXPORTS, DIFFERENTIATION FOR THE LOCAL MARKET

4.1. PATTERN OF COMPETITION NOW AND THEN: WIDENING AND DEEPENING THE SEARCH FOR LOW COSTS

Commodity related industries are engaged in producing intermediate inputs to industrial or final consumption, through large-scale production processes. The reference driver for commodity-based industries is cost competition. Cost minimisation strategies mattered in 1990 and are still prevalent in 2003. (See first two columns in Table 14) The search for and exploration minimisation drivers at company level, as well as in markets and industrial configurations was enhanced. This is most noticeable on regimes of incentives and regulations of developed nations, where markets were defended for local firms by means of explicit protectionist measures.

Since commodity products are intrinsically undifferentiated, competitive firms sustain and expand access to all sources of low unit costs and high production volume. Production efficiency and economies of scale are still ensured by three different but complementary sources: high capital intensive plants, preferential access to inputs –raw materials and energy sources- and transport logistics. In such a context, large, multi-plant, companies, operating internationally are capable of expanding the frontiers of low cost. During the last decade, simultaneously with similar operations in other sectors, more aggressive firms have deepened up their leadership positions, becoming larger and more internationalised by means of mergers and acquisitions transactions.

At the level of the firm, core competences are still related to four sources of competitive advantages: knowledge to effectively manage, acquire or access process technology, inputs, transportation, product distribution networks and preferential clients. The diffusion of information systems based on microelectronics technologies has provided the technical base for co-ordinating large-scale operations and logistics.

The pattern of competition among firms has remained closely associated with homogenous oligopoly; firms have knowledge on market perspectives and the behaviour of competing firms on a global basis. Thus, for competitive success, it is of fundamental importance to anticipate demand growth or to effectively respond to changes in price and quantity demanded from local and international markets.

Aggressive firms are those implementing two types of investment strategies –through green field but preferably M&A operations: expanding capacity ahead of demand growth of current products and virtualisation. Virtualisation expands the frontiers of cost minimisation, through economies of scale, and provides complementary sources of revenue. Revenue possibilities have expanded significantly in the past 10 years, by means of widening product portfolio (product grading in petrochemicals), exploring transportation assets for third parties or selling-off energy surplus.

The preferential access to capital markets is of vital importance for the competitiveness of investment-driven strategies. On this matter, large and internationalised companies have considerable advantages over firms operating single plants or in a limited number of national markets.

International competition in a context of liberalised national economies has strengthened a particular and historical trend: although prices of most commodities fluctuate along world economic cycles, relative prices have showed a declining trend, imposing problematic terms of trade for commodity dependent exporting nations.

TABLE 14
Patterns of competition (POC) and competitiveness in Commodities: now and then

| SOURCES OF COMPETITIVE ADVANTAGES | PoC COST RELEVANT DRIVERS 1990 | PoC COST RELEVANT DRIVERS 2003 | BRAZILIAN COMPETITIVENESS 1990 | Brazilian COMPETITIVENESS 2002 |
|---|---|---|--|--|
| INTERNAL FACTORS | | | | |
| MANAGEMENT PRODUCTION SALES INNOVATION | Process control Mass flow & energy efficiency Access to distribution channels Process technology | NO CHANGE | Efficient Efficient Efficient Incipient local efforts | More efficient Efforts placed in energy control More efforts Incipient local efforts |
| STRUCTURAL FACTORS | | | | |
| MARKET | Standardisation Price, technical conformity Access to international trade | NO CHANGE | Prominence in low value added segments Low growth of demand | Dual track more visible: low value added for exports and higher value added for local consumption Cyclical with worsening terms of trade |
| CONFIGURATION OF INDUSTRY | Company and plant level economies of scale Access to raw materials & transport logistics Specialised technical services | NO CHANGE | Efficient plant size but low size of companies; prominence of SOE; low internationalisation efforts Good access to inputs and deficiencies in logistics Reasonable efforts | Inside trajectory with important ownership change, prominent role for local capital and State as partner; low internationalisation efforts More efficient Reasonable efforts |
| REGIME OF REGULATION AND INCENTIVES | Anti-dumping & commercial policy Environmental protection Cost of capital | INCREASED IMPORTANCE INCREASED IMPORTANCE NO CHANGE | Trade restrictions Existing High Tax distortions Risk of cartelisation, infant privatisation | Stronger pressure Stronger pressure Still high Tax distortions, Cartelisation yet to come, privatisation completed but not consolidated |

4.2. COMPETITIVENESS IN 2002: SUCCESSFUL CATCHING-UP BUT OWNERSHIP CONSOLIDATION AND PRODUCT UPGRADING MUST BE FURTHER STRENGTHENED

Steel, pulp and paper and concentrated orange juice, among other commodity industries like soy and iron ore, are considered to be pillars of Brazilian international competitiveness. In these industries, in 2002, Brazil held a significant market share in international export markets: 80% in concentrated orange juice, 37% in sugar, 34% in soy grains, 32% in coffee and 16% in the meat industry. In 1990, the relatively small size of leading companies and the low levels of product value-added were the relevant competitive challenges facing Brazilian commodity producers. Since then these challenges were only partially addressed, while other sources of competitiveness were strengthened out. (See last two columns in Table 14)

Companies placed considerable emphasis on actions closely associated to direct input costs like ensuring access to raw materials and transport infrastructure. Lowering energy costs was an important investment item, given its high burden on total costs and the supply crisis the country faced in 2001. In addition, they consolidated capabilities to efficiently operate technically updated plants but still relying on capital goods suppliers to define the technological possibilities of improving processes.

Privatisation of the steel industry and private mergers and acquisitions have changed ownership structure of most industries, providing the opportunity for the emergence of larger firms. However, this process has not ended, meaning that market structures are still to be further consolidated. Even so, leading Brazilian firms, when compared to their international counterparts, have remained relatively small and oriented towards the local market. Leading international corporations were particularly active in acquiring competition and/or complementary assets in the 1990s.

In terms of product portfolio, Brazilian firms still supply international markets predominantly with low value added products, although they have invested in directly accessing distribution networks and large clients. For the local market, however, firms have evolved towards widening and upgrading product portfolio. This dual track behaviour has been consolidated throughout the years. Remains to be seen whether the experience in the local market may prove useful for conquering new and more valuable segments in international markets, in the years to come.

4.2.1. The steel industry

In the steel industry two outstanding processes were in place: the unfolding of the privatisation process initiated in the late 1980s and a substantial but localised investment drive in stages of the production process associated with the generation of new, higher unit value products to be sold in the local market.

Local capital prevailed in the privatisation process. Financial institutions accounted for 33.6%, pension funds for 15% and industrial corporations process for 21.8% of the value of privatisation transactions. Six large steel companies and six small ones were privatised in Brazil, for a consideration of US\$ 5.7 billion. Due, to a great extent, to the privatisation technique – auctions – an outstanding feature of the 1990s was the post-privatisation ownership instability and changes.

After privatisation was completed, 20 private M&A transactions were carried out. Between 1990 and 2000, only 17% of production units (measured in physical capacity) were not subject to at least one change in ownership. Concentration was increased in flat steel business, remembering that as USIMINAS acquired COSIPA, the plate segment became a virtual monopoly. The Gerdau group was the most active in acquiring private companies in Brazil and abroad. Throughout the 1990s it purchased 4 steel enterprises in Brazil and 7 abroad. It is focused on long steel business. Progressively the ownership structure of the industry has been consolidated, as shown in the Table 15.

TABLE 15
2002 OWNERSHIP STRUCTURE OF THE BRAZILIAN STEEL INDUSTRY

| | | |
|---------------------|---------------|--|
| Special Steel | Acesita | Arcelor (39%), Previ (19%), Sistel (12%) |
| | Villares | Sidenor (58%), BNDESPAR (29%) |
| | V&M | V&M (93%) |
| Long Steel (Carbon) | Barra Mansa | Votorantim (100%) |
| | Belgo-Mineira | Arcelor (60%), Bradesco (11,5%) |
| | Met. Gerdau | Gerdau (73%) |
| | Açominas | Gerdau (79%) |
| Flat Steel (Carbon) | Cosipa | Usiminas (92%) |
| | CSN | Vicunha (46,5%), Valia (10%) |
| | CST | Acesita/Arcelor (44%), CVRD (20,5%), Kawasaki (20,5%) |
| | Usiminas | CVRD (23%), Nippon Steel (18%), Previ (15%), CIU (10%) |

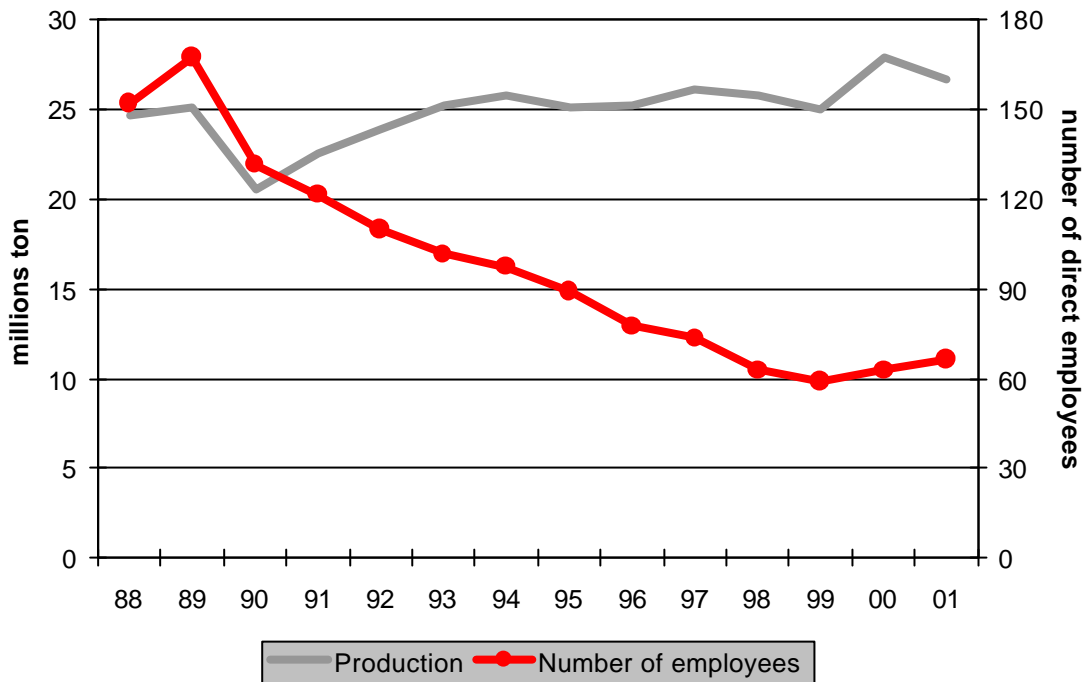
Source: Paula (2002)

The investment drive of the 1990s was very unexpected given the country's macroeconomic uncertainties and those arising from the privatisation process. As leading firms actively engaged in fixed capital spending, together with the automobile industry and telecommunications equipment suppliers, the steel industry was an exception to the low investment context of Brazil. What is even more surprising is that the investment drive took place in a context of strong ownership instability that normally would prevent corporations from capital immobilisation. Between 1994 and 2000 average annual investment was US\$ 1,450 billion. More important was the dual track destination of investments: large investments in rolling area, enabling product upgrading for the local market. On the other hand, the country's steel exports became more and more dependent on semi-finished products.

In 1999, in value terms, the world share of Brazilian production in semi-finished products was 14.1% and in galvanised sheets only 0.4%. The share of semi-finished in total Brazilian steel exports increased from 39.2% in 1990 to 68.4% in 2001, in physical production or 28.6% to 47.3% in value terms, respectively. This expansion was attained even in a context of increasing protectionist barriers, as the case of the USA demonstrates. Conversely, in the local market, between 1992 and 2001 total steel consumption increased 89% and galvanised sheets 402%. Above 50% of total demand came from the auto and civil construction sectors. The auto industries were responsible for 70.6% of special long steel products; the civil construction for 49.25 of carbon long steel products.

The investment drive had direct impact on efficiency levels. Even though output levels remained around 25 million tons per year, modernisation of installations and sharp cuts in employment levels – at an annual average of 7.6% between 1989 and 2000- resulted in corresponding sharp increases in productivity levels - from 11 to 5.4 man-hour per ton, between 1991 and 2000. (Figure 8) Most technologies associated with the investment drive was not developed in-house but incorporated in capital equipment.

FIGURE 8
 OUTPUT AND EMPLOYMENT IN THE STEEL INDUSTRY, 1988-2001



Source: Paula 2002

The strength of competitiveness in low value added products can also be found in the industry's cost structure. As shown in Table 16, competitiveness of the Brazilian steel industry also relies on the low level of labour and iron ore costs. Financial costs and the costs of coal still constitute the basic source of competitive disadvantage.

TABLE 16
 PRODUCTION COST OF BOBINAS LAMINADAS A FRIO, SELECTED COUNTRIES, APRIL 2001
 (US\$ / DISPATCHED TONS)

| | USA | Japan | Germany | UK | S. Korea | China | Brazil |
|--------------------------------|------------|------------|------------|------------|-------------|------------|------------|
| Raw materials | 115 | 106 | 109 | 105 | 112 | 118 | 103 |
| Coal | 27 | 27 | 26 | 24 | 28 | 28 | 37 |
| Iron Ore | 55 | 56 | 62 | 58 | 59 | 75 | 40 |
| Scrap / DRI | 33 | 26 | 21 | 23 | 25 | 15 | 26 |
| Other raw materials | 172 | 150 | 148 | 153 | 134 | 152 | 135 |
| Labour costs | 154 | 142 | 136 | 113 | 62 | 26 | 57 |
| Hourly wage | 38 | 36 | 34 | 27,6 | 13 | 1,25 | 10,5 |
| Total operational costs | 441 | 398 | 392 | 371 | 308 | 297 | 295 |
| Financial costs | 39 | 60 | 40 | 46 | 42 | 50 | 67 |
| Depreciation | 29 | 40 | 30 | 26 | 30 | 30 | 32 |
| Interest | 10 | 20 | 10 | 20 | 12 | 20 | 35 |
| TOTAL COST | 480 | 458 | 432 | 417 | 350 | 297 | 362 |

* in man-hour per ton
 Source: Paula (2002);

4.2.2. Pulp and paper

In 1990, competitive challenges facing the pulp and paper industry were very similar to those of the steel industry: lack of company level economies of scale and a product portfolio based on low value added. Since then the industry has evolved towards facing these competitive challenges, but at a slower rate when compared to its international counterparts. Thus, successful competitive catching up still requires those challenges to be addressed to.

Brazil produces around 7 million tons of pulp and another 7 million tons of paper. This output places the country as the 7th largest producer of pulp (first in short fibre pulp) and 11th in the production of paper. However, internal consumption per capita –at 40kgs- is very low, even compared to other countries at similar levels of development.

Two basic sources sustain competitiveness of the Brazilian industry: privileged and low cost access to the basic input – eucalyptus used for the production of short fibre pulp- and technically updated plants. Backward integration, towards rationalised eucalyptus forests is certainly a major source of competitiveness, given its important contribution to total costs and the high levels of efficiency attained in plantations. Industrial efficiency is particularly observed in pulp production but there has been considerable efforts also in increasing productivity levels of paper production. Efficiency in production has been accompanied by increasing levels of environmental compliance. As a result, the competitiveness of Brazilian products in export markets has been consolidated. However, much remains to be done in terms of expanding company size and updating product portfolio in the paper industry.

Eucalyptus forests have taken up space in Brazil. In 1990, out of 64 million hectares planted, 42 were eucalyptus forests and 20 million pinus forests. Ten years later, the extension of pinus plantation remained constant while 100 million hectares of eucalyptus forests were planted.

As shown in Table 17, in 2001, Brazilian industry leads world short fibre production, with a 19.4% share of total supply. Leadership has been consolidated as, in 1990, that share was

11.7%. Between 1990 and 2001 Brazilian industry expanded at 9.5% annually, inferior only to that of Indonesia, a late comer to the industry. In value terms, exports increased from US\$ 556 million in the beginning of the 1990s, to US\$ 1.3 billion in 2000.

TABLE 17
WORLD SUPPLY OF SHORT FIBER PULP (IN THOUSAND/TONS)

| Country | 1990 | 1992 | 1994 | 1996 | 1998 | 2000 | 2001 | share 2001 | Annual growth |
|-----------|--------|--------|--------|--------|--------|--------|--------|------------|---------------|
| Brazil | 1,380 | 2,215 | 2,260 | 2,700 | 3,285 | 3,615 | 3,740 | 19.4% | 9.5% |
| USA | 2,590 | 3,215 | 3,235 | 15 | 2,840 | 2,780 | 2,935 | 15.2% | 1.1% |
| Indonesia | 90 | 130 | 250 | 1,220 | 1,850 | 2,150 | 2,915 | 15.1% | 37.2% |
| Canada | 1,025 | 1,285 | 1,780 | 1,830 | 1,820 | 1,990 | 1,985 | 10.3% | 6.2% |
| Spain | 735 | 950 | 885 | 910 | 940 | 1,040 | 1,050 | 5.4% | 3.3% |
| Finland | 1,030 | 775 | 770 | 800 | 810 | 850 | 905 | 4.7% | -1.2% |
| Others | 4,930 | 4,695 | 4,790 | 5,065 | 5,350 | 5,845 | 5,790 | 30.0% | 1.5% |
| TOTAL | 11,780 | 13,265 | 13,970 | 12,540 | 16,895 | 18,270 | 19,320 | 100% | 4.6% |

Source: Fonseca (2002)

To a great extent, competitive success in pulp production relies on the capacity of companies to operate at low costs. Table 18 shows a picture very similar to that found in the steel industry. Compared to other leading pulp producers, direct production costs are very low, at US\$ 302 per ton while interest rates are the highest, among leading producing nations.

TABLE 18
COMPARATIVE PULP PRODUCTION AND FINANCIAL COSTS (US\$ TON/CIF NORTH EUROPE)
1995

| | Argentina | Canada | Chile | Portugal | Spain | Sweden | USA | Brazil |
|------------------|-----------|--------|-------|----------|-------|--------|-----|--------|
| Production costs | 974 | 452 | 371 | 349 | 370 | 424 | 374 | 302 |
| Depreciation | 40 | 41 | 56 | 33 | 21 | 50 | 40 | 45 |
| Interest | 35 | 36 | 37 | 65 | 59 | 55 | 40 | 70 |
| Total cost | 449 | 528 | 454 | 444 | 450 | 529 | 454 | 417 |

Source: Fonseca (2002)

In paper production the picture is very different both, in terms of volume of production and share of world markets. In 2000, Brazil produced 7,188 thousand tons of paper, while international counterparts produced 323,295. Although in the 1990s the 4.3% annual rate of growth of Brazilian industry is higher than the rest of the world (3.3%), its international market share is very small and has remained unchanged - 2.0% in 1991, 2.2% in 2000-, for all types of papers.

Five types of papers respond to more than 50% of 2000 exports –printing/writing, non-coated paper, sanitary paper, cardboard e kraftliner-; ten years before this concentration was higher, at 70%. However, since 1990, in value terms, paper exports have remained below US\$ 1 billion for most years. Thus, in 2000, 62% of total paper production was sold in the local market; 22% represented self consumption of the producer and only 15% was exported.

According to the trade association, Bracelpa, 220 companies produce pulp and/or paper in Brazil; 2000 sales reached US\$ 7.5 billion; sales of the largest 11 integrated companies reached 2/3 of this total, revealing, for this industry, the importance of plant and company level economies of scale. During that year, the 4 largest producers of pulp – Klabin, Aracruz, Suzano, Votorantim- were responsible for 70% of total production. In paper production, concentration levels are smaller, but have been increasing since 1990. In that year, the 5

largest producers were responsible for 39.5% of total production; ten years later this share increased to 51.4%. In different segments of the paper industry, concentration levels are higher, and similar to those prevailing in pulp production. Three companies control the production of printing paper; in packing paper, one company, Klabin, dominated 40% of the market in 2000. These concentration levels were increased by means of a very active process of mergers and acquisitions, as shown in Table 19. This process is very similar to international trends.

TABLE 19
MOST RELEVANT M&A IN THE BRAZILIAN PULP AND PAPER (1992-2001)

| Company Sold | Commanding Company | Date | Share | Product | Annual Capacity 1000 t |
|---------------------|---|------|--------|----------------------------------|---------------------------|
| Simão | Votorantim | 1992 | 100% | CFCB + Printing paper | 250 |
| Kimberly Clark | Melhoramentos | 1994 | 100% | Tissue | 25 |
| Iguaçu Cel.Papel | Sonoco Do Brasil | 1995 | 100% | Kraft low gramature | 20 |
| Nicolaus Papeis | Ahlstrom Papeis | 1995 | 100% | filter | 4 |
| J.Bresler | Orsa | 1996 | 100% | Packing | 35 |
| Mad. Sguário | Orsa | 1996 | 100% | Packing | 90 |
| Nicolaus Papeis | Md Papeis | 1997 | 100% | Special Paper + Cardboard | 70 |
| Pirahy | Schweitzer Mauduit | 1998 | 100% | Special Paper | 48 |
| Fab.Papel Guaiba | Santher | 1998 | 100% | Tissue | 20 |
| Klabin Tissue | Kimberly Klabin | 1998 | 50% | Tissue | 155 |
| Inpacel | Champion / International Paper | 1998 | 100% | LWC | 185 |
| Celpav | Votorantim | 1988 | 100% | Printing paper | 100 |
| Trombini* | Igaras | 1998 | 100% | Packing | |
| Igaras | Suzano | 1996 | | Packing | 360 / 460 |
| Igaras | Klabin/Riverwood | 2000 | 100% | Pulp / kraftliner | 360 / 460 |
| Salto | Arjo Wiggins | 1999 | 100% | Safety Paper | 27 |
| Veracel | Aracruz +Storaenso | 2001 | 100% | Acquisition of 10% da Oderbrecht | |
| Conpel | Grupo De Pauli | 1999 | 100% | Packing/bags | 28 |
| Bacraft | Klabin / Kimberly | 1999 | 100% | Tissue | 15 |
| Lalekla | Klabin | 1999 | 100% | Tissue | |
| Klabin | Joint Venture until 2002 Norske Skog | 2000 | 50+50% | Newsprinting Paper | 120 |
| Jarcel | Orsa | 2000 | 100% | Pulp | 300 |
| Bacell | Klabin Lenzig | Nd | | Pulp | 100 |
| Cataguases | Grupo Ibéria | Nd | | Packing | 50 |
| Iberkraft | Grupo Ibéria | Nd | | Packing | 25 |
| Pisa | Norske Skog | 2000 | 100% | PAR + Newsprinting Paper | 270 / 190 |
| Champion L. | International Paper | 2000 | 100% | Pulp + Printing Paper. | 305 / 365 |
| Ind.Papel Sto.Amaro | Ipb-Ind.Pap.Da Bahia | 2000 | 100% | Long Fibre Pulp + Packing | 42 / 56 |
| Agaprint | Rigesa | 2000 | 100% | Packing | |
| Bahia Sul | Suzano | 2001 | 100% | Pulp + Paper | 600 / 250 |
| Cenibra | Jbp | 2001 | 100% | Pulp | 830 |
| Portucel | Suzano + Sonae | 2001 | 28% | Pulp + Paper | 400 BEKP |
| Aracruz | Votorantim Acquisition of 26% of Mondi | 2001 | 26% | Pulp | |
| Pisa | Norske | 2001 | | Paper | |

Source: Fonseca (2002)

4.2.3. Citrus

Some of the 1990s competitive challenges facing the industry, like the need to close relations with distribution channels have been dealt with and presently the industry is stronger than

before. Others challenges remain. Most firms are still distant from final consumers; they are specialised in trading and producing to specifications for corporations that aggregate value to the product, selling them to shops, supermarkets or directly to the final consumer. Curiously, even in this relatively homogenous industry, the dual track pattern observed in the steel and in the pulp and paper industries are also present. In the Frozen Concentrated Orange Juice – FCOJ- segment, Brazil is an efficient exporter; in the Pasteurised Orange Juice –POJ-, segment, sales are directed to the local market. The latter requires more sophisticated industrial operations and it is very close to the final consumer market, requiring significant marketing efforts.

During the past 10 years, the Brazilian industry has consolidated its leading international position in the FCOJ segment and is facing an expanding local market in the POJ segment. Market perspectives are very reasonable, especially in the POJ and natural juice segments; in the US, annual consumption levels of POJ reach 40 litres; in Brazil total orange juice consumption is around 20 litres/year; only 1 litre is POJ but annual rates of growth in this segment are very high, at around 30%.

Brazil still is the most important international player in this industry; during most of the 1990s 50% of total world orange juice and 80% of FCOJ were produced in Brazil, generating, in average, US\$ 1 billion in annual exports. Similarly to other commodity producers, Brazil is very dependent on fluctuations of international prices; while total exports of FCOJ expanded from 785 million tons in 1990, to 1,030 million tons in 1995 and 1,234 million in 2000, export revenues, that have reached a peak of US\$ 1.3 billion, decreased to US\$ 800 million in 2001.

The industry's high market share has brought about reactions from important consumer/producer countries that have imposed important trade barriers to the Brazilian like the USA 56% ad valorem tariff. The most important markets are the US, Japan and Europe. The most developed markets are stagnating; it is estimated that West Europeans consume 24 litres of fruit juice per year, while East Europeans consume 5 litres per year. However, this market is very promising, having expanded 80% between 1995 and 2000.

The competitiveness of this industry is to be found in efficient industrial operations, in privileged access to inputs and in mastering and accessing a sophisticated transport infrastructure. The relevant transport infrastructure is related to specialised orange juice carriers, requiring a technical sophistication similar to a chemical vessel. In relation the agriculture base of the industry, Table 20 below informs how productivity has expanded, due to increases in plantation intensiveness and greater use of fertilisers, while total plantation area has decreased in the last decade. There has been considerable technological efforts to improve the industry's agricultural base; the most significant achievement was the DNA sequencing of genome of the bacteria *Xyllela Fastidiosa*, that provokes diseases to crops. Even though these figures suggest a worrisome trends for agriculture productivity, orange plantation is still economically attractive; its price per hectare is five times greater than those observed for soy and 70 % higher than coffee prices.

TABLE 20
THE AGRICULTURE OF BRAZILIAN ORANGE

| Year | Area (ha 1,000) | Box/tree | Box/ha | Fertiliser (kg/ha) |
|------|-----------------|----------|--------|--------------------|
| 1985 | | 2.0 | 452 | |
| 1990 | | 1.9 | 419 | |
| 1995 | 856 | 2.0 | 519 | 75.73 |
| 2001 | 821 | 1.8 | 532 | 116.36 |

Source: compiled from Neves & Marino (2002)

In the FCOJ segment, the processing industry is the coordinator of the associated logistics: from providing technical and financial support to orange plantations to the timely delivery to distribution channels or directly to the packaging industry. Their co-ordinating capabilities is so developed that important clients, like Coca-Cola, have transferred the managing of their

juice production units, in the USA, to a Brazilian company. This is an important change from the early 1990s; to by pass import restrictions, the most active firms have moved to the south of the USA, acquiring or investing in new processing units and even some plantations. The largest corporations have also increased their economic power; if in the early 1990s very few firms dominated Brazilian exports; in 1997 the share of the largest four producers was 70%; in 2001 this share had increased to 90%. However, even so, these firms remain distant from final consumers; they are typically commodity producers, relying competitiveness on the low cost of their undifferentiated product.

In the segment of pasteurised orange juice, a segment that has been expanding at high rates in Brazil, the market structure is relatively different. As shown in Table 21, searching for economies of scale, a dual verticalisation strategy is implemented by different corporations, along the production chain. In one extreme, close to the resource base, processing firms are verticalised towards packaging operations. On the other extreme, close to the final consumer, selling companies, including supermarkets exploring their own brands, incorporate distribution activities. The relations between these two extremes are mediated, in most cases, by supply contracts among different companies. The exception is Parmalat, a highly verticalised corporation and Yes, that contracts to Paulista their distribution activities. It is worth mentioning that the three leading FCOJ producers – Sucocitro Cutrale, Citrosuco Paulista and Coinbra-Frutesp do not participate in supply contracts of POJ to the major selling companies, contrary to the dual market segment strategies of Citrovita (the 4th largest) and Cargill (the 7th largest).

TABLE 21
 VERTICALIZATION AND SUPPLY CONTRACTS IN THE PASTEURIZED ORANGE JUICE
 PRODUCTION CHAIN

| 1- Selling company | 2- Distribution company | Relation 1x2 | 3- Packaging company | Relation 2x3 | 4- Processing company | Relation 3x4 |
|--------------------|-------------------------|--------------|----------------------|--------------|-----------------------|--------------|
| Nestle | Nestle | Vertical | Cargill | Contract | Cargill | Vertical |
| Dan' Fresh | Danone | Vertical | Citrovita | Contract | Citrovita | Vertical |
| Leco | Leco | Vertical | Citrovita | Contract | Citrovita | Vertical |
| Yes | Paulista | Contract | Cargill | Contract | Cargill | Vertical |
| Parmalat | Parmalat | Vertical | Parmalat | Vertical | Parmalat | Vertical |
| Carrefour | Carrefour | Vertical | Cargill | Contract | Cargill | Vertical |
| Sendas | Sendas | Vertical | Nova América | Contract | Nova América | Vertical |

Source: compiled from Neves & Marino (2002)

5. DURABLES: INWARD INTERNATIONALIZATION AND CACTHING UP IN MIDDLE INCOME SEGMENTS

5.1. PATTERN OF COMPETITION NOW AND THEN: INTERNATIONALIZATION AND DIFFERENTIATION

The market structure of durable industries, like consumer electronics and automobile industries, is characterised by few firms, implementing aggressive strategies towards a global market. Intense product renewal through continuously incorporating greater technological content prevails. To a large extent, competitiveness is defined by the capability of firms to differentiate products and to impose new consumer standards, associated with the intra and inter-firm co-ordination for the assembly of a wide number of components, in large scale. Thus, leading firms in this group are those capable of successfully exploiting economies of scale and scope. Accordingly, a differentiated and concentrated oligopoly is the prevailing market structure, meaning that firms must master competitive advantages by large-scale production of differentiated goods. These trends already successful competitive drivers, in the early 1990s were further stressed since then. (see first two columns of Table 22)

For competitive firms, the emphasis on product differentiation imply the promotion and the attraction of demand, through constant introduction of new products with sets of desirable – from a consumer perspective- attributes, such as price, brand, technology, and technical assistance. To achieve these product attributes, firms must invest in product development and in post-sales assistance, through authorised retailers' network. Firms are constantly trying to create or expand market segments, in order to amortise investments costs associated with product development and new or renewed installations.

Durable industries assemble products in large scale. To be competitive, it is mandatory to respect minimum requirements of technical and management scales. The large minimum efficient scale becomes, then, a significant barrier to entry: incumbent firms must implement investment strategies that anticipate market growth and have to try to expand market shares through constant product differentiation. It is also relevant to operate production systems with increasing ratios of technical efficiency and quality. Guided by principles established by Japanese firms many years ago, leading players have entered a trajectory of "slim" production, composed by a set of techniques that combine increasing process flexibility with the most favourable aspects of traditional Fordist model of production. Such strategy implies an increasing intensiveness in the use of microelectronic based automation and organisational techniques, devoted to continuous improvement of production processes, including production organised around cells. Relative to Fordist systems, production systems of this nature require less but highly qualified workers.

Due to the high ratio of components to production value, since the early 1990s, there has been a clear trend towards vertical disintegration, combined with new forms of articulation between assembler and suppliers. In relation to suppliers, essential competitive factors are: delivery times; price; technical conformity; stable industrial contracts incorporating the transfer of stock administration costs to suppliers; and, joint development of components that must be designed to fit in assembling units of final products. Under a global trade liberalisation context, firms have been developing global sourcing systems.

Investments carried out in these sectors normally induce dynamic effects in a host economy, directly or indirectly, including changing and upgrading the nature of employment and the modernisation of a region. In any part of the world there is always a fierce competition by local authorities to attract companies announcing new investment plans. That is the reason why these authorities provide generous fiscal incentives to attract these set of activities.

TABLE 22
PATTERNS OF COMPETITION (POC) AND COMPETITIVENESS IN DURABLES: NOW AND THEN

| SOURCES OF COMPETITIVE ADVANTAGES | PoC DIFFERENTIATION RELEVANT DRIVERS 1990 | PoC DIFFERENTIATION RELEVANT DRIVERS 2002 | BRAZILIAN COMPETITIVENESS 1990 | BRAZILIAN COMPETITIVENESS 2002 |
|-------------------------------------|---|--|---|--|
| INTERNAL FACTORS | | | | |
| MANAGEMENT | co-ordination capabilities | | Lack of capabilities | Closing gap with international practices |
| PRODUCTION | organisational flexibility | | Organisational rigidity | Closing gap with international practices |
| SALES | Brand image | NO CHANGE with increasing importance of information technologies | Brand image | Closing gap with international practices |
| INNOVATION | product & components design | | Local design capabilities but outdated products | Demobilisation of local capabilities but outsourcing of updated products |
| STRUCTURAL FACTORS | | | | |
| MARKET | Segmentation by quality and marketing | INCREASED | Low segmentation | Specialisation in middle range segments |
| | Price, brand, technological content, technical assistance | INCREASED | High price, low technological content | Increased competition but instability remains |
| | regional & global trade | INCREASED | Distant from international networks | Regionalisation of markets; less threat of competition from imports |
| CONFIGURATION OF INDUSTRY | firm and plant level economies of scale & scope | INCREASED | Scale deficiencies in most product lines | Optimisation through specialisation |
| | articulation assembler-supplier distribution | INCREASED | Infant articulation | Closing relations with suppliers |
| | metrology & standardisation | NO CHANGE | Adequate | Adequate |
| REGIME OF REGULATION AND INCENTIVES | Property rights | NO CHANGE | Low levels of compliance | Enforcement of property rights |
| | Consumer legislation | NO CHANGE | Infant legislation | Stricter legislation |
| | Consumer credit | NO CHANGE | Inexistent | Variation according to macroeconomic conditions |
| | Fiscal incentives | NO CHANGE | Inexistent | Extensive use of local incentives |

5.2. COMPETITIVENESS IN 2002: EXPANSION, MODERNISATION AND PRODUCT UPGRADING. BUT, DEMAND CONSTRAINTS STILL IMPOSE LIMITS TO FURTHER GROWTH

The consumer electronics and the automobile industries were strongly impacted by the Real plan in 1994, associated with trade liberalisation. On one hand, price stabilisation, anchored in local currency overvaluation, provoked an “income effect” that sharply expanded demand levels; on the other hand, the late 1980s trade liberalisation was reinforced, imposing new benchmarks for product attributes, like price and technical specification.

During the 1990s, firms in Brazil not only demonstrated the capacity to resist competitive pressure but, in fact, a significant number of them implemented pro-active strategies to exploit demand expansion, through investment in new plants and products. (see last two columns in Table 22) New entry was also observed, by means of green field investment or the acquisition of existing businesses. By 2003, the internationalisation of ownership, already a structural feature in these industries, was practically completed. Representatives of most international leading players do operate in Brazil.

Overall, in respect of durable industrial group, it is possible to identify a reasonably homogeneous feature, in terms of product and investment strategies. Regardless they are TV or car producers, along the past decade, the presence of transnational affiliates, with similar capabilities and performance, has increased. Firms have fiercely disputed market shares through investment in modernising and expanding productive capacity – acquiring local firms in the consumer electronic and autoparts industries and building of new production units in the automotive sector-. Given these investments, in the international scenario, Brazil has become an important production platform of middle range, but technically upgraded products, like sub-compact cars. However, given the oscillating and low growth trends of the Brazilian economy throughout the decade, most firms have yet to make full use of new installations.

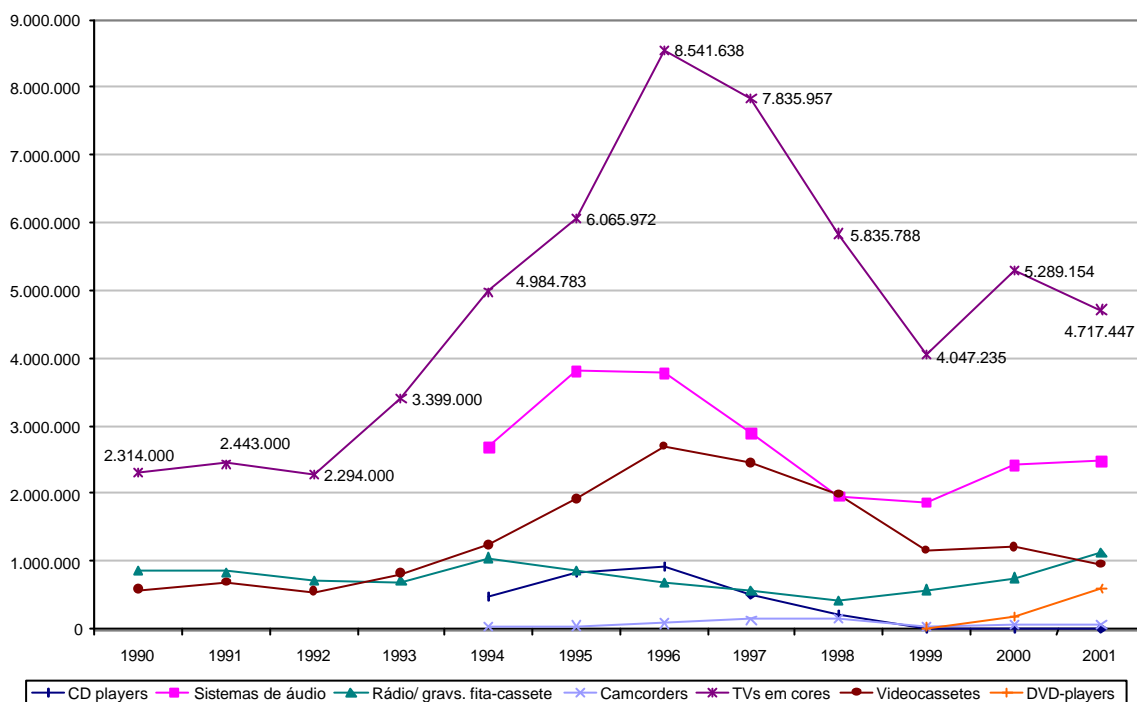
For firms from this industrial group, current competitive challenges are related to the consolidation of their relevance as producers of middle range but reliable products, for the local, regional and international markets. This involves expanding their presence in international, especially intra regional trade flows and the further exploitation of opportunities in global sourcing. This is especially true in a context of low growth of the Brazilian market. Nevertheless, given existing idle capacity, even in a scenario of an expanding local demand, most firms are well placed to sustain competitiveness, especially from imports, in the years to come.

5.2.1. The consumer electronic industry

The Brazilian consumer electronic industry, is located mostly at the “Zona Franca de Manaus” (a duty-free assembling zone). During the last decade it has faced different periods of adaptation and change. After a recessive beginning, in the early 1990s, leading manufacturers of audio and video segments improved their economic performance, due to a significant increase in consumption levels, mostly from lower social classes. As a result, in 1996, sales of TV sets amounted to an unprecedented level of 8,5 millions units. But, as shown in Figure 9, just as production expanded, it has quickly contracted, during the second half of the 1990s.

This inverted V shape of domestic sales reveals two main features of consumer electronic goods: firstly and most important, these trends are a good proxy of uncertainty levels prevailing in the Brazilian economy since the 1980s, a period of frequent oscillating cycles of growth levels; secondly, the vitality of local producers, capable of responding to demand expansion by quickly promoting new investment.

FIGURE 9
 INDUSTRIAL SALES IN DOMESTIC MARKET OF BRAZILIAN ELECTRONIC INDUSTRY
 (UNITIES)



Source: Sá (2002)

That is, the market expansion of the first half of the 1990s has induced the entry of new players and growth of incumbent competitors, both seeking to move into markets other than where they were placed at. It is worth emphasising that leading international players, such as Phillips, Panasonic, Sanyo and Toshiba have been operating in Brazil since the 1980s, thus, reproducing the international oligopoly structure in the Brazilian domestic market.

Sony, and the national firms CCE and Gradiente, which have been traditional players in the audio segments, strived to expand sales by diversifying into TV and video markets. Another national firm, Cinal, signed a joint-venture agreement with Daewoo to enter the audio and video markets. Moreover, the Koreans Samsung Electronics and LG entered the country through new investments in the video segment.

However, in the end of the 1990s, this favourable environment started to change. A new and difficult macroeconomic scenario emerged. High levels of credit default of low budget consumers damaged sales of major shopping outlets, leading to the bankruptcy of leading chains, thereby reducing revenue sales of most electronic manufacturers. The consumer electronic industry went through a reorganisation process. Daewoo closed their operation plants, the Brazilian subsidiary of Sharp defaulted, and Samsung Electronics decided to focus their activities on mobile telephony. In this aspect, due to privatisation of the national telecommunications sector, the expansion of the mobile market quickly became a really attractive option to diversification. This explains why Gradiente, in association with Nokia, moved into this market.

Meanwhile, on the freezers, fridges, cookers and washing machines segments, an unprecedented entry of foreign players through mergers and acquisitions (M&A) operations was observed. Eletrolux acquired the Brazilian group Refripar; Whirlpool bought a majority position in the largest national group, Brasmotor; Siemens-Bosch acquired Continental; Seb bought Arno; and, Tsann Kuen has settled a joint venture with Sector, a Brazilian company. These foreign firms used M&A operations not only as a way to quickly access market-share

and distribution networks of national firms, but also as a mode to move themselves into markets which was growing more rapidly than their traditional ones.

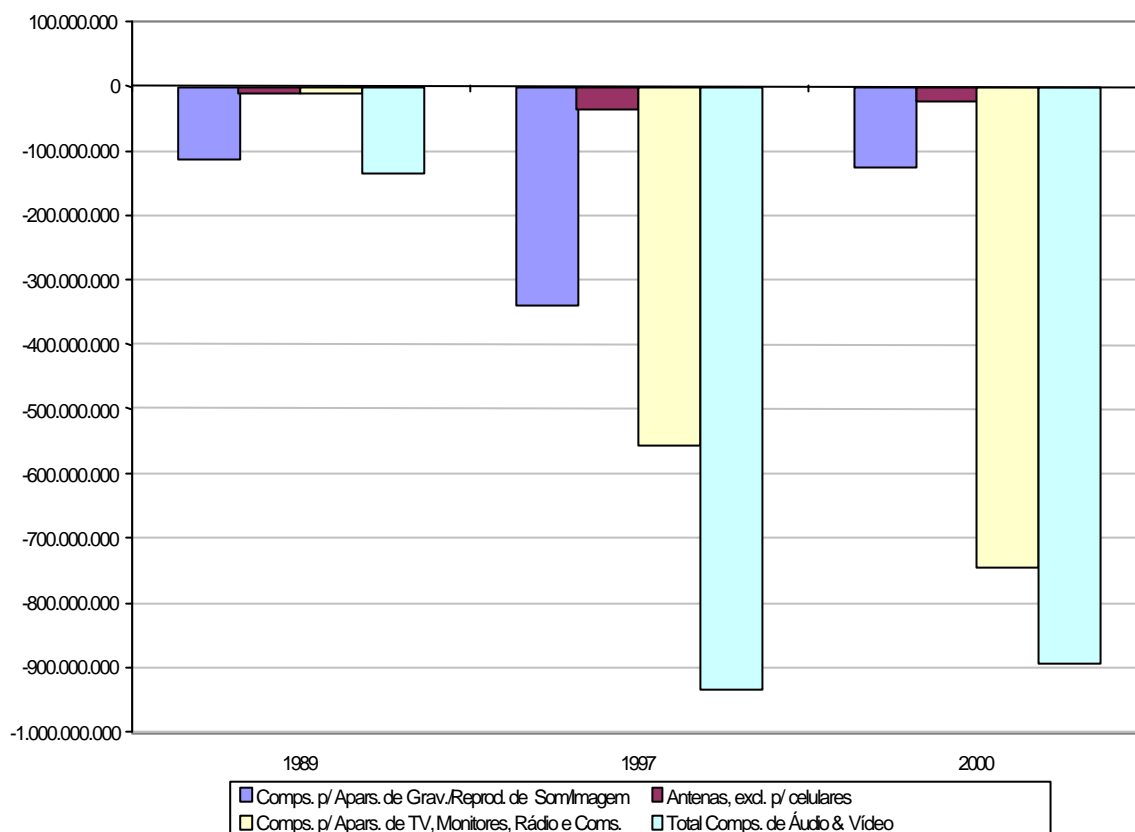
It is relevant to acknowledge the product strategy adopted by international players. In Brazil they implemented policies different from those employed in their original countries – or original markets – where they compete by trying to assume a leading role in defining technological standards. In the Brazilian market, firms implemented a market segment focused strategy, upgrading quality and other product attributes levels, but, at the same time, relying on internationally established technology standards. This option can be explained by three factors: firstly, competitive pressure from imports impose minimum levels for product attributes; secondly, the focus on middle range products is associated with the structural features of local demand and the most promising market segments, that is, low-budget consumers; thirdly, their inability to compete with low-end products, produced in very large scale and imported from Asian countries.

By the end of the 1990s, the Brazilian consumer electronic manufacturers faced a new challenge: the devaluation of the national currency. Devaluation had an immediate effect in raising debt levels of firms, which had borrowed in foreign currency. Devaluation was also followed by a slower rate of economic growth. In 2000, sales revenue of audio and video markets plummeted to US\$3.5 billion, well below the US\$ 8.1 billion reached in 1996.

The Brazilian industry has yet to compensate these trends with a greater exposure to international trade; exports in the audio and video segments have remained at around US\$ 350 million since 1990, representing a very small proportion of local sales; imports of final goods are around US\$ 150 million, increasing to US\$ 450 million, when local demand expands.

The main destinations of these exports were Argentina, Hungary, Italy and Spain. Nevertheless, this good performance has not been able to compensate the significant increase on the value of imports of electronic components that came from South Korea and Japan. As shown in Figure 10, although the industry has reduced its trade deficit, from US\$ 1.56 billion in 1997 to US\$ 1.06 billion in 2000, the lack of production capacity in components constitute a structural weakness of this industry.

FIGURE 10
 TRADE DEFICIT IN ÁUDIO & VÍDEO COMPONENTS
 (US\$ FOB)



Source: Sá (2002)

5.2.2. The automotive industry

Competitive catching up, in the relevant segments where it operates, is the main feature of the Brazilian automotive industry during the 1990s. This process was undertaken by four sets of interrelated investments in: i) new and renewing existing industrial plants; ii) launching of new products; iii) improving the productive-chain organisation mode and, iv) promoting intra regional trade, particularly between Brazil and Argentina. Moreover, new firms have entered the country, adding up capacity and competitive pressure in the local market. Similarly to the consumer electronic industry, Brazil has consolidated an important international position in middle range segments of this industry.

Three basic conditions were of fundamental importance: the regional integration that reduced intra-firm costs, expanded potential gains derived from economies of scale and induced specialisation; economic liberalisation – inducing imports and entry by new firms – that brought about competitive pressures for established firms to update products and modernise installations; economic incentives for firms and consumers that were vital for expanding local demand.

Thus, the most relevant fact that marked the industry in the 1990s is the significant increase in annual average investments: from US\$ 500 million in the 1980s, to US\$ 1.3 billion between 1990 and 1995 and US\$ 2 billion during the second half of the 1990s. During the

decade, investments in the assembly industry amounted to US\$ 16.5 billion and, in autoparts, to US\$ 12.1 billion. Table 23, below, informs new added capacity to the car assembly segment.

TABLE 23
AUTOMOTIVE INDUSTRY - NEW ASSEMBLY PLANTS, 1996-2000

| Firm | Type of Good | Location | Year |
|------------------|---------------------------|-------------------------|------|
| Volkswagen | Engines | São Carlos-SP | 1996 |
| Volkswagen | Lorries and buses | Resende-RJ | 1996 |
| Honda | Cars | Sumaré-SP | 1997 |
| Mitsubishi | Light commercial vehicles | Catalão-GO | 1998 |
| Renault | Cars and engines | São José dos Pinhais-PR | 1998 |
| Toyota | Cars | Indaiatuba-SP | 1998 |
| Daimler Chrysler | Cars | Campo Largo- PR | 1999 |
| GM | Components | Mogi das Cruzes-SP | 1999 |
| Volkswagen-Audi | Cars | São José dos Pinhais-PR | 1999 |
| Fiat | Cars | Juiz de Fora – MG | 2000 |
| GM | Cars | Gravataí-RS | 2000 |
| Iveco | Engines | Sete Lagoas-MG | 2000 |
| Ford | Cars | Camaçari-BA | 2001 |
| Nissan | Light commercial vehicles | São José dos Pinhais-PR | 2001 |
| Peugeot-Citroen | Cars and engines | Porto Real-RJ | 2001 |

Source: Sarti (2002)

While new entrants in car assembly increased competitive pressure, in the autoparts investment trends also brought in new firms but not via green field. Following an international trend, mergers and acquisitions (M&A) was the relevant mode of entry of newcomers into the Brazilian autoparts. Hence, only a small part of these investments were devoted to increase productive capacity. As a result, higher rates of internationalisation and market concentration were observed. In 1994, local capital was responsible for at least 50% of total capital, sales and investment. By the end of the decade, the share of locally owned firms was down to approximately 25%.

Regardless of ownership changes, investments were significant and the Brazilian competitive gap was significantly shortened, in terms of product attributes and efficiency levels of installations. As an example, GM's plant in the southern city of Gravataí operates with a high degree of automation (113 robots) and it is organised in modular systems, involving first degree suppliers. Assembly times are at around 13 hours, compared to average 22 hours in other GM plants. In other words, these investments brought about expansion of capacity, new machinery, new organisational formats, new product portfolio and changes with in relations with suppliers. In aggregate terms, as shown in Table 24, there were significant increases in productivity - the number of cars produced by worker has grown three times in the period 1990-2001, reaching 21.3 units in 2001.

TABLE 24
EMPLOYMENT AND PRODUCTIVITY IN CAR ASSEMBLY

| | 1990 | 1992 | 1994 | 1996 | 1998 | 2001 |
|----------------------|---------|---------|---------|---------|--------|--------|
| Employment | 117,396 | 105,664 | 107,134 | 101,857 | 83,049 | 85,257 |
| Labour productivity* | 7.8 | 10.2 | 14.8 | 17.7 | 19.1 | 21.3 |

* units per worker

Source: Sarti (2002)

It is clear that the 170% accumulated growth in productivity was related to increases in production levels coupled with decreases in employment. In average, production expanded at 6.4% while employment levels fell by 2.9% in average, during the 1990s. During this period

while production levels doubled, 32 thousand work positions were eliminated, outsourced or transferred between firms along production chains.

At this point, it is important to call attention to changes in the organisation of production and in the mode of relations prevailing between assembly and suppliers. Firstly, they were called to operate very close to assembly units, to enable just in time operations. Every new installation in Brazil was designed under the concept of condominium, where specific areas were designed to be occupied by selected autoparts corporations that would enjoy exclusive relations with assemblers but, in compensation, would also bear and share investment costs. Secondly, in order to deal with these new mode of relations, auto parts companies – now, for most part subsidiaries of key international players – developed an intense intra-firm trade, thereby expanding auto parts imports from their original transnational corporations. From 1989 to 2001, imports increased 300%, reaching US\$ 4.3 billions in 2001 and a trade deficit of US\$ 445 million.

Against this context of expansion, modernisation and ownership change, auto sales in Brazil presented a clear growing pattern during the first part of the 1990s, departing from 713 thousand units in 1990 to 1.9 million in 1997 and 1.6 million units in 2001. Most auto assemblers operating in Brazil have strongly specialised in the subcompact segment, with engines on the 1000 to 2000cc range. In 2001, 71% of domestic production was related to this segment. While specialisation may have positive effects in terms of economies of scale, potential profitability levels are low and acceptability of national production in foreign markets is narrow. On the other hand, concentration of production (and sales) in this particular segment provides a protection to the Brazilian auto industry against foreign competition. International trade of the Brazilian auto industry was marked by a strong complementarity with Argentina. Firms operating in each country tried to take advantage from complementarity between their product lines. After a brief expansion in the post-trade liberalisation years, the level of cars imports in Brazil was reduced, having equalled the average level of US\$ 2 billions in the biennium 2000/2001, while in the period 1995-1998 the average value was equivalent to US\$ 3.3 billions. Almost 66% of these imports came from Argentina. By the same token, 44% of the imports made from Argentina comes from Brazil.

In short, the Brazilian auto industry has managed to significantly close down the technological gap accumulated throughout the 1980s. The industry has been enlarged, by existing producers and new comers; product portfolio and production systems have been updated to international levels. However, its relative size and mode of international insertion is, still, relatively modest. Established affiliates are not economically expressive world-wide; only Fiat, Volkswagen and Scania have local operations amounting to more than 5% of total corporate business. Moreover, local demand levels never fulfilled new added capacity, remaining, in 2001, at 40%, much above the international average of 25%. Therefore, two possible scenarios can be drawn; on one hand, local industry has the supply resources, if demand levels expand. The export potential of the industry is also significant and Brazil can further explore international markets in the subcompact segments; on the other hand, if demand levels remain low, rationalisation, closing down of operations and even the exit of producers is a strong possibility in the years to come.

6. TRADITIONAL INDUSTRIES: COMPETITIVE CONSTRAINTS ARE STILL DEFINED BY UNEQUAL INCOME LEVELS

6.1. PATTERN OF COMPETITION NOW AND THEN: MARKET SEGMENTATION CUM NETWORKING

Final consumption is the common destination of products generated in traditional related industries. Market segmentation is extensive and an inherent feature of these industries. Thus variety prevails, in terms of number and technical specifications of products, nature of production processes (assembly, flow and batch production) and minimum size of technical economies of scale, verticalisation and outsourcing levels and organisational format of

companies.

Industries are very sensitive to oscillations in demand and responsiveness is the key competitive driver of these industries. (see first two columns in Table 25) Sensitivity is expressed by two means, both with direct implications over production capabilities. Firstly, with considerable marketing efforts, companies constantly have to introduce new product designs, creating niches or imposing themselves in their markets. If successful, immediate demand expansion follows. Thus, they must increase production levels to corresponding growth of demand, while keeping delivery times under control. Secondly, demand levels are subject to seasonal oscillations, imposing adequate adaptation to production levels. Compliance to these two sources of oscillations in demand is facilitated by the relatively technical easiness and low investment costs in expanding production in short time. In fact, regardless the importance of imposing new consumer habits, investment by firms in these industries are reactive to changes in demand levels.

The extent of market segmentation is defined by the size and income levels of a given consumer population. In such a context, the degree of importance for competitiveness of product attributes like price, brand and adequacy to use will be directly related to income levels of those consumers groups aimed at by corporations. The higher the income levels, the less relative importance the price attribute will have and the greater the value of attributes associated with attending particular specifications of clients. Nationwide, if high income levels prevail, similar competent firms will co-exist but operating in different market segments. Otherwise, where income differentials are significant, firms with very differentiated competences but operating in similar markets, will survive. It is important to remark that, given the relatively low unit value of traditional products in consumer baskets, high levels of product renovation and differentiated competences among firms may prevail, even in a context of very unequal income levels, but where the absolute size of the market is expressive, as in the case of Brazil.

Entrepreneurial skills to promote product renovation and to keep updated organisational formats - especially in relation to design, marketing, quality systems and relations with suppliers- are essential for competitive success in these industries. The basic sources of technical change for these industries come from equipment and input supplier industries; in the past 10 years an increasing role has been played by information technology related equipment and chemical plus biotechnology related inputs. Those corporations capable of accessing these inputs in better terms will definitely enjoy competitive advantages.

In general privileged access is related to size: smaller companies can survive in specific market niches, but they may face economic and financial difficulties in mobilising the necessary resources to fully enjoy equipment and input sources of competitive advantage. Given the inherent economic variety of this industry, this may be the basic reason behind an increasing trend towards companies organising themselves around local productive clusters – organised horizontally and/or vertically-. Through local clusters companies can benefit from another source of competitive advantage: economies of agglomeration, through which they share costs associated with any and every kind of their economic activity: infrastructure, labour and other inputs, design and marketing, information systems, etc.

6.2. COMPETITIVENESS IN 2002: INCREASING RESPONSIVENESS BUT HETEROGENEITY STILL PREVAILS

Traditional industries are among the oldest industrial activities in Brazil and competitive heterogeneity was and still is their relevant structural feature. The co-existence of very differentiated levels of competences among firms in each sector –and even among stages of production, within a given firm – can be directly associated with the country's remarkable uneven income distribution profile. In 1990 competitiveness was directly associated with size: large firms were likely to be more competent than their smaller counterparts.

Larger firms were able to explore different market segments, to invest in modernisation and

to export. The analysis of textile, shoe and furniture industries indicate that, in 2003, the 1990 basic structural feature of these industries –their competitive heterogeneity- still prevails. But, as shown in the last two columns of Table 25, some progress has also been observed. The rate of product renovation has increased, through explicit and increased design efforts. Production modernisation has been facilitated by the incorporation of more efficient. Local clusters have emerged in increasing number and are being consolidated in different industries and regions of the country. Companies have further explored low labour cost opportunities, by transferring installations to the Northeast of the country.

TABLE 25
Patterns of competition (POC) and competitiveness in Traditional Industries: now and then

| SOURCES OF COMPETITIVE ADVANTAGES | PoC RESPONSIVENESS RELEVANT DRIVERS 1990 | PoC RESPONSIVENESS RELEVANT DRIVERS 2002 | BRAZILIAN COMPETITIVENESS 1990 | BRAZILIAN COMPETITIVENESS 2002 |
|-------------------------------------|---|--|---|--|
| INTERNAL FACTORS | | | | |
| MANAGEMENT | Entrepreneurial skills | More importance of creating new market segments | Existence of a core group of competitive firms; size and nationality heterogeneity | Increased heterogeneity: leaders close to the international frontier; reliance on outsourcing and low labour costs |
| PRODUCTION | Quality control | Increasing trends towards greater flexibility and outsourcing | Incipient | Increased competence |
| SALES | Market information | Increasing importance of marketing | Incipient | Increased competences |
| INNOVATION | Embodied technology, learning by doing | Increasing importance of design | Copying strategy | Similar, improvements in few segments and products |
| STRUCTURAL FACTORS | | | | |
| MARKET | Segmentation by levels of income & type of product | INCREASED | Limited segmentation due to inequalities in income levels | Inequalities remain but segmentation increased |
| | Price, brand, delivery times, customer orientation | INCREASED | Low use of product attributes | Higher use of price attributes, increased competition |
| | Local & international trade | INCREASED importance of insertion on international supply chains | Potential large size of national market but reliance on local trade; threats from imports | Demand fluctuation due to economic instability; incipient international exposure |
| CONFIGURATION OF INDUSTRY | Economies of agglomeration and networking | GREAT INCREASE | Limited to few segments | Some dissemination of local arrangements; relocalisation due to labour costs |
| | Efficient supply of equipment | NO CHANGE | Deficient supply of equipment | Expansion of equipment imports with better price/efficiency ratio |
| | Metrology, standardisation, certification & accreditation; market & technical information; training | NO CHANGE | Low efforts and lack of co-ordination | Improvements restricted to medium and large companies |
| REGIME OF REGULATION AND INCENTIVES | Anti-dumping | INCREASED, due preferential access in bilateral agreements | Low use | Increased use in local markets |
| | Competition & consumer policies | NO CHANGE | Infant, unfair competition from informal sector | Increased but still incipient importance; unfair competition from informal sector remains |
| | Support for SME | INCREASED in size and scope | Lack of effective instruments | Improvements in support for management but lack of financial instruments remain |
| | Tax system | NO CHANGE | Anti-competitiveness bias | Bias remain |

6.2.1. The shoe industry

The geography of shoe production is dictated, to a great extent, by labour costs. International competitiveness is defined by wage levels as well as the relation between exchange rate and wage rate. Thus, to a great extent, this is a nomad industries, moving toward regions where labour costs are more attractive. This is a labour intensive industry and because of its technical "easiness", in terms of knowledge and capital inputs, this industrial activity may be found in most nations, around the world. Employment in selected countries can be found in Table 26. It is worth mentioning that between 1980 and 1997 world employment fell by 13%, reaching 1.7 million.

TABLE 26
SHOE INDUSTRY EMPLOYMENT IN SELECTED COUNTRIES, 1998

| Relative position | Countries | Number of employees (1.000 workers) |
|-------------------|-----------|-------------------------------------|
| 1 | China (*) | 923.0 |
| 3 | Brasil | 147.5 |
| 4 | India | 134.7 |
| 6 | Italy | 79.0 |
| 15 | USA | 42.7 |

(*) 1994

Source: Compiled from Costa (2002)

As shown in Table 27, in Brazil, during the 1990s, the industry produced, annually, at least 500 million pairs of shoes, 70% of them delivered to the local market. Imports are very local, at around 1% of national production.

TABLE 27
BRAZILIAN SHOE PRODUCTION –SELECTED YEARS

| Year | Production (million of pairs) |
|------|-------------------------------|
| 1990 | 509 |
| 1995 | 543 |
| 1999 | 500 |
| 2000 | 530 |

Source: Costa (2002)

Until the 1990s, Brazilian most exports were directed to market segments where the price attribute is relevant. International clients would define technical specifications and brand names and sell them world-wide. In despite of competitive pressure from Chinese producers –that occupy similar market segments -, export performance has evolved positively during the 1990s. As shown in Table 28, exports increased from US\$ 1.1 billion in 1990 to US\$ 1.6 billion, in 2001 and unit prices have increased, indicating that the local industry is upgrading its product portfolio. It is necessary to bear in mind that since the 1999 devaluation may have helped exports.

TABLE 28
BRAZILIAN SHOE EXPORTS, SELECTED YEARS (VALUE, QUANTITY AND AVERAGE PRICE)

| Year | Value (US\$ million) | Pairs (millions) | Average price (US\$) |
|------|----------------------|------------------|----------------------|
| 1990 | 1,107 | 143 | 7.74 |
| 1995 | 1,414 | 138 | 10.25 |
| 2000 | 1,547 | 163 | 9.52 |
| 2001 | 1,615 | 171 | 9.43 |

Source: Costa (2002)

Other factors also helped the industry's international performance: fiscal incentives and export credits; the consolidation of gains from economies of agglomeration, especially in the southern state of Rio Grande do Sul, the accumulated export experience. Nevertheless, labour costs still make up an important difference. In 1993 labour costs in Brazil were US\$1 per man-hour, In Spain it was US\$8, in Korea US\$2.5, in China US\$0.5.

The importance of the exchange/wage ratio can be seen in Table 29. During the 1994/98 period, when the Real was overvalued, total employment fell by 56 thousand. But, as demand expanded – between 1999 and 2000 exports increased by US\$ 270 million or 26 million pairs of shoes-, companies quickly contracted 29 thousand extra workers. No apparent differences seems to exist in employment generation capacity, among different sizes of firms.

TABLE 29
 EMPLOYMENT IN THE SHOE INDUSTRY ACCORDING TO SIZE OF FIRMS, SELECTED YEARS,
 (1,000 WORKERS)

| Size | 1990 | 1992 | 1994 | 1996 | 1998 | 2000 |
|------------|-------|-------|-------|-------|-------|-------|
| Very small | 23.1 | 21.4 | 18.9 | 16.9 | 19.6 | 24.2 |
| Small | 36.9 | 37.0 | 43.8 | 38.7 | 34.6 | 47.9 |
| Medium | 89.8 | 95.0 | 92.4 | 68.4 | 61.3 | 75.6 |
| Large | 76.6 | 82.9 | 85.3 | 78.6 | 69.1 | 92.5 |
| Total | 226.6 | 236.4 | 240.6 | 202.7 | 184.7 | 240.3 |

Source Costa 2002

In terms of industrial organisation, this is an industry where local capital is prevalent. In 2000, large size firms owned 1.3% of establishments, employing 38.5% of shoe workers while very small firms accounted for 77% of establishments and 10% of total employment. Exports concentration is also significant: in that year shoe exports (US\$1.6 billion) were undertaken by 821 firms; 53% of this value was generated by 18 firms.

During the 1990s company strategies followed two directions. On one hand, firms implemented modernisation of production processes and product portfolio, including the introduction of automated equipment, new organisational techniques associated with increasing quality and decreasing waste and down time. There were also concerted efforts to increase product lines, associated with higher process flexibility. On the other hand, a significant number of companies migrated from Rio Grande do Sul to the Brazilian Northeast, especially Ceará and Bahia.

In the Northeast firms enjoy lower labour costs and the benefit of special and generous incentives. These include: VAT exemption for fixed and running capital and municipal tax exemption, the supply of physical infrastructure, like land and electricity and partial but automatic export credits. Most important, not only relative labour costs are lower than those prevailing in the South. Most labour contracts are intermediated by co-operatives, providing exemptions from social overheads. The organisation of co-operatives, as well as most of the training costs are undertaken by local governments. Thus, by the late 1990s, the international competitiveness of the Brazilian shoe industry was ensured by the opening up production capacity in the Northeast. Curiously the, to a great extent, in this industry, the country's structural heterogeneity has helped the survival and growth of firms in local and international markets.

6.2.2. Textiles and garment

Economic differences among the three most important segments –textiles, fibre and garment- of this industry can be found in Table 30. Combined sales of 22 thousand establishments, that employed 1.5 million workers, amounted to US\$ 45.2 billion, in 2000.

The production of chemical fibres is technically more sophisticated and the size of operations

is higher, in general, controlled by foreign owned firms. On the other extreme, in the garment industry, small and medium size, locally owed firms prevail, employing 1.2 million workers in 18.000 establishments.

Contrary to the shoe industry, the international performance of the textile Brazilian industry, as shown in Table 31, was never economically significant, in despite of the fact that in some segments, like garment, competitiveness drivers are similar to those prevailing in shoe industry. Thus, Brazilian textile industry is, to a great extent, oriented towards the local market.

TABLE 30
NUMBER OF ESTABLISHMENTS, EMPLOYMENT AND REVENUE SALES IN TEXTILE, FIBER AND GARMENT INDUSTRIES, 2000

| | Chemical Fibres | Textiles | Garment |
|-----------------------------|-----------------|----------|---------|
| Establishments | 25 | 3,305 | 18,797 |
| Employment (1,000) | 15 | 339 | 1,233 |
| Production (1,000 ton/year) | 640 | 1,750 | 1,287 |
| Sales/ year (US\$ billion) | 1.4 | 16.6 | 27.2 |

Source: Prochnik (2002)

TABLE 31
TEXTILES AND GARMENT WORLD TRADE AND BRAZILIAN SHARE, 1995/2000

| Textiles | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|----------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| World trade (US\$ billion) | 111.1 | 113.6 | 119.3 | 112.5 | 113.0 | 126.1 |
| Brazil export share (%) | 0.90 | 0.89 | 0.86 | 0.79 | 0.73 | 0.71 |
| Brazil import share (%) | 1.23 | 0.98 | 1.01 | 0.95 | 0.79 | 0.88 |
| Garment | | | | | | |
| World trade (US\$ billion) | 124.0 | 128.7 | 141.9 | 149.3 | 150.0 | 165.5 |
| Brazil export share (%) | 0.24 | 0.19 | 0.15 | 0.12 | 0.12 | 0.17 |
| Brazil import share (%) | 0.30 | 0.29 | 0.32 | 0.25 | 0.14 | 0.11 |

Source: Compiled from Prochnik (2002)

There is not a generic pattern of industrial organisation in this industry; firms may operate in a specific segment of textile production or may be vertically integrated, incorporating all stages of production, including garment. During the 1990s, as most other sectors, leading and especially large size firms went through an active process of modernisation, by means of machinery acquisition, introduction of new organisational techniques and, as in the shoe industry, migration to the Northeast of Brazil.

Investment in modernisation was stimulated by three sources of dynamism. Firstly, during the first half of the 1990s, the Real Plan induced positive expectations in relation to growth of demand; secondly, starting in 1995, the national development bank, BNDES, financed a US\$2 billion modernisation program for machinery acquisition, especially for larger firms; thirdly, import liberalisation and an overvalued Real on one hand, and advances in technology, on the other, resulted in the possibility of importing updated machinery at decreasing prices. (Table 32)

TABLE 32
TEXTILE MACHINERY: LOCAL PRODUCTION AND IMPORTS (US\$ MILLION)

| Year | Local production | Imports | Total |
|------|------------------|---------|-------|
| 1990 | 307 | 377 | 684 |
| 1995 | 316 | 738 | 1.054 |
| 1999 | 185 | 373 | 558 |
| 2000 | 185 | 453 | 638 |

Source: Prochnik (2002)

Investments in new machinery implied changes in production processes with negative impact on employment levels. As elsewhere in the Brazilian industry, employment levels in the textile and garment industries fell substantially along the 1990s, as shown in Table 33.

TABLE 33
EMPLOYMENT IN TEXTILES AND GARMENT, 1990/2000, SELECTED YEARS (1,000 WORKERS)

| | 1990 | 1995 | 1998 | 2000 | % |
|---------|---------|---------|---------|---------|--------|
| Textile | 893.8 | 449.4 | 326.3 | 339.3 | - 62,0 |
| Garment | 1,755.8 | 1,468.1 | 1,237.2 | 1,233.2 | - 29,8 |
| Total | 2,649.6 | 1,917.5 | 1,563.5 | 1,572.5 | - 40,7 |

Source: Prochnik (2002)

Finally, as in the shoe industry –for the same reasons and benefiting from similar incentives– an expressive process of relocation to the Northeast was undertaken (Table 34), especially by large size firms.

TABLE 34
SHARE OF DIFFERENT REGIONS IN BRAZILIAN TEXTILE PRODUCTION, 1990/2000

| Industry | Northeast | | Southeast | | South | | Total |
|-----------------|-----------|------|-----------|------|-------|------|-------|
| | 1990 | 2000 | 1990 | 2000 | 1990 | 2000 | |
| Fibre | 24.9 | 35.4 | 55.2 | 42.6 | 17.2 | 21.7 | 100 |
| Fabric | 17.6 | 21.5 | 65.6 | 62.0 | 12.8 | 13.7 | 100 |
| Knitted Garment | 2.8 | 10.0 | 39.9 | 35.2 | 55.7 | 53.5 | 100 |
| Garment | 8.0 | 11.3 | 66.6 | 56.1 | 21.6 | 25.4 | 100 |
| Total | 13.3 | 19.6 | 56.8 | 49.0 | 26.8 | 28.5 | 100 |

Source: Prochnik 2002

7. INNOVATION CARRIERS: MOVING AHEAD, LAGGING BEHIND, COMPETITIVENESS IS STILL VERY WEAK

7.1. PATTERN OF COMPETITION NOW AND THEN: THE INCREASING ROLE OF INNOVATION

The innovation carriers industrial group brings together sectors that have in common the ability to induce technical progress to other economic activities, through the provision of equipments or components.

The segmentation of markets demand is the main feature of the demand for these sectors. Since their products have specific applications, in general, each firm competes directly with very few other firms. The most competitive firms have evolved from equipment producers to providers of technical solutions and services to clients. Leading firms are notable in terms of high levels of expenses in R&D activities, reflecting the sectors' most relevant competitive driver: the capacity to implement product innovations and to address particular demands of

clients, in specific market segments. (see first two columns in Table 35)

Innovation capability defines the most important barrier to entry in these sectors. For that reason, companies place significant resources to R&D activities. Their growing costs has led to the emergence of different forms of strategic alliances, mostly devoted to dilute technological risks of partners involved. These features define an important relationship between firms and research centres, of public or private nature.

Due to its strategic role in any industrial matrix, nations with strong production capabilities have always implemented active industrial policies to promote and consolidate the competitiveness of their firms in local and international markets. Besides an active support to technological development, imports restrictions, favourable financing conditions, the purchasing power of governments, fiscal incentives are mechanisms used by nations.

TABLE 35
Patterns of competition and competitiveness in innovation carriers: now and then

| SOURCES OF COMPETITIVE ADVANTAGES | PoC INNOVATION RELEVANT DRIVERS 1993 | PoC INNOVATION RELEVANT DRIVERS 2002 | BRAZILIAN COMPETITIVENESS 1990 | BRAZILIAN COMPETITIVENESS 2002 |
|-------------------------------------|--|--------------------------------------|--|--|
| INTERNAL FACTORS | | | | |
| MANAGEMENT | R&D-production-marketing integration | NO CHANGE | Low capabilities | Low capabilities with increasing marketing efforts |
| PRODUCTION | Design for manufacturing | NO CHANGE | Some capabilities in mechanical engineering | Reliance on imported design |
| SALES | Market creation & business to business marketing | INCREASED due to the diffusion of IT | Low capabilities | Infant |
| INNOVATION | R&D + <i>design</i> | NO CHANGE | Low capabilities | Increasing reliance on imported technology |
| STRUCTURAL FACTORS | | | | |
| MARKET | Segmentation by technical needs | NO CHANGE | Capabilities in lower end segments | Increasing segmentation |
| | Attention to client specifications | INCREASED | Excessive standardisation | Increasing responsiveness |
| | Local & regional trade | INCREASED | Exports of standard and technologically simple equipment | Increasing imports of components from OECD and exports of final goods to Latin America |
| CONFIGURATION OF INDUSTRY | Economies of specialisation | Related diversification | Excessive diversification and verticalisation | No clear emerging pattern |
| | Interaction with users | INCREASED | Low interaction | Increasing interaction |
| | Science & technology systems | INCREASED | Incipient | Low technological investment |
| REGIME OF REGULATION AND INCENTIVES | Intellectual property rights | INCREASED | Nationalistic oriented regulations | Enforcement of property rights and stabilisation of rules |
| | Selective protection | DECREASED | Nationalistic oriented regulations | Excessive liberalisation |
| | Risk support | NO CHANGE | Inexistent | Limited |
| | Credit for users | NO CHANGE | Limited | Limited |
| | State purchasing power | DECREASED | Few attempts towards articulation | Disarticulated |

7.2. COMPETITIVENESS IN 2002: ECONOMIC LIBERALISATION IMPOSED CONTRADICTIONARY SIGNS. INNOVATION IS STILL GENERATED ABROAD

Among all industrial groups, the Brazilian innovation carriers suffered the worst consequences from the economic liberalisation of the 1990s. Until then firms presented reasonable levels of production capacity and well-qualified human resources were available (mainly in the mechanical sector). This was a result of a long learning process carried out since the 1970s, partially as a result of an expanding market, partially as a result of active industrial policies. But, even then, most producers of mechanical engineering and electronic based equipment were not competitively strong. Their main features were high levels of verticalisation and diversification and dependence on foreign technological suppliers and fragile relations between manufacturers and the R&D sector.

Along the 1990s, producers of mechanical engineering and telecommunication equipments and computers reveal a common feature: an increase of production capabilities. However, this was not enough to resist foreign competitive pressures which is mainly based on intra-firms imports. (see last two columns of Table 35)

Apart from that, given very different framework conditions surrounding each of these sectors, a considerable competitive heterogeneity prevails. Suppliers for the telecommunications sector considerably expanded production capacity. Firms from the mechanical engineering sector promoted a modernisation process strongly associated with a significant decrease in production capacity. The performance of the computer manufacture sector was characterised by ownership internationalisation, substantial increases of component imports and by the implementation of new methods of labour management, which has lessened employment levels.

As a way to counterbalance competitive pressures from imported equipments, the competitive challenges most corporations of this industrial group are facing is related to expanding assembly capacity and export performance and accessing foreign technology while increasing local innovation capabilities.

7.2.1. Mechanical equipment

The mechanical engineering industries were affected by the low levels of investment prevailing in the country, and trade liberalisation that significantly reduced non-tariff barriers and other duties related to the imports of capital goods. These conditions have clearly restricted the domestic market for mechanical goods made in Brazil, favouring imports.

While apparent consumption decreased from US\$17.2 in 1990 to US\$14.4 billion in 2000, imports increased and local production local decreased substantially. Exports and import coefficients remained relatively stable, after 1995. (Table 36)

TABLE 36
MECHANICAL EQUIPMENT: PRODUCTION AND INTERNATIONAL TRADE -1980-2000 (US\$ BILLION)

| Year | Production | Exports | Imports | Trade balance | Apparent consumption | Export coefficient % | Import coefficient % |
|------|------------|---------|---------|---------------|----------------------|----------------------|----------------------|
| 1990 | 16.7 | 2.6 | 3.2 | -0.5 | 17.2 | 15.9 | 18.5 |
| 1995 | 14.3 | 3.8 | 6.9 | -3.1 | 17.4 | 26.6 | 39.8 |
| 1996 | 12.4 | 3.8 | 7.4 | -3.6 | 16.0 | 31.2 | 46.6 |
| 1997 | 12.3 | 4.1 | 9.6 | -5.4 | 17.7 | 33.9 | 54.2 |
| 1998 | 11.5 | 3.9 | 8.8 | -4.8 | 16.4 | 34.0 | 53.6 |
| 1999 | 10.2 | 3.4 | 7.3 | -3.8 | 14.1 | 33.3 | 51.7 |
| 2000 | 11.5 | 3.5 | 6.4 | -2.9 | 14.4 | 30.5 | 44.7 |

Source: Vermulm and Erber (2002)

Facing hardship, firms implemented an important restructuring process. As shown in Table 37, between 1990 and 2000, employment levels were cut by 50%.

TABLE 37
 CAPITAL GOODS: SALES PER EMPLOYEES (R\$ 2000) AND ANNUAL AVERAGE TOTAL
 EMPLOYMENT 1990/2000

| Year | Revenue/employee | Employment (1,000) |
|------|------------------|--------------------|
| 1990 | 92.4 | 331.9 |
| 1995 | 119.9 | 218.2 |
| 2000 | 131.6 | 160.2 |

Source: Vermulm and Erber (2002)

To sustain restructuring company level efforts focused on the introduction of new managerial methods to ensure efficiency of production processes and the reduction and specialisation of product portfolio. The results of implementing new methods of productive organisation were important. Through the adoption of just in time methods and subcontracting some activities, the mechanical engineering sector was able to improve efficiency and maintain minimum levels of production, without corresponding increases in expenses on the purchase of new machinery.

The competitiveness of Brazilian mechanical engineering capital goods is higher in product lines of low and medium technological intensity, where product cycles have matured. Price competitiveness is decisive and company advantages lie on privileged access to low cost inputs and labour costs. Brazilian industry also occupies certain niches where equipments are technically more sophisticated, requiring strong interactions between suppliers and clients, especially if local and regional demand is economically relevant and relatively high.

However, some of the structural features of this industry, especially in relation to the division of labour between local and foreign producers have not changed. On the contrary, past trends were reinforced: locally owned companies tend to participate in the low technology segments while foreign companies produce more sophisticated capital goods. Concentration levels are lower than the manufacturing industry's average; in 1997 the four largest corporations shared 18% of the sector's revenue, compared to an average of 30% in the manufacturing industry.

These features indicate that companies that have managed to survive the hardships of the 1990s are, probably, in better competitive shape than before; they are leaner in terms of production processes and product portfolio; most probably there has been an increase in specialisation levels which may constitute the basis upon which to grow in the years to come. Even so, most of the competitive challenges of the early 1990s remain, especially those related to a weak technological base.

7.2.2. Teleequipment industry

The scenario in the telecommunications equipments sector is very different from the mechanical engineering sector, due to the high intensity of technical progress in the industry and its close relationship with the Brazilian privatisation process, undertaken in the second half of the 1990s. A recent estimate by Oliva (2002) indicates that, under strict rules of concession, that imposed investment targets, expenditures by privatised companies amounted to US\$ 20 billion, between 1998 and 2000.

As a result, as shown in Table 38, sales revenue in 2000 were 124% higher than the 1995 level. These figures indicate that, most probable, the growth of the local market was sufficient to attract new assembly units to Brazil. It is important to take into account that being an assembly operation, it is likely that these new production units relied on global sourcing to ensure delivery times to clients. That is the reason behind the constant trade deficit of the industry that reached, in 2001, US\$ 2 billion, with US\$ 3.5 billion of imports

(43% from the ALCA region, 26% from UE) and US\$1.5 billion of exports (90% to the ALCA region).

TABLE 38
TELEQUIPMENT INDUSTRY SALES, 1995-2000 (US\$ MILLION)

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | Δ 2000/1995 |
|-----------------------|-------|-------|-------|-------|-------|-------|-----------------------|
| Sales | 2,442 | 3,553 | 5,107 | 4,698 | 4,044 | 5,471 | 124% |
| Annual rate of growth | 16% | 45% | 44% | -8% | -14% | 35% | - |

Source: Oliva (2002)

Even so, to a great extent the sharp increase in demand could be supplied from local sources because of its previous consolidated existence in the country; most of the major international players were already established in the country and some local firms were equally active.

But the expansion of demand brought into the country new foreign firms that acquired locally owned ones. Out of the 10 largest international producers, only two do not have production plants in Brazil. As a result of this situation, the domestic market of telecom equipments has faced an intense process of inward internationalisation. According to Oliva (2002), of the 42 main firms operating in this market in 2000, 26 were foreign firms. As shown in Table 39, out of a total revenue of US\$ 8.8 billion, the share of foreign owned corporations amounted to 91.3%.

TABLE 39
THE MARKET SHARE OF LOCAL AND FOREIGN CAPITAL IN 2000

| Controlling capital | Sales (US\$ million) | Market share |
|---------------------|----------------------|--------------|
| Foreign | 8,054.2 | 91,3% |
| Local | 762.9 | 8,7% |
| Total | 8,817.1 | 100% |

Source: Oliva (2002)

More important, locally owned firms are, in general, of medium size, supplying simple and standardised inputs and components to major international telequipment producers. These foreign firms relied on the strategy of combining local production expansion and imports of components to be locally assembled. This has decisively influenced the trade-flow scenario. Indeed, sectoral growth can be largely attributed to the expansion of imports. Thus, although the industry has expanded production capacity, there are still very clear deficiencies concerning the lack of supply capacity of components.

As in the past, for the years to come, the evolution of the industry will depend on investments carried on in the country's telecommunication infrastructure. Since 2001 as investments slowed down supply firms contracted production just as fast as capacity was expanded.

7.2.3. Computer industry

The computer sector has been expanding steadily in the country but, contrary to the national ownership oriented regime of incentives and regulation of the 1980s, during the 1990s barriers to foreign firms and to imports were not relevant. Thus framework conditions changed and this had a direct impact on performance and market structures.

The most important change was the increasing market dominance of foreign firms. From 1996 to 2000, the share of sales of foreign firms on total sectoral sales increased from 48% to 66%. Among the largest 15 firms in the sector, only one, Itautec, is controlled by local capital. Another change was the increasing role of larger firms, relatively to small and medium size ones. As Table 40 shows, SMEs were responsible for 17.1% of sales revenue in 1996; in 1998 sales from SMEs reached 21.1% but, in 2000, their share had receded to only

5.2%.

TABLE 40
SALES REVENUE OF HARDWARE, SERVICES AND SOFTWARE INDUSTRIES

| | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | |
|------------|--------|------|--------|------|--------|------|--------|------|--------|------|
| | US\$ | % | US\$ | % | US\$ | % | US\$ | % | US\$ | % |
| Hardware | 8.821 | 53.1 | 10.654 | 49.4 | 14.976 | 55.7 | 13.709 | 53.9 | 16.310 | 53.4 |
| Software | 1.327 | 8.0 | 1.928 | 8.9 | 2.361 | 8.8 | 2.160 | 8.5 | 2.527 | 8.3 |
| Services | 6.453 | 38.9 | 8.969 | 41.6 | 9.546 | 35.5 | 9.564 | 37.6 | 11.721 | 38.4 |
| Total | 16.602 | 100 | 21.552 | 100 | 26.884 | 100 | 25.434 | 100 | 30.558 | 100 |
| Total SMEs | 2.838 | 17.1 | 3.375 | 15.7 | 5.665 | 21.1 | 2.929 | 11.5 | 1.591 | 5.2 |

Source: Porto (2002)

Table 40 also shows that, the relative importance among various industrial segments has not changed; sales from hardware producers still predominate in this industry, with at least 50% of total share, followed by service suppliers, with an average of 38% of total sales, during the second half of the 1990s.

Table 41 below indicates an important expansion of the industry (computers and components), departing from US\$ 6 billion in 1990 to reach US\$ 10.7 billion in 1998. Since then growth has slowed down. These figures also indicate that the computer industry has managed to outgrow component production. This, to a large extent, is the increasing reliance of this industry on imported inputs.

TABLE 41
REVENUE SALES IN THE BRAZILIAN COMPUTER INDUSTRY - 1990/2001 (US\$ MILLION)

| | 1990 | 1992 | 1994 | 1996 | 1998 | 2000 | 2001 |
|---------------|-------|-------|-------|-------|-------|-------|-------|
| A) Computers | 3,719 | 4,169 | 5,274 | 7,407 | 8,311 | 7,047 | 5,892 |
| B) Components | 2,336 | 1,361 | 2,179 | 2,783 | 2,456 | 2,587 | 2,105 |
| A/B | 1.59 | 3.06 | 2.42 | 2.66 | 3.38 | 2.72 | 2.80 |

Source: Porto (2002)

Indeed, when contrasting imports of components and imports of final computer goods (Table 42), there is a clear disparity: from 1997 to 2001 the average annual value of components imports equalled US\$5.1 billion, while the average annual value of computer goods imports amounted to US\$1.02 billion. More important, when computer sales decreased, after 2000, and the Real was devalued -after 1999-, computer imports remained relatively stable but imports of electronic components remained substantial.

TABLE 42
COMPUTER INDUSTRY, IMPORT/EXPORTS 1997/2001, US\$ MILLION

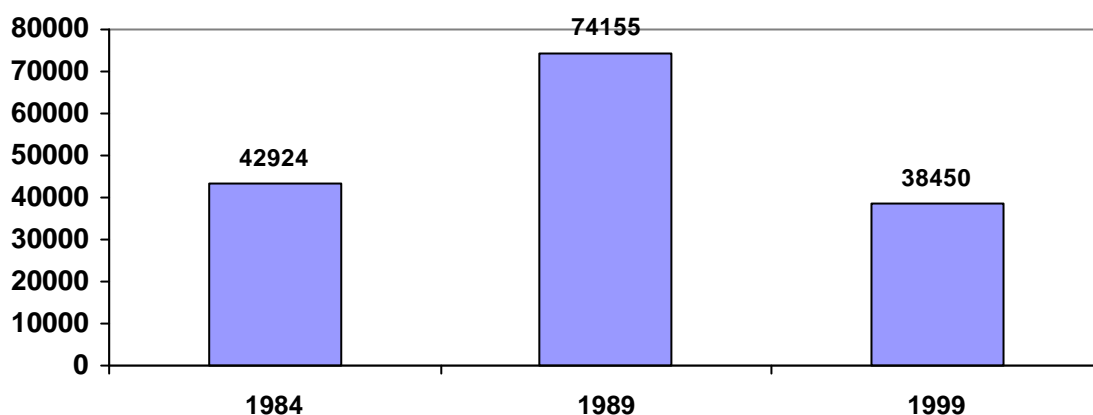
| Year | 1997 | 1998 | 1999 | 2000 | 2001 |
|------------------------------------|-------|-------|-------|-------|-------|
| Exports (1+2) | 1,331 | 1,458 | 1,587 | 1,865 | 1,809 |
| 1- Computer | 255 | 235 | 323 | 346 | 251 |
| 2- Components | 1,076 | 1,223 | 1,264 | 1,519 | 1,558 |
| of which, components for computers | 91 | 124 | 151 | 144 | 146 |
| Imports (3+4) | 6,406 | 5,840 | 5,874 | 7,690 | 6,793 |
| 3- Computer | 1,232 | 1,090 | 855 | 1,080 | 1,032 |
| 4- Components | 5,174 | 4,750 | 4,839 | 6,610 | 5,761 |
| of which, components for computers | 562 | 671 | 665 | 856 | 782 |
| Trade Balance | 5,075 | 4,382 | 4,287 | 5,825 | 4,984 |

Source: Porto (2002)

Computer producers also went through major adjustment in their production processes. Following a well established pattern in other industries, computer firms initially outsourced

administrative activities, followed by the introduction of new organisational techniques that implied lower employment levels. New methods of labour organisation and reengineering process resulted in a sharp reduction of employment levels. As shown in Figure 11, employment expanded between 1984 and 1989. Since then and until 1999 the total number of employees was cut by 48,1%.

FIGURE 11
 EMPLOYMENT LEVELS AMONG THE LARGEST 50 MANUFACTURERS OF INFORMATION TECHNOLOGY



Source Porto (2002)

8. MADE IN BRAZIL 10 YEARS LATER. AND AFTER?

Between 1990 and 2002 the Brazilian economy went through a process of radical institutional change, towards economic liberalisation. During the same period, the economy accumulated low rates of growth, with frequent annual oscillations. Internationally, the diffusion of information technologies was very expressive and a wave of mergers and acquisitions swept the planet.

These are not minor processes, having induced, in other industrialising Latin American countries, major structural changes, but with very specific national idiosyncrasies. Within the NAFTA context, Mexico became a specialised supplier (of low labour costs) to the US as it entered into and sustained very high rates of growth in assembling electronic goods. Chile modified its industrial matrix, shifting towards exploiting and transforming its natural resource base, generating products for exports, supported by sophisticated logistics. Argentina found and lost direction; for some time it seemed that the country would constitute an important industrial base for the Mercosur market. But, after the Brazilian devaluation and the break up of the Argentinean convertibility plan, relatively to its past, an economically significant portion of its industrial activities became idle or was dismantled.

In Brazil, the most striking feature of the period was the lack of structural transformation. That is, international changes and, in the local front, economic liberalisation and low but oscillating growth did not induce shifts in the specific trajectory the Brazilian industry was already evolving along, since the late 1980s. Then, modernisation and inward internationalisation were emerging processes, high in the agenda of leading firms, in most industrial groups. Along the years these two processes were accentuated, assuming economically significant proportions.

Were external changes not sufficient for changing the industry's trajectory? Or, alternatively, have the accumulated size and competences and the complexity of Brazilian industry been so high that previous trajectory would not have changed, regardless the size of exogenous

shocks? These are questions with no possible answer. It is more reasonable to proceed to a careful balance of industrial production Made in Brazil, 10 years after our early, but thorough investigation on the perspectives of competitiveness, in order to examine the extent of evolution and change. By doing that, it may be possible to draw out perspectives for the years to come.

The lack of structural change can be confirmed by simple but strong evidence. The most important is: during this period, very few genuinely new economic activities were added to the country's industrial matrix. Similarly, very few previously existing activities ceased to exist. More important for industrial progress is the fact that, between 1990 and 2002, only in very few sectors a set of firms responsible for most part of production were engaged in investments directed towards capacity expansion. Substantive investment only occurred in steel, automotive, consumer electronics and teleequipment. These are good examples of reactions to a combined phenomenon of positive perception on demand expansion together with pro-active response to competition. These examples may be useful in indicating a potential vitality, pro-growth, in the Brazilian industry.

Competitive industrial activities – where competent firms represent a large proportion of production- remain so, essentially those associated with the commodity group. Weak competences still prevail among activities associated with innovation carriers, although firms demonstrated ability to deliver equipment where demand expanded –teleequipment-. Heterogeneity is still an important feature of traditional industries, even though responsiveness has increased, alongside with the formation of local clusters of productive systems. As an industrial group, perhaps, changes were more pronounced in durable industries, through expansionist investments and increasing rates of product differentiation.

Imports and exports increased along the years, but they are originated from expected industrial segments: inwards, electronic components and chemical inputs are still a burden on the country's international trade; outwards, the commodity industrial group still generates most of the country's foreign exchange. Of course these exports should be further expanded, alongside with others that should have higher income elasticity. Indeed, new exports, from high technological opportunities, have taken roots. The aircraft industry is the outstanding example. On the same token, imports of electronics and chemicals are very important to the modernisation of the Brazilian industry. But, certainly, the size of their trade deficit induces serious thoughts on how to internalise production, at least in some segments of these industries.

As mentioned above, from an economic perspective, the most significant active processes were the continuation of modernisation and ownership change. In the early 1990s, there were already signs of modernisation and inward internationalisation, especially among leading firms, in most industrial groups. Between 1990 and 2002, modernisation provided the technical basis upon which firms could sustain competitive pressure from imports. Inward internationalisation reached levels that imposed changes to market structures, in segments where firms controlling a large proportion of sales change ownership, in a short span of time.

Modernisation was a process in play in very economic activity in the country, reaching organisations, production processes, products and suppliers. Supported by a wide diffusion of labour saving techniques and without sustained growth in demand levels, the negative impact of modernisation on employment was extremely high. Between 1990 and 2002, in most industrial activities, at least 30% of the labour force was dismissed. Thousands of work places simply disappeared or were outsourced.

But, as a result, surviving firms became more efficient and capable of sustaining competitive pressures from imports and from newcomers to local production. More interestingly though, the recent process of change has not induced modifications in the relative position among different firms. Those that were relatively stronger in the period pre-crisis have shown better adaptive capacity and vice-versa. In other words, the relative position of players –in terms of size, origin of capital, sector and location of corporations- did not change. Large firms, from commodity or durable industrial groups, located in the southern part of the country not only

actively engaged in the process of modernisation and inward internationalisation but , more important, they have increased their relative distance from those situated down below the competitive ladder.

Mergers and acquisitions changed the ownership landscape of Brazilian industry, reinforcing the role of foreign capital in it. As a result the Brazilian economy is now even more internationalised than before even though this is a long term and structural feature of the country. However, the country may face a development paradox in the years to come. History tell us that local capital and local innovation capabilities have been outstanding features of countries successful in sustaining economic and social development. If ownership internationalisation is to remain and local innovation capabilities must be pursued, then Brazilian private and public policy makers are facing challenges associated with how to attract investments of this nature. To a great extent, this will mean an important departure from established policy practices, to new ways of regulating and inducing firms towards local value creation.

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