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**RESTRUCTURING AND CHANGING MARKET CONDITIONS
IN THE BRAZILIAN AUTO COMPONENTS INDUSTRY*/**

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INTRODUCTION*

The Brazilian auto components industry could be considered to be a "success case" of Third World import substitution policies. Decisive government policies to build a domestic automotive complex in the 1950s turned a backyard industry, which produced replacement parts for imported vehicles, into an integrated national industry with strong backward linkages throughout the economy, reporting estimated sales revenues of an estimated US\$15 billion and exports of US\$3.3 billion in 1994. The parts industry employs nearly twice as many workers as the assembly industry and accounted for 6.7% of Brazilian industrial gross national product (GNP) in 1992.

On the other hand, a look behind these aggregate figures reveals an industry where the performance of individual companies has been irregular, even under protected market conditions. Parts producers are highly differentiated on the basis of size, technological sophistication, origin of capital ownership and market behavior. A select group of leading parts producers in Brazil have demonstrated their capability to compete at international standards of quality, price and delivery. Meanwhile, a large intermediate group of firms is struggling to upgrade product quality and design, as well as cut production costs. However, competitiveness is a dynamic process, and the context in which these companies operate is undergoing profound changes.

The post-1990 period has marked a turning point in the history of the Brazilian autoparts industry. Domestic economic turmoil and the liberalization of the domestic market has provoked a shake-out of companies and downsizing of the labor force, sculpting a new sectoral profile. At present, the surviving firms are faced with two major sets of pressures: changing market conditions (reduced domestic tariff rates for imported vehicles and parts and the creation of regional trading blocks); and, the diffusion of "best practice" standards and new inter-firm relations in the global auto industry.

Many parts firms are already restructuring along the lines of current tendencies in the international automotive industry, incorporating such practices as single-sourcing to the assemblers and supplying sub-assemblies directly to the final assembly line. New inter-firm relationships between parts firms and the auto assemblers may offer a way for the leading parts producers to guarantee a position as "first tier" suppliers; in turn, this could secure a role for medium and small companies as second, third and fourth tier suppliers - thereby sustaining a network of companies in the Brazilian parts industry. The vehicle assemblers have also adopted programs to assist parts firms in upgrading their practices - a role they formerly played in earlier stages of the industry's development.

At the same time, other institutional and organizational innovations in Brazil may offer opportunities for companies to become competitive. For example, the tripartite Sectoral Chamber in the automotive industry formed in 1992, has negotiated an agreement between government, industry and labor, involving tax reductions which have led to skyrocketing demand for cars. This demand expansion has been supported further by an economic stabilization program - the *Plano Real*, introduced in July 1994 - which has cut inflation from around 3,900% in 1993 to less than 2% per month. The formation of strategic alliances to keep pace with rapid technological change in the auto industry may enable leading firms to sustain their in-house innovative capability which was achieved under import substitution policies. Finally, the formation of regional trading blocks - MERCOSUR, NAFTA and the European Union - is re-shaping market opportunities for exports of Brazilian parts.

This paper examines the principal areas of change in the Brazilian autoparts industry since the 1990s and assesses its future prospects in facing a new set of challenges in the domestic and international market.

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I. RESTRUCTURING IN THE BRAZILIAN AUTOPARTS INDUSTRY

1. Industry origins and current structure

The production of automotive parts in Brazil predates the start-up of local manufacture of vehicles. Local parts production emerged at the start of the century from modest roots where backyard tinkerers and mechanics hand-produced replacement parts for imported vehicles, and later for locally-assembled vehicles. By providing the services required to repair and sustain these foreign-made vehicles, a base of local metal-working skills was established - from these humble origins emerged the first Brazilian parts producers (Gattas, 1981; Guimarães and Gadelha, 1980; and Almeida, 1972).

In the 1950s, the Brazilian government implemented policies to establish a national automotive industry, thereby transforming the domestic assembly of imported CKD (completely knocked-down) kits, into local manufacture using domestic parts. In 1956, President Kubitschek created the Executive Group of the Automotive Industry (GEIA) to introduce and oversee a system of incentives, enforce compliance with legislation and assist companies in their negotiations with foreign firms (Gattas, 1981; Martins, 1976; and Mericle, 1984). GEIA set guidelines for the gradual replacement of imported parts for locally-produced parts, and persuaded new Brazilian firms to enter into parts production. Local content reached 85% in 1960 and 98% in 1966 (Almeida, 1972, p. 45).

Later, when export promotion policies came into effect in 1972, local content requirements were lowered to 85% for autos, between 78% and 82% for commercial vehicles and 95% for jeeps (Guimarães, 1987). By the late 1980s, local content was no longer controlled, but hovered around 85%, far greater than in Mexico (from 55% to 65%) and slightly below South Korea (from 90% to 95%) (Lee and Casson, 1994, p. 229).

Throughout its history, the Brazilian autoparts sector became increasingly differentiated (Guimarães and Gadelha, 1980). A pyramid structure has emerged, with a restricted group of companies at the top which supply to the vehicle assemblers, export competitively to the industrialized countries and have developed in-house innovative technological capabilities. The majority of these competitive companies are of foreign capital ownership, or are large national firms. By supplying to the most demanding markets, both in Brazil and overseas, these companies were forced to refine their product quality, production methods and product designs up to international standards (Posthuma, 1991).

An intermediate group of firms which have upgraded their product quality and performance and which demonstrate a potential for competing successfully in an open economy, has grown substantially in recent years as competitive pressure has increased. At the bottom of the pyramid is a large group of small and medium-sized firms, mostly of national capital, which use less sophisticated production techniques and serve the local aftermarket (for replacement parts). The technological and market barriers to entry are low in this latter segment of companies, and competition is price-based, even to the point where product quality may be sacrificed.

Currently, the Brazilian auto components industry is composed of an estimated 750 companies, following a massive downsizing in the sector in the 1990s described in the following section. Of these companies, approximately 480 are members of SINDIPEÇAS (Sindicato Nacional da Indústria de Componentes para Veículos Automotores), the representative association for the sector, and represent

between 90-95% of total sales from independent autoparts producers. The industry produces a range of goods from engine components, transmissions and braking systems, to foundry and stamped parts and plastic or rubber trim items.

In contrast to the terminal industry, which is dominated by a limited number of large multinational enterprises, the autoparts industry is composed principally of small and medium firms (72% employ less than 500 workers) of national origin (73% are of private national capital, 13% of majority national capital and 14% of either total or majority foreign capital) (SINDIPEÇAS, 1994). Yet, if we look for the truly dynamic and productive force behind the Brazilian autoparts industry, the picture is inverted - large companies, principally under foreign ownership, dominate the industry. For example, of the top fifteen companies in terms of sales, five are under Brazilian capital ownership, ranging in annual sales from US\$100 million to US\$500 million in 1993 (Exame, 1994). If export activity is considered an indicator of competitiveness, then foreign subsidiaries once again are leaders in the sector. Fifteen firms accounted for around three-fourths of the US\$1.6 billion exported by the independent autoparts producers in 1993 (SINDIPEÇAS, 1994).¹ Of these, ten are multinational subsidiaries and only five are national firms.

Brazilian parts producers have traditionally been highly verticalized. As the sector first emerged, this was a practical response to the difficulties they encountered in obtaining good quality inputs, at a reasonable price, in sufficient quantities and with reliable delivery. However, over time, verticalization became an integral part of company culture, as it enabled components firms to maintain greater control over the production and price of manufactured inputs, even as the upstream supplier chain evolved. High verticalization has added to company inefficiencies by generating low scale-high cost production and dispersing technical activities as the firm involves itself in activities outside of its principal product line. As companies are exposed to international manufacturing standards, they must focus upon their core activities and delegate peripheral activities to other firms.

Currently, a strong trend toward sub-contracting of activities is taking place among companies in all sectors of Brazilian industry (DIEESE, 1993). Similar to the pattern in the industrialized countries, the majority of sub-contracting has begun with service areas - such as the company restaurant, security, cleaning and even data processing and trading - as immediate cost-cutting measures. Over time, some companies have deepened this process by also out-sourcing manufacturing activities, in order to increase productive flexibility and efficiency.

During the crisis of stagnation in Brazilian automotive production during the 1980s, the auto parts industry reduced its dependence upon the automotive assemblers, on whom their growth formerly relied, by increasing sales on the replacement market and especially by penetrating new export markets, as seen in Table 1.

The aftermarket is attractive to many parts producers as the barriers to entry are lower than the original equipment market - yet, it is very price-competitive, at times sacrificing product quality for cost competitiveness. On the other hand, exports have provided an important path for Brazilian components producers to gain access to more advanced product designs and enlarge their production scale, which is generally much higher for auto parts than for vehicles (Womack, Jones and Roos, 1990; Black, 1993, p. 37).

¹ The independent autoparts producers represent between 55-60% of total exports. The vehicle assemblers account for nearly 40% of parts exports, while trading companies and distributors export almost 5% (ibid).

Table 1
DISTRIBUTION OF BRAZILIAN AUTOPARTS SALES
ACCORDING TO MARKET SERVED, 1980-1993
 (as percentage of total sales)

Year	Assemblers	Aftermarket	Exports
1980	70.7%	18.4%	5.8%
1981	65.0%	21.6%	6.2%
1982	65.0%	20.0%	6.7%
1983	62.8%	22.7%	9.2%
1984	58.9%	21.6%	15.0%
1985	60.3%	22.5%	12.7%
1986	56.2%	25.1%	13.4%
1987	51.3%	27.2%	16.3%
1988	60.3%	21.3%	13.1%
1989	59.7%	24.8%	10.2%
1990	57.7%	26.0%	11.1%
1991	59.5%	22.3%	13.5%
1992	60.1%	20.3%	15.1%
1993	63.0%	17.5%	15.5%

Source: Sindicato Nacional da Indústria de Componentes para Veículos Automotores (SINDIPEÇAS), Desempenho do setor de autopeças, 1974/1993, São Paulo, 1994.

2. Downsizing - sculpting a new sectoral profile

An intense process of downsizing was triggered early in the 1990s in the Brazilian auto components industry, cutting the total number of companies in the sector from reportedly 2,000 firms in 1990 (Booz-Allen and Hamilton, 1990) to around 750 in 1993 (SINDIPEÇAS, 1994). This transformation is taking place in roughly two phases, due to two distinct sets of factors. In the first phase, a large group of firms was eliminated as a result of domestic economic turmoil and recession, generated by the Collor Plan which was introduced in March 1990.² This measure fell hardest upon small and medium firms of national ownership, which were suddenly de-capitalized overnight, with no other source of finance available. Large companies and foreign subsidiaries, in contrast, normally had access to resources overseas which could be transferred to Brazil, which helped them weather the shock program. During the recession which ensued, real sales in the parts sector fell by 22% and idle capacity fluctuated around 27% on average between 1990 and 1992. Firms reacted by cutting costs, starting with labor - in all, employment fell by one-fourth between 1989 and 1992, representing an overall loss of 78,700 jobs (SINDIPEÇAS, 1994).

More long-lasting changes have also taken place at the firm level. Many companies have reduced their vertical layers of hierarchy from between 7-10 layers down to 5-6 layers between shop floor workers and upper management. This has forced companies to cut their formerly top-heavy administrative structures, and to re-evaluate procedures and assign new areas of responsibility (Posthuma, 1993).

The impact of this first stage of downsizing was dramatic, cutting the size of the sector in half, and eliminating some small and medium firms of national capital, which could have upgraded their competitive standards, but did not withstand the recession and unstable economic conditions. Nevertheless, the restructuring which followed may have strengthened the sector overall. The parts sector had been heavily populated by small companies, mostly uncompetitive by international standards, which did not treat the auto industry as their primary market. With the economic crisis, these less competitive companies were eliminated. Others moved into less demanding sectors and larger firms bought up smaller firms in financial difficulties or restructured separate plants under the umbrella of the same parent company.

Whereas the first shake-out of parts firms was related to domestic economic factors, the second phase, whose impact is now intensifying, is related to structural changes in the international automotive industry, which are filtering down to the Brazilian auto industry. As the domestic market is being opened to imports of vehicles and parts, the local parts firms are being exposed to a new set of assembler-supplier relations which will re-shape this industry qualitatively.

Beginning in March 1990, the Brazilian government eliminated non-tariff barriers against imports. Duties on vehicles were reduced from 85% in 1990 to 20% in September 1994, moving forward tariff reductions which the industry had expected only in the year 2001. Import tariffs on autoparts were also lowered from between 60-65% down to 20% for most parts at present. Increased vehicle imports represent a two-fold loss for domestic parts producers - both original equipment sales and the aftermarket for replacement parts. Vehicle imports are rising rapidly, totalling 9.1% of sales between January and June 1994. Of this total, 3.1% of imports were from companies with no presence in Brazil and 6% were

² The Collor Plan was an unorthodox anti-inflationary package which froze all savings and current accounts without notice, as well as all wages and prices for the first three months of the package.

imports by the assemblers installed in Brazil. While these rates are still low, the reduction of tariffs to 20% and overvaluation of the real to the dollar by around 15% following the *Plano Real* stabilization package have boosted the price competitiveness of imported vehicles and will undoubtedly accelerate imports.

This second phase of structural transformations in the industry is most likely to induce a more gradual squeezing out of uncompetitive firms and a transformation in the practices of the survivors. As noted by the Purchasing Manager at General Motors do Brasil, it is a lengthy process for deeper changes to work their way through the industry:

"Firms do not die overnight. Things do not happen as quickly as that. To develop another supplier and develop another set of tooling takes time - it can't be done in a few weeks. This group of uncompetitive firms will not win any new businesses. We are updating car models more quickly, so this means that they will be restricted to the aftermarket. In my opinion, around 1996 either these companies will have succeeded or will have died. By then, the different groups of parts firms will be very distinct."

Productivity in the autoparts sector has risen by approximately 25% between 1989 and 1993 during the restructuring process, if measure as annual sales revenues per direct employee, as demonstrated in table 2. It must be borne in mind, however, that while a part of this productivity improvement is due to improved company practices, a significant proportion is also due to intensified use of labor, and working overtime, in order to avoid contracting new workers.

Table 2
SALES REVENUES PER DIRECT EMPLOYEE IN THE
BRAZILIAN AUTOPARTS INDUSTRY
(1981-1993)

Year	Sales revenues per employee*	Annual change (in %)	Investments (in US\$millions)
1983	16,370	-	189
1984	17,793	8.7%	232
1985	18,854	6.-%	254
1986	22,177	17.6%	430
1987	25,912	16.8%	440
1988	30,139	16.3%	628
1989	34,165	9.9%	1,061
1990	37,924	11.-%	987
1991	33,071	(-12.8%)	764
1992	36,485	10.3%	715
1993	41,597	14.-%	750

Source: Sindicato Nacional da Indústria de Componentes para Veículos Automotores (SINDIPEÇAS), *Desempenho do setor de autopeças, 1974/1993*, São Paulo, 1994.

* Measured as annual sales revenues per direct employee.

It is also worth noting that the differentiation between parts producers, mentioned earlier, has had an impact on the competitive performance of different firms. When the price of Brazilian and European autoparts for two identical car models were compared, it was discovered that 65% of the items (which represented 40% of the cost of parts for these models) were more expensive in Brazil than their European equivalent (Booz-Allen and Hamilton, 1990). More importantly, this cost differential remained largely unchanged, when updated with data in 1993, despite the widespread restructuring which took place in the autoparts sector (Booz-Allen and Hamilton, 1994). In fact, the data suggest that firms have improved production costs over this period, yet labor costs (not wages but the set of benefits and government taxes which firms must pay for social security, unemployment benefit, etc) have risen and eat into the cost improvements obtained through restructuring up to now (ibid).

This type of sectoral shake-out due to structural transformations in the world automotive industry is not unique to Brazil. It comprises part of the same process of downsizing and restructuring which has been taking place in the Organization for Economic Co-operation and Development (OECD) countries. For example, a large-scale reduction of components firms is expected in the European auto industry over the next few years. A report commissioned by the European Commission indicated that the European auto parts industry - which reported sales of US\$108 billion and employed 940,000 employees in 1992 - has lost competitiveness against the new global competitive standards set by Japanese industry. This report calculated that Japanese assemblers enjoy 30% greater productivity than the European assemblers on average, and 250% greater productivity than the European auto components industry (Boston Consulting Group, 1993). In order to match these new standards of productivity by 1999, it is estimated that European productivity must rise 14% per annum and more than a minimum of 400,000 workers will need to be dismissed (ibid). Similarly, restructuring in the Argentine autoparts industry expelled a large number of uncompetitive small and medium firms from the sector (see Maceira's paper in this collection).

Clearly, the downsizing process and restructuring of the profile of the Brazilian autoparts industry is not yet finished. On a more optimistic note, the sudden revitalization of demand for cars in Brazil, starting in 1992, is breaking all previous production records, after more than ten years of stagnation. This is boosting parts sales and enabling a modest recovery in employment. However, improved domestic sales are not sufficient to guarantee the future survival of these parts companies.

The greater integration of the Brazilian automotive industry into the world market occurs precisely at the same moment that the rules of the game are undergoing profound change the world over. Hence, companies which operated safely within the protected market, with little link to events overseas, must upgrade rapidly to international standards of quality, price and client services, while also adapt themselves to new firm-level and inter-firm behavior, if they are to survive.

The domestic automotive assemblers are modifying their practices in line with changes in the international automotive industry and are altering the basis of their relations with parts suppliers. These trends, and their impacts, are discussed in the following section.

II. CHANGING INTER-FIRM RELATIONS

Competition has increased in the world automobile industry with the diffusion of new manufacturing practices. Restructuring in the industry and individual company crises were accentuated by the crisis of demand in 1993, in which new car sales dropped in all of the OECD countries (with the exception of the United Kingdom) at an estimated overall rate of around 16% (Financial Times, February 3, 1994). Excess

capacity is forecast by industry exports to be as much as 4 million units in Europe and over 2 million in the United States (Folha de São Paulo, October 18, 1993). In response, the multinational auto assemblers are searching for ways to cut costs, regain competitiveness and secure market share in highly-disputed markets.

Vehicle parts and components comprise the principal cost area in automotive assembly - estimated at around 60-70% of the total cost of manufacturing an automobile (OECD, 1990). In order to reduce the cost of components, and thereby free up their working capital, as well as better focus their human and productive resources, the multinational vehicle assemblers are introducing changes which profoundly alter the way in which components producers operate, their relationship with other firms throughout the production chain, and their set of in-house activities (while condemning a large share of companies to extinction). The principle elements of these changes by the vehicle assemblers include: increased outsourcing of parts and services; reducing the number of suppliers with which they deal directly; and demanding sub-assembled, not individual, components.

These changes in the international automotive industry are being transferred to Brazil, forming new inter-firm relations and giving rise to new competitive strategies for components producers.

1. Reduced supplier base and tier-structure of supply

The Western auto assemblers are reducing the number of components suppliers with which they deal directly, moving toward a single-sourcing relationship with selected components firms on the basis of long-term contracts and cooperation in the design and development of new products. This tendency has already been visible in the industrialized countries since the mid-1980s and has progressed further in recent years. For example, North American and European suppliers traditionally worked with between 1,000 and 2,500 suppliers (Lamming, 1989). However, it is estimated that vehicle assemblers in the OECD countries have reduced the number of their direct suppliers from an average of 1,250 in 1988 to approximately 900 at present; this process is expected to intensify and reach around 400 suppliers by 1997 (Boston Consulting Group, 1993).

Ford USA has announced its plans to reduce its supplier base from 1,200 in the late 1980s to around 500 firms in 1996 (Financial Times, August 15, 1994). As a herald of future events, the Ford Contour/Mercury Mystique, which was recently launched in the USA, used merely 227 suppliers worldwide for its components (ibid).

In this aspect, the Western vehicle producers are starting to imitate the Japanese tier-structure of suppliers - in which the first-tier firm works directly with the assembler, and is supported by a larger base of second, third and fourth-tier suppliers. For example, one of the Japanese assemblers in the late 1980s purchased engine parts from 25 first-tier suppliers, which sub-contracted 912 suppliers, which were supplied by nearly 5,000 third-tier firms (Lamming, 1989). The number of companies operating as second, third or fourth-tier suppliers in the Western auto industry is also expected to be reduced by one-third (Boston Consulting Group, 1993).

In Brazil, all of the major automotive assemblers are adopting this approach, albeit at different speeds, in accordance with each company's strategy. Fiat do Brasil is the most advanced in this process, having reduced the number of its suppliers from 510 in 1988, to 230 in 1994, and has stated its target of working with only 180 first-tier suppliers in 1995. According to the Supply Director, Fiat do Brasil could assemble a car with as little as 100 suppliers (interview data).

It appears that the trend toward outsourcing of components production and passing greater responsibility to the supplier base is moving in the opposite direction from the Argentine auto industry, where the terminal industry is vertically integrated the production of many parts, largely due to problems with quality and cost (Maceira, 1994).

It is worth noting here that the type of tier structure emerging in Brazil differs from that which exists in Japan. Due to its own specific historical antecedents, the types of relationships already established between companies and their relatively low scale production (Addis, 1993), Brazilian parts companies tend to form networks, rather than clear pyramids, of supply. These firms join in different constellations, depending upon the market and client served, and the needs of each. In some cases, a first-tier firm may operate as a second-tier firm in a sub-assembly for another client.

Rather than representing a Third World aberration, or a temporary phenomenon as these firms make the transition to the "proper" model of supplier relations, this may constitute a more stable adaptation of Japanese practices, especially in uncertain market conditions, granting supplier firms more flexibility for responding to a range of different clients and needs. Indeed, the Japanese supply structure in which the assembler has partial ownership in its exclusive key suppliers, may not be as effective when a company's operating environment passes from a stable economy of sustained growth to one of fluctuation and recession. Whereas many industry experts imagined that the Japanese system of linked ownership with suppliers, with exclusive sourcing contracts, created a more stable industrial structure, the fact is that a supplier firm may not have sufficient market flexibility to survive when its sole client runs into difficulties. For example, over the past year and a half, 127 of Toyota's Japanese sub-contractors have closed (*Financial Times*, September 14, 1994). The supplier networks found in Brazil present an industrial structure which may be more suitable for firms in unstable developing country conditions.

2. Demand for sub-assemblies

The reduction of the supplier base and the adoption of a tier-structure of supply are pre-requisites for the next step of restructuring in the assembler-supplier relationship: delivery of sub-assemblies. These sub-assemblies must be pre-tested for quality, and ready for immediate delivery and installation on the assembly line, thereby helping the assemblers cut production time by simplifying final assembly and by eliminating the need for quality control of components (Ruigrok, van Tulder and Baven, 1991; Womack, Jones and Roos, 1990).

If, on the one hand, this restructuring process means the elimination of some autoparts producers, on the other hand, it also means an increasingly tight and inter-dependent relationship between assemblers and their primary suppliers in this new, leaner supplier base. Those companies which are selected as first-tier suppliers are growing in size and are increasing their technological capacity as well as taking on new responsibilities with their assembler client. In particular, when a component is technologically sophisticated, then the relationship between the assembler and supplier normally becomes single-sourcing, enabling both partners to use longer-term planning horizons (Ruigrok, van Tulder and Baven, 1991, p. 14).

This new type of assembler-supplier relationship is starting to emerge in the Brazilian auto industry, albeit in its early stages. General Motors do Brasil is also moving in this direction, by outsourcing more than 5,000 different components, which were formerly produced in-house, to suppliers

which will produce sub-systems (Gazeta Mercantil, June 8, 1994). The most advanced assembler in this regard is Fiat do Brasil, which outsources as much as possible, via a policy of "outward growth". As an extreme example, Fiat transferred 16 presses to Usiminas, its traditional supplier of sheet steel, in order to provide stamped parts. Usiminas has already begun to weld some of these stamped parts into sub-assemblies and eventually plans to deliver the entire body pre-assembled (Estado de São Paulo, September 22, 1994). In contrast, General Motors do Brasil has not even dared to think of out-sourcing its stamping section (Gazeta Mercantil, July 12, 1994).

In another case, the dashboard control panel of the Tempra is now delivered as a sub-assembly by its first-tier supplier, which manages 15 different sub-suppliers which deliver 100 parts in all (interview data; and Estado de São Paulo, September 22, 1994). This medium-sized producer of plastic components in São Paulo state has installed a factory near Fiat's assembly plant in Minas Gerais state, where the supplier joins the parts into sub-assemblies. This supplier is linked on-line to Fiat's factory and receives messages regarding the type and volume of sub-assemblies needed as the vehicle begins to be assembled, with reportedly as little as two hours' lead time (interviews). In other cases, however, assemblers are still unwilling to relinquish control over the production process, even when the supplier is a multinational subsidiary. Instead, the assembler negotiates price and quantities directly with all the suppliers, but the parts are delivered to the first-tier supplier, who must manage the problems of storage before the assembly is ordered (interviews).

The effectiveness of this strategy is demonstrated by the fact that Fiat do Brasil has increased daily output from 770 in 1988 to 1,500 units in 1994, with the target of 2,000 per day in 1995 - all within the same factory. The area where parts were stored now houses a fourth assembly line. The company also relies upon flexible work practices, and operates in three shifts, which is only possible due to its non-unionized labor force, in contrast to its major competitors which are installed in the ABC region of São Paulo, the cradle of the powerful Metalworkers' Union.

3. Assemblers re-discover their role of upgrading supplier firms

This new set of demands and responsibilities being placed upon suppliers requires a transformation in traditional inter-firm behavior. Throughout the history of Brazilian automotive manufacture, relations between assemblers and suppliers have moved between cooperation and conflict (Shapiro, 1994; Addis, 1993). Given the importance of this task of restructuring the local parts sector to operate in a new competitive environment, the vehicle assemblers are re-discovering their former role of assisting their parts suppliers which they played at the dawn of the Brazilian automotive industry and certain other crucial moments in the industry's history (Almeida, 1972; Gattas, 1981; CEBRAE/UIPERJ, 1981). Each of the three major automotive producers in Brazil has introduced a program designed to identify parts producers with the potential to compete at international standards of price, quality and client services, and to help them on the journey toward achieving this goal. General Motors has introduced the OTIMO program, Autolatina³ has introduced the "P1 program", and Fiat the "J program". This type of assistential approach to upgrade parts producers is largely absent in the Argentine auto industry (Maceira, 1994).

³ A holding group, composed of Volkswagen and Ford, formed in 1986. Its intention was to cut administrative and design costs and generate economies of scale by sharing common vehicle platforms. However, the two company cultures never merged and with the current revitalization of demand in the domestic market, each firm wishes to re-assert its individual product identification. The "marriage" began to be dismantled in 1994.

In light of the need to rapidly upgrade their supplier base, the vehicle assemblers use a carrot and stick approach - they help suppliers to adopt advanced manufacturing methods, but also use the threat of imported parts to keep down prices. Both General Motors do Brasil and Fiat do Brasil have transferred international car models to increase the flexibility of their sourcing operations world-wide (Autolatina has no "world car" model yet in Brazil). In this case, the two assemblers can standardize component designs and benchmark prices internationally, giving them the option of importing when local prices do not meet international standards, or of exporting when Brazilian components are competitively priced.

a) The OTIMO Program

General Motors has transferred its supplier assistance program to Brazil, calling it the OTIMO (Optimization of Time, Inventory and Labor) program. Under OTIMO, a specialist from GMB is sent, free of charge, to the supplier firm for one week of intensive work. The GMB specialist analyzes the component producer's cost structure, inventory levels, production layout, labor costs and production indicators (such as manufacturing lead time). The supplier's staff is also involved in this process of analyzing production, identifying problems and implementing changes. The GMB specialist selects one area to serve as a pilot project; when this area has been restructured, the consultant then leaves the firm's staff to carry on with spreading changes through the rest of the factory. These services have also been provided to several firms who are potential, but not current, GMB suppliers.

By offering these services quickly and free of charge, General Motors is able to see a rapid response in its supplier base, as firms are not restricted by cost, nor the time delay of waiting for a consultant to come on site. By the end of December 1993, GMB had conducted the OTIMO programme with 200 suppliers. Although the assembler uses approximately 400 suppliers in all, the program is considered to be nearly finished, as it has been introduced in the principal suppliers (responsible for around 90% of total material purchases). In early 1994, GMB reportedly imported 15-20% of its components, maintaining a rough average of 80-85% local content in its vehicles overall.⁴ In a cyclical process, new models contain more imported parts until these can be produced locally. In light of growing domestic demand, GMB has initiated a plan to launch a new model on the domestic market every six months; if this plan is sustained, GMB can use the new models to sift out suppliers which are not price competitive, have poor product quality, or lack the technological capability to collaborate on new designs (interview data). The OTIMO program is also being introduced in five of its parts suppliers in Argentina (Gazeta Mercantil, June 10-12, 1994).

b) The P1 Program

Autolatina has followed a different approach with its "P1 program", providing no financial input nor direct consulting services to its suppliers. In 1992, a consultant was sent from Ford Motors USA to present a "survival plan" to Ford Brasil, indicating that the future survival of the company depended upon its relationship with suppliers (interview). In a sharp departure from past policies, the plan suggested that Ford stimulate the participation of suppliers in generating ideas to improve production, quality or cost, whereas Ford had previously discouraged any attempts by suppliers to make suggestions or change production and designs (Addis, 1993).

⁴ This was roughly the same for most Brazilian auto assemblers at that time, yet is high in comparison with other regions, such as NAFTA, which has set 62.5% as the minimum local content level.

Under the P1 Program, Autolatina's staff encourage suppliers to contract a management consulting firm to guide their restructuring activities. Those who agreed to follow these measures, received Preferred Supplier status, but would have to pay for the consultant services. Companies which participated and showed significant results, were encouraged to make presentations to other suppliers, showing the full benefits of the program. These suppliers were also asked to send a signed statement of their commitment to the P1 program and granting permission for the assembler to visit the factory at any time to examine their performance. As of mid-1994, approximately 30% of Autolatina's 500 suppliers (representing around 96% of total parts purchases) were participating in this P1 program. A base of 133 principal suppliers has been created in which all firms send a monthly performance report detailing 12 productivity indicators. In turn, the assembler provides feedback on the average level of improvement among these suppliers.

Using the internal data base of internationally benchmarked prices received from its parent firm, the assembler can push suppliers to improve costs even further. Twice a week a group of Autolatina buyers and engineers join to consider suppliers and their performance. As of mid-1994, Autolatina still allowed a 10% price margin for local firms, against imported parts. However, companies which surpass the extreme margin of 30% above the international benchmarked price, and which do not show signs of improvement, are replaced.

One innovative aspect of this program was directed toward smaller firms which are often overlooked in this upgrading process and which have difficulty bearing the cost of consultant services alone. The staff at Autolatina played an orchestrating role in arranging a four-way collaboration of actors, involving Autolatina, a major consulting firm, the supplier firms and SEBRAE (the Brazilian Assistance Service for Micro and Small Enterprises). In this case, a group of five small firms pooled their resources, the consultant firm granted a special discounted group rate and SEBRAE provided US\$5,000 each month per firm. After achieving significant improvements in productivity, these firms are now paying all the consultant costs involved in obtaining ISO 9000 certification. This story shows how improvement can be achieved throughout the production chain, and not only in isolated firms. In the new competitive environment where a tier-structure of suppliers and the delivery of sub-assembly systems are common, the ability for smaller firms to participate as capable and competitive suppliers further down this production chain helps to guarantee the quality and cost of domestically-produced sub-assemblies, and thereby keeping greater value-added in Brazil.

4. Operating in an inflationary environment

Before going any further, it is important to mention briefly how the high rates of inflation over the past decade have distorted many firm activities, making it difficult to achieve significant modernization and productivity increases. Brazilian inflation reached 3,857% per year, from March 1993-1994 (General Price Index, Fundação Getúlio Vargas). The inflationary culture created by a decade of high inflation encouraged attitudes which do not support improvements in firm efficiency and productivity.

With the exorbitant cost of capital, firms avoided borrowing, preferring to make investments from profits, which discourages long-term planning, in favor of short-term profitability or survival. As observed in other Latin American countries, firms in an uncertain macroeconomic environment are risk-averse to assuming new fixed costs (Fanelli and Frenkel, 1994). On the contrary, the high rents to be gained from the financial market favored speculative, rather than productive, investments. This behavior is highly deleterious to industry at a time of global restructuring, where new investments are essential for upgrading and modernization.

Inflation masks the true performance of the firm and also distorts attempts to measure and improve productivity, where gains of 2% or 3% appear minuscule in relation to high inflation rates. While this same environment has effected all companies in Brazil, multinational firms have had an advantage by being able to implement organizational systems used in other parts of the world. These companies are concerned with improvements, as they must show them to the parent firm, and these pre-established indicators can help.

Control of inflation, with the *Plano Real*, implemented in July 1994, will have a positive impact in this regard at all points of the production chain, by stabilizing prices, although interest rates continue to be high, in order to control inflationary pressure.

III. STRATEGIC ALLIANCES IN PRODUCT TECHNOLOGY

The liberalization of the domestic market has placed Brazilian components producers in direct contact with leading-edge transformations in product technology and designs. The pace of technological innovation has accelerated rapidly in the international auto industry, requiring auto component manufacturers to meet a more stringent set of performance requirements. As a consequence, R&D and design activities are crucial. Yet, the cost of maintaining a leading-edge research laboratory, with modern testing and design equipment, as well as research in new materials use has become exorbitant for many companies in the major industrialized countries - and certainly for companies in Brazil. Hence, in order to innovate more quickly and to offset the high costs of technological innovation at this point in time, the major global components companies are forming strategic alliances to share resources and pool investments in innovative activities, as well as reap economies of scale by joining their production volume (Ruigrok, van Tulder and Baven, 1991; Schoenberger, 1994).

Components account for approximately half of product development costs in the automobile industry (Cusumano, 1994). Therefore, in a new manufacturing environment in which assemblers rely upon first-tier suppliers to delivery sub-assemblies, parts producers must be capable of taking on responsibility for product design and development (Clark and Fujimoto, 1991). Due to these cost, scale and technological factors, a strategic alliance may be the only viable type of strategy for future innovations in certain product lines.

The growing list of new materials being used in vehicle manufacture (such as plastics, composite materials, aluminum, new alloys and ceramics) offers new possibilities to meet these new, more demanding performance requirements, even those which are difficult to reconcile - such as developing more durable and robust parts which are light-weight, or designing a more powerful engine which operates under higher pressure, yet which is economical and less polluting. New materials offer possibilities to alter design and manufacturing processes by presenting new characteristics for molding and shaping of components. Strategic alliances may also be formed for market access, between parts producers which operate in different geographical regions. At a global level, companies form partnerships even with traditional competitors.

In Brazil, national components producers in more technologically sophisticated product lines, or in areas where the rate of technological innovation is particularly acute, must upgrade their technological capabilities in order to remain competitive. Yet, these companies are faced with a dilemma. On the one hand, the level of technological capability obtained under import substitution may not be sufficient to continue competing successfully in the future in an open market. On the other hand, a traditional type

of technological licensing relationship may not be viable when a Brazilian producer has become a world player, and therefore only willing to work together with a foreign firm on equal terms, as this may pose a competitive threat to the other firm.

Three phases of product technology acquisition can be identified in the Brazilian auto industry. The first phase involved basic technology transfer of product designs, production techniques, and sometimes equipment or machinery specifications and technical assistance, either from the respective vehicle assemblers in Brazil or by forming a licensing agreement with a supplier firm overseas (CEBRAE/UIPERJ Convênio, 1981; Almeida, 1972). In the second phase, the leading national companies in the sector sought more sophisticated technological relationships which would enable them to compete in export markets demanding greater technological capability. This phase arose principally due to the World Car programs by the assemblers, which required suppliers who were selected to follow developments at the technological frontier in specific product lines.

More recently, only a restricted group of advanced companies in the sector are entering into a third phase which involves strategic alliances for technological development. In this case, a conventional technological licensing relationship is not the same as a strategic alliance - the former consists of learning from a foreign company with superior capability, and the latter working as equals on original product research, design and development of a specific project.

1. Three cases of product development and strategic alliances

Three case studies of technological leaders in the Brazilian autoparts industry provide useful examples in this regard. For example, one company had recently terminated a long-term licensing agreement formed in the 1950s, and had no intention of forming any strategic alliance in the near future. The licensing relationship had evolved from one of technology transfer to a two-way exchange of technical information. A turning point occurred in the 1970s, when the company started to export and realized that the licensor's technology was not adequate for supplying to the European market - therefore, the Brazilian company opened its own technology and research center. Over the years, the firm had developed independently along its own distinct technological trajectory, patenting its own innovations, and even designing equipment specially to serve its needs, thereby weakening the initial ties of dependency with its licensor. The company has also conducted original research in new materials in order to meet new product specifications.

The company's management had decided to only enter into another association meets strategic interests: "We are looking for a partnership, and not technical assistance or technology transfer". As the domestic market has opened, the company has been besieged with low-cost producers who are taking large shares of the aftermarket; hence, its future competitive strategy is geared toward developing new products for the original equipment market, according to client specifications or in conjunction with customers.

Another company, which has also surpassed the point of licensing technology, now operates as a world leader in one product line. However, as noted above, even world-class firms in the industrialized countries are finding it necessary to form strategic alliances in order to offset the high cost of innovative activities and to share the economies of scale in technological innovations. It is worrying that this company has reduced its investments in R&D as a result of the recent crisis in the 1990s and the need for downsizing. Nevertheless, this company has formed two joint ventures recently which could bolster

its technological capability. One joint venture in the United States involves sharing technological know-how with a German competitor, which serves as a trial balloon for testing out a technological partnership in the NAFTA region. The second joint venture was formed in Brazil with a foreign competitor in order to enter into an entirely new product line in which neither company had technical know-how. In this way, two rivals joined forces to develop a new product line which would benefit both companies.

Finally, a third company relies primarily upon one licensing agreement with a leading global producer, yet, maintains its own technology laboratories for innovation and adaptation. A clause in the technology licensing agreement gave its foreign licensor the option to purchase a one-third share of the Brazilian company, thereby forming a joint venture between both companies and linking the foreign firm's interests with the success of the Brazilian firm. Both companies work increasingly as partners, in reorganizing production flow, introducing new management techniques and opening access to new markets, as well as collaborating in the technological development of some new products. At this point in its trajectory, the company rates itself as being at the technological frontier in terms of product and process technology. This company has the in-house infrastructure to continue strengthening its innovative capability, including its own technology centre in Brazil, with laboratory facilities and testing equipment, and CAD-CAM design and production. These technological activities are complemented with smaller technology centres in the United States and Argentina, which involve 150 employees in all.

This last firm has not limited its technical collaborations solely to its European associate. In response to the need for partnerships in selected project development for specific technological and/or market objectives, the firm has formed two partnerships, in Japan and the USA. The partnership with a Japanese firm was formed to build technological know-how and production capability in a new product system. While it has no illusions about becoming a market leader in this product line, the firm's leadership recognizes the need to upgrade technological capacity and to establish a presence in this new market. The company will continue importing this component from its Japanese associate until it is ready to set up manufacture in Brazil. The partnership in the United States, with their leading American competitor, will not involve competition on the basis of product technology. Instead, it provides the opportunity to learn more about technology demanded by the American market and to establish market share on the basis of price competitiveness.

IV. THE AUTOMOTIVE SECTORAL CHAMBER

The preceding sections discussed some of the dimensions of the changes taking place in the international automotive industry and their impact upon the Brazilian components industry. The pressure to restructure the entire domestic automotive industry is great. Recent institutional innovations, such as the creation of the Sectoral Chamber, provide a framework in which to collectively establish measures in order to steer the entire automotive complex, and all of its various actors, in a more coordinated direction toward restructuring to operate in an open market.

Throughout the "lost decade" of the 1980s, vehicle production in Brazil stagnated and never regained its former peak of 1.17 million units attained in 1980. Shocked into action by this situation, which was also evident in other sectors, the government sought a new approach to industry's troubles. In 1991, the government began to organize Sectoral Chambers in diverse sectors of the economy, such as petrochemicals, toys, textiles, cosmetics and agro-industry (CEBRAP, 1994). This unprecedented institutional innovation provided a broad-based forum for industrial negotiation, joining representatives of government, industry and labor around the same table (Guimarães, 1994; Arbix, forthcoming).

Different actors in the production chain discuss issues such as costs, supply, wages, taxes and profit margins, thereby granting legitimacy to their decisions and broadening the commitment to implementation of its policy decisions (Carvalho, 1993). An essential feature of this forum is the commitment to negotiate long-term economic policies for the collective good of the sector, rather than for individual short-term interests (CEBRAP, 1994, pp. 5-27).

The Sectoral Chamber proceeded in roughly three stages. First, in an inflationary environment, the Sectoral Chamber helped to move from price controls to freely-set prices by examining the entire production chain and pressuring areas which posed bottlenecks or abusive pricing. Second, the Chambers began to address sectoral industrial policy. This involved conducting a diagnostic of the sector in question, identifying structural problems and specific areas of inefficiencies, and implementing medium and long-term sectoral programs for quality and productivity as part of the Brazilian Program for Quality and Productivity. Finally, the Chambers reached the point where all parties elaborated and signed a sectoral agreement, which was binding for all participants (*ibid*).

The Automotive Sectoral Chamber joins representatives of federal and state government, the private sector (including not only the vehicle assemblers and component suppliers, but also other members of the production chain such as suppliers of raw materials and vehicle retailers) and representatives of labor. This new structure allows broad-based participation in formulating industrial policy, which has traditionally been the private domain of powerful industrial and governmental interest groups (Guimarães, 1994). For the first time, the representatives of labor have also been involved, and have presented solid proposals for negotiation (Metalworkers' Union of the ABC Region, 1992).

The Sectoral Chamber for the Automotive Industry has been the most visible and has had the most far-reaching impact of all sectoral chambers formed at the time, serving as a testcase for this new method of formulating industrial policy and new model of industrial relations. The first meeting of the Automotive Sectoral Chamber was convened in Brasilia in early 1992, to address concern over the continued stagnation of domestic vehicle production and sales. Participants sought to formulate measures which could help the market to recover quickly and to halt the downward spiral of declining sales, reduced output, higher costs and low investments. The first agreement was signed in 1992, and a second agreement in 1993 broadened the terms of the original document. For labor, the agreement included measures to sustain employment levels and guarantee monthly wage adjustments in line with inflation and a real salary increase of 20% over the period 1993-95, in exchange for establishing the groundwork for collective bargaining where negotiations, rather than strikes, comprise the first tool of industrial relations (ANFAVEA, 1993; Metalworkers' Union of the ABC Region, 1993). The business sector agreed to reduce costs throughout the production and distribution chain, setting the target of reducing final consumer prices by 5%, implementing their programs for new investments (which had been formulated earlier) and helping to arrange new buyers consortiums with easier financing terms, to facilitate consumption (*ibid*). The government, for its part, agreed to reduce federal and state taxes on vehicles, in varying degrees, in accordance with engine type and size (*ibid*).

Despite its commitment to determine long-term policies, the most effective measures thus far have tax reductions which resulted in an immediate surge of demand. Four different taxes are currently levied on vehicles sold in Brazil, varying by engine type. By reducing profit margins and taxes, final car prices dropped straightaway by 30% on average. In particular, the "*carro popular*" program, directed toward stimulating the low end of the market, set the price of selected 1000 cc models at US\$7,300 (formerly priced around US\$10,000). The reduction of the state tax (ICMS) from 18% to 12% and the federal tax

(IPI)⁵ from 14% to a symbolic 0.1% only for 1.000 cc cars, made them by far the most price-competitive vehicles on the market. The data in Table 3 show the decline in total government taxes on various models, in this rather complicated taxing system. Each assembler has a "*carro popular*" model: Volkswagen has re-launched the Beetle for the programme and the Gol 1.000, Ford has the Escort Hobby, Fiat has its Uno Mille and General Motors started with the Chevette which was recently replaced by the Corsa, with resounding success.

Table 3
TOTAL TAXES ON MOTOR VEHICLES IN BRAZIL*
BY VEHICLE TYPES 1986-1994**

Year	Cars up to 1,000 cc	Gasoline cars up to 100 hp	Gasoline cars over 100 hp	Light commercial vehicles, gas	Truck chassis	Tractors
1986	-	87.1%	88.4%	51.7%	36.0%	10.7%
1987	-	43.6%	45.4%	36.7%	22.8%	14.1%
1988	-	43.7%	45.4%	36.7%	22.8%	19.2%
1989	-	39.0%	41.1%	30.5%	23.0%	19.4%
1990	34.5%	42.2%	44.1%	32.2%	24.8%	21.3%
1991	35.6%	43.1%	45.0%	33.4%	26.1%	15.7%
1992	27.1%	36.1%	38.4%	24.4%	20.4%	15.7%
1993	17.0%	33.0%	35.3%	22.7%	20.4%	11.8%

Source: Associação Nacional dos Fabricantes de Veículos Automotores (ANFAVEA), Anuário estatístico, São Paulo, 1994.

* includes IPI (federal excise tax), ICMS (value-added tax), PIS (federal Programme of Social Integration) and COFINS (contribution to the Social Investment Fund).

** as of 30/09/94.

By reacting quickly to this initiative, both Fiat and General Motors have emerged as the most dynamic of the automotive assemblers, as evidenced by their increase in market share. For example, Fiat rose from 13% of the market in 1980 to 32% in August 1994, whereas Volkswagen has fallen from 49% in 1980 to 32% of the market in August 1994 (Folha de São Paulo, October 2, 1994). This marks a striking turn-around from the former situation in which auto producers focussed upon luxury models, with higher profit margins for a restricted market; as they return to economy models, the assemblers are re-introducing a mass production logic of scale economies for a mass market.

⁵ Already reduced from 20% to 14% in the first automotive agreement in 1992 (ANFAVEA, 1994).

The success of the "*carro popular*" program has far-exceeded expectations. In September 1994, these compact models surpassed 51% of domestic sales, with Fiat accounting for 39% of these cars (ANFAVEA, 1994).⁶ These measures have resulted in a general recovery of the domestic automotive industry. Total production for 1994 is forecast at 1.6 million units, surpassing by 200,000 the original output targets set under the sectoral agreement (ANFAVEA, 1994). The assemblers have announced new investment programs and have begun updating their local models, presenting the possibility that some assemblers, such as General Motors and Fiat, may turn Brasil into a platform for production and export of their compact car models. They also are pressuring the government for further tax reductions for medium-sized and luxury models, to correct the skewed sales structure and spread out sales across more model ranges.

After its initial success, other more difficult points must be addressed by companies in the sector which fall outside of easy areas of consensus, such as government tax reductions. Tax cuts have worked as a temporary palliative, but now the industry must address the structural problems which have led to its loss of competitiveness over the past decade (Carvalho, 1993). The automotive complex must come to grips with the need to make new investments necessary for a technological leap in product and process technology, implement more comprehensive programs for quality and productivity and elaborate viable export programs. Furthermore, the traditional corporatist modes of behavior of industry and labor in Brazil must be altered, if this more democratic manner of forming economic policy is to be fruitful and sustained (Guimarães, 1994).

The future of the Sectoral Chambers, nevertheless, is uncertain. The new government has demonstrated a preference for using market mechanisms in order to bring about price reductions and to upgrade products and production methods, giving little support to the continuity of this institutional mechanism. In any case, after experiencing the positive results of dialogue, rather than conflict, the leadership of industry and labor in the automotive sector are more willing to negotiate than ever before and will discover other means for this to continue.

In order to encourage and sustain the large new investments which are required in the Brazilian automotive industry, revitalized domestic demand must be complemented by new market opportunities elsewhere. The creation of MERCOSUR and the Global Sourcing strategies may provide this additional demand for those companies which adopt strategies to take advantage of these new opportunities, as discussed in the following section.

⁶ Fiat has firmly directed 75% of its production into the "*carro popular*" compact range of vehicles (Folha de São Paulo, September 11, 1994).

V. RESTRUCTURING OF EXPORT MARKETS, EMERGING REGIONAL TRADING BLOCKS

This next and final section discusses the restructuring of export markets, the responses of a few leading components companies and what this suggests for the future of Brazilian components exports.

As noted earlier, the Brazilian parts sector became more independent from the domestic vehicle assemblers during the 1980s, in response to stagnating vehicle production, especially by increasing sales in export markets. This is in marked contrast to Argentine parts firms which, in general, are unable to gain greater independence from the domestic assemblers and move into export markets. Instead, their activities are strongly determined by the assembler strategies (Maceira, 1994). Exports of Brazilian auto parts have risen 350% in nominal dollar terms from 1980 to 1994. Yet, this is largely due to the activities of a few leading firms which have managed to establish a strong foothold in overseas markets, and components exports by the vehicle assemblers. However, the creation of trading blocks in the industrialized countries, could restrict exports by Brazilian parts producers. A recent consultancy report by Coopers & Lybrand predicts that investments in Brazil will decline in favor of Mexico, and that in five years exports of shoes, orange juice and autoparts to the USA will suffer from Mexican competition (Coopers and Lybrand, 1994). Two strategies are recommended for parts producers: diversify markets and create associations with other companies in Mexico and the USA (ibid). Some firms are already pursuing such strategies, as will be seen below.

In order to guarantee access for direct exports to the trading blocks of NAFTA and the European Union (EU), Brazilian-owned parts producers must establish some physical presence to meet their strategic objectives - financial, productive or commercial. Only a restricted group of Brazilian companies will have the administrative capacity and financial resources to undertake and manage such investments. Yet, another intermediate group of companies may be able to export indirectly through the global sourcing programmes by the assemblers. There are already clear signs that this type of indirect parts exports on the back of the assemblers, is on the rise, as will be seen below. Finally, the creation of MERCOSUR, with the gradual reduction and elimination of trade tariffs between member countries, opens a new trade region with low barriers to entry for many more Brazilian companies. A large segment of producers will probably never achieve the competitive conditions necessary to move beyond production for the Brazilian aftermarket. Yet, the trend toward supplying sub-assemblies could enable small and medium enterprises to export indirectly in cases where the first-tier supplier is able to win exporting and Global Sourcing contracts. This section discusses some of the features of these changing market conditions and the challenges they pose for Brazilian autoparts producers following the liberalization of the domestic market.

1. New trading blocks: MERCOSUR, NAFTA and European Union

On March 26, 1991, the Presidents of Brazil, Argentina, Uruguay and Paraguay signed the Asuncion Treaty, stating their intention to create a common market between the four countries, with the full elimination of tariffs on January 1, 1995, establishing the free trade of goods, services and productive factors between these countries. The import of autoparts and components free of tariffs and import duties is limited to those items specified on the Common List of Parts and Components of the Automotive Industry which is revised periodically. Among other points of relevance for the Brazilian autoparts sector, MERCOSUR specifies that when a new car is imported into another member country, one may also

import original equipment parts for replacement free of tariffs and import duties, up to the equivalent of 15% of the value of the new car (ACE No. 14, Annex 8, Chapter 3, Section 1, Article 6, 1991). Another article indicates that autoparts and components may have no more than 15% imported content from non-MERCOSUR countries and must be manufactured locally to be considered a national item and to be eligible for trade under MERCOSUR regulations (ACE No. 14, Annex 8, Chapter 3, Section 2, Article 14, 1991). The vehicle assemblers are negotiating proposed 70% local content for vehicles within MERCOSUR (ANFAVEA, 1994).

Brazil constitutes the economic heavyweight in MERCOSUR, accounting for 79% of the population and 82% of the GNP of the regional trading block in 1993. The minimum wage in Brazil is also lower than its neighboring countries (currently set around US\$70.00). Brazil currently holds a trade surplus within MERCOSUR. Continued negotiations will certainly aim to address this disequilibrium, in order to prevent protectionist reactions by the other partners in MERCOSUR. The creation of MERCOSUR opens opportunities for Brazilian firms in the auto components sector, which, in general, are more technologically sophisticated, present better product quality and are more price-competitive than their regional neighbors. Of particular interest to this study is the weight that autoparts hold in regional trade - exports of Brazilian autoparts accounted for approximately 11% of total trade between MERCOSUR member countries in 1992.

The MERCOSUR market (and the Latin American region to a lesser extent) is of growing importance for Brazilian vehicle and components exporters. Car exports to Argentina grew by 454% (from 35,080 units to 194,515 units) and commercial vehicles rose by 1,625% (from 2,117 units to 36,523 units) between 1990 and 1993. The overall growth of Brazilian vehicle exports to Latin America as a whole was 254% between 1990 and 1993 (from 81,220 units to 287,628 units). In contrast, overall sales to North America and Europe declined over the same period.

The situation is similar in many respects for Brazilian autoparts. The major growth in exports is with Argentina, as seen in Table 4 (while not a member of MERCOSUR, Chile is included in this table due to its commercial significance). In the NAFTA region, components exports to the USA grew by 9.8% from 1990-1993. It appears that after the slump of production and demand during 1991 and 1992 in the American market, demand for parts from Brazil may be renewed. Components exports to Mexico increased by 131% during this same time period. These are primarily parts exports by the vehicle assemblers in Brazil to be assembled in vehicles for the North American market. Hence, the scope for exports of Brazilian parts to the North American market has not yet shown signs of narrowing, although these are largely due to exports of engines and components by the vehicles assemblers, and less due to direct exports from independent parts firms. Once again, this demonstrates the importance of inter-firm linkages and developing the ability to supply sub-assemblies to the assemblers for the future growth of the Brazilian parts industry.

These data confirm the growing significance of the MERCOSUR countries for Brazilian autoparts exporters (and the Latin American region to a lesser degree). It also suggests that assembler sourcing strategies to the North American market may make Mexico a large recipient of Brazilian engines and components.

Table 4
MAJOR EXPORTS MARKETS FOR BRAZILIAN AUTOPARTS (US\$MILLIONS)
1989-1993

Destination	1989	1990	1991	1992	1993	% change, 1989-93
USA	1,200	1,086	888	871	1,083	9.8%
Europe	481	474	500	467	385	- 20%
Argentina	57	78	153	415	591	937%
MERCOSUR (including Chile)	170	126	217	492	692	307%
Mexico	107	199	201	254	247	131%
Rest of the world	275	290	306	305	394	43%
TOTAL EXPORTS	2,120	2,127	2,048	2,312	2,700	27%

Source: Sindicato Nacional da Indústria de Componentes para Veículos Automotores (SINDIPEÇAS), Desempenho do setor de autopeças, 1974/1993, São Paulo, 1994, and Secretariat for Foreign Trade, Rio de Janeiro.

Exports to Europe have dropped by one-fifth since 1989; even with a revitalization of European demand for vehicles, the region does not promise to be a significant importer of Brazilian parts in the future, especially with the growth of parts production being encouraged in Eastern Europe. Indeed, the European market may be turning into a net import region, with Germany, Italy and Sweden being major suppliers to autoparts to Brazil.

2. Strategies of autoparts firms in new trading blocks

In the new trade regime of MERCOSUR, companies must maintain balanced trade, or are subject to a fine, (although some Brazilian firms reported that an imbalance of between 20% to 30% is usually tolerated). Many Brazilian companies import Argentine capital goods or productive inputs in order to balance their trade. Some larger parts firms, however, have made direct foreign investments in Argentina, either by buying shares in Argentine firms, forming joint ventures, or taking over Argentine firms. For example, Companhia Fabricadora de Peças (COFAP), the third largest Brazilian parts producer (with sales of US\$371.9 million in 1993) has bought 26% of the shares of Perdriel S.A., and 50% of the capital stock of the Indufren group, the largest autoparts group in Argentina, thereby also gaining participation in four firms which comprise the group, as well as access to sell its products in the Speedy chain of distribution and service stores. Similarly, Freios Varga, the ninth largest Brazilian autoparts firm (with sales of US\$186.3 million in 1993) has bought 25% of the Indufren brakes producer. In some cases, however, the initial convergence of two distinct manufacturing and management cultures has been conflictual - highly-skilled and politically-conscious unionized workers in Argentina have resisted attempts by some Brazilian directors to introduce more

flexible work practices and participatory programs (interviews). The vehicle assemblers also account for a share of these autoparts trade, such as Autolatina's Transax plant in Córdoba. No Brazilian parts firm has yet installed a wholly-owned subsidiary in Argentina. This strategy has only been used by the assemblers.

Penetration of markets in the NAFTA and EU is slightly more complex, and company strategies vary, depending upon the size, capital resources and degree of technological sophistication of the component involved. A more restricted group of leading parts firms has made direct productive investments in these markets. For example, Metal Leve, the fourth largest Brazilian autoparts firm (with sales of US\$263.1 million in 1993) has opened three factories in the United States: two factories are wholly-owned subsidiaries and one is a joint venture with its major German competitor. This company also opened a Center for Research and Development in 1988, in Ann Arbor Michigan, to better follow recent developments in automotive technology, to conduct tests and trial runs, and to provide more immediate technical services to its main clients, such as Cummins and Caterpillar. Metal Leve also has commercial offices in the US and in Europe. Similarly, COFAP received financing from the European Community for its investment of US\$100 million to open a factory for piston ring production in Portugal, using some of the most advanced equipment available overseas. The company also has a technical service office in Germany, as well as commercial offices in the US and Europe.

The Iochpe-Maxion group, the second largest autoparts producer (with sales of US\$425.4 million in 1993), has bought Midland Steel in the US, which henceforth will be called Iochpe-Maxion Ohio Inc. and has signed an agreement with the Rover Group in England, to produce a new diesel engine for Land Rover to serve the entire Latin American market, through a ten-year technical agreement. In another case, Freios Varga, which has joined with its British partner on a global sourcing project, and will use its production facilities in the US, Argentina and Brazil in this effort.

Companies which do not have the financial capacity, nor technological sophistication to merit such investments overseas, have made contact with distributors overseas. Sales to the aftermarket via distributors is a good point of entry for developing country firms into the industrialized country markets (Bowring, 1990). Global Sourcing will be another important option for companies, as will be seen below.

3. Global sourcing

The trend toward increased outsourcing of parts by the vehicle assemblers, discussed in the first section of this paper, is being internationalized by some companies, such as General Motors and Volkswagen. Through global sourcing, General Motors is able to compare prices for the same parts and components around the world and determine the lowest price on the global market for a product which meets its quality standards. According to the Purchasing Manager of General Motors do Brasil, the global sourcing programme works as a benchmarking exercise to help reduce component costs - while also opening the possibility for increased imports of parts (interview). Using this information, General Motors identifies parts which are cheaper overseas and informs its Brazilian producers of this price difference - and gives the firm the opportunity to reduce its final price to the new level. This Purchasing Manager argues that GM would prefer to buy its components locally (thereby reducing delivery time, as well as other direct and indirect costs) and therefore provides assistance to its suppliers in order to bring down their production costs, such as the OTIMO program described earlier.

Global sourcing also involves single-sourcing in certain product lines and creating partnerships with suppliers to work closely together in product development. Engineers at General Motors do Brasil reportedly work with between 150-200 suppliers in "Product Development Teams".

The fundamental logic behind global sourcing of autoparts is twofold. First of all, to cut costs by out-sourcing parts production to different geographical regions; passing on the fixed costs of equipment, installed capacity and labor to parts suppliers; and by increasing competition between components producers. Furthermore, General Motors can help to achieve economies of scale among the companies which are awarded Global Sourcing contracts by concentrating production amongst a few suppliers world-wide. Second, the assembler increases its flexibility by freeing up the company's investment capital, standardizing the designs of certain parts and components and passing the risks of market fluctuations onto parts suppliers. Several Brazilian components firms have already been awarded global sourcing contracts, which opens access to the North American and European markets which would otherwise be more difficult to penetrate with direct exports.

VI. CONCLUSION

This paper has examined the Brazilian autoparts industry from the perspective of being a significant example of infant industry industrialization in Latin America, and to assess its development and future prospects. The principal features of the restructuring of this industry in response to domestic economic factors and liberalization of the domestic market were analyzed. The restructuring process is seen to be following closely in the direction of current trends in the international automotive industry, involving such features as single-sourcing relationships with the vehicle assemblers, forming a hierarchical structure in the supplier base and delivering sub-assemblies. The leading firms in the sector are becoming first and second tier suppliers, and are seeking strategic alliances in order to keep pace with technological developments in automotive product technology. As another sign of tightening inter-firm relations, the domestic assemblers are re-adopting their previous assistential role with the parts sector by introducing programs which help their supplier firms adopt modern manufacturing techniques.

The opening of the market is converging with an expansion of consumer demand for vehicles, resulting from a tripartite agreement between government, industry and labor which reduced government taxes on cars. This surge of demand has been sustained and has brought new life to the domestic automotive complex, increasing autoparts sales by 39% and exports by 57% between 1990 and 1994. Regional sales are also promising - exports of Brazilian parts to MERCOSUR countries grew by 448% between 1990 and 1993.

However, while parts firms are increasing efficiency and productivity, this liberalization is not being accompanied by policies which could help consolidate the learning achieved by the sector during the import substitution period. The current environment favors increased parts imports - the liberalized economy grants access to the vast domestic market; demand for cars has been revitalized and the domestic automobile producers cannot satisfy demand; and, a stabilization program, the *Plano Real*, has controlled inflation from 3,857% from March 1993 to March 1994, down to less than 2% monthly. Increased car imports signify a double loss for the domestic autoparts industry - lost original equipment and replacement market sales.

However, the government has few policies to help the sector in making the transition to global competitive standards. For example, no local content requirements exist (as opposed to earlier periods of the industry) and imports are only limited by tariffs which have been reduced to 20% (as of September 1994) for vehicles and most auto components. Taxes on inputs and domestic sales of vehicles continue to be high, eating away at the protection afforded by import tariffs and logistical costs (estimated at an additional 8%) (Booz-Allen and Hamilton, 1994).

Such "hands off" policies threaten to encourage direct imports of parts into Brazil, rather than foreign direct investment by leading international components producers, which could find the large, and revitalized, domestic market sufficiently attractive to form joint ventures, or collaborations with local firms, and thereby serve as a font for new technology transfer.

Brazilian parts firms are restructuring and the leading firms are performing well in international markets, providing an example for the rest of the sector. Yet, these firms still have a number of hurdles to cross over. The strengthening of inter-firm relations in the production chain will assist in transferring new techniques and maintaining a share of the original equipment market. The future structure and market options of this sector will rely upon the speed at which firms continue upgrading quality and modernizing their product designs and production methods in line with international standards, which are increasingly present in their domestic market.

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