

**MEXICO'S AUTO INDUSTRY AFTER NAFTA:  
A SUCCESSFUL EXPERIENCE IN RESTRUCTURING?**

**Juan Carlos Moreno Brid**

**Working Paper #232 - August 1996**

**Juan Carlos Moreno Brid** has been a consultant to the Mexican Government, specifically to the Chief of Economic Advisers of Petróleos Mexicanos (PEMEX) and the Secretary of Industry. His publications include the article "Structural Change in Mexico's Motor Vehicle Industry: 1977-89" in G. Van Liemt, ed., *Industry on the Move*, (International Labour Office, Geneva 1993), based on a study he undertook for the ILO. Moreno Brid is currently a Visiting Scholar at the Rockefeller Center for Latin American Studies at Harvard University. In spring 1992 he was a Visiting Fellow at the Kellogg Institute.

An earlier version of this paper was presented at the Conference "Liberalization and Competitiveness: The New Opportunities in Investment and Technology in Big Emerging Markets," 5-7 May 1994, Center for US-Mexican Studies, University of California, San Diego. This revised version was completed before the collapse of the Mexican economy in December 1994.

## **ABSTRACT**

Mexico's motor vehicle sector is viewed as a most successful case in industrial restructuring. In the mid-seventies it was an industry characterized by outdated machinery and incapable of competing in the international market. Today its manufacturing plants are competing worldwide in automotive production, exporting more than a million engines and 400,000 vehicles a year. This transformation is explained by changes in Mexico's positioning within the automobile global market as well as by the policies applied by the Mexican government to regulate vehicle production, imports, and sale in the country. The North American Free Trade Agreement (NAFTA) is changing the institutional framework of the Mexican economy and radically liberalizing its highly protected domestic automotive market. In this study we examine the evolution of Mexico's automotive sector in the last fifteen years and the various factors contributing to its transformation. The first section reviews Mexico's overall economic strategy and trade policy. The second focuses on the regulation of vehicle and auto parts production in Mexico. Clearly, trade restrictions have been very important for the development of Mexico's automotive sector. The third section deals with the performance of the Mexican automotive industry up to 1993, before NAFTA was put into effect. It is followed by some comments on the changes that NAFTA is already bringing about. In the final section, we present our view on the industry's outlook.

## **RESUMEN**

El sector automotriz mexicano es visto como uno de los casos de reestructuración industrial más exitosos. A mediados de los setentas, era una industria caracterizada por la obsolescencia de su maquinaria e incapaz de competir en el mercado internacional. Hoy, sus plantas manufactureras compiten mundialmente en la producción de automóviles, exportando más de un millón de motores y cuatrocientos mil vehículos por año. Esta transformación se explica por los cambios en el posicionamiento de México en el mercado automotriz global, así como por las políticas aplicadas por el gobierno mexicano para regular la producción de vehículos, las importaciones y las ventas en el país. Hoy, el NAFTA está cambiando el marco institucional de la economía mexicana y liberalizando radicalmente su altamente protegido mercado automotriz. En este estudio examinamos la evolución del sector automotriz mexicano durante los últimos quince años y los varios factores que contribuyeron a su transformación. La primera sección reseña la estrategia económica general y la política comercial adoptadas por México. La segunda se concentra en la regulación de la producción de vehículos y auto-partes. Claramente, las restricciones al comercio han sido muy importantes para el desarrollo del sector automotriz mexicano. La tercera sección evalúa el rendimiento de la producción automotriz mexicana hasta 1993, antes que el NAFTA entrara en vigencia. Le siguen algunos comentarios acerca de los cambios que el NAFTA ya ha producido. En la sección final presentamos nuestro punto de vista sobre el panorama de esta industria.

## **1. MACROECONOMIC PERFORMANCE: 1980–1993**

### **Mexico's Strategy for Economic Growth and Stabilization**

From 1978 to 1981, oil revenues and foreign loans helped to bring about an unprecedented boom in the Mexican economy, with real gross domestic product (GDP) growing at more than 8% per year. However, this economic expansion was unstable, causing severe internal and external imbalances. In 1981, the fiscal deficit reached 14% of GDP—8 points above its 1977 level—and public foreign debt increased 20 billion dollars, most of it of a short-term nature. The current account deficit expanded to 16 billion dollars (6.4% of GDP) with oil and gas covering nearly 80% of total exports. It is well known that this dash-for-growth ended in a dramatic collapse in 1982 with the weakening of the international oil market and the rationing of foreign credits, pushing Mexico into a deep recession and inaugurating the international debt crisis.

Mexico's initial policy response included nationalization of the banking system, extensive import restrictions, public expenditure cuts, moratorium on foreign debt payments, full-fledged exchange rate controls, and a major adjustment in the dollar-peso parity. Nevertheless, by mid-1982, foreign reserves were nearly depleted, productive activity remained stagnant, and external obligations exceeded Mexico's capacity to pay.

A new administration took office in December 1982, and set up a stabilization program based on the assumption that Mexico's difficulties were a consequence of its inward-looking pattern of development and the state's excessive intervention in the economy. The program's objectives were to reduce inflation, to overcome the balance of payments crisis and to transform Mexico's productive structure, strengthening the role of markets and the private sector.

The government's stabilization program followed orthodox principles: i) fiscal and monetary austerity aimed at reducing domestic absorption, and ii) exchange rate policy targeted to shift relative prices. Though some positive results were obtained in 1984–85, the decline in oil prices in 1986 led to balance of payments difficulties, accelerating inflation and a decline in per capita income.

In December 1987, with annual inflation reaching nearly 160% and productive activity receding, a new program was launched: the Economic Solidarity Pact (ESP), established as an agreement between the government, the business sector, and labor unions. This program incorporated some heterodox elements, recognizing the role of inertial inflation and the need for an incomes policy to stabilize the economy, and using the nominal exchange rate as an anchor for inflationary expectations. In essence, the ESP ratified fiscal and monetary austerity together with a freeze on wages, prices, and the exchange rate—after a major devaluation.

The subsequent administration (Carlos Salinas de Gortari 1988–94) continued the same stabilization strategy, annually revising the ESP—making very minor variations. After remaining nearly static, the exchange rate has been floating in a gradually widening band. Salinas pushed intensively for a restructuring of the economy. Deregulation and privatization gained unprecedented strength. From 1989 to 1993, the banking system, and more than 800 public enterprises, including the steel and copper mining companies, the airlines, and the telephone company, were sold to the private sector (Secretaría de Hacienda y Crédito Público 1994).

In 1989 Mexico's stabilization efforts were compensated by the rescheduling of the foreign debt with commercial banks, reducing its outstanding balance by 18% and significantly lowering interest payments.

From 1988 to mid-1992, the outcome of the Solidarity Pact was, in many ways, extraordinary. Public finances improved, inflation decreased, foreign capital net inflows resumed, non-oil exports soared and a moderate economic expansion was achieved. Since then, however, its performance has diminished, and the reduction in inflation is associated with a decline in economic growth. In fact, Mexico is repeating the typical cycle of stabilization programs based on the exchange rate as a nominal anchor, beginning with a boom and ending in a deep recession (Kiguel and Liviatan 1992).

Though it is expected that NAFTA will attract sufficient foreign capital, the widening trade and current account deficits, the real exchange rate appreciation, the reliance on short-term capital inflows attracted by high interest rates, and the declining private savings are cause for concern among some analysts.

In addition, the performance of the economy in the first quarter of 1994 was affected by political turmoil. The peasant uprising in Chiapas and the assassination of the ruling political party's candidate for the August presidential election put Mexico's institutions under strain and its political stability in jeopardy. We must recognize, however, that the economic policy has, so far, eluded critical fluctuations in the financial markets. Whether it will be able to keep doing so depends both on political and economic considerations.

### **Trade Liberalization Strategy**

Historically, Mexico's development strategy was based on import substitution, applying high tariffs, widespread import licensing and quotas, official prices, and restrictions on foreign investment. This strategy reached its limit in 1982 when, as a response to the debt crisis, virtually all imports were subject to license requirements.

Mexico first began to move towards liberalization in 1983, by removing some constraints in its foreign exchange market. The few exchange controls left had no major effect on capital

movements (OECD 1992). In 1984 the government issued a decree stipulating the opening of the domestic market to redress the antiexport bias and the suboptimal investment decisions inherent in the import substitution era (Peres 1990). The actual results were meager; ten different tariff rates remained, and their mean value was just half a point lower than its 1983 level (Zabludovsky 1990). More than 90% of domestic production value was still covered by import licensing.

In 1984 the government began a more flexible application of the 1973 law on foreign investment,<sup>1</sup> seeking a way to promote export-oriented activities, as well as capital and technologically intensive sectors. A year later, with exports of manufactured goods losing their pace, a new trade decree began to open trade on capital goods and intermediate inputs and to reduce import tariffs. By December 1987 official reference prices on imports had been virtually eliminated, import tariffs averaged 11.8%, with 25% of domestic production subject to import licensing, and only five different rates remained. The pace of trade liberalization went beyond the requirements of the World Bank and of the international banking community (Schatán and Moreno 1992). It is important to point out that loans granted to Mexico between 1986 and 1988—over 7 billion dollars—were subject to the implementation of trade liberalization measures.

Mexico continued its trade liberalization strategy. In 1989 the new “Regulations of the Law to Promote Mexican Investment and Regulate Foreign Investment” eased the constraints on a wide number of foreign investment activities. Trust fund mechanisms were introduced to allow foreign entry in reserved sectors, and the number of basic petrochemicals was again reduced in order to authorize foreign investment in their production. By then, approximately 75% of economic activities were open to 100% foreign ownership without previous approval by the government. In 1990 reference prices on imports were eliminated, and only 20% of domestic production was still subject to import licensing. The average tariff rate was low, with a maximum rate of 20%, and remained at similar levels until NAFTA was put into effect in 1994.

The dismantling of trade restrictions was expedient. In 1982 Mexico’s domestic market was highly protected. Eight years later, it probably ranked among the most open economies in the world. Its mean tariff rate was close to that of many industrialized countries, but with a considerably lower maximum level.

During these years, Mexico also modified its role in trade negotiations. In 1981 it had refused to join the General Agreement on Tariffs and Trade (GATT), but five years later it was a full member. It agreed to eliminate export incentives and pledged not to create new ones. In particular, it phased out tax refund certificates, preferential prices for basic petrochemical products and oil, as well as subsidized interest rates for exporters (Schatán and Moreno 1992). By May

---

<sup>1</sup> In 1973 the government issued the “Law to Promote Mexican Investment and Regulate Foreign Investment,” establishing limits on foreign capital on different economic activities.

1994 it had joined the Organization for Economic Cooperation and Development (OECD), and signed the NAFTA treaty with the United States and Canada.

With only a few exceptions, the State's active intervention in industry has disappeared. Most sectoral policy measures and programs have been eliminated. They conditioned fiscal subsidies and import licenses to the fulfillment of requirements associated with local content or trade balance performance. By 1990 only three such programs remained: pharmaceutical, computer, and automotive.

Trade liberalization, deregulation, and privatization have become the core of industrial policy. Few of the traditional instruments used to promote industrial development and manufactured exports remain in force. Tax incentives have decreased, and even those aimed at promoting decentralization have been suspended (United Nations Industrial Development Organization 1994). The only one still in force—the duty drawback system and the temporary import program (*Programa de importación temporal para las exportaciones*)—allows the refund of indirect taxes and the tax-free import of inputs, components, and equipment to be used in the production of export goods. Since 1992 no special export subsidies exist (OECD 1992).

In December 1993, Congress approved a new “Law on Foreign Investment” to adjust Mexico's legal framework to NAFTA. Though it did not modify the list of economic activities reserved for the state, it allowed greater foreign investment in more areas. In addition, it simplified the procedures to authorize foreign investment and reduced the state's discretionary power.

## **2. AUTOMOTIVE POLICY IN MEXICO**

The motor vehicle sector has held a special place in Mexico's industrialization strategy, being one of the very few sectors subject to specific development programs. Formal implementation of these programs has been carried out through “Automotive Decrees,” issued by the presidency, to regulate production, sales, and imports of vehicles and auto parts. These decrees have not always been mutually consistent, and tend to reflect changes in the government's position on industrial policy.

Initially, the decrees were aimed at creating a local automotive manufacturing capacity. By the late seventies, they put emphasis on trade performance. In the second half of the eighties, they began to moderately open the domestic automotive market, especially for auto parts. This process is gaining momentum through NAFTA and the gradual dismantling of trade barriers between Mexico, Canada, and the United States between 1994 and 2003, marking the end of Mexico's trade protectionist policies in the automotive sector.

The various official regulations and the strategies of the automotive companies, in a rapidly changing competitive environment, are transforming Mexico's auto industry—and its role in the motor vehicle global matrix—allegedly making it a most successful case of restructuring.

### **Phase I: Growth by Import Substitution, 1962–1976**

Before the Automotive Decree issued in 1962, Mexico's automotive industry was a mere assembly activity, with less than 20% domestic content, and most vehicles being imported. The decree banned importation of vehicles, of completely knocked-down kits (CKDs), of engines, and of many major auto parts. It set a 60% local value-added requirement on vehicles assembled in Mexico, a 40% limit on foreign ownership of auto parts plants, and severely restricted further vertical integration by terminal companies. Price controls were introduced to contain profit margins and to induce higher productivity.

As it happened, the decree triggered the creation of a local automotive core, with spill over effects in the rest of the economy. By 1970 annual vehicle production was five times higher—250,000 units—and local value-added requirements were met, aided by a tightly protected domestic market. By then, only seven automotive companies remained in the country, with most plants clustered around Mexico City and equipped with outdated machinery. Clearly, international competitiveness was not a concern; locally made vehicles were of poorer quality and entailed higher production costs than their foreign counterparts.

In the early seventies new regulations were introduced to improve trade performance. The Automotive Decree of 1972 allowed lower domestic content in export vehicles, mandating auto companies to export an equivalent of 30% of their imports. These measures had little impact given the outdated production capacity. By 1975 automotive exports amounted to less than 16% of the industry's import bill (ECLAC 1992).

Mexico's balance of payments crisis in 1976 proved that its industry had to urgently gain international competitiveness. The lesson was soon put into practice in the automotive sector.

### **Phase II: Towards International Competitiveness Through Trade Protection and Export Promotion, 1977–1989**

Relying on the leverage given by its vast oil reserves and the favorable prospects for the domestic economy, and taking advantage of the competitive conditions in the automotive world market, Mexico negotiated a new Automotive Decree with the automotive companies in 1977. Its objective was to turn Mexico's auto industry into a competitive exporter, inducing substantial foreign investment.

The decree established strict foreign exchange balancing requirements for the vehicle manufacturers, taking into account all imports—including those carried out by its domestic suppliers—as well as certain capital flows. To protect auto parts manufacturers, value-added requirements were tightened and foreign firms remained excluded from majority ownership. It stipulated that at least 50% of the foreign exchange requirements of terminal firms should come from exports of auto parts domestically produced.

To meet these conditions, automotive companies had to modernize their Mexican plants. This was fully compatible with the objective of American firms to restructure their industrial capacity to face the competition of the small, fuel-efficient, and less expensive Japanese vehicles. In fact, Japanese vehicle manufacturers had been rapidly penetrating the US domestic market, through imports and the establishment of production plants in the United States (the so-called Japanese transplants).

Soon, American companies began to invest millions of dollars in the northern regions of Mexico, building new plants to produce engines. Technology transfer was very significant in this restructuring, and took place mainly through the establishment of these modern plants, embodying up-to-date technologies. Their state-of-the-art equipment and machinery and their distinct labor relations and working conditions made them a striking contrast with the old plants built in the sixties (most of them close to Mexico City).

Workers at the new plants were generally younger, more qualified, and better trained to perform a wide variety of tasks than the work force of the old plants. Labor unions had a much more limited role in the organization of the production process than in the old plants. Their prerogatives in hiring, firing, and relocating workers were substantially cut. In the new plants, promotion and job allocation depended on aptitude tests and no longer on seniority. Earnings and wages were relatively lower in the new plants but still way above the average of the manufacturing industry.

Restructuring did not translate immediately into an improved trade balance; high trade deficits prevailed during the next four years. The appreciating exchange rate, the increasing domestic demand, and the weak external markets all worked against better trade performance. When the Mexican economy collapsed in 1982, the trade deficit of the auto industry surpassed 1 billion dollars.

In September 1983, in a severe economic slump, regulations were modified by the “Decree to Rationalize the Auto Industry.” The decree put more pressure on automotive companies to improve exports. Export promotion was given a higher priority than auto parts manufacturing. Foreign exchange budgets were modified to include royalties, interests, and debt

payments. Lower domestic contents were allowed on production lines to be exported.<sup>2</sup> These new regulations favored greater economies of scale, reducing the number of lines each company was allowed to assemble.

These regulations, the stagnation of domestic demand, the undervalued exchange rate, and the beginning of operations of the new plants quickly brought about a trade surplus for the auto industry. The structure of the industry was transformed in other ways too. The state sold its share in Renault and Vehículos Automotores Mexicanos to foreign firms, marking the end of Mexican capital in the terminal industry.

### **Phase III: The Beginning of Trade Liberalization, 1990–1993**

In December 1989 the Salinas administration issued the “Decree for the Modernization and Promotion of the Auto Industry,” authorizing imports of new vehicles for the first time since 1962. Automotive companies producing in Mexico could import new vehicles, up to 15% of domestic sales in 1991–92, and 20% in 1993, as long as their trade balances were positive. Foreign exchange budgets were substituted by more lax trade compensatory requirements, forcing terminal firms to meet each dollar of automobile imports by 2.5 dollars of exports. This ratio was to decline to US \$2 in 1993, and US \$1.75 in 1994. Companies were allowed to credit 30% of any investment they undertook as well as previous trade surpluses up to a US \$150 million annual limit.

The decree opened up the auto parts market in many significant ways. First, although it set a minimum of 36% of the terminal firm’s domestic value added to be provided by local suppliers of auto parts, it also allowed a virtual exemption on exports. Essentially, the value-added requirement became a function of domestic sales and imports of finished vehicles (Fernández 1994). In addition, it lowered import tariffs on auto parts and components, and eliminated the legal obligation to buy from local manufacturers a number of specific auto parts and components.

That year, Mexican regulations on in-bond plants were modified, allowing them to sell a larger share of their output locally, and thus establish greater linkages with vehicle and auto parts manufacturers in Mexico. Restrictions on the production of different makes and models were lifted.

---

<sup>2</sup> Defined as vehicles sharing the same basic body, drive train, and platform.

#### **Phase IV: NAFTA and the Gradual Liberalization of the Automotive Market**

In January 1994 NAFTA was put in place, with the three nations pledging to eliminate restrictions to North American trade. The motor vehicle sector has a crucial place in this agreement, being the largest trade component between Mexico and both Canada and the United States. In 1992, 65% of United States exports of vehicles and auto parts went to Mexico (US \$6.8 billion) or Canada (US \$23.7 billion) (United States Department of Commerce 1993). NAFTA will fulfill the longstanding goal of the US Big Three (Chrysler, Ford, General Motors) to integrate the North American automotive market. Mexico's market, being the most protected one, will be radically transformed with NAFTA.

Even before NAFTA, the US automotive market was very open to trade with Mexico. Its tariffs were particularly low, averaging 2.5% on automobiles and 3% on auto parts. The exception, the 25% truck tariff—being cut to 10% by NAFTA—is only applied to foreign value added. It is important to point out that even before NAFTA, a vast majority of Mexican auto parts had duty free entry to the United States. Probably the only significant trade barrier in the US automotive market that NAFTA will eliminate concerns the ruling on Corporate Average Fuel Efficiency (CAFE), stipulating separate fuel-efficiency targets for domestic and for imported fleets. Under NAFTA, in ten years, Mexico's motor vehicle production will be subject to the same CAFE targets as US production.

The dismantling of trade barriers comes at a time when Mexico is the only significant automotive market in the OECD and Latin America with expectations of a strong medium-term expansion. The US Department of Labor estimates that in the next decade it will grow 7% per year, soon reaching the size of Canada's automotive market (US Department of Labor 1991). NAFTA will try to ensure that this expansion benefits North American manufacturers. In fact, the three countries pledged to extend any future concession awarded to new entrants to all automotive manufacturers established in the region.

From the first day of 1994, Mexico's regulatory framework for the auto industry has changed. Import duties were cut in half and, most significantly, dismantling of nontariff barriers began. Import tariffs on automobiles and light trucks were immediately cut from 20% to 10%, to be phased out in ten years. In auto parts, it eliminated tariffs on 16% of its fractions, in the next five years on 54% more, and in ten years on the remaining 16%.<sup>3</sup> It is estimated that the average tariff rate in this sector will fall from 14% at the end of 1993, to 10% in 1994, and to less than 3% by 1998.

---

<sup>3</sup> The schedule for the elimination of US tariffs on auto parts is: immediately on 84% of fractions, in five years on 5%, and in ten years the final 11%.

Most restrictions on imports of new cars to Mexico have been canceled or drastically reduced. The trade compensating ratio was slashed to 0.8, from its previous level of 1.75 for automobiles and 1.0 for auto parts, and will be phased out by 2003. Quantitative restraints on imports were abolished too, but in the next ten years only automotive companies manufacturing in Mexico may import vehicles. Regarding used cars, NAFTA bans their import to Mexico for fifteen years, and will fully liberalize it ten years later.

Mexico is scheduled to rule out local content requirements, from 34–36% in 1993 to 29% by 1998, and decreasing to 0% five years later. Moreover, during the first four years, such ratios will be applied to a fraction of incremental output: 65% in the first 4 years, 60% the next three, and 50% the final three, before their elimination in 2004.

According to the National Association of Auto Parts Manufacturers (*Industria Nacional de Autopartes*, or INA), it is likely that in a few years the average local content requirement for vehicles assembled in Mexico will fall to 20%. However, they consider that, despite this progressive reduction, NAFTA temporarily guarantees local manufacturers a share of Mexico's market expansion. Trade protection has been further weakened by NAFTA's allowing assemblers to consider inputs from *maquiladoras* for their domestic content requirements.

NAFTA's rules of origin guarantee major processing within North America. To receive duty-free treatment after the transition period, automobiles and light trucks as well as engines and transmissions must satisfy a 62.5% regional value added content; other vehicles and components, 60%. This local content is calculated on a net-cost basis, and meticulously traced for 69 major auto parts, accounting for close to 80% of the total value of cars and light trucks (US Department of Labor 1991). For other components, 'tariff jumps' in the Harmonized Code of Classification will be used to prove significant manufacturing in the region. New plants will benefit from a five-year grace period, allowing them to have only 50% regional content.

Mexico agreed to end its duty-drawback programs by January 1, 2001. This will affect *maquiladoras*, regular beneficiaries of these programs. Accordingly, constraints on the domestic sale of *maquiladora* output will be canceled in the next seven years.

### **3. STRUCTURE AND COMPETITIVENESS OF THE AUTOMOTIVE INDUSTRY**

The automotive sector has a key place in Mexican industry. By the late eighties, it accounted for 9% of fixed assets, 5% of employment, and generated 12% of value added (Instituto Nacional de Estadística, Geográfica e Informática 1988). Its labor productivity was three times the industrial mean; a result partially explained by its capital intensity, with a capital/labor ratio twice as high as the industrial average.

According to the most recent Industrial Census, in 1988 wages and salaries represented approximately 10% of total costs in automobile and engine manufacturing in Mexico and close to 20% in auto parts manufacturing. Imports represented 42% of the nonlabor costs in vehicle and engine manufacturing, and 24% in auto parts manufacturing. In 1980 these last shares were lower: 34% and 13%. Such reliance on imported inputs has undoubtedly gained importance in the 1990s.

Until 1993 Mexico's automotive industry was increasingly concentrated in a few producers. All passenger car producers are subsidiaries of transnational corporations. However, some Mexican capital is found in other segments.<sup>4</sup> By 1992, only five auto firms remained in the country: Chrysler, Ford, General Motors, Nissan, and Volkswagen (VW). With their 14 plants they have manufacturing facilities that range from foundries to final assembly of vehicles and engines (Secretaría de Comercio y Fomento Industrial 1993b). Together, their annual capacity is above 1.2 million vehicles: Chrysler, 215,000; Ford, 290,000 (42% in its Cuautitlán plant and 58% in Hermosillo); General Motors, 194,000; VW, 309,000; and Nissan, 200,000.<sup>5</sup> Including Ford's recent expansion in Chihuahua, and production in the Renault plant,<sup>6</sup> Mexico now has the capacity to produce more than 2.8 million engines annually (see Table 2).

Mexico's automotive market has been largely dominated by VW and Nissan, which have a combined share of more than 50%, achieved by focusing on small cars in the subcompact segment, at comparatively low prices. Generally VW has been the leader in units sold in the domestic market; in 1992 its share was 31% against Nissan's 24%, Chrysler's 19%, Ford's 15%, and GM's 11%. The relative market positions of the Big Three in the last ten years have been fundamentally the same.

The light-truck industry consists of the five companies mentioned above plus two more: DINA—the only one with Mexican ownership—and Mercedes Benz; both have little participation in this segment. The largest share goes to the Big Three, regularly accounting for more than 75% of the market. In 1992 Chrysler's share was 27%; GM's 23%, and Ford's 20%. Nissan has consistently occupied fourth place, with a presence around 17% since the late eighties, while VW has not exceeded 5% for several years.

The geography of automotive manufacturing in Mexico began to change radically in the late seventies due to substantial investment by the Big Three. Their new, sophisticated engines and vehicle assembly plants in northern Mexico shifted the dynamic center of the auto industry away from Mexico City's metropolitan area. Between 1979 and 1985 seven new plants were

---

<sup>4</sup> See Table 1 for a list of the main firms in different segments of the vehicle market in 1993.

<sup>5</sup> This figure pertains only to Nissan's plant in Aguascalientes, as no data were available for its plant in Cuernavaca.

<sup>6</sup> Renault stopped producing vehicles in Mexico in the mid-eighties, but continued to produce engines in Gomez Palacio (also in northern Mexico), for export.

established, with modern technology and an aggregate annual capacity above 2 million engines, fundamentally geared towards the export markets. Auto parts manufacturing also began to weigh heavier in the north, mainly through a boom in *maquiladoras*.

**TABLE 1**

**Mexico: Main Firms in the Automotive Market  
(By type of product)**

Firms	Cars	Light Trucks	Heavy Trucks	Buses	Engines
Ford	0	0			0
General Motors	0	0			0
Chrysler	0	0			0
Nissan	0	0			0
Volkswagen	0	0			0
Dina			0	0	0
Mercedes Benz			0	0	0
Kenworth			0		
Trailers Monterrey			0		
Mexicana Autobuses				0	
Renault					0
Perkins					0
Cummins					0

Source: Asociación Mexicana de la Industria Automotriz.

**TABLE 2**

**Mexico: Production Capacity for Engine Manufacturing, 1993**

Firms	
<b>Gasoline</b>	
Renault de México	288,000
Nissan Mexicana	468,000
Chrysler de México	474,000
Ford Motor Company <sup>a</sup>	530,880
Volkswagen de México	540,000
General Motors	566,880
<b>Subtotal</b>	<b>2,867,760</b>
<b>Diesel</b>	
MDM	7,500
Cummins	12,000
Motores Perkins	36,000
<b>Subtotal</b>	<b>55,500</b>
<b>Total</b>	<b>2,923,260</b>

Source: Industrial Nacional of Autoparts.

Note: Assuming 2 shifts and the average number of working days per year.

<sup>a</sup> Includes the plant in Chihuahua.

Soon a dual structure in the industry became evident. Plants in central Mexico were equipped with old-fashioned machinery,<sup>7</sup> sold only to the domestic market, while those in the north were equipped with modern technology, fully export oriented. However, this structure has been vanishing as old plants have been closed down or modernized.

Mexico's auto parts industry consists of 500 to 600 companies, 70% of them located in Mexico City's metropolitan area, 20% in Querétaro, Puebla, Jalisco, and Nuevo León, and the rest in eleven different states (Secretaría de Comercio y Fomento Industrial 1993c). Output concentration is high. In 1992 less than thirty firms accounted for 70% of the domestic market (Instituto Mexicano de Ejecutivos de Finanzas 1993), most of them belonging to one of the ten Mexican industrial groups that engage in auto parts manufacturing. For certain auto parts and components there are only one or two local producers in Mexico (Instituto Tecnológico Autónomo de México 1992b).

A common opinion is that, excluding major investments or alliances, no more than 20% of local manufacturers can survive open competition. Fewer than fifty firms have a promising outlook, favored by strong alliances with transnational corporations and by other market power advantages. These firms tend to be large, with preferential access to finance capital—foreign or domestic—as well as solid links with final assemblers. In fact many originated from joint ventures of the assembler and a local manufacturer. We must remember that Mexico's legal framework limits foreign participation in auto parts manufacturing. However, by the late eighties, more than 40% of capital in the Mexican auto parts industry came from abroad, primarily the United States. In addition, in many cases these limitations have been eluded.

As mentioned previously, the motor vehicle industry is an important source of employment. Including auto dealers and *maquiladoras*, it absorbed 217,000 workers in 1982, and more than 500,000 by 1992 with 270,000 in manufacturing, 109,000 in distribution, and 124,000 in the *maquiladoras*. The last category has registered the greatest expansion in the last ten years (see Table 3).

### **Domestic Activity and Foreign Trade Performance (1980–1992)**

After growing at an accelerated rate during the oil boom years, the automotive industry—as well as the rest of the economy—entered a phase of stagnation in 1982, reaching its lowest level in 1986. By then its real GDP stood 32% below its 1981 level, representing 5.1% of GDP in manufacturing value (see Tables 4 and 5). This decline reflected the impact of external shocks on the Mexican economy and of some policies adopted to confront them.

---

<sup>7</sup> From their initial establishment in central Mexico, plants were equipped with outdated technology.



TABLE 4

## Mexico: GDP of Manufacturing and Motor Vehicle Industry, 1980–1992

Year	Billions of pesos, 1980			Annual growth rate	
	Manufacturing industry (1)	Motor vehicle industry (2)	Share % (2/1)	Manufacturing	Motor vehicle
1980	988.90	63.36	6.4	...	...
1981	1,052.66	74.70	7.1	6.45	17.9
1982	1,023.81	59.86	5.8	-2.74	-20.0
1983	943.55	42.73	4.5	-7.84	-28.4
1984	990.86	54.15	5.4	5.01	26.7
1985	1,051.11	67.58	6.4	6.08	24.8
1986	995.85	51.38	5.1	-5.26	-23.9
1987	1,026.14	58.22	5.6	3.04	13.3
1988	1,058.96	74.10	7.0	3.20	27.3
1989	1,135.09	87.94	7.7	7.19	18.7
1990	1,203.92	104.20	8.6	6.06	18.5
1991	1,252.25	127.86	10.2	4.01	22.7
1992 <sup>a</sup>	1,274.59	141.69	11.1	1.78	10.8

Source: SECOFI, Dirección de la Industria Automotriz del Transporte y Control Sectorial, *La Industria Automotriz en Cifras*, August 1993.

<sup>a</sup> Preliminary figures.

TABLE 5

## Mexico: GDP of the Motor Vehicle Industry: Automotive Vehicles and Engines and Autoparts, 1980–1992

Year	Billions of pesos, 1980				Annual growth rate (%)		
	Total (1)	Automotive vehicles (Branch 56) (2)	Engines and autoparts (Branch 57) (3)	Shares (%)		Branch 56	Branch 57
				(2/1)	(3/1)		
1980	63.36	36.85	26.51	58.2	41.8	...	...
1981	74.70	44.62	30.08	59.7	40.2	21.0	13.5
1982	59.86	34.20	25.66	57.1	42.8	-23.4	-14.7
1983	42.73	20.45	22.28	47.8	52.1	-40.3	-13.2
1984	54.15	26.79	27.36	49.4	50.5	31.0	22.9
1985	67.58	34.93	32.65	51.6	48.3	29.9	19.3
1986	51.38	25.43	25.95	49.4	50.5	-27.2	-20.1
1987	58.22	31.69	26.53	54.4	45.5	24.6	2.2
1988	74.10	42.08	32.01	56.7	43.2	32.8	20.7
1989	87.94	51.70	36.24	58.7	41.2	22.9	13.2
1990	104.20	67.43	36.77	64.7	35.3	30.4	1.5
1991	127.86	85.56	42.30	66.9	33.1	26.9	15.0
1992 <sup>a</sup>	141.69	96.42	45.27	68.0	32.0	12.7	7.0

Source: SECOFI, Dirección de la Industria Automotriz del Transporte y Control Sectorial, *La Industria Automotriz en Cifras*, August 1993.

<sup>a</sup> Preliminary figures.



In 1987 the automotive industry began to recover, more rapidly than other areas of manufacturing. By 1992, its GDP was nearly three times its 1986 level, and accounted for 11% of GDP in the manufacturing industry. Preliminary data show that in 1993 the auto industry came to a standstill, with exports barely compensating the collapse in domestic sales affected by the recession in the Mexican economy.

According to National Accounts, trade performance of the motor vehicle industry's two branches has differed. As expected, import penetration<sup>8</sup> is much lower in the vehicle market (see Table 6) than in auto parts where it has grown strongly from around 40% during the first half of the eighties to over 70% thereafter. It is apparent that manufacturing, as a whole, shows increasing import penetration since 1983, reaching 22% in 1991. Information from other sources suggests that this process continued at a lower pace in 1993, given the slow growth in the Mexican economy.

The export performance of these two branches is different. As of 1985, practically no automotive vehicles manufactured in Mexico were exported. Since then the industry's export ratio<sup>9</sup> has increased considerably, from 3% in 1985 to 40% in 1991. Engines and parts showed an increasing export orientation until 1986, but subsequently weakened. Part of this decline may be explained by the recovery of the domestic market, and the slowdown in exports of engines as some plants faced capacity constraints. At any rate, since 1986 the export orientation of the automotive sector is notorious.

The trade balance of the automotive industry registered a deficit of 3 billion dollars in 1981, the peak of the oil boom. Subsequently it reversed this trend, obtaining a modest surplus in 1986–87 (see Table 7).<sup>10</sup> Since then it has registered increasing deficits, reaching 2 billion dollars in 1992—similar to the 1980 figure but much lower as a proportion of the overall trade deficit in manufactured goods. These deficits were caused by the surge in imports, associated with the recovery of economic growth in Mexico and with the opening of the domestic auto parts market. It should be emphasized that the automotive share in manufactured imports declined from 21% in 1987 to 18.6% in 1992. At the same time, its role in manufactured exports increased from 31% to 35%.<sup>11</sup>

The relevance of automotive exports for the Mexican economy, can not be over-emphasized. From 1987 to 1992 manufactured exports increased by 7 billion dollars, and automotive exports by 2.9 billion. Thus, more than 40% of the manufactured exports boom

---

<sup>8</sup> Rate of penetration =  $\text{imports}/(\text{production}-\text{exports}+\text{imports})$ ; measured at 1980 prices.

<sup>9</sup> Export ratio =  $\text{exports}/\text{gross production}$ ; measured at 1980 constant prices.

<sup>10</sup> On the basis of figures at current dollars, provided by Banco de México, including temporary imports but excluding trade by *maquiladoras*.

<sup>11</sup> Reference to manufactured exports in the rest of this section excludes exports of petrochemicals and oil by-products.



originated in the automotive sector. On the other hand, in this same period, manufactured imports rose by 32 billion dollars, while imports of automotive products rose by 5.6 billion—a much lower share (17.5%). Moreover, in the nineties, Ford, GM, and Chrysler's subsidiaries in Mexico rank among the country's greatest exporters just behind *Petróleos Mexicanos* (Expansion, various years).

As mentioned previously, the different segments of the automotive industry had a varied trade performance. In the early eighties, engines were most dynamic in penetrating foreign markets, increasing their share in Mexico's automotive exports from 8% in 1980 to 70% in 1985. From 1986 onwards their growth slowed down, but close to 1.2 billion dollars were still exported in 1991 and 1992 (see Table 8). Vehicle exports became important in the second half of the decade, growing from 8% of automotive exports in 1985 to nearly 60% by 1991 and 1992. Thus, in the last ten years, vehicles and engines have provided around 75% to 80% of Mexico's automotive exports.

In relation to automotive industry imports, the share of assembly materials has increased regularly since the early eighties. It accounted for 80% in 1987 and has remained around 75% in the nineties. Imports of passenger cars and other vehicles are still low, but are expanding strongly (see Table 9).

The number of vehicles produced and those exported reveal the sector's growing export orientation. In 1984, only 4% of vehicles produced went to foreign markets, compared to 36% in 1992. Of the 1.1 million vehicles assembled in Mexico in 1992, 393,000 were exported. So far, Mexico's export orientation is stronger in automobiles. From 1990 to 1992 car exports reached 75% to 80% of production for the domestic market.

Before NAFTA, the vehicle assemblers differed in their interest in exporting from Mexico. VW's exports practically vanished in the eighties due to problems which arose in the US market. Since 1989 they have increased, and in 1992 represented over 20% of domestic sales. Nissan traditionally showed a limited export drive; its few exports were principally to Latin America and only very recently did it start exporting vehicles to Japan. Its exports/production ratio was 30% in 1992. On the other hand, the Big Three have firmly placed Mexico as an export platform to the United States, progressively gearing their Mexican plants toward export purposes. Their vehicle exports amply surpass the number of units assigned to the local market. The export drive is most noticeable in Ford and General Motors, but exports also represent a significant percentage of Chrysler's sales. Together with Nissan, they are the only companies exporting light trucks, and have similar export ratios in this segment (30–40%).



## Indicators of International Competitiveness

To have a clearer perception of the competitiveness of Mexico's automotive industry, we examined its performance in world markets by analyzing the following indicators of Mexico's trade with the OECD:

- i) Penetration (Pi). Share of Mexican exports of product 'i' to the OECD, relative to OECD imports of product 'i':

$$P_i = X_i / M_i^*$$

- ii) Contribution (Ci). Mexican exports of product 'i' to the OECD, as a share of total Mexican exports to the OECD:

$$C_i = X_i / X$$

- iii) OECD share (Si). OECD imports of product 'i' relative to OECD total imports. An increase in 'Si' from one period to another implies that product 'i' was relatively dynamic in OECD demand for foreign products:

$$S_i = M_i^* / M.$$

- iv) Specialization (Ei). Obtained by dividing 'Ci' by 'Si.' Corresponds to the indicator of revealed comparative advantage (see Balassa 1965). Mexico's exporting sector will have relatively more (less) comparative advantage in product 'i' if the indicator 'Ei' is higher (lower) than 1.0:

$$E_i = \frac{X_i/M_i^*}{X/M}$$

Where :  
Xi = Mexican exports of product 'i'  
Mi\* = OECD imports of product 'i'  
X = Total exports from Mexico to the OECD  
M = Total imports of the OECD

Using the CAN data base<sup>12</sup> of the Economic Commission for Latin America and the Caribbean (ECLAC), we estimated these indicators for 1980, 1985, and 1990, for four segments of the automotive industry: engines and engine parts, passenger cars, transport vehicles, and auto parts and components. The results show an improvement in the competitiveness of Mexico's automotive industry (see Table 10). The 'Penetration' coefficient reveals that in all four groups Mexico increased its presence in OECD imports between 1980 and 1990. Engines stand out in this respect; their penetration index grew more than four points, representing 7.8% of OECD imports of such items in 1985, then sliding back to 5.3% by 1990. Mexico's share in OECD imports of automobiles and auto parts grew by more than 1.5 points in this period. Transport vehicles followed a similar course, but did not reach 1% of OECD imports.

---

<sup>12</sup> See ECLAC "Analysis of Competitiveness of Nations: CAN Users Handbook Vol. 1.1," Santiago de Chile, LC/R.1258, March 1993. It must be noted that figures include exports by *maquiladoras*, and that calculations are based on triennial averages, i.e., data reported for 1980 is the average of 1979, 1980, and 1981.

Mexico's export performance is remarkable, with each segment obtaining a greater share in OECD imports during the decade (column 3, Table 10). Imports of automobiles grew relatively fast in the OECD, reaching a share of 5.9% in 1990. Auto parts and engines expanded only in the first part of the decade. The drive in OECD imports of automotive products reflects an adjustment of the global production matrix, resulting in a further displacement of plants from the OECD towards some developing countries, allowing the latter to restructure and strengthen their production capacity.

**TABLE 10**

**Mexico: Export Performance of the Motor Vehicle Industry, 1980–1990**

Concept		Penetration (Pi) (%)	Share of Mexico's export (Ci) (%)	OECD Share (Si) (%)	Special- ization (Ei) (%)
Engines and their parts	1980	0.96	0.59	0.78	0.76
	1985	7.78	4.59	1.07	4.30
	1990	5.29	3.45	1.03	3.34
Automotive vehicles (for passengers)	1980	0.10	0.31	3.85	0.08
	1985	0.27	0.86	5.63	0.15
	1990	1.63	6.04	5.89	1.03
Transport vehicles (for merchandise)	1980	—	—	0.81	—
	1985	0.82	0.53	1.15	0.46
	1990	0.78	0.55	1.12	0.49
Auto parts and components	1980	0.85	1.33	1.96	0.68
	1985	1.73	2.58	2.63	0.98
	1990	2.76	4.30	2.47	1.74

Source: Own calculations based on ECLAC's, "Análisis de la Competitividad de las Naciones," 1993.

The 'contribution' figures found in Table 10, column 2 indicate the automotive industry's expanding role in Mexico's exports from 1980 to 1990. Automobiles experienced the greatest increase in this respect, representing 6% of the total exports by 1990. Engines and auto parts also became more conspicuous in Mexico's exports. Much of the auto parts expansion originated in the success of *maquiladoras*, a great proportion of which was in fact owned by assembler firms. By 1990 the aggregate share of these four items in Mexico's exports was almost 15%.

The 'specialization' indices (column 4, Table 10) show ratios above 1.0 for automobiles, engines and engine parts, and auto parts, thus revealing Mexico's comparative advantage in the production of these goods. Between 1980 and 1990 the 'Ei' indicator for engines went from 0.8

to 3.3; in auto parts from 0.7 to 1.7, and in automobiles from 0.08 to 1.03. However, this evolution coincided with a drastic reduction of the role of oil in Mexican exports.<sup>13</sup>

In the next section we provide more detailed comments on the competitive position of Mexico's automotive products.

## **Selected Aspects of the Competitiveness of the Auto Industry<sup>14</sup>**

### **Engines**

Notwithstanding that the manufacture of automotive engines is a complex industrial activity, Mexico has become an important exporter of engines (Instituto Nacional de Estadística, Geografía e Informática 1994), with annual exports close to 2 million engines. Its advantage stems from investments made by transnational corporations in Mexico to build efficient assembly plants with best-practice technology. Relatively low transport costs and high labor intensity foster Mexico's competitiveness in engine production.

An updated and comprehensive evaluation of the comparative efficiency of Mexican plants is scant. A study of Ford's modern plant in northern Mexico indicated that after fewer than 18 months in operation, productivity in many complex tasks was comparable to that in a US counterpart—producing the same engine (Shaiken 1993). Quality in Mexican plants is internationally recognized. The Nissan plant at Aguascalientes is a world leader in low number of defects per thousand engines, and the GM plant in Toluca has one of the highest quality indexes in the company.

Mexico's plants are capable of placing engines in the United States with better quality and lower costs than many of their US counterparts. Recent estimates indicate that building additional engine manufacturing facilities in Mexico would entail, on average, savings of US \$50 or US \$70 per unit (Automotive News September 1993). Previous estimates from other sources suggest even greater savings (Womack 1991).

### **Vehicle Assembly**

In the last fifteen years, foreign companies in Mexico have established a number of assembly plants of international standing. Export potential was strengthened by regulations linking lower domestic content requirements to greater export orientation. In 1992 Mexico held third place in automobile exports to the United States. Quality of vehicles assembled in Mexico is widely acknowledged, excelling that of many plants in North America, including Japanese

---

<sup>13</sup> Preliminary calculation for 1990, excluding oil exports, also show 'Ei' coefficients greater than 1.0 for automobiles, engines, and auto parts.

<sup>14</sup> This section relies on works by L.E. Arjona 1990; K. Unger 1990, 1991; A. Mercado and T. Taniura 1991; and J.C. Ramírez 1993.

transplants. Some of the Big Three's assembly facilities in Mexico are regularly ranked among those with the highest quality in the United States or Canada. However, they are yet to reach the 200,000 units per year threshold to profit from economies of scale and guarantee stronger international competitiveness.<sup>15</sup>

The Office of Technology Assessment indicates that, on average, labor costs for automobile assembly are five times lower in Mexico than in the United States; but they are counterbalanced by transport and shipping costs—of parts and final output—which are three times higher (Automotive News September 1993). It should be pointed out that, in general, no technology is developed in Mexican automotive plants, but at headquarters.

### **Foundry**

Mexico has several internationally successful steel and aluminum companies. The problems in the aluminum supply have been overcome through imports, mainly from South America.

### **Stamping**

Mexico benefits from certain advantages in the area of stamping, which is highly labor intensive. For example, Mexico enjoys a favorable position in bus manufacturing due to infrequent changes in bus designs. Also, the bus market is not considered big enough to attract powerful international competitors. According to various sources, the bus market in the United States is rather lethargic, long ago surpassed by other means of transportation.

### **Springs**

These are products with widely diffused technology. Their market is limited to certain types of trucks, since shock absorbers have replaced them in other vehicles. In addition, Mexico does not seem to have any major problems—in quality or in price—in supplying steel bars, the main raw material for their manufacture.

### **Glass Products**

Mexico has a definite competitive advantage in the area of tempered glass for vehicles. The basis for this advantage is a successful and strong alliance between Vitro (leader in glass production in Mexico, using best-practice techniques) and Ford. In addition, this product has undergone relatively little technological innovation.

---

<sup>15</sup> See M. Mortimore 1994.

## **Electrical Systems**

Competitiveness of the Mexican industry in electrical systems rests on the high labor intensity of *maquiladoras* (given Mexico's cheap labor costs), the proximity to the US market, and the joint participation of vehicle assemblers and large Mexican firms with access to basic raw materials required in this process.

## **Brakes, Transmissions, and Standard Gears**

Mexican exports of brakes, transmissions, and standard gears, manufactured with highly familiar technology, are oriented to relatively less dynamic markets, in the final stages of the product cycle.

It is important to remember that in 1990 average hourly wages in the automotive industry were US \$2.75 in Mexico, compared to US \$21.93 in the United States, US \$19.23 in Canada, US \$5.73 in Korea, and US \$4.76 in Taiwan. It should not be surprising that Mexico's highest participation in US imports of automotive products is in assembly parts, followed by wires, audio equipment, glass, and batteries. But in areas like electronic equipment and machined parts, associated with more sophisticated technology and higher value added, Mexico's presence in the US market was slight, less than 6%.<sup>16</sup> The list of Mexican auto parts with export values over 3 million dollars in 1992 includes: body parts, axles and transmissions, brakes and their parts, radiators, wheels, standard gears and their parts, steering wheels, springs and leaves, mufflers and exhaust pipes, and bumpers.

An examination of Mexico's relative position as a source of auto parts for the United States indicated that it is the main supplier of components for electrical systems (mainly wire harnesses) and is the second most important supplier of parts for cooling systems, measuring and control instruments, accessories, glass, and seats and parts (see Table 11). Interviews suggest that in the items included in the 'measuring and control instruments' Mexican production is mainly assembly.

It may be useful to summarize our observations on the competitiveness issue by considering two main divisions of Mexican exports.

## **Finished Vehicles and Engines to North America**

The competitive advantage of vehicles and engines manufactured in plants of transnational corporations is based on adequate technology in their manufacturing processes, as well as low labor costs. The origin of this competitive position goes back to the decision by the Big Three to use Mexico as an export platform as "a partial solution to the Japanese challenge in the

---

<sup>16</sup> See United States Department of Labor 1991.

US market, most particularly in the 4-cylinder, front wheel drive small car segment” (Mortimore 1994, p. 80).

In addition, Mexico became a safety net for VW, allowing it to remain as a producer in North America when its venture in the United States went sour. Nissan-Mexico has so far remained detached from the US market. Renault had to rationalize its production capacity in Mexico, leaving the vehicle market and concentrating on manufacturing engines for export purposes.

**TABLE 11**

**Ranking of Selected Countries  
According to Their Share in US Imports of Autoparts and Components  
(Based on figures at current prices)**

System	1991				1992			
	Mexico*	Brazil	Korea	Japan	Mexico*	Brazil	Korea	Japan
Electrical	1	11	7	2	2	11	9	1
Cooling	2	10	5	3	2	10	5	3
Engines and parts	4	5	10	1	4	6	10	1
Transmission and suspension	5	9	11	1	4	9	11	1
Brakes	5	6	10	2	4	5	11	2
Accessories	2	10	8	1	2	10	7	1
Measurement and control equipment	2	10	9	1	2	9	11	1
Stamped parts	3	11	8	1	3	11	7	1
Glasses	2	9	7	3	2	9	7	3
Seats	2	11	8	4	2	11	8	4

Source: Industria Nacional de Autopartes.

\* Including exports by in-bond plants in Mexico.

**Exports of Auto Parts and Components**

The competitive advantage of auto parts and components varies according to three main types of manufacturing plant:

a) *Plants established through joint ventures between an auto assembler and a large Mexican firm belonging to an industrial group.* These exports are generally of the intrafirm type, and their competitive edge partially derives from the privileged market position and access to raw materials by the Mexican firm, as well as certain technological advantage.

b) *Maquiladoras.* Their competitive advantage stems from Mexico’s low labor costs and close access to the US market. A vast majority of *maquiladoras* in the auto parts sector was initially set up by terminal firms. In fact, in the 1980s GM became the company in Mexico’s industry owning the most *maquiladoras*.

c) *Local manufacturing plants not belonging to final assemblers.* Their exports tend to embody widely diffused technology, since they are products in the final stages of their cycle, geared to markets with weak demand. However, the group also includes some sophisticated products, whose competitive advantage is derived from an alliance between a foreign firm providing the technology and a Mexican one guaranteeing market access.

#### **4. NAFTA'S IMPACT ON MEXICO'S AUTOMOTIVE PRODUCTION**

It is still too early to assess the overall impact of NAFTA on Mexico's auto industry. We believe that many of the statements concerning NAFTA have been so politically oriented that it is risky to take them at face value. Remarks made by the Big Three have been greatly influenced by their caution to avoid any negative reaction to NAFTA in the United States.

It is a fact that regional trade will expand enormously. Some estimate that US-Mexico bilateral trade in automotive goods may reach US \$25 billion by 1995, nearly tripling its 1990 level (Hufbauer and Schott 1993). Others expect US exports to Mexico to double between 1994 and 1999 (Berry et al. 1992).

At any rate, it is clear that Nissan and VW must carry out substantial investments in the auto parts sector in Mexico to be able to meet the new competitive conditions and comply with the regional content requirements. Both firms have begun to strengthen their local suppliers, mainly by inducing their international suppliers to set up manufacturing facilities in Mexico, close to their assembly complexes.

Much has been said about new entrants. So far three more companies have begun operations to manufacture vehicles in Mexico: Honda, Mercedes Benz,<sup>17</sup> and BMW. Until now, Mercedes Benz and BMW have only considered small-scale operations—of fewer than 5,000 passenger cars per year—targeted to Mexico's wealthy population. In mid-May 1994 Honda announced an investment of US \$50 million to build an assembly plant of subcompact cars (Accord) in El Salto, Jalisco. An annual output of 15,000 vehicles is estimated for the first phase, increasing to 30,000 in the second phase. In fact, Honda has a significant distribution network in the country—initially established for motorbikes—and is already exporting body parts and bumpers to the United States for the Acura and Civic.

Toyota, too, has stated that it will start producing auto parts in Mexico to supply its plants in the United States. It has also expressed interest in producing vehicles, but such operations have not yet begun. At any rate, high-ranking Toyota executives have had various conversations with Mexican authorities, suggesting that its entry as a producer in Mexico is quite likely.

---

<sup>17</sup> Mercedes Benz has established a significant capacity to manufacture heavy trucks and buses in northern Mexico, becoming a major competitor in these market segments.

There is consensus that the trend is to specialize Mexican plants in the production of small, subcompact vehicles. By meeting sophisticated domestic demand through imports, plants in Mexico will be able to concentrate on fewer models with longer production runs, thus benefiting more from economies of scale. It seems safe to say that, in general, the Big Three will strengthen Mexico's production capacity of small trucks, which will be exported both to the United States and to Latin America.

Competitiveness in auto manufacturing in Mexico also is being fostered by the gradual phasing out of domestic content requirements. As they are being eliminated, terminal firms are allowed to get their supplies from more efficient producers in the region. It is important to mention that this possibility has been increasingly feasible since the late eighties, because of the allowance of lower domestic content requirements on export lines, the elimination of the list of auto parts to be—by law—exclusively supplied by domestic manufacturers, and according to some sources, Mexico's somewhat lax application of rules on local content and trade compensation requirements.

Assemblers have announced investment programs of up to 4 billion dollars in Mexico for the next few years. Nissan, with US \$1 billion, is increasing its capacity to manufacture vehicles for export markets, as well as to build up its supplier matrix. Initially, it will likely import more auto parts from its affiliates in the United States. VW plans to invest a similar amount to duplicate its production capacity and develop new models, also improving its auto parts supply.

Ford is expanding its stamping and assembling facilities as well as its production capacity for motor engines. Ford's director in Mexico has announced plans to relocate its production facilities of compact cars in Europe (Festiva) and in Korea (Fiesta) to Mexico. In turn, production of Thunderbirds and Cougars will be transferred to Lorain, Ohio. In addition, Ford is increasing production capacity of its 'Z' engine in Chihuahua and manufacturing two new models, Mistique and Contour, in the Cuautitlán plant.

Chrysler is beginning production of the Neon and Dodge in its Toluca plant. It is also transferring production of small trucks to its plant in Saltillo. GM is closing its Mexico City plant and inaugurating a new, modern one in Silao, Guanajuato, with estimated initial capacity of 200,000 small trucks per year.

## **5. THE AUTO INDUSTRY'S INTERNATIONAL COMPETITIVENESS**

### **SOME FINAL COMMENTS**

In the last fifteen years Mexico has made definite progress towards establishing an internationally competitive automotive industry. This success is partially explained by automotive policy which, using the leverage given by its favorable market prospects, induced auto companies, beginning with the Big Three, to gradually turn Mexico's plants into significant world competitors. Clearly this development was not due entirely to an imposition upon the transnational corporations by the Mexican government, but resulted from corporations' interests, given the competitive context which then prevailed worldwide, and the Big Three's urgent need to respond to Japanese competition.

In the late seventies, these factors triggered a huge wave of investment to build new plants in the northern region of Mexico, marking the beginning of a new era for its motor vehicle industry. The new plants soon proved to be competitive, manufacturing high-quality engines and placing them in the US market at relatively low costs. Their success paved the way for other ventures in Mexico to manufacture finished vehicles with best-practice technology. It should be recalled that motor-engine production is probably among the most sophisticated tasks in the auto industry (Shaiken 1993).

It must be emphasized that this modernization of Mexico's motor vehicle industry took place in a context marked by an automotive policy that combined trade protection with export requirements. In fact, even though Mexico began to open its economy in 1985, its auto market remained highly protected, subject to regulations on its production, local content, foreign trade, and distribution. Before the December 1989 decree significant barriers on imports of automotive products were firmly in place. The decree eliminated many of these restrictions, and NAFTA will phase out the rest of Mexico's barriers to regional trade.

Trade protection in the auto sector did not impede—perhaps it caused?—the fact that when liberalization gained force in Mexico, motor vehicles and auto engines spearheaded the manufactured exports boom. Today, the Big Three's subsidiaries are among Mexico's greatest exporters, just behind *Petróleos Mexicanos*, the state's oil monopoly. Moreover, Chrysler and GM subsidiaries in Mexico rank among the most profitable operations of these companies in North America (Mortimore 1994).

Export success, however, has unveiled some imbalances that merit attention. First, Mexican plants manufacture too few vehicles to benefit from economies of scale. A second potential problem concerns the surge of imports, reflecting weaker linkages with the rest of Mexico's industry. This is leading to lower value added and weaker job creation.

In addition, just-in-time (JIT) practices have not infiltrated Mexico's auto industry, especially in the auto parts sector. Even in modern plants producing engines and vehicles, operations widely differ from the 'JIT classic case.' Numerous sources within the industry state that, in Mexico, many local manufacturers of auto parts tend to build a warehouse close to the assembler's facilities. This warehouse is supplied in a conventional manner by the auto parts manufacturer, but used as a source of JIT deliveries to the assembler's plant.<sup>18</sup> Evidently, there is ample need for better inventory management and cost reduction.

Lack of competitiveness is an important problem in many firms in Mexico's auto parts sector. In general, Mexico's exports of auto parts are not technologically intensive, tending to base their advantage on low labor costs (i.e. *maquiladoras*), using highly diffused technology in products in the final stages of their cycle, and attacking slow growing markets. Most of the exceptions with best-practice technology originated as joint ventures of assemblers and Mexican firms belonging to powerful industrial groups.

There is much to be done to improve manufacturing of auto parts and components in Mexico. Most of the local firms have difficulties attaining economies of scale, as well as absorbing or developing technology. Even many efficient firms have problems entering the original equipment market, especially if they are small and lack alliances with foreign firms. Preference for inside suppliers, the high costs of laboratory tests, and the price discounts asked for by some assemblers to compensate for what is seen as a risky enterprise, are usually identified as important obstacles.

Not surprisingly, NAFTA endangers the survival of a majority of local manufacturers of auto parts. Many will either close down or be absorbed by foreign competitors. Such fate is a danger even to current exporters of auto parts, whose competitive advantage depends on technology provided by foreign allies. As constraints on foreign ownership are being eliminated, some international companies have already expressed interest in cutting short their alliances with Mexican producers, preferring to attack the Mexican market independently. On the other hand, various local manufacturers are establishing new alliances with world class manufacturers. The trend points to a relative expulsion and downsizing of Mexican capital in the auto parts industry.

Their demise will not necessarily harm the competitiveness of Mexico's auto industry. On the contrary, and according to the extent to which they are substituted by firms producing locally with modern technology, it may have a favorable impact on the Mexican economy as a whole. As transport costs and JIT practices become increasingly important in Mexico's industry, the danger of their replacement by imports is reduced.

---

<sup>18</sup> This situation turned out in the various interviews we concluded among auto parts manufacturers and terminal firms. See Carrillo 1993 for a description of Ford-Mexico's experience in these matters.

Potential problems in the balance of trade cannot be ruled out, especially if we take into account that the industry's trade deficit is being increasingly fueled by imports of finished vehicles. In fact, the sharp increase in imports of auto parts and assembly material is cause for concern. According to various sources, the failure of some assemblers to comply with the local content and trade compensation requirements is partly to blame. Complaints abound in the auto parts sector that sanctions should be drastically enforced.

In any case, there is consensus that NAFTA, by opening the door to a rationalization of the North American auto industry, will solidly carve out Mexico's niche as a world manufacturer of vehicles. It will permit Mexico to specialize—on a global scale—in small, subcompact cars, small trucks, and engines. Thus, it will give an additional boost to an industry that, through a successful combination of import restrictions, export promotion measures, and favorable changes in the world competitive matrix, has been, for the last 15 years, transforming itself into a solid competitor at international levels.

The specialization of Mexico's auto industry in compact cars will be an outstanding achievement, since this segment has very favorable growth perspectives. Whether the Mexican industry again becomes a mere assembly activity with relative low Mexican content is uncertain.

## BIBLIOGRAPHY

- Alberro, J.L. and J. Cambiaso. 1989. "Características del Ajuste de la Economía Mexicana," in ECLAC, *Políticas macroeconómicas y brecha externa: América Latina en los años ochenta*, Santiago de Chile.
- Arjona, L.E. 1990. "La industria mexicana de autopartes durante el auge exportador de los años ochenta" in Carrillo J. (Coord.), *La nueva era de la industria automotriz en México*, El Colegio de la Frontera Norte, Mexico.
- Arteaga, A. (ed.). 1992. *Proceso de trabajo y relaciones laborales en la industria automotriz en Mexico*, Universidad Autónoma Metropolitana, Mexico.
- Asociación Mexicana de Distribuidores de Automóviles, A.C. (AMDA). 1984. *Desarrollo del sector automotriz y sus alternativas*, Comité de Comercialización y Estudios Económicos, Mexico.
- \_\_\_\_\_. 1987. *Cifras. Diez años del sector automotriz en México, (1977-1986)*, Comité de Comercialización y Estudios Económicos, Mexico.
- Asociación Mexicana de la Industria Automotriz, A.C. (AMIA). *Boletín mensual*, various issues, Mexico.
- Automotive News*, various issues.
- Balassa, B. 1965. "Trade Liberalization and Revealed Comparative Advantage," *The Manchester School of Economic and Social Studies*.
- Banco de Comercio Exterior and Secretaría de Comercio y Fomento Industrial. 1987. *Industria de autopartes*, Mexico.
- Berry, S., V. Grilli, and F. Lopez de Silanes. 1992. "The Automobile Industry and the Mexico-US Free Trade Agreement," NBER Working Paper No. 4152. Cambridge.
- Business International Corporation. 1992. *Business Latin America, Special Supplement: NAFTA*, Sept.
- Carrillo, J.V. 1993. *La FORD en México: Restructuración industrial y cambio en las relaciones sociales*, Ph.D diss., El Colegio de Mexico.
- Congress of the United States. 1993. *A Budgetary and Economic Analysis of the North American Free Trade Agreement*, July.
- Desrosiers. 1993. *Automotive Reports* Vol. 7, No. 19 (Oct.), Ontario.
- Dombois, R. 1986. *La producción automotriz y el mercado de trabajo en un país en desarrollo*, International Institute for Comparative Social Research/Labor Policy, Working paper, IIVG/dp-86-216, Berlin.
- ECLAC. 1992. *Reestructuración y desarrollo de la industria automotriz mexicana en los años ochenta: evolución y perspectivas*, Estudios e informes No. 83.
- Expansion. "Las exportadoras mas importantes de Mexico," various years, Mexico.

- Fernández, M. 1994. "Regulaciones en materia automotriz" in ITAM, *Lo negociado del TLC*, McGraw Hill, Mexico.
- Gil-Díaz, F. 1984. "Mexico's Path from Stability to Inflation" in A. Harberger (ed.) *World Economic Growth*, San Francisco, Institute for Contemporary Studies.
- Hufbauer, G. and Schott, J. 1992. *North American Free Trade: Issues and Recommendations*, Institute for International Economics, Washington.
- \_\_\_\_\_. 1993. *NAFTA: An assessment*, Institute for International Economics, Washington.
- Institute of Development Studies. 1993. *Quality and Productivity in Industry: New Strategies in Developing Countries*, Vol. 24, No. 2 (April), University of Sussex, Brighton, U.K.
- Instituto Mexicano de Ejecutivos de Finanzas IMEF. 1993. "La competitividad de la empresa mexicana en la década de los noventa," *Ejecutivos de finanzas*, Año XXII, Special issue.
- Instituto Nacional de Estadística, Geografía e Informática. 1988. *Censo Industrial 1988*, Mexico, D.F.
- \_\_\_\_\_. 1994. *La industria automotriz en México*, Mexico.
- Instituto Tecnológico Autónomo de México. 1992a. *México y el tratado de libre comercio: Impacto sectorial*, McGraw Hill, Mexico.
- \_\_\_\_\_. 1992b. *La tecnología en el sector industrial mexicano* (May), Mexico.
- International Monetary Fund. 1993. *Survey*, August.
- Karmokolias, Y. 1990. *Automotive Industry Trends and Prospects for Investment in Developing Countries*, International Finance Corporation, Discussion Paper No. 7.
- Kiguel, M. and N. Liviatan. 1992. "The Business Cycle Associated with Exchange Rate-Based Stabilizations," *World Bank Economic Review* Vol. 6, No. 2 (May).
- Mercado, A. and T. Taniura. 1991. "Las exportaciones automovilísticas de México: Factores favorables, obstáculos y necesidades de política," *Comercio Exterior*, Vol. 41, No. 9 (Sept.).
- Mexican Investment Board. 1991. *Mexico: Your Partner for Growth*, Mexico.
- Moreno-Brid, J.C. 1988. *The Automotive Industry in Mexico in the Eighties*, Working Paper No. 22, World Employment Programme, ILO, Geneva.
- \_\_\_\_\_. 1992. "Structural Change in Mexico's Motor Vehicle Industry (1977-1989)" in G. Van Liemt *Industry on the Move*, International Labour Office, Geneva.
- \_\_\_\_\_. 1994. "La competitividad de la industria automotriz en México," study prepared for ECLAC and the Office of Economic Advisers of the President of Mexico, forthcoming.
- Mortimore, M. 1994. "Transforming Sitting Ducks into Flying Geese: The Example of the Mexican Automobile Industry," mimeo (April).
- OECD. 1992. *Mexico*, OECD Economic Surveys, Paris.
- Peres, W. 1990. "From Globalization to Regionalization: The Mexican Case," *Technical Papers* No. 24, OECD Development Centre, August.

- Ramírez, J.C. 1993. "Recent Transformations in the Mexican Motor Industry," *IDS Bulletin* Vol. 24, No. 2 (April).
- Rubli, K. and B. Solís, (Eds). 1992. *México hacia la globalización*, Diana, Mexico.
- Schatán, C., and J.C. Moreno Brid. 1992. "Trade Liberalization Policy in Mexico," paper presented at the Seminar "Trade Liberalization in Colombia," Institute of Foreign Trade, Bogota, Colombia (August).
- Secretaría de Comercio y Fomento Industrial. 1983. *Decreto para la racionalización de la industria automotriz*, Diario Oficial No. 11, 3–11 (15 Sept.), Mexico.
- \_\_\_\_\_. 1989. *Decreto para el fomento y modernización de la industria automotriz*, Diario Oficial (11 December), Mexico.
- \_\_\_\_\_. 1990. *Acuerdo que determina las reglas para la aplicación del decreto para el fomento y modernización de la industria automotriz*, Diario Oficial (Nov.), Mexico.
- \_\_\_\_\_. 1990. *Acuerdo que establece reglas de aplicación del decreto para el fomento y modernización de la industria manufacturera de vehículos de autotransporte*, Diario Oficial (30 Nov.), Mexico.
- \_\_\_\_\_. 1990. *Decreto por el que se reforma y adiciona el relativo al fomento y modernización de la industria automotriz*, Diario Oficial (8 June), Mexico.
- \_\_\_\_\_. 1993a. *Tratado de libre comercio de América del Norte*, Volumes I y II, Talleres Gráficos de la Nación, Mexico.
- \_\_\_\_\_. 1993b. "Diagnóstico sobre la industria automotriz," *Comisión de Seguimiento y Evaluación del Pacto para la Estabilidad, la Competitividad y el Empleo*, Mexico.
- \_\_\_\_\_. 1993c. *Perfil y perspectivas para la industria automotriz mexicana*, Mexico.
- Secretaría de Hacienda y Crédito Público. 1994. *El Proceso de Desincorporación de Empresas Paraestatales*. Mexico, D.F.
- Secretaría de Patrimonio y Fomento Industrial. 1977. *Decreto para el fomento de la industria automotriz*, Diario Oficial No. 35, 2–7, (20 June), Mexico.
- Shaiken, H. 1993. *The Mexican Automobile Industry, Dimensions of Change*, Universidad de Berkeley, mimeo.
- Shaiken, H. and S. Herzenberg. 1989. *Automatización y producción global. Producción de motores de automóvil en México, Estados Unidos y Canadá*, Facultad de Economía, UNAM, Mexico.
- Suárez, J.L. 1993. La implantación de la manufactura esbelta en la industria de autopartes en México, B.A. Diss. U. Iberoamericana, Mexico.
- Taniura, T., C. Schatán and J. Máttar. 1988. *Intra-Industry and Intra-Firm Trade between México and the United States: The Auto Parts, Electronics, and Secondary Petrochemical Industries*, Joint Research Programme Series No. 97, Institute of Developing Economies, Japan
- Unger, K. 1990. *Las exportaciones mexicanas ante la reestructuración industrial internacional. La evidencia de las industrias química y automotriz*, El Colegio de Mexico and FCE, Mexico.

- \_\_\_\_\_. 1991. "The Automotive Industry: Technological Change and Sourcing from Mexico," *North American Review of Economics and Finance* 2(2).
- United Nations Organization for Industrial Development. 1994. Mexico, unpublished.
- United States Department of Commerce. 1993. "NAFTA Opportunities: Motor Vehicles and Auto Parts," mimeo.
- United States Department of Labor. 1991. The North American Auto Industry at the Onset of Continental Free Trade Negotiations, Economic Discussion Paper No. 38.
- United States International Trade Commission. 1991. *The Likely Impact on the United States of a Free Trade Agreement with Mexico*, USITC publication 2353, Washington, Feb.
- Urquidi, V., F. Giner, A. Mercado, T. Taniura. 1988. *Export Promotion Manufactures in Mexico*, Joint Research Programme Series No. 71, Institute of Developing Economies, Japan.
- Ward. 1992. *Automotive Yearbook*, EUA.
- Womack, J. et al. 1990. *La máquina que cambió al mundo*, McGraw Hill.
- \_\_\_\_\_. 1991. *A Positive Sum Solution: Free Trade in the North American Motor Vehicle Sector*, Business Mexico (Nov.).
- Zabludovsky, J. 1990. "Trade Liberalization and Macroeconomic Adjustment" in D.S. Brothers and A.E. Wick, eds., *Mexico's Search for a New Development Strategy*, Westview Press.
- Zapata F., T. Hoshino and L. Hanono. 1990. *Industrial Restructuring in Mexico: The Case of Auto Parts*, Joint Research Programme Series No. 84, Institute of Developing Economies, Japan.

**TABLE 3**

**Mexico: Employment in the Motor Vehicle Industry, 1983–1992**

Year	Total Thousands	Automotive vehicles		Autoparts and components		Distribution		In-bond plants	
		Thousands	Share (%) <sup>a</sup>	Thousands	Share (%) <sup>a</sup>	Thousands	Share (%) <sup>a</sup>	Thousands	Share (%) <sup>a</sup>
1983	216.8	46.8	21.6	105.4	48.6	44.6	20.6	20.0	9.2
1984	259.7	54.9	21.1	108.8	41.9	63.0	24.3	33.0	12.7
1985	279.6	53.6	19.2	117.9	42.2	65.1	23.3	43.0	15.4
1986	262.8	49.8	18.9	116.8	44.4	43.2	16.4	53.0	20.2
1987	287.7	50.9	17.7	121.9	42.4	51.9	18.0	63.0	21.9
1988	335.8	51.9	15.5	141.1	42.0	59.8	17.8	83.0	24.7
1989	386.9	52.4	13.5	155.2	40.1	89.3	23.1	90.0	23.3
1990	420.4	52.7	12.5	173.6	41.3	105.0	25.0	89.1	21.2
1991	470.0	68.8	14.6	184.2	39.2	105.0	22.3	112.0	23.8
1992	506.9	72.0	14.2	201.5	39.9	109.0	21.5	124.4	24.6

Source: SECOFI, Dirección de la Industria Automotriz del Transporte y Control Sectorial, *La Industria Automotriz en Cifras*, August 1993.

<sup>a</sup> Relative to Total (column 1).

**TABLE 6**

**Motor Vehicle Industry: Import Penetration and Export Ratio, Mexico, 1980–1991**

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Import penetration (%) <sup>a</sup>												
Branch 56	8.3	7.6	4.3	5.4	2.8	3.2	4.0	4.5	5.3	3.3	6.1	4.5
Branch 57	43.	43.	40.	46.4	42.	40.	87.3	75.9	73.4	69.1	75.5	71.0
Manufacturing Industry	9	5	7	10.1	7	1	15.1	15.0	16.5	18.8	20.9	22.2
	14.	15.	12.		10.	11.						
	9	2	5		3	3						
Export ratio (%) <sup>b</sup>												
Branch 56	2.4	1.5	1.9	7.1	5.2	3.1	22.9	47.4	33.0	32.2	37.8	40.8
Branch 57	6.8	4.8	15.	51.2	65.	46.	79.1	43.7	41.9	30.7	29.4	18.8
Manufacturing industry	3.3	2.8	3	7.5	0	6	11.3	12.2	10.7	10.2	10.3	10.0
			4.0		7.5	6.3						

Source: INEGI.

<sup>a</sup> Import penetration = Imports/(production + imports - exports).

<sup>b</sup> Export ratio = exports/production.

Branch 56 = Automotive vehicles.

Branch 57 = Engines and autoparts.

**TABLE 7**

**Mexico: Trade Balance of the Motor Vehicle Industry, 1980–1992**  
(Millions, US dollars)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	Net value 1987-1992
<b>Manufacturing (non-oil)</b>														
Trade balance	-13,088	-17,889	-9,835	-1,988	-3,569	-6,396		-1,183	-5,505	-9,075	-13,476	-18,153	-26,169	
Exports	3,030	3,360	3,018	4,583	5,595	4,978	-3,137	9,746	11,504	12,607	13,955	15,769	16,740	16,740
Imports	16,118	21,250	12,853	6,571	9,164	11,374	7,242 10,379	10,928	17,009	21,682	27,431	33,922	42,910	33,922
<b>Motor vehicle industry</b>														
Trade balance	-1,916	-3,137	-1,330	-139	-160	-839	297	691	-14	-380	-604	-1,114	-2,034	
Exports	404	378	483	981	1,493	1,476	2,291	3,043	3,311	3,585	4,625	5,383	5,938	5,938
Imports	2,320	3,515	1,813	1,120	1,653	2,315	1,994	2,351	3,325	3,966	5,230	6,497	7,972	7,972
<b>Share of motor vehicle in manufacturing (%)</b>														
Trade balance	14.6	17.5	13.5	7.0	4.5	13.1	-9.5	-58.5	0.3	4.2	4.5	6.1	7.8	
Exports	13.3	11.2	16.0	21.4	26.7	29.7	31.6	31.2	28.8	28.4	33.1	34.1	35.5	35.5
Imports	14.4	16.5	14.1	17.0	18.0	20.4	19.2	21.5	19.6	18.3	19.1	19.2	18.6	18.6

Source: Bank of Mexico, various years.

<sup>a</sup> Motor Vehicle exports (1987–92)/Manufacturing exports (1987–92); %.

<sup>b</sup> Motor Vehicle imports (1987–92)/Manufacturing imports (1987–92); %.

**TABLE 8**

**Motor Vehicle Industry, Exports  
(Millions US dollars)**

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Manufacturing (non-oil)	3,030.1	3,360.5	3,017.5	4,582.7	5,594.8	4,978.0	7,242.3	9,745.6	11,504.0	12,607.5	13,955.4	15,768.7	16,740.4
Motor vehicle industry	404.1	377.8	483.0	981.3	1,492.9	1,476.1	2,290.7	3,042.7	3,311.1	3,585.4	4,625.3	5,383.2	5,938.0
Passenger cars	98.5	70.0	66.9	109.7	119.1	116.4	657.0	1,243.1	1,416.1	1,641.9	2,491.5	3,360.5	3,378.0
Transport vehicles	30.1	39.4	14.3	14.5	26.7	24.3	29.3	23.5	37.1	32.6	39.0	169.9	588.3
Chassis	1.0	1.5	0.4	0.1	0.0	0.1	0.1	0.4	8.6	17.5	31.6	44.9	81.0
Engines	32.7	61.5	214.1	602.7	982.7	1,039.2	1,219.2	1,222.3	1,248.5	1,335.9	1,503.0	1,191.4	1,202.3
Springs and leaves	13.7	18.4	28.5	33.9	47.2	6.3	10.7	45.8	49.3	53.1	46.2	56.4	59.2
Spare parts for vehicles	207.7	165.0	131.4	179.8	270.2	240.4	293.3	409.0	453.7	396.7	416.7	455.0	470.5
Parts and components for engines	20.3	21.8	27.4	40.6	46.8	49.1	80.8	98.4	97.8	107.6	97.3	105.0	158.6

Source: Banco de México.

**TABLE 9**

**Motor Vehicle Industry: Imports  
(Millions, US dollars)**

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Manufacturing (non-oil)	16,117.9	21,249.5	12,853.0	6,570.6	9,164.1	11,373.7	10,379.2	10,928.4	17,009.5	21,682.3	27,431.0	33,921.9	42,909.8
Manufacturing industry	2,320.0	3,514.5	1,812.7	1,119.9	1,652.6	2,314.7	1,993.5	2,351.3	3,325.4	3,965.9	5,229.6	6,496.9	7,971.7
Passenger cars	279.0	330.8	152.0	25.1	73.0	80.1	62.6	88.0	132.4	131.3	338.0	329.1	504.9
Trucks	153.2	194.5	64.0	8.3	24.4	55.3	28.5	34.1	93.3	30.4	45.9	56.1	58.5
Chassis	1.3	6.7	1.6	0.3	0.3	0.5	0.7	1.1	1.9	1.3	2.1	2.9	24.8
Assembly material	1,303.7	2,010.9	1,182.6	674.2	1,177.9	1,649.9	1,497.1	1,898.3	2,354.3	2,978.0	4,009.4	5,024.0	6,007.1
Engines and their parts	147.2	177.0	109.2	65.5	111.9	145.9	112.7	102.7	148.0	170.9	177.6	250.5	339.2
Spare parts	412.9	552.4	296.1	99.2	210.0	288.6	239.3	179.9	555.2	639.7	632.5	818.8	996.3
Other	22.6	242.0	7.1	247.1	55.0	94.2	52.5	46.4	40.2	14.2	24.0	15.2	40.8

Source: Banco de México.