

**COMPETING IN A LEAN WORLD:
HOW THE AUTO PARTS INDUSTRIES IN CANADA AND MEXICO ARE
RESPONDING TO THE PRESSURES OF FREE TRADE AND LEAN PRODUCTION**

BY

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Abstract

Much of the literature on free trade in North America as dealt with two issues: first, the details of the Canada-US Free Trade Agreement (CAFTA) and the North American Free Trade Agreement (NAFTA) and the processes through which they were negotiated, and second, their likely microeconomic, macroeconomic and social impacts. Similarly, work on the shift from mass production to lean production has dealt with the components of lean production and how firms are affected by the shift to just-in-time production, zero defect quality, simultaneous engineering, etc. A less studied topic has been how North American firms and industries will respond, and are responding, to the opportunities and threats represented by free trade. Similarly, little work has been done on how firms in North America are responding to the pressures and opportunities of lean production. What work has been done tends to focus on US multinationals, such as the Big Three auto assemblers, firms that already are diversified into the three NAFTA countries. Our work shifts this focus to look at auto parts suppliers -- firms who sell to the Big Three -- in Canada and Mexico. These firms tend to be smaller firms, domestic rather than foreign owned, and less engaged in trade or investment outside of their own country. As such, these firms face different opportunities and threats from regional integration than do US multinationals. In addition, auto parts suppliers tend to be reactive to the pressures, rather than initiators, of lean production techniques, as they respond to demands placed on them by downstream auto assemblers. Therefore this paper attempts to examine firm responses to the pressures of the 1990s (free trade and lean production) through a nontraditional lens; that is, not through the lens of the responses of veteran multinationals such as the Big Three US auto multinationals, but through the lens of the responses of their upstream smaller suppliers, in the host countries, Canada and Mexico.

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INTRODUCTION

The purpose of this paper is to develop a framework for analyzing how firms in the automotive parts industries in Canada and Mexico are adjusting to the North American Free Trade Agreement (NAFTA) and the implementation of lean manufacturing techniques such as just-in-time delivery, simultaneous engineering and total quality (lean production).

Most of the studies of North American free trade have focused on the impact of free trade on large firms, in particular, on multinationals. Even in the auto industry, most of the work has looked at the auto assemblers, primarily the Big Three US multinationals: Ford, Chrysler and GM. Less attention has been paid to the auto parts sector, which itself is comprised of a range of firms, small and large, domestic and (national or foreign owned) multinational. In addition, much of the research in this area has focused on the United States where the bulk of the auto parts and assemblers are located. In this study, we take a less studied route.

We focus on the auto parts segment of the North American auto industry; more specifically on the two “spoke” economies: Canada and Mexico.¹ Since the parts sectors in Canada and Mexico are mainly comprised of small and medium sized enterprises (SMEs), our study focuses on the impact of free trade on both SMEs and multinational enterprises (MNEs). We can therefore compare the impacts of NAFTA on Canadian and Mexican firms, and between SMEs and MNEs.

Adjustment to free trade is not the only challenge facing the auto parts producers in Canada and Mexico. For at least a decade, the auto assemblers have been engaged in a transition from mass production to lean production.² This transition has placed increasing pressure on the parts producers, such as just-in-time production and delivery, zero defect quality, tiering of suppliers, and the development of in-house design capability.

These pressures -- free trade and lean production -- are affecting the competitiveness of both Canadian and Mexican parts suppliers. NAFTA was designed to integrate the Mexican auto industry into the already integrated Canada-US industry. In general, policy makers expected the auto assemblers to make the transition more easily than parts producers, and foreign (especially US) owned parts suppliers to make the transition more easily than domestic firms. Domestic Mexican parts suppliers were expected to have the highest costs of adjustment, both because they were the most insulated and least competitive, but also because Mexico had higher tariffs and nontariff barriers to dismantle.

At the same time, analysts of lean production (e.g. Womack 1990) have suggested increasing demands are being placed on both groups of auto parts suppliers by the downstream assemblers. The Big Three, in their desire to stop the penetration of the North American auto market by Asian imports and transplant production, are demanding suppliers move physically closer to assembly plants, take on more of the technology and design functions, form themselves into pyramid relationships (first, second and third tier suppliers), adopt Japanese production techniques (just-in-time, simultaneous engineering), and meet new quality standards (ISO 9000).

Two years into NAFTA, it is useful to step back and see how the integration of the North American auto industry is proceeding. How is NAFTA affecting the auto parts suppliers? How are the suppliers adjusting to the increasing demands of lean production?

The paper is structured as follows. First, we briefly compare and contrast the auto parts industries in Canada and Mexico. We then review the literature, both theoretical and empirical, on how firms in North America are responding to free trade and lean production. We develop a series of research questions and hypotheses about the responses of Canadian and Mexican auto parts producers that will be explored through a survey of plant managers in the two countries. Lastly, we provide some evidence, drawn from statistical and secondary sources, on these responses.

AN OVERVIEW OF THE AUTO PARTS INDUSTRIES IN CANADA AND MEXICO

We first provide a “thumbnail” sketch of the auto parts industries in the two countries. These sketches are useful in suggesting hypotheses about how the two industries are likely to respond to the pressures of NAFTA and lean production because they show *position*; i.e. the competitiveness of the industries prior to their being forced to “compete in a lean world”.

An Overview of the Canadian Auto Parts Industry

The Regulatory Environment

The key regulatory measure influencing the structure of the Canadian auto parts industry has been the 1965 Canada-US Automotive Pact. The Auto Pact, which was a sectoral free trade agreement, facilitated duty-free Canada-U.S. trade in parts and vehicles for qualified producers. The result was that the Big Three allocated the assembly of specific vehicle models to particular plants in each country. Canadian parts producers have reaped significant benefits over the last decade from the Auto Pact production-to-sales safeguards and Canadian value added (CVA) requirements that generate incentives for assemblers to source production in Canada. For parts producers what was critical was the CVA requirement which generated incentives for assemblers to source in Canada.

The thumbnail sketch of the current situation of the Canadian parts industry clearly suggests that as NAFTA is being implemented, the industry is reasonably robust.

Industry Structure and Competitiveness

Four categories of firms comprise the Canadian automotive parts industry: the in-house producers owned by the Big Three; a small number of Canadian-based multinational firms; foreign, primarily U.S.-owned companies; and a large number of small and medium-sized, Canadian owned firms. Chrysler has 3 in-house parts facilities in Canada, Ford, 8, and General Motors, 8; all 19 of these plants are located in Ontario. The major Canadian-owned parts producers are A.G. Simpson (6 plants in Canada and 2 in the United States), the ABC Group (18 plants in Canada, 5 in the U.S., 1 in Mexico and 3 overseas), Magna International (whose 4 Canadian-based divisions comprise 37 Canadian, 14 U.S. and 1 overseas plants), and Woodbridge Foam (9 plants in Canada, 17 in the U.S., 2 in Mexico and 3 overseas). Among the larger foreign-owned parts companies are Hayes-Dana (4 divisions with 8 locations), Lear Seating (5 plants and 1 joint venture), and TRW (3 divisions and 7 plants). Whatever their ownership, overwhelmingly the province of Ontario is the location of choice for Canadian auto parts plants whatever their ownership or size. The reason is proximity to the assemblers, all but two of which are in Ontario. (FN: GM has one assembly plant in Quebec and Volvo's facility is in Nova Scotia.)

Over the last few years Canadian parts producers have continued to capture an important part of the Canada-US parts market, indeed taking some market share from their US competitors

(Desrosiers 1995:3). Canadian-based original equipment parts manufacturers have benefited from the rapid growth in Canadian vehicle production. Canadian parts firms have a reputation for being low cost manufacturers because of subsidized health care and the value of the Canadian dollar. Parts producers are continuing to invest in new machinery and equipment designed to reduce costs and create the in-factory capacity for growth to the end of the decade (Desrosiers 1995 :3). The recent success of the Canadian parts industry is also due to the high skill level of the Canadian work force, which reflects a focus on training.³

As Table 1 illustrates the Canadian auto parts industry in Canada has recovered from the recession of the early 1990s. Over the last 3 years, the value of parts production has risen to new highs, employment in the industry is moving back to its pre-recession levels and there has been significant investment in new machinery and equipment. These capital expenditures have been undertaken to further reduce production costs and to provide the in-factory basis for growth to the end of the decade (Desrosiers 1995:1)

Table 1: Auto Parts Manufacturers in Canada, 1988-95

Year	Production \$billions	Employment (000s)	New Capital Expenditures \$Millions
1988	14.5	87.4	646.3
1989	15.4	90.1	589.6
1990	13.9	84.8	421.0
1991	12.7	72.5	402.2
1992	14.1	70.3	588.3
1993	16.3	75.6	679.5
1994	18.3	81.5	1790.4
1995 (est)	21.7	88.6	1576.0

Source: Desrosiers (1995:1)

Sales by Canadian parts producers in 1993 increased 17 % from their 1992 levels and are expected to rise by another 9 % in 1994 (Pritchard 1993a: B1). The percentage of total North American original equipment parts accounted for by Canadian parts producers has risen over the last decade, from 7.8 % to 11-12 % (Desrosiers 1994: 3). The Canadian parts sector is enjoying the benefits of both the growth in overall vehicle production in North America as well as location of a healthy segment of this production in Canada. It is also benefiting from General Motors' decision to produce fewer of its own components. A large number of Canadian parts suppliers have won contracts from GM.⁴ The Canadian parts sector is growing despite some downturn in demand in the US and Canadian auto markets (Heinrich 1996: 5). More growth is anticipated as a result of decisions by the vehicle assemblers to expand capacity in Ontario. As a result of new efficiencies,

cost advantages from the Canadian health care system and the lower Canadian dollar, Canadian suppliers have been winning business away from their American competitors.

Canadian parts producers have become much more efficient in recent years. The parts industry added some 10,000 jobs during 1993, for a total of 81,000. Although this number is well below the peak of 97,000 employed in 1989,⁵ the value of output per worker reflects an improvement in productivity of 30 % (Pritchard 1993a: B1). Some 50 Canadian parts firms have closed in the last few years, many of them US-based companies that consolidated their operations in the United States. However, the shakeout is seen now as being largely complete (Fowlie 1993b: 4).

Investment in the parts sector has averaged over \$900 million annually since 1985 (Desrosiers 1994: 1). As a result of new efficiencies, cost advantages from the Canadian health care system, and the lower Canadian dollar⁶, Canadian suppliers, have been winning business away from their US competitors.⁷ That the North American auto sector purchases much of its tools, dies and molds from the Canadian parts sector is evidence of the level of skill that now exists in this industry.

Despite weak vehicle demand, particularly during the latter part of 1995, the Canadian motor vehicle industry ended the year with higher value shipments of vehicles than any previous year in the decade. As Table 1 demonstrated, the value of parts and accessories shipped by Canadian parts producers also reached a new high.

Thus the Canadian auto parts sector appears to be adjusting well to the pressures of NAFTA and lean production. The same cannot be said for the Mexican auto parts industry.

An Overview of the Mexican Auto Parts Industry

The Regulatory Environment

Mexico had a thirty-two year history of regulation of the auto parts industry before NAFTA was implemented in 1994. The import-substitution cum export-promotion rules were the instruments the Mexican government used to create a viable auto industry which would become their second most important industry after petroleum. However, in the wake these rules came production inefficiencies plague the Mexican auto parts industry even today. As trade and investment restrictions are rolled back by NAFTA, Mexican auto parts suppliers must fight to maintain relationships which auto assemblers that were once forced by protectionism (Piquini).

In 1962, the first Auto Decree prohibited the import of CKD and SKD kits for cars, engines and other main vehicle components. Assemblers were required by the Decree to have 60% of their components sourced from Mexican suppliers. The resulting growth of indigenous parts production was, however, not sufficient for parts producers to achieve minimum efficient scale. Mexican parts suppliers, therefore, were found to have higher costs of production than their foreign rivals.

The Auto Decree of 1972 reduced the local content rule to 30% only for those vehicles that were produced for export. While continuing to support the interests of local parts suppliers, a second objective of the Mexican government was to stem the decline of the worsening trade balance in auto parts. While this Decree liberalized ownership rules so that foreign companies could own up to 40% of local suppliers, it forbade the production of parts that competed directly with production of indigenous suppliers by foreign companies. As joint ventures between Mexican and foreign companies increased, so did the capabilities of selected local suppliers.

With the purpose of increasing the sourcing of engines in Mexico, the Auto Decree of 1977 tightened the local content rules. By 1983, Mexico was exporting 700,000 engines, double the

number of units exported in 1972. The 1983 Auto Decree eased the content rules of the 1970s by halving the content requirement if 80% of production was destined for export. Again, the Mexican government tried to achieve dual purposes with their trade and investment regulations: increase the production capabilities of local suppliers, and maintain a trade surplus in auto parts. By 1989, engine exports reached 1.5 million units.

The 1989 Auto Decree was the first step toward liberalization of the Mexican auto industry. Local content was significantly reduced to 36%. In 1992, the Mexican Investment Board also liberalized their ownership rules so that foreign companies could own 100% of a local facility.

Industry Structure and Competitiveness

In 1994 there were approximately 600 auto parts suppliers in Mexico, of which 170 were wholly owned subsidiaries of foreign-based companies (Piquini). The majority of the foreign subsidiaries were owned by the U.S. Big Three. The remaining 430 companies (from here on be referred to as "Mexican suppliers") were either wholly indigenous or partly owned by foreign assemblers of suppliers. Of the twenty-five largest [FOOTNOTE: See Automotive News, March 13, 1995, page 20. Companies were ranked by total number of employees in Mexico.] auto parts suppliers in Mexico, only four are headquartered in Mexico: UNIK, Rassini, Proeza and Nemak. All four companies belong to industrial groups in Mexico, which endow them with the financial and intellectual capital necessary to be considered world class producers. Of the 125 member companies of Industria Nacional de Autopartes (INA, the Mexican auto parts association), 100 were part of 13 industrial groups. These conglomerates typically have strategic alliances with foreign companies whereby they gain access to process technology.

Technologically, the Mexican auto parts industry is severely lacking in world-class machinery and know-how. More than 60% of product technology in this industry is more than six years old, and 80% of process technology is 10 years old or older (Husbands 1995b). In fact, Mexican suppliers are typically not depended upon for co-development of parts with the assemblers. In 1992 only 25% of technological innovation utilized by Mexican auto suppliers was generated by Mexican companies. Of the foreign sources of technology, the U.S. provided 63%. Mexican suppliers also procured technology from Germany (17%), Japan (6%) and the U.K. (4%).

Strategic alliances and licensing agreements were utilized extensively by Mexican suppliers to procure new process technology. While NAFTA has increased the desire of Mexican suppliers to create technology linkages with foreign suppliers and assemblers, the foreign companies have grown increasingly reluctant to engage in such alliances (Husbands 1995b). The motivation for assemblers to develop local suppliers has diminished with the weakening of local content rules.

Capacity utilization is relatively low for Mexican auto suppliers. In 1992, overall capacity utilization in auto parts was 72.2%, up from 71.5% in 1991. But in anticipation of increased orders under NAFTA, over 100 of INA's members planned to invest \$4.22 billion over the period 1993 to 1996. This investment was targeted at expanding their installed capacity by 50% and their sales by 25.4% (Scheinman). Any short-fall in demand would therefore leave large portions of the supplier's plants idle, or even force the closure of the weaker suppliers. In 1994, \$2.4 billion was invested in vehicle assembly and auto parts in Mexico, one-third of which was directed at the auto parts sector.

In 1992, Mexican suppliers sold 69.6% of their output to auto assemblers and 20% to aftermarket distributors. The remaining 10.4% of production was exported (INA). The United States was Mexico's biggest trading partner in auto parts (see Table 2 below). Sixty-six % of

Mexico's exports were purchased by assemblers and distributors in the U.S., while 65% of auto parts imported into Mexico originate in the U.S. Although Canada was an insignificant supplier of auto parts to Mexico, Canada was the third most important recipient of Mexican auto parts in 1992 .

Table 2: Mexican Auto Parts Exports and Imports, by Country--1992

Country	Exports	Country	Imports
United States	66%	United States	65%
France	10%	Japan	8%
Canada	9%	Germany	7%
Germany	8%	France	5%
Other	5%	Other	5%
Japan	1%	Brazil	4%
Brazil	1%	Italy	3%
		United Kingdom	2%
		Canada	1%

Source: INA

Mexico had a positive trade balance of \$205.3 million in auto parts in 1985. During the economic recovery of the late 1980s, auto parts exports continued to rise. Between 1989 and 1992, exports of Mexican auto parts increased by 50%. However, imports of auto part nearly doubled, significantly outpacing exports (see Table 3 below). The balance of trade deficit in auto parts worsened dramatically, going from \$47.6 million in 1989 to almost \$1.1 billion in 1992. Not surprisingly, Mexico had its largest negative balance with the U.S. Between 1991 and 1992, the Mexican auto parts trade deficit with the U.S. increased by 503.1% (INA). Mexico also ran trade deficits in auto parts with Japan, Brazil and the U.K. Mexico's surplus with Germany in 1991 turned to deficit in 1992. France was the only country for which INA reported a sustained favourable trade balance in auto parts for Mexico.

**Table 3: Statistics on the Mexican Auto Parts Industry
(millions of dollars)**

	1985	1989	1992
Exports	1,474.1	2,046.7	3,003.6
Imports	1,268.8	2,194.3	4,082.0
Trade Balance	205.3	-47.6	-1,078.4

Source: INA.

Although indirect exports of Mexican auto parts are not reflected in these figures, it is clear that foreign imports were becoming an increasing competitive threat to Mexican suppliers as early as 1989. Not surprisingly, the 1989 Auto Decree reinforced export promotion rules such that assemblers were required to export \$1.50 domestic value added for every \$1 they imported, or face a tariff penalty. Assemblers were therefore encouraged to utilize Mexican suppliers instead of their tradition (foreign) suppliers.

There were a few sectors of the auto parts industry where Mexico had a comparative advantage. In 1992, engines and engine parts held the largest share of exports at 47% (see Table 4 below). That year Mexico exported over \$1.4 billion engines and their parts, while importing \$869.5 million. This yielded a trade surplus of \$542.2 million for engines. The only other auto parts sectors to have a positive trade balance were glass (\$93.1 million) and air conditioning (\$54.1 million). The relative success of these three sectors is attributable to large investments in world class plants by auto assemblers under the constraints of import substitution rules.

Table 4: Composition of Exports and Imports for Mexican Auto Parts, 1992

Export Composition		Import Composition	
Engines and their parts	47%	Engines and parts	21%
Trans., susp., dir., and clut.	14%	Trans., susp., dir., & clut	17%
Stampings and parts	12%	Other	16%
Electric	11%	Electric	15%
Accessories	6%	Stamping and parts	12%
Glass	3%	Accessories	10%
Other	3%	Inst. of meas. and control	4%
Seats	2%	Seats	3%
Cooling	1%	Brakes and parts	2%
Brakes and parts	1%		

Source: INA

Between 1980 and 1989, the overall growth of passenger car sales in Mexico was a modest 2.8%.⁸ Mexico's economic recession of the early 1980s had a chilling effect on sales and production of vehicles. Rebounding from the dismal sales market of the early 1980s, the annual growth rate of vehicle sales and production outpaced the growth rate of the overall economy as well as other manufacturing industries. By the early 1990s, passenger car sales were growing at an annual rate

of 17.4%. Between 1986 and 1990, the compounded annual growth rate in auto GDP was 27.6%, while the corresponding rate for manufacturing was 4.8%. Among Mexican auto parts producers, however, the rebound from the recession of the 1980s was much more modest. For example, the compounded annual growth rate of GDP was 6.7% for auto bodies and 9.3% for engines and accessories. This gap between GDP growth of vehicles and parts is primarily attributable to the increase in imports of parts by assemblers.⁹

Comparing and Contrasting the Auto Parts Industries in Canada and Mexico

Based on the above sketches, we conclude that the Canadian and Mexican automotive parts industries share certain similarities. First, they both supply parts primarily to US auto assembly firms. The Big Three firms (General Motors, Ford and Chrysler) dominate the North American auto market and are the leading producers in all three countries. Second, to the extent that parts suppliers in Canada and Mexico engage in international trade, their exports and imports are primarily with firms located in the United States and not with each other. That is, there is very little direct Mexico-Canada trade in auto parts. International trade within North America is a “hub-and-spoke” relationship whereby the trade flows are primarily dyadic pairs, linking producers in the spokes (Mexico or Canada) to producers in the hub country (the US). Third, the industries in both countries can be divided into two groups, the independent producers (often small firms supplying the domestic market) and subsidiaries of other firms (primarily larger firms, either US owned or joint ventures with US partners). Fourth, both industries are expected to incur significant adjustment costs as the implementation of the North American Free Trade Agreement takes place over the 1994-2004 period. And lastly, both industries have had increasing demands placed on them by downstream customers as a result of the wide adoption of lean production manufacturing and distribution techniques within the automotive industry.

However, there are also significant differences. For example, the Canadian and U.S. auto assembly and parts industries have had time to become closely integrated as a result of the 1965 Canada-US Auto Pact which allowed duty-free crossborder trade in parts and finished autos (only for producers). The Canada-US Free Trade Agreement in 1989 cemented this process. Mexico, on the other hand, until the late 1980s used auto decrees, foreign investment regulations, and tariffs to keep the industries segmented along the Rio Grande. That is not to say that the Mexican auto industry had been totally insulated from foreign competition. In fact, since Mexico joined the GATT in 1986, the government has been dismantling the regulatory framework of decrees, tariffs and licenses and begun encouraging foreign direct investment. However, the integration process, creating a North American common market in autos and auto parts, only just begun in Mexico whereas the integration is much further advanced above the 49th parallel.

A second difference is that the Canadian parts producers in general are larger and more competitive than their Mexican counterparts; e.g. several Canadian firms are multinational enterprises in their own right. On the other hand, the Mexican parts firms have the advantage of significantly lower wage rates, but disadvantage of poorer infrastructure. A third difference is that the Mexican industry is bifurcated. One group of firms are maquiladoras (in-bond processing plants, importing parts and assembling parts, components and subassemblies for re-export to their US assembler parents). A second group of firms are clustered around Mexico City and sell primarily to the domestic market. No such bifurcation occurs in the Canadian parts industry.

We turn now to setting up our model on how the auto parts industries are likely to respond to the twin pressures of regional integration and increasing demands from downstream buyers that auto parts firms adopt lean production methods.

A LITERATURE REVIEW: RESPONSES TO FREE TRADE AND LEAN PRODUCTION

Before developing a model on how firms are likely to respond to free trade and lean production, it may be useful to review the literature in this area. We focus on surveys or empirical studies, first, in terms of general industry responses, and then more specifically in terms of auto industry responses.

General Industry Responses To Free Trade and Lean Production

There is already a considerable literature examining the ways in which multinational corporations (MNEs) are likely to respond to NAFTA (see for example the papers in Eden 1994). The literature typically suggests that MNE reactions will involve changes in plant location as "insider" MNEs rationalize production for the larger regional market and as "outsider" MNEs are attracted into the market (Eden and Molot 1993; 1995). Changes in MNE organization are also expected to occur as these enterprises adopt a broader North American mind set, i.e., reducing the autonomy of subsidiary head offices, centralizing activities such as advertising and accounting, and giving subsidiaries product mandates for individual product lines.

Some of this MNE rationalization of operations within North America has been occurring for some time. Spurred first by the reductions in tariffs under the Tokyo Round of the GATT and subsequently by the Canada-US Free Trade Agreement (CAFTA), many manufacturing enterprises have already organized themselves for production in a North American (i.e., United States and Canada) market (Litvak 1991; Blank 1995). In some instances, Canadian subsidiaries have closed; in others they have been given product mandates for North America or beyond.

There have been some tests of these hypotheses with respect to large North American multinationals and their Canadian subsidiaries. The results of some of these are summarized below with a view both to capturing the general tone of the results and to establish some of the background for questions posed in our research.

Rugman's Multinationals and Free Trade,¹⁰ which reports on the results of a survey of the anticipated responses of MNEs in Canada and the US to the Canada-US Free Trade Agreement, suggests that large firms in the two countries supported free trade, anticipated few adjustment problems and would focus on issues of competitiveness; more US subsidiaries than Canadian MNEs anticipated the development of new world product mandates as a result of CAFTA (1990: 147-50).

The Conference Board of Canada (Krajewski 1992) surveyed its members about the likely impact of the Canada-US Free Trade Agreement on plant rationalization in Canada. The study looked at two groups: Canadian parents with US subsidiaries and Canadian subsidiaries with US parents. CAFTA was seen by the respondents as a primary driver, in addition to globalization of markets in general, causing multinationals in Canada to rationalize their production and sales for the North American market. The firms had a sense of new opportunities and/or felt that they must compete globally in order to survive. CAFTA provided new business opportunities through a more open door to the US market. The report argued that Canadian firms needed to be more aggressive, both to protect the Canadian market and to penetrate US market.

More recently, Stephen Blank et al. (1995) have published a survey of Conference Board members in the United States¹¹. Focusing on the restructuring of US firms and their Canadian subsidiaries survey results confirm that large corporations are moving toward some kind of North American strategy and structure and doing so with some speed (Blank et al 1995: 25). Canadian subsidiaries are being integrated more rapidly than Mexican ones into a continental production system (Blank 1995: 30). Driving this reorganization is what the authors term the emerging "architecture" of North America, a North American economic community as well as intensified global competition, the recession of the early 1990s, and technological change. For Canadian subsidiaries the impact of continental reorganization is unclear: many predict a rise in intrafirm trade as fewer goods will be produced in Canadian plants; a decrease in subsidiary autonomy; a loss of production capacity and jobs along with the redefinition of their role within the corporate network; and growing intrafirm competition for product and marketing mandates (Blank 1995:46-55).

Johnson et al. (1995) surveyed senior operations executives at 139 North American manufacturers, including a number of Canadian and Mexican firms, in 1993.¹² The managers were asked to assess the impact of NAFTA on their operations strategies and to outline the programs and responses they had made during the past two years. Canadian firms did not expect to meet global competition through low manufacturing costs, but through superior customer service, dependable deliveries and high quality. They were responding by developing capabilities in these areas, seeking more international customers, and avoiding markets where fast deliveries and product proliferation were critical. Mexican manufacturers, realizing their low cost labour advantage would likely disappear over time, were putting money into worker retraining, attempting to improve product quality, cutting overhead costs and inventories, and reducing manufacturing lead times. Firms from both countries saw their greatest opportunities in the US market, but also saw their US competitors as their greatest threat, under NAFTA.

Auto Industry Responses to Free Trade and Lean Production

Within the larger literature on MNEs, there is a narrower literature which specifically addresses the North American auto industry and its likely response to NAFTA (Molot 1993; Eden and Molot 1993a,b,c; 1994; 1996; Studer 1994; Womack 1995; Berry, Grilli and Lopez de Silanes).

The Canadian and US auto industries have been integrating since the negotiation of the Canada-US Auto Pact in 1965. Rationalization of assembly operations amongst the Big Three and the North American content provisions of the Auto Pact promoted cross-border sourcing of parts. Introduction of lean production has intensified the competition between Canadian and US parts producers; the demands of just-in-time delivery have induced some Canadian parts producers to locate in the United States to be closer to users of their goods.

Because the rationalization of production in the auto industry between Canada and the United States has been considerable over the last 30 years, much of the reaction to CAFTA and more particularly, NAFTA, is expected to come from integrating Mexico into US-Canadian production and marketing patterns. Again, rationalization is anticipated, with smaller, less efficient producers in the Mexican auto parts sector either going out of business or being absorbed into larger, more efficient units.

Since the adjustment of the Mexican auto industry to NAFTA is likely to be more difficult than that of the Canadian and US industries, it is instructive to summarize, briefly, how the literature

anticipates the character of that adjustment process (other than in terms of its impact, or lack thereof, on the US industry). There is general consensus that the adjustment will be difficult for Mexican parts producers, particularly the medium and smaller sized companies which suffer from the constraints of size, a historically protected market, and limited technology.

Womack suggests that an appropriate division of labour for the Big Three within the North American assembly industry would be to establish Mexico as the assembler and parts producer for inexpensive entry-level cars and truck (1994: 3). This is a "best case" scenario which is dependent upon (a) the appropriate rationalization decisions being made by the Big Three; (b) the development of the necessary parts production capacity, suitably located to facilitate just-in-time production, recognizing that few Mexican-owned firms could become tier-one suppliers; and (c) the development of capacity in Mexico to produce the inputs for parts production as well as upgraded infrastructure.

Studer argues that Mexican parts producers face an uncertain future (1994: 42-6). Those engaged in joint ventures with the assemblers have better prospects because their size allows them to take advantage of economies of scale and they are more likely to have access to newer technologies. Some of the larger Mexican suppliers have attained international quality standards. However, the bulk of the industry consists of medium and smaller-sized parts suppliers, which are not particularly efficient. These producers will face increasing competition from maquiladora parts firms (which under NAFTA will be able to sell in the domestic market) as well as from increasing imports. Over the longer term the small and medium-sized parts producers will also be affected by reduced Mexican domestic content requirements.

Berry, Grilli and Lopez de Silanes (1993) devote the bulk of their attention to assemblers rather than parts producers. Their analysis of the Mexican auto industry is framed in the context of its relationship to, and integration with, the US industry. Their discussion of the parts sector notes the establishment by the Big Three of high technology engine-producing plants, the bulk of whose output is exported, and then describes the range of products, primarily labour-intensive, made by maquiladora plants. The authors are optimistic about the future of the export-oriented auto industry but very much less so about that segment of the industry that is focused on the domestic market.

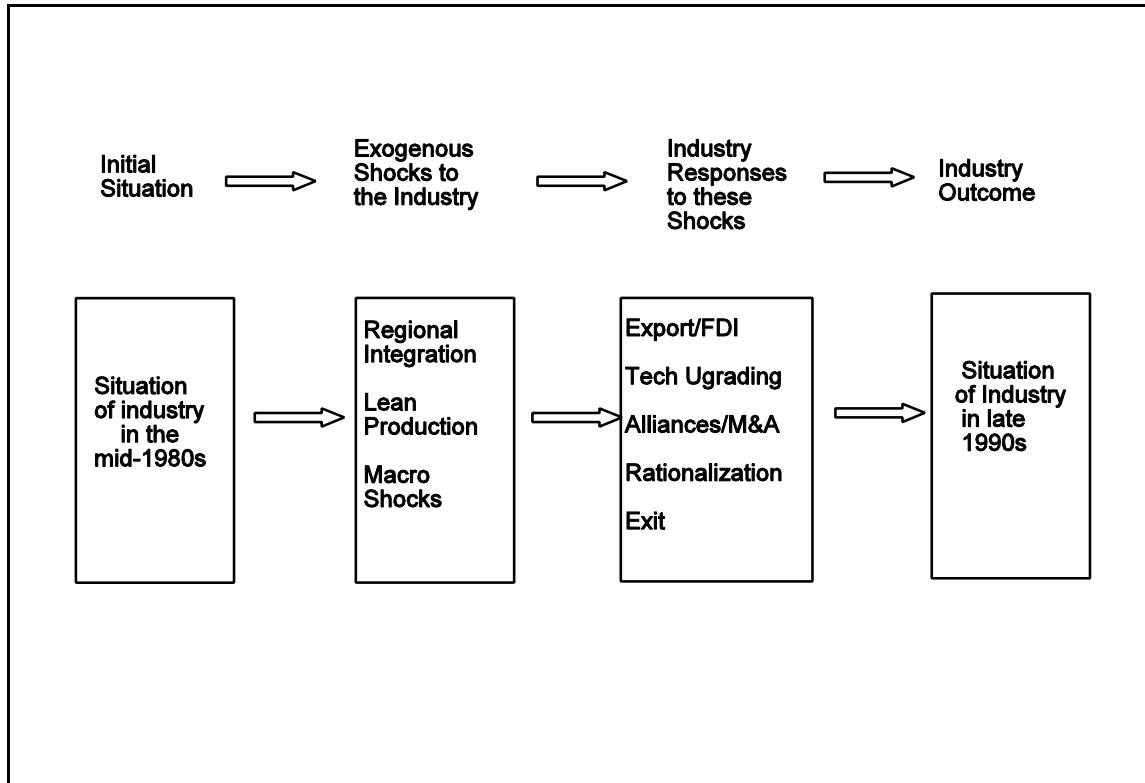
The dynamic of regional integration is not the only "driver" of continental organization of production in the auto industry. It is essential to disentangle the impact of regional integration from other promoters of restructuring, such as exchange rate changes (the dollar-yen shift the collapse of the peso), the adoption of lean production by the Big Three as they attempt to meet competition from Japanese auto firms (particularly those located onshore), and the cyclical problems in the economies of the three NAFTA signatories.

A MODEL OF INDUSTRY RESPONSES TO FREE TRADE AND LEAN PRODUCTION

Our general argument is illustrated in Figure 1. We argue that the auto parts industries in Canada and Mexico have been buffeted by three types of changes since the late 1980s: (1) regional integration, (2) lean production, and (3) changing macroeconomic conditions. Under *regional integration* we include regional policy changes such as CAFTA and NAFTA, and unilateral policy changes in each country (these are primarily for Mexico: i.e. liberalization of FDI regulations, changes in the Auto Decrees, reduction in tariff barriers and licenses after joining GATT). Under *lean production* we include the changing demands placed by the downstream assemblers on the parts producers in terms of tiering, technology, quality and delivery. *Macroeconomic conditions* are seen

as a filter (the background) to industry changes (i.e. domestic recessions slow the growth in demand for autos and therefore for OEM parts).¹³

Figure 1: Industry Responses to Exogenous Shocks



We hypothesize that the responses of auto parts firms to these changes will depend upon the players, their relative competitiveness, degree of internationalization, and access to financial and technological support at the beginning of the time period (i.e. the mid-1980s). The major players in the auto parts industries in Canada and Mexico are shown in Table 5. We distinguish four basic categories: (1) home multinationals, (2) partner subsidiaries, (3) foreign subsidiaries, and (4) domestic firms. (See Table 5 for definitions).

Table 5: The Players in the North American Auto Parts Sector

	Locally Owned Firm		Partner Subsidiaries			Foreign Subsidiaries of Firms Headquartered Outside NAFTA)
	Domestics	Home MNEs	of Firms Headquartered in a NAFTA Partner:			
			US	Canada	Mexico	
Canada a	a	b	c		d	e
Mexico	f	g	h	i		k

Home Multinationals: Canadian or Mexican auto parts MNEs; these are parent firms in their home country with foreign subsidiaries elsewhere in North America

Partner Subsidiaries: auto parts subsidiaries of MNEs from NAFTA Partner Countries; their parents can be either other auto parts firms or auto assemblers. A major group within this category are subsidiaries of the Big Three auto assemblers. We can separate this category into firms that are majority or wholly owned subsidiaries (*Partner MOFAs*) and firms that have joint ventures with firms from partner countries (*Partner IJVs*).

Foreign Subsidiaries: auto parts subsidiaries of MNEs from non-NAFTA partner countries; their parents can be either other auto parts firms or auto assemblers. A major group within this category are subsidiaries of Japanese auto assemblers. We can separate this category into firms that are majority or wholly owned subsidiaries (*Foreign MOFAs*) and firms that have joint ventures with firms from non-NAFTA countries (*Foreign IJVs*).

Domestic Firms: firms with no foreign investments outside their home country. These firms may or may not be engaged in exports and imports within or outside NAFTA. We can separate this group into *traders* (domestic firms that engage in either exports or imports) and *pure domestics* (firms with no international linkages).

Research Questions and Hypotheses

The research questions we want to address in this study are outlined below. In each case, we sketch out some of our initial hypotheses.

1. How are NAFTA and lean production perceived by managers in terms of the impacts of these exogenous forces on their automotive parts plants? Do they see these events as positive or negative for their plants? What do they see as threats and what as opportunities?

Our hypothesis is that, in general, auto parts producers see NAFTA as both an opportunity and a threat: an opportunity to sell more throughout North America due to improved access to markets in the other NAFTA partners, but also a threat due to increased competition from other North American producers with better access to the domestic market.

We hypothesize that lean production offers similar impacts; i.e. increased opportunities from lower costs, better technologies and closer links with suppliers and customers, but also more responsibilities in terms of demands placed on the firms by the Big Three auto producers and reduced sales if the plants do not qualify as first or second tier suppliers.

And subsidiary questions:

1.a. Is there a difference in perceptions of plant managers in Canada and Mexico?

Hypothesis: To the extent that Mexican plants are smaller, more isolated and less technically sophisticated, and face larger reductions in tariff and nontariff barriers as NAFTA is implemented, than plants in Canada, we hypothesize that plant managers in Mexico will see NAFTA as more threatening, and offering fewer opportunities, than do Canadian plant managers.

Hypothesis: Canadian parts plants, in general, have adopted lean production techniques faster and sooner than their Mexican counterparts, and are more ready to move into tier one relations with the auto assemblers.

1.b. Is there a difference between domestic and foreign owned plants?

Hypothesis: We expect that foreign owned plants will find the transition to a continentally integrated auto market easier than will domestic plants since they are already, as part of the MNE hierarchy, partly integrated into North American production and distribution patterns. On the other hand, foreign owned plants are likely to experience larger changes in horizontal integration (e.g. narrowing of product lines) and vertical integration (e.g. reduction in the number of stages of the value chain within the plant) than will domestic firms. These changes will lead to greater intraindustry and intrafirm trade, especially for the foreign owned plants.

Hypothesis: Foreign owned plants are further along the lean production path than are domestic parts plants, and are therefore better able to adjust to the pressures of downstream suppliers.

Domestic firms, to the extent they are small and sell primarily in the domestic market, are less likely to make the transition to first or second tier supplier status.

1.c. Is there a difference in terms of other categories (e.g. size of plant, product line, level of technology)?

Hypothesis: Larger plants and more technically sophisticated are better able to handle the competitive pressures of NAFTA, and to engage in substantial exporting and investing in the other NAFTA countries than are smaller, less sophisticated plants.

Hypothesis: Larger, more sophisticated plants are more likely than smaller plants to become first or second tier suppliers than smaller plants, more likely to have partnership agreements, and more likely to have engaged in substantial technology upgrading.

2. How have plant managers have responded to these technology and trade policy changes? We hypothesize that there could several different types of reactions, such as (1) shifts in production and trade patterns, (2) technology upgrading, (3) changes in parent-subsidiary relationships. We want to see whether the responses vary in terms of the criteria outlined above (Canada vs. Mexico, domestic vs. Foreign owned, large vs. small, technically sophisticated vs. low skill level plants).

Hypothesis: At the individual plant level, we hypothesize that the firms are adjusting to market opening and lean production through a variety of methods including technology upgrading, increased attempts to export, and changes in parent-subsidiary relationships.

3. What do the plant managers think they need in order to be competitive in the North American market? Here we are interested in the types of services, government support, technology infrastructure, that the firms see as necessary to ensure they are competitive in a post-NAFTA environment (i.e. after 2004 when the terms of NAFTA are to be fully implemented).

Hypothesis: We expect that Mexican plants are less likely than Canadian plants to think they will be competitive with other North American firms, and therefore more likely to see themselves in need of government support, longer adjustment periods, etc.

Our intention is to answer these questions through a survey of Canadian and Mexican auto parts plant managers, to be completed over the next four months. However, in the absence of the results from this survey, we can provide some information by looking at the available empirical evidence on how free trade and lean production have been affecting the Canadian and Mexican auto parts industries. What answers to these research questions can be found from looking at statistics and secondary sources on the industries? How is NAFTA affecting the auto parts suppliers? How are the suppliers adjusting to the increasing demands of lean production?

RESPONSES OF CANADIAN AUTO PARTS PRODUCERS

Auto parts firms in Canada are more concerned with issues of efficiency and lean production than they are with free trade.

Responses of the Canadian Auto Parts Industry to NAFTA

Parts producers in Canada supported both the Canada-U.S. Free Trade Agreement (CAFTA) and NAFTA. In both sets of negotiations parts producers pushed for high levels of North American content and for retention of the Auto Pact, positions that can be explained by anticipated new opportunities for sourcing, particularly by the Asian transplants which would face with new and more stringent definitions of domestic value-added.

One of arguments used to sell NAFTA in Canada was the potential for access to the Mexican market for Canadian exporters. Prior to the conclusion of NAFTA much of Canada-Mexico trade in vehicles and parts was already duty-free under the Auto Pact. It is not clear, therefore, what longer-term potential there is for increased Canadian parts exports to Mexico, though the greater efficiency of Canadian parts producers in comparison to their Mexican counterparts should enhance export opportunities (assuming the recovery of the Mexican economy).

The major challenge facing Canadian parts producers is their ability to compete within the overall North American market for inputs. The test is particularly critical with respect to the Asian auto assembly transplants. At issue is whether Canadian parts producers will be able to retain the overall percentage (11 to 12 %) of North American production they currently hold. A corollary is whether investment in new capacity will be made in Canada or the United States. This question about long run competitiveness can be subdivided into three: (i) continued sourcing in Canada by the Big Three assemblers; (ii) competition Canadian parts producers might face from Mexican firms; and (iii) the potential to serve the transplant assemblers.

Sourcing by the Big Three

Continued sourcing by the Big Three assemblers is critical to the continued health of the Canadian parts industry and to the employment it generates. As long as the Big Three in Canada have the mandate to produce vehicles for which there is high demand, and assuming they remain competitive, Canadian parts producers can expect to sell components to these assemblers.

It is important to recall, however, the link between the Auto Pact and sourcing in Canada by the Big Three. Careful attention by the Big Three to their Auto Pact undertakings has worked to the advantage of Canadian parts producers. The Auto Pact is retained by NAFTA and remains important as a means to allow the Big Three to import new vehicles duty free from third countries. However, as noted above, the significance of the Auto Pact safeguards with respect to automotive goods imported from the US terminates in 1998; that with respect to Mexico will be relevant until 2003 for vehicles and until 1999 or 2003 for many components (Johnson 1993: 110). With the ability of the Big Three to import cars duty free into Canada either under the Auto Pact or the free trade regimes, the Big Three could reduce their level of assembly in Canada. Any such reduction would clearly impact negatively on Canadian components producers.

Competition from Mexican Firms

There are, in effect, three aspects to this question: Will Canadian firms move to Mexico; will Canadian parts producers be able to compete in the Mexican market; and will Canadian parts producers face competition in the US market from parts made in Mexico?

Although a very small number of Canadian firms manufacturing labour-intensive components have relocated, Canada has not yet lost a major parts investment to Mexico. Canadian parts producers should increase their sales in Mexico as NAFTA is implemented. Because it has long been protected, the Mexican-owned domestic parts industry is considerably less efficient than those in either Canada or the United States.¹⁴ As these firms face competition, many of them will fail, leaving possible opportunities for Canadian, but also for American, companies.

Autos and parts constitute the largest component of exports to the United States from both Canada and Mexico. We have argued elsewhere that although there is some potential for competition between Canadian and Mexican parts firms for sales in the US market, the likelihood of this is reduced by the fact that the exporting companies are almost all subsidiaries of US multinationals. Thus, rather than overt competition, we expect continued plant rationalizations and reductions in product lines (Eden and Molot 1992:49).

Asian Transplant Purchases

To comply with the NAFTA rules of origin and reduce the pricing disadvantages that result from the high value of the yen, the Asian transplant producers will have to increase their sourcing of components in North America. Theoretically, therefore, Canadian parts producers stand to benefit; in practice, though, there are uncertainties about the extent. Because the parts industry in Canada is smaller and less developed than that in the United States, the Asian transplants anticipate difficulties in increasing Canadian content quickly, while running their assembly operations on a just-in-time basis (JAMA Canada 1993: 25).

Of the transplant assemblers, CAMI, the GM-Suzuki joint venture, has had the most Canadian suppliers. Honda and Toyota have done relatively less Canadian sourcing, in part because most of their major purchasing decisions are made by the much larger Honda and Toyota plants in the United States (Wolf and Taylor 1991: 299). Another problem, already noted, is the limited number of first tier transplant suppliers located in Canada. Given lean production techniques, this in turn means that few Canadian parts producers have the opportunity to work with tier one transplant suppliers in the development of products or new materials (Wolf and Taylor 1991: 300-301). In short, while there are opportunities for Canadian parts producers to augment their sales to the transplant assemblers, they will have to work assiduously to do so.

Responses by the Canadian Auto Parts Industry to Lean Production

Auto parts producers in Canada recognize that one of their major challenges is to increase their efficiency and competitiveness in order to meet the sourcing demands of the assemblers (the Big Three and the Asian transplants). The Big Three have been outsourcing an increasing proportion of their parts requirements, and to do so efficiently have significantly reduced the number of their Tier I suppliers. At stake is the 11 to 12 % of the total Canada-US parts market currently held by parts firms in Canada.

As the Big Three outsource more and demand new capacity from Tier I suppliers, parts producers along the components line are having to adapt. In order for firms to remain part of the

reduced ranks of Tier I suppliers, or to attain this status, they must provide low cost parts on increasing stringent schedules, have important volume capacity, and have substantial R&D capabilities. At the same time, the number of parts required for an automobile is decreasing as firms adopt lean production techniques. The trend to system sourcing, the closer and more integrated style of sourcing characteristic of lean production, has implications for second and third suppliers that used to produce inputs for first tier suppliers. They will lose business as the design and production of components becomes more sophisticated (Wolf and Taylor 1991: 303).

Amongst the in-house suppliers, General Motors' Canadian parts plants are the most vulnerable, given the company's need to restructure and downsize, and its decision to do so, at least in part, by divesting some of its parts producers. At the same time, as noted above, independent suppliers are the beneficiaries of GM's new out-sourcing policy.

Also important to the long run competitiveness of the Canadian auto parts industry will be its ability to adapt to continuing technological change. Auto parts firms now require R&D capabilities to attain Tier I status (Globe and Mail, March 21, 1994, p. B3). For example, Magna attributes its success to innovation and system design expertise, both of which are now required of Tier I suppliers by automakers. Magna is focusing on increasing its specialization, and subsequently spinning off of its non-core business, much like the automakers are doing (AN 6-19-96 p16). One technology that Magna is taking advantage of is the Grammer foam-spray system used to make car seats. This system works well with JIT delivery: Magna delivers 33 seats every half hour from one of its plants to a factory 12 minutes away (G&M 10-14-95 pB7). Magna's investment in hydroforming technology has resulted in a \$500m annual contract with GM (Globe and Mail, June 11, 1994, p. B1).

Lean production capabilities are being provided to many firms by both the transplants and by Japanese consultants. This can be attributed in part to the freer continental trade that attracted the transplants in the first place. Toyota Canada says that "developing suppliers is our biggest challenge", and is training Canadian firms in 'Kaizen' to facilitate JIT delivery. CAMI is doing likewise, and says that "sourcing local parts is the only way to survive" (Financial Post, October 21, 1994, p. 10). Canada is said to hold an advantage in this area due to American reluctance to follow suit; apparently due to US bitterness over Japanese trade issues (Desrosiers 1995:1).

Virtually all Canadian parts producers, whatever their size, understand the new environment. How they are responding is a function of size and financial capacity. While many are investing in new technologies and acquiring varying degrees of inhouse design capacity, only the largest can afford to internationalize their production and seek or reinforce their status as Tier I suppliers. In order to invest heavily in technology, to afford frequent retooling, and to be able to produce large volumes of parts, companies must have considerable capital at their disposal (Globe and Mail, May 29, 1993, p. B1). Table 1 above demonstrates that parts producers have, in recent years, made significant new capital investments, although not all firms can afford to do this.

Two responses by Canadian auto parts producers to the demands of global sourcing are particularly noteworthy: (1) the move to establish production capacity outside Canada, either through greenfield investment or acquisitions, and (2) the development of closer supplier relationships with each other.

Canadian parts firms have become more efficient at home in recent years and they have also begun to internationalize their production. The most dramatic, perhaps, is Magna International Ltd., which, during 1993 announced acquisitions in Germany and Austria. Of the Canadian-based

multinationals, Magna International has been the most aggressive in the pursuit of international acquisitions. Cognizant of the fact that only 53 % of European seat market is supplied by Tier I suppliers, compared to 70 % in North America, Magna created a "war chest" for European expansion (Keenan 1995: B1). The MNE has recently acquired most of the automotive operations of the British-based Marley PLC, a purchase which gives it 6 plants and half of a joint venture as well as the ability to manufacture instrument panels, the only part of the interior of a vehicle that the corporation does not already make (Keenan 1996: B1). Some years ago Magna purchased interests in Austrian and German firms (Pritchard 1993: B11) and it has developed considerable production capacity in the United States. Magna also has a manufacturing facility in Puebla, Mexico, to supply Volkswagen, and has negotiated a multimillion dollar contract to supply complete body stampings and other components for BMW's proposed plant in Spartanburg, South Carolina (Fowlie 1993c: S14).

The investment activities of a second Canadian-owned parts producer, A.G. Simpson Co. Ltd. of Scarborough, Ontario, demonstrate the increasingly continental (read Canada and the United States) character of industry sourcing. A.G. Simpson has recently added a stamping plant in Kentucky to its other US locations (Saunders 1993: B3).

This internationalization of Canadian parts firms marks a new stage for this sector of the Canadian auto industry. Prompted by the introduction of lean production techniques, suppliers recognize the importance of location proximate to assemblers. This is the rationale behind the expansion of Magna International and A.G. Simpson into the United States, to sites that are close to the Big Three as well as to transplant assemblers. While both companies maintain that their expansion southward will not take work away from their Canadian facilities but will add jobs in Canada, there is no question that the attractiveness of US locations will act as something of a break on the growth of sourcing in Canada, particularly if US state governments compete for plants with incentive grants.

The need for capital expenditures combined with Big Three reduction in numbers of Tier I suppliers, has put a lot of pressure on smaller companies. It is these firms, those with annual revenues between \$100 and \$300 million, that face the greatest difficulty in adapting to the demands of the assemblers. Many have or will seek mergers and/or acquisitions to develop the capacity to be full-service suppliers (Heinrich 1994: 5). Triam Automotive Inc., for example, believes that it must acquire other companies to maintain its Tier I ranking (Globe and Mail, March 30, 1994, p. B11). Firms also need to be able to produce entire systems, not just parts, to meet tier I requirements (Financial Post, December 30, 1994, p. 5). These issues foreshadow a trend to increased mergers and acquisitions, to expanded use of joint ventures, as well as to the demise of some smaller firms.

While there are no comparable statistics for Canadian firms, 40 % of US suppliers are now involved in some sort of partnership with another firm. This follows from automaker demands that entire systems be supplied and developed by their suppliers. Numbers of Tier I suppliers are declining, so more suppliers are supplying each other (Automotive News, 9-4-95:37). The Canadian companies making car seats (Magna, Lear, and Johnson Controls Inc.) supply each other, which they attribute to the following trends: global competition, consolidation of suppliers, and vertical disintegration of the car manufacturers.

RESPONSES OF MEXICAN AUTO PARTS PRODUCERS

Responses of the Mexican Auto Parts Industry to NAFTA

The implementation of NAFTA in 1994 brought with it the full program for trade and investment liberalization of the auto industry. The local content requirement for 1994 was reduced to 34%, and it would continue to decline to 29% by 2003. In 2004, local content rules for Mexico would be replaced by regional content rules for North America. The rules that governed maquiladora parts producers also changed. Under NAFTA, maquilas can supply parts for vehicles that would be sold in Mexico under the condition that the plant attain a simple 20% content level.

Until the recent change of government and the financial instability of peso-denominated assets, freer trade between the US, Canada and Mexico under the North American Free Trade Agreement (NAFTA) was expected to generate growth in the Mexican market overall. In 1993, CIMEX/WEFA and other economic forecasters estimated that the Mexican real Gross Domestic Product (GDP) would grow at 5.3% per year between 1995 and 2004. Given this assumption and the rule-of-thumb that the growth rate of auto production is usually three to four percentage points higher than the growth rate of GDP, assemblers predicted that Mexican new vehicle sales would double by the year 2000. Mexico was likely to be the country with the highest growth rate in new vehicle sales in the North American triad, and Mexican suppliers eagerly anticipated the benefits of increased local assembly and sales.

However, three events of the early 1990s altered the growth trajectory for Mexican auto parts suppliers. First, in 1992, the Mexican Investment Board liberalized the rules by which foreign companies could obtain "100% Mexican" status. Before this ruling, the Mexican Auto Decree of 1989 stipulated that foreign companies could only own up to 40% of a company in Mexico. Maquiladora (or in-bond) companies which exported 100% of their production were the only companies that were exempt from this ownership rule.

The influx of foreign companies that the change in the ownership rule allowed, meant that Mexican firms could face increased competition in their local market. Although the new rule was intended to allow foreign plants to locate in Mexico that did not directly compete with local suppliers, it is not clear that such a stipulation was strictly enforced. With the increase in transplanted supplier operations, Mexican suppliers were losing their locational advantage.

Second, domestic vehicle sales and production began to wane beginning in 1993. In 1992, vehicle production in Mexico reached an all time high of 1,080,760 vehicles (Piquini). Domestic vehicle sales in Mexico also reached their peak that year (706,846). Then pre-election economic recession which began in late 1993 precipitated the decline of Mexican vehicle production. Mexican vehicle sales were a disappointing 620,000 in 1994. The booming Mexican market for vehicles that was anticipated based on demographic forecasts⁵ had not materialized. Only those domestic parts suppliers that produced for export (direct or indirect) could hope to thrive during that period.

Third, the NAFTA brought a reduction in tariffs which allowed assemblers to import parts at lower costs. Mexican suppliers not only faced more efficient transplanted suppliers, but they also had to compete against foreign parts for which price had effectively declined. Mexican suppliers, therefore, were losing any cost advantage they had while under the protection of tariffs.

By the mid-1990s, Mexican auto parts suppliers found themselves in a doubly subordinate position where they were primarily dependent on foreign assemblers for sales and technology and they were second-source or second-tier to foreign suppliers. They also faced two tightening

efficiency constraints. First, as assemblers implemented lean manufacturing techniques, supplier performance benchmarks on cost, quality, delivery and service became more stringent. Second, NAFTA forced suppliers that had grown accustomed to protection to compete head on with world-class foreign suppliers.

Under these circumstances, the Mexican suppliers faced with three options: (1) exit the market; (2) merge with another supplier; (3) develop a competitive (technological) competence. Clearly, the third option seemed most favourable for those suppliers that anticipated significant returns from a burgeoning auto market. Overcoming the technology bottleneck was necessary if they were to become world-class, full service suppliers. Scaling this obstacle would require a significant infusion of financial and intellectual capital. However, 74% of the workers in the Mexican auto parts industry were unskilled (equivalent of 6th grade education or less) and most Mexican suppliers did not have a history of technological innovation. Also, borrowed capital carried a high interest rate. Strategic alliances were therefore seen by Mexican suppliers as a panacea. As motivation for foreign companies to enter alliances with Mexican suppliers diminishes, it remains to be determined which Mexican suppliers will survive the leaner, freer market of the 1990s, and what strategies would prove successful at sustaining a competitive position in that market.

As trade and investment regulations are modified during the transition period of NAFTA, foreign auto assemblers and suppliers as well as Mexican suppliers will be assessing the fruitfulness of previous partnerships, and the economic benefit of future alliances. Mexican suppliers are already scrambling to maintain or establish new technology and equity alliances with foreign, world-class partners. However, since NAFTA reduces the incentives for foreign companies to form partnerships with Mexican suppliers, it is very likely that the absolute number of partnerships will be significantly reduced in the near future. (see Husbands 1995b).

Even in the event that most Mexican suppliers are successful in forming strategic alliances with foreign assemblers or foreign suppliers which have superior technology and know-how, there is still a question as to whether Mexican suppliers are acquiring the capabilities which will propel them to the position of first-tier, world class suppliers. Furthermore, for those auto parts which are not specially made for the Mexican market, it is unlikely that auto assemblers will require their Mexican suppliers to become full service suppliers (that is, to have product design capabilities, effective quality assurance programs, just-in-time delivery and continuous improvement of quality and productivity).

Husbands (1995b) states that a plant manager at one large auto parts supplier felt that his company had little to fear under NAFTA. He was certain, however, that smaller, less technologically advanced Mexican companies are unlikely to weather the influx of products made by foreign suppliers. He predicted that smaller Mexican suppliers with unique technologies would be acquired by larger suppliers, while those without much to offer would exit the market. This manager did voice one fear, however: the future acquisitions of technology would be more difficult for his firm since foreign assemblers (including their customer-partner) would view his firm as a competitor upon the removal of local content rules.

At another manager of a Mexican parts supplier that was interviewed by Husbands indicated that they embarked on a strategic study in 1992 in anticipation of NAFTA. They have since been concentrating on consolidating plants and reducing the number of products offered in order to be leaner and more able to face increase competition from foreign suppliers. Such rationalization of

the auto parts industry is expected to increase efficiency, not only at the firm level, but also in the entire North American region. It remains to be seen if such strategies will be successfully implemented by the majority of Mexican parts suppliers. It is quite possible that only the few suppliers that are members of conglomerates or that reaped the benefits from strategic alliances in the 1970s and 1980s would be viable producers in the next decade.

Responses of the Mexican Auto Parts Industry to Lean Production

In The Machine That Changed the World, Womack, Jones and Roos present compelling evidence from which it can be concluded that high-performing assemblers in the automobile industry exhibit the following characteristics: good cost control, continuous learning, emphasis on first-time quality, responsibility passed down the value chain, concurrent engineering, just-in-time manufacturing and delivery, multi-functional teams, and close coordination with and among suppliers. In related studies on supplier relations in the automobile industry, Helper and Sako find the following to be critical determinants (either directly or indirectly) of high profitability: tight cost control; high technology usage; high technical proficiency (high R&D-to-sales ratio and/or design office near the customer); ability to deliver large lot sizes; emphasis on quality improvement; high degree of information sharing with customers. Most recent extensions of the lean paradigm also link competitiveness to these core characteristics. By improving productivity and market flexibility, lean practices enhance a company's competitiveness.

With increasing market openness, Mexican supplier participation in global supplier networks depends more critically on their ability to satisfy the lean metrics described by Helper and Sako, and on their strategic fit. Although automakers traditionally identified price, quality, deliverability and service as the key metrics on which to compete their suppliers, Mexican suppliers were often chosen because local content rules biased the market in their favour. During the 1980s, assemblers implemented supplier development procedures, engaged in strategic alliances, and encouraged their high-performing traditional suppliers to transfer technology to Mexican suppliers. These procedures yielded mixed results in terms of building the capabilities of Mexican suppliers to world-class status. With increasing market openness under NAFTA, therefore, Mexican suppliers much develop effective strategies by which they may achieve the lean benchmarks.

Currently, as customer-supplier partnerships and longer-term relationships are increasing in number, pre-selection competition is still based on those four metrics. As we head into the 21st century and automakers are taking a more global view of competition, production and sourcing, three other metrics are concatenated to the original four: market flexibility, global organizational structure and ecology. Instead of having to strive harder than their foreign competition to clear the original four hurdles, most (not all) Mexican suppliers are repelled by an even more difficult challenge.

Mexico is often referred to as the prime location of low-cost automobile production in the North American region. Because Mexican wages in the automobile industry are on average 17% of those in the US, it is assumed that production costs are lower in Mexico than in the US. For example, the plant manager of a transplanted supplier indicated that his overhead costs dropped from 22% to 3% when his operation relocated to Mexico from the US (Husbands, Metal Ceilings). He also experienced labour costs savings of 20% on managers and 70% on line workers. This manager was quick to add, however, that the appropriate mix of machinery and labour is key to his overall cost

savings. Quadrupling the labour content when labour cost savings are about one-third would only stand to increase costs, not to mention the likely reduction in product quality.

Several other plant managers and corporate executives reported that their input costs are often significantly higher than those of their foreign competitors. For example, inefficiencies in steel production at Hylsa were reported to be the main cause of front-end inventory inefficiencies and of higher prices at suppliers of steel-based products (such as chassis, cross members and frames). These same plant managers also attributed their difficulty at achieving low-cost producer status to lower production volumes at their plants relative to foreign plants. Not only were scale economies in production illusive, they received lower or no volume discounts from their suppliers. Thus, the smaller scale of production in Mexico is a key inhibitor to cost competitiveness of Mexican suppliers relative to their foreign competitors.

Another gauge of the cost competitiveness of Mexican suppliers is the percentage of plant capacity and machinery that is utilized at any given time for a given product. Based on survey results from 1993, the lowest capacity utilization rate was 33% while the highest was 80%. Although a much larger sample is necessary to estimate a weighted average of capacity utilization for Mexican auto suppliers, it is still apparent from the preliminary data that those suppliers are under utilized compared to their foreign competitors. This under utilization of resources certainly reduces the efficiency and therefore yields sub-optimal cost of operations in Mexican auto supply plants.

One other key resource that is not efficiently utilized is labour. Although manufacturing techniques of Mexican suppliers take advantage of relatively lower labour costs by utilizing relatively more labour intensive processes than their US competitors, the employee turnover rates are significantly higher in Mexico than they are in the US or in Japan. Some companies indicate that they have employee turnover rates of 6% per month. This compares to less than 1% per month for their US competitors. Training costs and missed learning curve economies would therefore elevate the cost of operation.

Surprisingly, the recent devaluation of the peso has not unilaterally reduced the costs of production for Mexican suppliers. Indigenous (non-maquila) suppliers that were visited and surveyed in March 1994 often sourced 40%, and as much as 70% of their inputs outside of Mexico. To maintain high quality outputs, some suppliers rely on foreign sources of products such as steel, aluminum and sand for foundry cores. When devaluation occurred in December 1994, their purchasing power of foreign inputs was halved, causing their costs to increase. In addition, domestic energy costs increased by 30% in the month of February, while labour costs increased by 10%. Further price increases were on the immediate horizon. Finally, the cost of borrowing increased not only for suppliers which had flexible rate short-term loans denominated in dollars, but also for suppliers seeking new financing for capital expenditures.

Thus, despite the expected cost advantage of producing auto parts in Mexico, Mexican suppliers still face a non-trivial challenge of being the low-cost source. The main inhibitors to cost competitiveness are their continued dependence on financial capital from foreign sources, lack of scale economies and inefficiencies in production of their domestic suppliers.

"Quality Is a Way of Life" is the company motto for a leading supplier in Mexico. At every plant visited, the verbal emphasis on production of quality products was poignant. Indeed, the vast majority of suppliers surveyed indicated that they made moderate or extensive use of statistical process control (SPC) and total quality control (TQC). Among those firms that have SPC, there was

general agreement that SPC reduced defect rates and lowered costs at their plant. Only one company surveyed indicated that no such benefits were forthcoming at their plant from implementing SPC. Also only two suppliers that had SPC rarely used quality control data to modify their process. Even with this emphasis on quality, however, only one company surveyed indicated that they had a first pass yield rate greater than 97%. Most suppliers that were interviewed or surveyed stated a first pass yield rate of between 80-95%.

There is clear evidence of a wide variation in the quality rates for individual Mexican suppliers, as well as among Mexican suppliers. One method by which customers have successfully mitigated this variability in quality is the supplier certification process. For example, assemblers that rely heavily on local supply have all but a few suppliers certified at the base quality level. Suppliers that have not yet been able to pass certification are either vigorously endeavouring to meet quality targets or recognize that they will be removed from the assembler's supplier network. Those suppliers that will inevitably be dropped by such assemblers are those that lack either the financial resources for investments in more modern machinery, or that lack the personnel necessary for absorption and implementation of quality assurance practices. The financial and learning bottlenecks are key explanatory factors of the variability in quality performance among Mexican suppliers.

Regarding delivery, surveyed companies indicated that they achieved on-time delivery 95- 100% of the time. However, site visits reveal that the thresholds of on-time delivery are significantly lower for most Mexican suppliers than for world class suppliers. Many companies indicate that they have a just-in-time production and delivery system even though it takes ten days for a truck shipment to reach its destination. In this case, the companies are taking logistical bottlenecks of the highway system and border crossings as given. Another example of inefficiencies in delivery is a common practice among Mexican suppliers of storing significant quantities of material before it is used in the manufacturing process. Suppliers blame inefficiencies in their supplier's process or the forcing practices of monopoly suppliers for large lead inventories. Suppliers also attribute higher end-process inventories than is efficient to the reluctance of their customers to share forecasts of production runs for which the supplier's input is needed. Indeed, the survey results show that customers provide these suppliers with very little information. In particular, only two suppliers indicated that their customer provided them with forward information on production batch size. It therefore appears that market imperfections and inefficiency in communication flows create bottlenecks in deliveries for the Mexican suppliers.

A key indicator of the supplier's ability to be a full-service supplier is how early in the stage of product development they are engaged. It appears that the vast majority of suppliers get involved in the middle of the product development process or even later. This is in part due to the absence of CAD/CAM systems, other product development tools, integrated information commerce or the necessary human capital for the product development and engineering processes. Some Mexican suppliers seem to receive updates of specifications which enable them to ramp-up their production processes soon after the launch of the product. Others, however, indicate that they are often one or even two years behind foreign suppliers in launching a new product.

Survey results and site visits by Husbards reveal that Mexican suppliers focus solely on process engineering and improvements. This is not necessarily because these suppliers lack the ability to do product development. In fact, suppliers which are members of grupos and therefore have greater access to technical know-how than the average Mexican supplier are eager to become partners in the

product development process with their customers. However, it appears that their customers, especially assemblers, are not eager to take on Mexican suppliers as full-service providers primarily because they already have a supplier-partner in product development in another country. It is only for those few specialized products for the Mexican market that Mexican suppliers are likely to be utilized for product development. Thus, even the most technologically sophisticated Mexican supplier faces this late-comer disadvantage. The average Mexican supplier which is typically a small shop without sophisticated quality assurance or product development techniques clearly finds it much more difficult to attain to full-service supplier status.

Based on the site visits conducted by Husbands, it appears that only the grupos have the ability to compete on all seven performance metrics, including market flexibility. It is also clear Mexican suppliers must concentrate their efforts at overcoming the following bottlenecks: financial, intellectual capital and technology, information sharing and communication, and learning. Each of these core factors is critical to high performance in the seven performance metrics.

CONCLUSION: COMPETING IN A LEAN WORLD

In the middle of the 1990s, the Canadian and Mexican auto parts industries are being buffeted by three kinds of change: regional integration, lean production, and general macroeconomic changes (recession, peso collapse). How have these firms been responding?

We have argued in this paper that the responses of the industries has differed because of their differing locations within the North American auto industry. The Canadian auto parts sector is, to a large extent, already continentalized. Its problems therefore are more ones of adapting to the increasing pressures downstream buyers are placing on the firms to adopt lean production techniques. The largest firms in the Canadian auto parts industry, e.g. Magna, are internationalizing, becoming MNEs in their own right with subsidiaries in the United States, Europe and Mexico. While the costs of technological upgrading are high, and firms in general do not have deep pockets, the problems seem surmountable.

On the other hand, during the near thirty years of import substitution policies, Mexican suppliers have mainly faced competition from other domestic suppliers. As it became more apparent in the 1980s that severe competition from foreign suppliers (via exports or transplants) was eminent, forward-looking suppliers sought strategic alliances with foreign suppliers and customers in order to enhance the core factors mentioned above. Assemblers were willing to engage in these alliances to ensure the quality of inputs they were required to buy from Mexican suppliers as legislated by the Mexican Auto Decrees. Foreign suppliers were encouraged by the assemblers to engage in alliances with Mexican suppliers because of the same regulatory pressures.

In the wake of NAFTA and changes in the rules which designate enterprises as 100% Mexican, the eagerness of foreign companies to partner with Mexican companies is waning. Assemblers have already begun to increase sourcing from their traditional suppliers. The pressure is on some traditional suppliers to relocate to Mexico to create a more efficient just-in-time supplier network in Mexico. Mexican suppliers are finding it much more difficult to improve their core factors through alliances. This strongly implies that small and medium-sized Mexican suppliers will continue to exit the market or be absorbed by more viable Mexican or foreign firms. The effect of consolidation of the Mexican automotive supply base remains to be examined.

In summary, emerging markets are enticing to auto assemblers because of the potential high growth rate of sales and long-term profits. As assemblers broaden their sales scope, they are also attempting to rationalize their global supplier base. Because of this broadening marketing focus of assemblers and the relaxation of import substitution rules in emerging economies, indigenous auto parts suppliers in both Canada and Mexico are increasingly facing world-class competition on price, quality, delivery, service, market flexibility, global organizational structure and ecology. Because of their late-comer status in the global supply chain, most of the Mexican auto parts suppliers are having difficulty meeting these demands. The Canadian auto parts firms are in a more fortunate, but still precarious, situation.

ENDNOTES

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1. We see North America as a hub-and-spoke relationship, since most MNEs are headquartered in the United States, with subsidiaries in Canada and Mexico. In addition, trade and investment relationships are very strong between Canada and the US, and between Mexico and the US, but very weak between Canada and Mexico (Eden and Molot 1993a).
2. We use the term “lean production” as in Womack (1990) to connote the adoption of less labour and resource intensive production methods, just-in-time delivery, zero defect quality, etc.
3. This training is funded in part by the Federal and Ontario governments (Financial Post, July 13, 1994, p. 11 and Desrosiers, quoted in Financial Post 500, 1994, p. 22).
4. In May 1993, 172 Canadian companies had won US\$725 million worth of new work from General Motors (Pritchard 1993: B1).
5. Desrosiers puts parts industry employment a little lower, at approximately 75-76,000 (Desrosiers 1994: 1-2).
6. Parts producers suggest that a Canadian dollar valued at below 82 cents is necessary for them to make money (Pritchard 1993: B1).
7. One example of this is the successful bid by SKD Co. of Milton, Ontario, for a new steering assembly unit for Chrysler; in contrast to the 26 weeks that its North American competition required, SKD tooled up to make the unit in nine weeks (Pritchard 1993: B1).
8. The sources of these statistics are various publications by INA and INEGI.
9. This increase in imported parts did not include imports by maquiladora plants.
10. The Rugman questionnaire was administered to 21 Canadian MNEs plus the largest 17 US manufacturing subsidiaries in Canada. The survey was done in February-March 1987.
11. This survey included 34 companies, one of which has some involvement in the auto industry.
12. The industries included fabricated metals, machinery and equipment, metal products, machinery, electrical machinery apparatus, transport equipment, and professional and scientific measuring equipment.
13. Since the general public often blames the loss in jobs after 1989 on CAFTA and NAFTA, whereas most of the job losses (according to economists) have been due to macroeconomic

conditions, we intend to ask questions about the impact of macro changes separately from questions about market opening, in the hopes of separating the two exogenous events in senior managers' perceptions.

14. For a more detailed discussion on the structure of the Mexican parts industry and that sector's competitiveness see Office of Technology Assessment (1992: 137-8; 148-9).

15. Over 50% of the Mexican population was under 20 years of age.

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