

**International Motor Vehicle Program**  
**Globalization Research Program**  
**Fiscal Year 1999 Summary Report**  
**Tim Sturgeon, Globalization Research Director**  
**September 28, 1999**

**Program Summary**

One of the key drivers of change in the automotive industry can be summed up by the word "globalization." Globalization is driving industry consolidation, the expanding role of suppliers, underbody commonalization, product diversification, and efforts to reduce minimum scale economies in final assembly plants. Automakers, along with their largest suppliers, are in the process of creating enterprise and supply-base structures that function at a truly global scale. Because globalization connects activities occurring in an extremely diverse set of locations, it is an inherently complex process, one that cannot call for a static set of strategic responses or result in a single societal or competitive outcome. Accordingly, IMVP's Globalization Research Program (GRP) is relying on a series of inter-linked research projects that seek to understand the process of globalization in terms of corporate strategy, industry organization, and social impacts for both "home" and "host" countries.

Currently, the program is comprised of 11 funded research projects that are being led by researchers based in a wide range of countries (e.g. the U.S., Japan, China, Italy, Brazil, India, and South Africa). Some of these projects are exploring overarching themes, such as the relationships between product development and globalization, the employment effects of globalization, and the role of the supply-base in globalization. One project follows the worldwide roll-out of a single car model, the Fiat "project 178" World Car. Other projects are examining the process and impacts of globalization in particular places, such as China, Brazil, India, and South Africa. Taken together, the projects form an increasingly detailed picture of the form and nature of the industry's spatial spread and reorganization. Timothy Sturgeon, the GRP's director, is responsible for developing the overall intellectual framework for the project and for the coordination and synthesis of the various research project's results.

The globalization project summaries included in this report are:

- 1) Addis-Botelho, Caren: The Changing Faces of Globalization in a Big Emerging Market: Brazil and the Motor Vehicle Industry
- 2) Black, Anthony: The South African Automotive Industry in a Globalizing World
- 3) Camuffo/Volpato: The Internationalization of the Italian Auto Industry
- 4) Fujimoto/Lee/Chen: Globalization's Impact on the Chinese Automobile Industry: Policy Assessments, Typology of Strategies and Management Influences of Foreign Companies
- 5) Fujimoto/Sugiyama/Muffatto: Globalization and Automobile Design
- 6) Gulyani, Sumila: The Links Between Lean Production, Industrial Competitiveness, and Infrastructure in Emerging Economies: Evidence from the Indian Auto Industry
- 7) Luchi, Roberto: Improving Competitiveness in Manufacturing: Value Chain Issues Dealing with the Automobile Sector in Argentina and MERCOSUR
- 8) Molot/Eden/Husbands: Lean Production and NAFTA: A Survey of Canadian and Mexican Automotive Parts Suppliers

- 9) Shimokawa, Koichi: The Japanese Automotive Industry in ASEAN/Global Sourcing and the Changing Structure of the Japanese Parts Industry
- 10) Sturgeon, Tim: Globalization and Jobs in the Automotive Industry
- 11) Thun, Eric: Changing Lanes in China: Developing the Auto Industry in an Era of Reform

## **Project 1**

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1. Name of researcher: Caren Addis-Botelho

2. Working Title of Project: **The Changing Faces of Globalization in a Big Emerging Market: Brazil and the Motor Vehicle Industry**

3. Summary of Research Topic/Question:

Brazil has become a laboratory for new ways of organizing production for almost all of the world's multinational assemblers. VW's Rezende plant with its "modular consortium" project is only the boldest example of many assemblers' which are bringing their systems suppliers next to or inside of the factory in variations of what is referred to as the "industrial consortium." Many questions regarding these new arrangements need to be answered:

- Supplier firms are building dedicated factories to meet assemblers' need for co-location and just-in-time delivery. To achieve scale economies suppliers are supplying these dedicated factories from larger, centralized plants to the greatest possible extent. The logistical and efficiency implications of this approach to dividing production needs to be explored as does the implication for second and third tier supply-chain management.
- What prospects are there for older "brownfield" vehicle assembly plants to be included in the new "industrial consortium" type of production schemes that are emerging in Brazil?
- What different approaches are there to supply-chain management among various assemblers in Brazil?
- How does "follow-sourcing" work in Brazil and what role is being played by foreign first tier suppliers.

4. Summary of Research Status:

The research is still at a preliminary stage after preliminary interviews with trade association officials and other researchers as well as extensive secondary research, I have been able to specify very concretely the questions that need to be answered.

5. Summary of research results to date:

The most striking discovery is the speed at which transitions have taken place in Brazil. The central actors have somehow been able to withstand the animosities and adversities that have accompanied rapid change, the very high levels of unemployment in the auto sector in the industrial heartland of Sao Paulo and the denationalization of the Brazilian auto parts firms. Both the trade unions and the parts association are working with the assemblers and their

associations as well as with government officials and technical support agencies to launch the greenfield projects and support the profound transitions underway in the brownfield plants.

## **Project 2**

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1. Name of Researchers: Anthony Black; Research assistant: Samson Muradzikwa

2. Working title: **The South African Automotive Industry in a Globalizing World**

3. Summary of Research Topic/Questions:

This project assesses the impact of globalization on the South African automotive industry. Previously high levels of protection are being reduced leading to substantial changes in the industry. The research seeks to assess structural changes (e.g. extent of rationalization in the industry); changes in trade flows (the growth in imports and exports and the type of components and vehicles being exported); the impact on profitability and investment and the level of integration (e.g. levels of local content in locally assembled vehicles). The study then seeks to link these outcomes to the main drivers of changes in the industry viz. industry policy (in particular, tariff reductions) and the strategies of parent/local firms which are in turn contingent on global requirements, degree of foreign ownership etc. Another important driver is general economic conditions such as the domestic market, the regional market and the overall investment environment.

4. Summary of Research Status:

Completed.

Research Results to Date:

Research to date indicates the rapid response of the industry to changes in the regulatory regime though with a caveat with regard to sustainability as tariffs/incentives are reduced. This has been particularly important for export growth and has also impacted on the type of export growth, which may have adverse consequences for industry integration and longer term development. Imports have grown but have not seriously exceeded expectations, profit margins have come under pressure but this does not appear to have seriously affected investment and may actually have spurred decisions on major investments as a result of longer term strategic positioning by parent companies. The strategies of the vehicle manufacturers can be crudely grouped according to the home base of the parent company with German based firms, in particular, being far more advanced in terms of the level of integration into the activities of the parent company and actively co-operating to secure investments by first tier suppliers. The strategic response by component firms is also contingent on levels of linkage with major foreign firms.

## Project 3

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1) Name of Researcher(s): Arnaldo Camuffo; Giuseppe Volpato. Department of Business Economics and Management, Ca Foscari University of Venice.

2) Working Title of Project: **The Internationalization of the Italian Auto Industry**

3) Summary of the Research Topic/Questions:

The project develops a longitudinal study of how FIAT Auto (and, more in general the Italian auto industry) is globalizing, focusing on the company's first world car platform, the "178" project. Building on original fieldwork carried on by the investigators in Fiat plants in 5 countries (Argentina, Brazil, Morocco, Poland and Turkey), where the models (Palio, Palio Weekend, Siena, Palio pick-up) deriving from "178 platform" are currently manufactured, the project analyzes: 1) platform birth, 2) product design and development, 3) manufacturing and supplier base start-up in 5 plants, and 4) global sourcing and logistics management.

4) Summary of Research Status:

For each of the above mentioned 4 points, the investigators collected data and documentation, and interviewed FIAT managers in Argentina, Brazil, Morocco, Poland and Turkey. Three draft versions of papers are currently available.

5) Summary of Research Results to Date.

In contrast to other automakers that have designed vehicles with common "global" underbody platforms while retaining the ability to adapt body, trim levels and ride characteristics to a wide range of local conditions, Fiat Auto's "world car" concept and globalization strategy is more ambitious and complex, since the standardization of the 5 models stemming from the 178 platform involves absolute cross-country compliance not only of interior/exterior design and contents but also of quality levels, robustness and European rules in terms of safety and pollution control. The results of this project concern five major areas: 1) Product development process, the world car concept adopted by FIAT Auto, the platform concept adopted at Fiat Auto, and the dynamics of the platform. 2) Global sourcing. The double network: the global supplier base for project 178 sourcing consists of both internal and external supply chains. 3) Global manufacturing. The major findings regard concern Fiat's transition from lean to modular manufacturing, how this transition varies among different manufacturing locations (4 countries); and a cross-plant analysis of technologies, work organization, human resource management systems. 4) Global logistics. The major findings concern Fiat's world material flow concept and the company's management of information and physical logistic flows. It is likely that Fiat's "178 project" is a unique experience in the auto industry. It shows a peculiar pattern of globalization and gives examples on the one hand of approaches, tools and policies for global sourcing, manufacturing and marketing of a "world car", and, on the other hand, of typical problems and downsides of globalization, such as the impact of product design changes on global sourcing and manufacturing, the difficulty to balance activities across manufacturing locations and suppliers, and the organizational adjustments required by both central (e.g.: purchasing department) and local (e.g.: degree of supply chain direct control in different countries) units.

## Project 4

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1. Name of researcher(s): Takahiro Fujimoto (Tokyo University), Chunli Lee (Aichi University, Jin Chen (Tokyo University)

2. Working title of project: **Globalization's Impact on the Chinese Automobile Industry: Policy Assessments, Typology of Strategies and Management Influences of Foreign Companies**

3. Summary of Research Topic/Questions:

This research aims to shed light on the relationship between China and foreign companies in the context of globalization and the wider background of the world economic dynamism. The research has developed:

- 1) assessments of FDI related policies and its impacts on the development of China's automotive industry,
- 2) a typology of the strategies of automakers from Japan, Europe and the United States, and
- 3) an analysis of the application of "lean" principles First Automotive Works.

The research has been based on field surveys, company interviews and analyses of public statistical data.

4. Summary of Research Status:

Complete.

5. Summary of Research Results to Date.

The Chinese government is striving to foster its own automotive industry and is not interested in turning China into an expansion base for European, American, or Japanese auto industries. This intention of the Chinese government is made clear by the fact that foreign companies are not allowed to have majority (over 50 percent) share holding in a joint venture project for the production of finished vehicles. In other words, we believe that foreign auto manufacturers in China will never surpass the role of assistance provider. Foreign automotive companies are accepted in China strictly to help promote the Chinese auto industry and the independence of China itself.

The three types of strategies of followed by foreign companies in China's passenger car market are as follows:

- building on the advantage of "pioneer status" & strong supplier network (Shanghai VW),
- making intelligent choices about which car models to introduce and then following a low price strategy (Tianjin Automotive Industry Co.), and
- the big late comer approach catching up by making use of existing supplier networks (Dongfeng Citroen Motor Co.).

In a large context of worldwide Japanization, Chinese automotive companies introduced the Toyota production system earlier than American and European firms. In the late 1970s First

Automotive Works (FAW) began to introduce the philosophy of the Toyota production system under the direct technological instructions of Taiichi Ohno, who was born in China. Ohno conducted seminars and on-the-spot technological instructions at FAW in 1977 and 1981. He not only harshly criticized the existing mass production system of FAW, but also taught FAW by providing them with an example of how to change the lay-out of production line. They also built a typical Toyota-style transmission plant which received technological assistance from Hino Motor Co. of Toyota Group in the 1990s. These efforts have contributed greatly to the evolution of the production system in FAW.

## Project 5

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1. Name of researcher(s): Takahiro Fujimoto (Tokyo University), Moreno Muffatto (Padova University), Yasuo Sugiyama (Tokyo University: at Wharton School in 1998-99)

2. Working title of project: **Globalization and Automobile Design**

3. Summary of Research Topic/Questions:

What is the impact of globalization on the vehicle development process? How far can a company go in creating global cars and/or global platforms, and under what conditions? What are the trade-offs involved? How are vehicle models altered to fit local markets? What experiences have companies had with international design efforts?

4. Summary of Research Status:

We have finished most of the data collection activities through questionnaires in Japan. Data collection in Europe and US is lagging behind the Japanese cases. We have made feed-back presentations of the interim report (in Japanese) for most of the Japanese companies and one European firm. We are also discussing future research collaboration with researchers in Brazil. We are also collecting further clinical data for selected international R&D projects.

5. Summary of Research Results to Date.

As for the analysis of the Japanese data set, one of our main findings is that the most important motivation of the overseas locations of R&D facilities is not necessarily the existence of the local market, but the presence of local suppliers. Using the term of Prof. von Hippel (MIT), information for local customer problem solving may be less "sticky" than local supplier problem solving, so automakers are choosing to locate parts of their R&D facilities where there are local parts suppliers, rather than where there are customers. On the clinical research side, Fujimoto and Sugiyama made an in-depth study of Japanese auto makers' product development for Indonesian market. We identified a relatively successful design strategy: new derivative model from old platform, which may make the cost-differentiation trade-off more effectively than other strategies. We found that auto firms may choose this particular strategy in a path-dependent or emergent way rather than through deliberate choices. Also, when the Asian economic crisis struck in 1997, some of the models that had been adapted accurately to the local requirements turned out to be "over-adapted" vehicles because these country-specific models could not be exported easily to foreign markets. Thus

there may be dynamic paradox of the organization's adaptation capability leading to its product's over-adaptation.

## **Project 6**

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1) Name of researcher(s): Sumila Gulyani

2) Working title of project: **The Links Between Lean Production, Industrial Competitiveness, and Infrastructure in Emerging Economies: Evidence from the Indian Auto Industry**

3) Summary of Research Topic/Questions:

This study focuses on the following questions: How does poor infrastructure, in particular, unreliable power and transportation, affect the costs and competitiveness of auto firms in India? How do firms cope?

4) Summary of Research Status:

I have completed my Ph.D. dissertation on this topic. Over the fiscal year 1999-2000, I have written three papers -- one of these is forthcoming in World Development (Oct. 1999) and two are under review for publication.

5) Summary of Research Results to Date:

Auto assemblers in a developing country like India find that poor infrastructure is a major obstacle in implementing lean and just-in-time production. As a result, assemblers are devising elaborate and often highly innovative solutions to solve infrastructure problems not only at their own assembly plants but also those at their supplier plants. To offset infrastructure constraints, assemblers are altering and adapting some of the standard competitive strategies that they use in their home countries. For example, assemblers like Maruti-Suzuki, Ford, Hyundai, and Daewoo are requiring their component suppliers to move within a radius of about 80 km from their plants to overcome freight transportation constraints that prevent implementation of just-in-time/lean production systems. To counter power problems, Maruti-Suzuki, India's largest carmaker, has invested in a gas turbine power plant and is hooking up its component suppliers this system. Overall, infrastructure constraints are strongly influencing assemblers' sourcing strategies, supplier selection criteria, assembler-supplier relations, and the emerging geography of production in the Indian auto industry.

## **Project 7**

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1. Names of Researchers: Kaye Husbands, Lorraine Eden, Maureen Appel-Molot

2. Working Title of Project: **Lean Production and NAFTA: A Survey of Canadian and Mexican Automotive Parts Suppliers.**

### 3. Summary of Project:

The project analyses the responses of plant managers in the parts sectors in Canada and Mexico to lean production (endogenous to the firm) and NAFTA (exogenous). The survey will generate a data set that will allow us to test a range of hypotheses by firm size, ownership, location, and relationship with suppliers, etc. We pose a range of questions to our respondents, among them the use of technology, frequency of contacts with major suppliers and the nature of these contacts, increases or decreases in the number of producers, and, if relevant, relationships with other parts of the company. The Canadian survey results are in and the data is in the process of being analyzed. The Mexican survey is now in the field and we are hopeful that we will complete this aspect of the project soon. We can then begin some comparative analysis. The project fits into the Globalization Research program insofar as it addresses supplier-assembler relationships and the pressures suppliers are experiencing in the face of industry as well as national economy policy changes.

### 4. Summary of Research Status:

As noted, the Canadian survey has been completed, the Mexican one is currently in the field. We hope to do interviews at a select number of Canadian parts plants as a follow up to the Canadian segment of the research. Our survey sample includes Canadian owned firms, three subsidiaries of the Canadian multinational Magna and plants owned by non-Canadian MNEs. Our intention is to interview executives from all three categories on issues such as their perception of the environment in which they are making decisions, the evolution of their relationship with their major customer, their acquisition and use of technology, the pressures on plants of varying sizes as OEM expectations of parts producers change, etc. We had hoped to conduct the interviews at the Canadian plants in the first six months of 1999; however, some difficulties in getting the data entered and analyzed has delayed our progress. It is our intention to do these site visits as soon as possible. There are three primary purposes for the interviews with executives from firms participating in our study:

- To validate the results collected from the survey.
- To gather information to help us interpret the results obtained in the survey.
- To unmask and clarify issues related to plant responses to exogenous shocks that were not easily discernible from our data. Interviews will provide a better understanding of the complexity and dynamics inherent in the plant manager's decision making under uncertainty.

We are also in the process of creating a data base of Canadian and Mexican auto parts plants, that combines the primary data from our surveys with secondary data from the ELM Guide's 1998 electronic data base. Dr. Eden has an MIS graduate student working with her this summer setting up the data base. This new database should provide us with detailed information on our parts plants, facilitating more in-depth analysis of plant responses based on their characteristics.

### 5. Summary of Research Results to Date:

A very preliminary analysis of some of the Canadian data suggests that lean production and concerns about competitiveness are the critical drivers for change among Canadian parts producers. Since there has been virtually free trade in autos and auto parts between Canada and the US since the implementation of the Auto Pact in January 1966, it is not surprising that few respondents felt NAFTA had had any impact on their operations; a few spoke of



increased business opportunities. (We expect a different response in Mexico, with the pressures generated by NAFTA deemed more significant. Mexican parts suppliers face a double challenge, adjustment to a less protected economy as well as to demands of lean production.) The most critical responses among Canadian plants appear to be quality upgrading, implementation of CAD/CAM, and introduction of robots in the appropriate places. These are the responses which all high performers (defined by profits as a percentage of total sales) and MNEs executed. It is clear that even if plants initiate these responses to exogenous shocks, other plant characteristics are important for high profits to be maintained or obtained. The majority of low performing plants also utilized this technology upgrading strategy, an indication of a necessary but not sufficient undertaking.

## **Project 8**

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1. Name of Researchers: Roberto Luchi, Julio Sanchez Loppacheer, Javier Mones Cazon

2. Title of Project: **Improving Competitiveness in Manufacturing: Value Chain Issues Dealing with the Automobile Sector in Argentina and MERCOSUR**

3-4-5. Summary of Research Topic/Results: This paper describes the challenges being faced by different participants in the automobile sector value chain during MERCOSUR market consolidation. This is an extended case study that analyses in depth actions that different companies have carried out, both in their internal operations management and with their customers and suppliers. The research highlights several aspects of the Argentine automotive value chain: difficulty in managing relative developments speeds within the value chain; how the uncompleted regulatory framework is blocking synergy in a regional context; different operational strategies followed by assemblers to cope with market pressures (e.g. "greenfield" vs. resource improvement approaches), and weak links in the value chain, especially suppliers and dealers. The paper recommends future efforts by assemblers to calibrate the development speeds of the entire value chain from the early phases of their investment project planning in order to improve competitiveness.

Methodology: A clinical research method of phase studies was chosen in order to get in-depth results. Several participants were selected from across the value chain, from suppliers of raw materials up to customer satisfaction management. The cases analyzed were, among others: General Motors, Mercedes Benz, and Fiat (assemblers); Cibie and Valeo (first tier suppliers); and Furlong (pre-delivery services and automobiles).

## **Project 9**

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1. Name of Researcher: Koichi Shimokawa

2. Working Title of Projects: **A) The Japanese Automotive Industry in ASEAN. B) Global Sourcing and the Changing Structure of the Japanese Parts Industry**

3. Summary of Research Topics/Questions:

A) What is the emerging structure of the Japanese automotive industry in ASEAN? B) What geographic patterns are emerging in the Japanese automotive parts industry at the global level?

#### 4. Summary of Research Status:

Two working papers are in preparation (A&B). Working paper A, entitled "Direct Investment and the Development of an International Division of Labor by Japanese Automotive Companies in Asia" is complete. Working paper B, entitled "Global Sourcing and the Changing Structure of the Japanese Parts Industry" will be ready in September, 1999. Ongoing research will extend both of these research projects into the year 2000.

#### 5. Summary of Research Results to Date:

A) This project describes FDI by Japanese automotive firms in ASEAN, with special attention to the expanding division of labor and technology transfer. Comparisons are made between the automotive industry and the electronics industry. The strategies of companies in both of these sectors have changed radically since the onset of the emerging market financial crisis in the Summer of 1997, when falling production volumes forced a switch to export oriented strategies. It appears that the electronics industry has had an advantage over the automotive industry in making this shift because of more adaptable production networks.

B) This project describes the basis issues associated with global sourcing, including emergent global sourcing strategies, product development integration strategies, Japanese automaker's global strategies and the changing keiretsu system, the restructuring of the world automotive components industry, and the future prospects of global sourcing in the context of changing global product strategy. Addition research will explore how mega-consolidation impacts the viability of flexible production systems.

## **Project 10**

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1. Name of Researchers: Timothy Sturgeon (MIT), Richard Florida (Carnegie Mellon), Teresa Lynch (MIT), Aya Okada (MIT), Kiyooki Aburaki (MIT), Juan Pea Acosta, (Carnegie Mellon)

2. Working Title of Project: **Globalization and Jobs in the Automotive Industry**

3. Summary of Research Topic/Question:

As we enter the new millennium, globalization has emerged as one of the most salient and powerful forces shaping domestic and world economies. Accordingly, a debate has emerged in recent years over the causes and consequences of globalization. On the one side of the debate are the advocates of globalization, the so-called globalization optimists such as Robert Riech, Paul Krugman, and George Gilder. On the other side of the debate are the globalization pessimists, such as Dick Gephardt, Jeremy Rifkin, Bill Greider, Pat Buchanan, and Ross Perot, who counter that globalization is leading to greater economic instability, eroding the power of nation states to shape their destinies, and eroding wages and working

conditions for workers in both advanced and emerging economies. Thus far, the debate has proceeded with little in the way of solid empirical research on the actors that are directly shaping globalization at the industry-level nor on effects of globalization on employment. In the past several years, there have been several studies which outline the broad phenomenon of globalization and make some assessments at the macro-level, but there remains a lack of empirical studies at the industry-level. This study was designed to fill that gap. The study has explored the factors driving globalization in the automotive industry and has begun the task of exploring the effect of globalization on the quality, quantity and location of jobs in that industry. The central hypothesis of our work is that globalization is causing a shift in the source of competitive pressure, and of competitive advantage, from excellence at the point of production, now more or less assumed, toward excellence in governing spatially dispersed networks of plants, affiliates, and suppliers.

Guided by this hypothesis, the research has focused on three related questions:

- What are the determinants of the globalization?
- What is the effect of the current wave of globalization in the industry on the location, quantity, and quality of employment?
- How are changes in the organizational structure of the industry affecting the architecture of global production networks in the automobile industry and hence, the location of jobs?

To shed light on these questions the research consisted of four elements:

- Plant-level databases of automaker and supplier facilities.
- Interviews.
- Field research and site visits.
- Archival and historical research.

#### 4. Summary of Research Status:

Complete.

#### 5. Summary of Research Results to Date:

Globalization is changing the economic geography of the automotive industry.

- There has been a wave of new assembly and supplier plant construction in places such as China, India, Thailand, Vietnam, Brazil, Mexico, and East Europe. These new investments are being driven by increased competition and market saturation at home, the opening of vast new investment spaces since the end of the Cold War, host country requirements for local production, and an effort by automakers to cut costs within the context of regional trade arrangements such as NAFTA and the European Union.
- Even so, the automotive industry remains overwhelmingly concentrated in the developed economies of Japan, Europe, and the United States.

Globalization is creating new challenges and opportunities for corporate strategy.

- Globalization strategies vary depending on the starting point of individual firms, but there seems to be a large measure of convergence toward 1) building vehicles where they are sold; 2) designing vehicles with common "global" under-body platforms while retaining the ability to adapt bodies, trim levels, and ride

characteristics to a wide range of local conditions; and 3) leveraging the move to global platforms by creating assembly capacity that is more "generic" and less model-specific. On the other hand, there is less convergence on the strategies of increased outsourcing and making vehicle assembly more "modular."

- Automakers have employed a series of measures to lower the minimum scale of vehicle assembly plants to reduce the risk of emerging market investments. These measures include starting with small, flexible and expandable "complete knock down" (CKD) assembly plants; sharing large capital expenditures (e.g. paint shops) with other automakers; increasing reliance on suppliers; and moving to modular vehicle designs to simplify the final assembly process and reduce initial investment requirements.
- The newest assembly plants in emerging economies as test-beds to experiment with innovative forms of work and industry organization, especially by American and European automakers. There have been and will continue to be attempts to use the lessons learned in emerging markets to transform existing operations in the traditional centers of the industry, but this process is proving to be extremely difficult.

Globalization is having a significant impact on industry structure.

- Globalization is changing the nature of relationships between automakers and key suppliers. As first-tier suppliers take on a new, larger role in the industry, we are seeing the concomitant emergence of "global suppliers;" firms that have the capability to coordinate and deploy component manufacturing on a global-scale. First-tier suppliers are moving to module design, second tier component sourcing, and the provision of local content in the context of emerging markets. The growing need to provide automakers with modules on a worldwide basis is driving a wave of consolidation and geographic expansion among first-tier suppliers. For suppliers that serve multiple automakers, the geographic scale of operations can surpass that of any single customer. In the long run it may well be suppliers, not automakers, that generate the vast majority of the industry's future foreign direct investment (FDI), and associated economic and social benefits (e.g. employment).
- The recent spate of investment in emerging markets has all the earmarks of a classic speculative over-extension: too many investments chasing too few buyers. Speculative over-investment in emerging markets, greatly exacerbated by the recent economic crisis in Asia, has combined with sluggish vehicle sales in all large existing markets except for the United States to create a true overcapacity crisis in the industry. Overcapacity, along with the rising cost of global platform development, is driving a wave of mergers at the automaker level.

Globalization is having a variety of effects on the quantity and quality of jobs.

- The quantity of jobs in developed countries has remained more or less constant during the past ten years. In the United States the automotive sector actually added 103,000 workers between 1993 and 1996. At the same time, there has been an erosion of job quality, especially in the United States, as work has shifted from automakers to suppliers, where pay is usually lower. Still, the potential for massive downsizing is real (and especially acute in Japan) as vehicle manufacturing continues to shift to new locations.

- Especially alarming because of the potential impact on jobs in United States and Northwest Europe is the sudden jump in finished vehicle imports from Mexico, Canada, Spain, and increasingly, East Europe. The negative employment impacts of these shifts have been muted, so far, because the assembly plants in these lower-cost locations rely to a significant degree on parts imported from the traditional centers of the industry.
- The consolidation of design activities in core locations has helped to re-energize the traditional centers of the automotive industry (such as the Detroit metropolitan region) with high paying research, design, engineering, and administrative jobs.
- Employment gains in emerging economies have been modest, given the small size of initial investments and low levels of local sourcing, but the jobs that have been created appear to be of extremely high quality by local standards.

## **Project 11**

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1. Name of Researcher: Eric Thun

2. Working Title of Project: **Changing Lanes in China: Developing the Auto Industry in an Era of Reform**

3. Summary of Research Topic/Question:

Five regions in China have attempted to construct a network of local automobile supply firms to support a joint venture (JV) assembly project, and the degree of success has varied widely. Because creating a modern automotive sector necessitates the development not only of a core assembly plant, but due to the extensive forward and backward linkages in the industry, an entire industrial sector composed of hundreds of firms, coordination is critical. Foreign partners can provide the capital, technology, and knowledge necessary for development at the core assembly plant, but these same key ingredients must disseminate throughout the network of local supply firms. During the reform period in China, local governments have had both the autonomy and the incentive to promote local development, and because they have utilized different policies and organized their regional economies in different ways, it is possible to compare alternative economic systems at the sub-national level. It is an excellent "laboratory" for comparative research. Of the five cities in China that have joint venture assembly plants, only Shanghai has succeeded. Why has Shanghai, in comparison to Beijing, Changchun, Guangzhou, and Wuhan, been so much more successful in developing manufacturing capability in this sector?

4. Summary of Research Status:

Complete.

5. Summary of Research Results to Date:

Auto sector development in Shanghai demonstrates the way in which the investment role of local government and a hierarchical institution can facilitate the development of a network of supply firms capable of supplying components that meet the quality standards of joint venture assembly projects. Shanghai has been able to develop this manufacturing capability

because the local government compensates for underdeveloped capital markets by taking on the role of capital accumulation and investment bank, and the hierarchically organized conglomerate facilitates the process of technology transfer, cooperation with foreign firms, and the development process for small firms within the supply network. An institution which is modeled after a modern corporation provides coordination and assistance to small firms which are struggling to adjust in a transitional economy. A problem that is just beginning to emerge in Shanghai, however, is that the same institutions which promote the development of manufacturing capability in early stages of development, increase the difficulty of promoting competitiveness. Initial success depends on institutional structure, but continued success depends on institutional change, and politics makes change of this sort extremely difficult.