Research Note: The Globalization of Automobile Production

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Introduction

This paper is based on research from an in-progress project on the effect of globalization on competition and jobs in the automotive industry.[3] Its purpose is to gain a clearer picture of the emerging economic geography of automobile production. The project has found that automakers and their Tier 1 suppliers are aggressively internationalizing their operations in search of new markets and lower production costs. At the same time, the largest automakers are attempting to centralize the product development and corporate control functions of their organizations in their home locations, where they are working more closely than ever with Tier 1 suppliers. We believe that both the centrifugal and centripetal aspects of the "globalization" process will have important long-term effects on the character of competition; and the quantity, quality, and location of jobs in the sector. Moreover, many analysts who watch the automotive industry closely warn that the aggressive offshore investment that we are seeing today will create conditions of severe excess capacity in the near- and medium-term. A major "post-globalization shakeout" could permanently alter the competitive landscape of the industry and have disastrous consequences for the employees of the firms that lose.

This paper provides a discussion the issues that have been raised by the project's research so far. The first phase of the field research has consisted of a series of on-site interviews at automaker and Tier 1 supplier headquarters in Europe, Japan, Korea, and the United States. The headquarters interviews have focused on four themes: 1) new market identification and facility planning; 2) automaker-supplier relations both at home and abroad; 3) the commonalization of vehicle, component, and process design; and 4) geographic variations in methods of worker recruitment, training, and work organization.

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[3] The project is being undertaken by a team of researchers from the Massachusetts Institute of Technology (MIT) and Carnegie-Mellon University in cooperation with the International Motor Vehicle Program (IMVP) at MIT and is funded by the Alfred P. Sloan Foundation. Dr. Richard Florida of Carnegie Mellon

A second phase of the research, to be completed in 1998, will involve visits to selected on- and off-shore production sites. At the time of this writing, we have completed the first phase of the research in the United States and Europe. Since the headquarters interviews in Japan and Korea have not yet been conducted, the following discussion will inevitably be canted toward the perspective of American and European firms. Furthermore, some of the data that we will provide are not yet complete, and are presented in draft form.

The paper is organized in four sections. Section One presents the typology of locations that the project has developed as a way to make sense of the data we collect. Section Two presents the empirical case: the geographic spread of automobile production. Section Three discusses some of the factors that are driving the new investment, especially slow growth and increased competition in established markets. Section Four outlines the strategic responses of automakers to the increased risk and operational complexity caused by the globalization process itself.

1) BEMs, PLEMAs, and LEMAs: A Typology of Production Locations

In order to conduct our research on the globalization of automobile production more effectively, we have devised a typology of production locations as a basis for comparison. There are too many existing and planned production locations and too many automakers for any simple list of new plants to shed much light on the process of globalization. We have segmented the types of production locations that are available to automakers into three broad categories: 1) Large Existing Market Areas, or LEMAs, such as the United States and Canada, West Europe (excluding the Iberian Peninsula), Japan, and Australia; 2) Peripheral to Large Existing Market Areas, or PLEMAs, such as Mexico, Spain, Portugal, and East Europe; and 3) Big Emerging Markets, or BEMs, such as China, India, Vietnam, and Brazil. A fourth type of production location that is sometimes used in the analysis, HOME, is actually a subset of the LEMA category. HOME represents the country (or

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University is the Principal Investigator and Dr. Charles Fine of MIT serves as the liaison with the IMVP. Timothy Sturgeon is the project's Director.

region) where an automaker's headquarters are located, such as General Motors in the United States, Volkswagen in West Europe, Toyota in Japan, or Hyundai in South Korea.

The reason we have chosen this typology is because there are different strategic goals behind locating production in each market type. Because of high operating costs, LEMA locations outside of HOME (widely referred to as "transplants") are chosen when automakers are sure of their market, perhaps because it was previously established through successful exporting. The assumption of the automakers we spoke with is that locating in LEMAs will garner the maximum amount of good will from the host government, as well as from consumers, who tend to buy locally-built vehicles for nationalistic reasons. Because sales growth is stagnant or negative, there are limits to growth in LEMAs beyond import substitution. Expansion in a firm's overall sales can only come when market share is captured from other automakers. Thus, LEMAs are a zero-sum game.

The principal strategic role of PLEMA locations is to provide a proximate low-cost environment from which to supply large existing markets. While such locations do not provide the same political or consumer payoffs that LEMA locations do, they do provide trade benefits because they share, or are expected to soon share, common markets with LEMA economies (e.g. NAFTA and the EU).[4]

BEMs provide automakers with opportunities to participate in growing markets. Where market penetration is low and populations are large (e.g. China and Vietnam) the potential for growth in BEMs is huge. Table 1 shows that passenger vehicle sales growth rates in BEMs, though in many cases starting from a small base, are, on average, far outpacing growth in established markets (LEMAs). The intent of locating new plants in BEMs, then, is to establish an early market presence in high-potential emerging economies as a way to ensure participation in the automotive market as it develops. Because BEMs are expanding, growth can come even when market share remains unchanged.

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[4] We have placed the Eastern European countries in the PLEMA category even though they do not yet share a common market agreement with the EU, and contain assembly plants that are currently focused on supplying local markets. There is widespread expectation that the EU will be broadened to include some

Table 1 presents some of the data collected for the project according to the locational typology outlined above. It reveals some stark differences among them. First, market penetration, calculated by dividing the total country population by the number of passenger vehicles in operation, is much lower, on average, in BEMs than in LEMAs or PLEMAs. Second, wages, on average, are very high in LEMAs and very low in BEMs, with PLEMA locations providing a middle ground that makes them attractive for exporting to LEMAs (along with their spatial proximity). Third, as already mentioned, BEMs are growing much faster than other markets, with most of the growth coming from locally manufactured vehicles (the rate of growth in production in BEMs is not far behind sales growth). For a more detailed presentation of this data, refer to Table 6 in the appendix.

Table 1. Passenger Vehicle Production Location Types: Market Penetration, Auto Sector Wages, Sales Growth, and Production Growth (note: unweighted averages underrepresent large markets)

Location Type	People/Car 1993	Weekly Wages 1991	Average Annual AAGR '85-'95	Sales Growth AAGR '90-'95	Avrg. Ann. Production Growth AAGR '85-'95	AAGR '90-'95
Large Existing Market Areas	**2.2**	**578.4**	**-0.6%**	**-3.1%**	**0.8%**	**0.0%**
range:	1.7 to 2.6	480 .0 to 712.7	-5.3 to 3.4%	-10.5 to 1.7%	-8.9 to 3.9%	-9.3 to 4.1%
Peripheral to Large Existing Markets	**5.8**	**174.2**	**1.5%**	**-7.7%**	**5.4%**	**3.5%**
	2.8 to 11.2	51.9 to 433.6	-7.0 to 7.2%	-19.6 to -0,4%	1.8 to 9.6%	3.2 to 4.0%
Big Emerging Markets	**149.4**	**109.3**	**16.9%**	**16.1%**	**13.8%**	**15.8%**
range:	6.7 to 950.2	20.5 to 384.6	-4.4 to 52.6%	-9.7 to 42.3%	-5.2 to 51.1%	-11.2 to 50.0%

Sources: People/Car: calculated from country statistical yearbooks and Wards PARC; Weekly Wages: OECD; Sales and Production Growth: Wards Decade of Data

Using the locational typology of LEMA/PLEMA/BEM has allowed us to see the component parts of the globalization process more clearly, and to make comparisons among them. Through the use of this typology, previous analysis of foreign direct investment for automobile production, of the "transplants" for example, can be placed in the broader context of globalization. The typology also allows us to separate PLEMA locations from BEM locations. While these two locational types are quite different, as Table 1 reveals, they are often lumped together in discussions of globalization.

East European countries in the near- to medium-term. When such a pact is made, we believe that many of

2) The Empirical Case: Globalization of Automobile Manufacturing

Since the early-1980s the automotive industry has been undergoing an unprecedented boom in new "offshore" automobile assembly plant construction in large existing and emerging markets (LEMAs and BEMs). The wave was initially propagated by Japanese firms investing in North America but is now being driven in large part by American and Korean firms investing in BEMs such as China, India, the ASEAN nations, Brazil, Argentina, and Russia. While Table 2 is drawn from an as-yet-incomplete data set, it clearly demonstrates several points. First, as just mentioned, there has been a shift in both the origin and destination of new assembly plant investments. In the 1980s, most new assembly plants were established by Japanese firms in the United States. In the 1990s, the bulk of the new investment activity has come from American and Korean firms establishing plants in big (and some small) emerging markets (BEMs). Second, the pace of new investment picked up dramatically after the early 1990s. Third, even though Table 2 is missing some new investments by European automakers, these firms have been very conservative in their offshore investments. BMW and Daimler Benz are just now building their first integrated offshore passenger car assembly plants in the American South. Volkswagen is basing a large part of its global production strategy on its earlier investments in China, Brazil, and Mexico. Lastly, the size of new plants appears to have diminished rapidly, as far as we are able to judge from data on 1996 capacity.[5]

The recent and planned assembly-plant investments are being made in an environment of declining capacity utilization, making it likely that the industry will move into a period of severe overcapacity in the near future. In a report by AUTOFACTS, the automotive planning group of Coopers & Lybrand Consulting, it is estimated that excess capacity will reach 21 million units by 1998, more than one and one half times the total 1996 passenger vehicle output of North America. By most estimates capacity utilization

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the plants in East Europe will begin to supply the West Europe with finished vehicles.

[5] Obviously, some of this effect could be due to older plants growing over time.

today is at about 75%, which is a relatively low point at which to see a boom in new investment (in a "rational" environment one would predict that new investment would be made when capacity utilization is high).

Table 2. New Passenger Vehicle Assembly Plants by Type of Investment Location: Home Country of Investing Automaker, and Average 1996 Capacity, 1980-1998. (draft version)

New Plant Location Type	'80-'82	'83-'85	'86-'88	'89-'91	'92-'94	'95-'98
Large Existing Market Areas (US, Austrl, Can., W. Eur.)	AJ	JJ	JJJJJ	AJ	AJ	AKEE
Peripheries of Large Existing Mkt. Areas (Mex., Spain, E. Eur.)		J	AA	EE		
Big Emerging Markets (China, India, Brazil, Russia, Turky). Note: some "small emerging markets," such as Namibia and Botswana, are included in this data.	A			AEK	AAA KKKKKKK KK	AAAAAAA KKKKKKK KKKKKKK KK
Total New Plants per 3-Year Period	3	3	7	7	15	28
Average Unit Capacity in 1996 (earlier plants could have grown)	380,240	367,920	230,001	130,888	21,417	34,593

Key: A: American automaker; E: European automaker; J: Japanese automaker; K: Korean automaker.
Source: Globalization Project Assembler Database

The sheer volume of recent and planned investment, and the willingness that we found in our headquarters interviews for automakers to endure negative returns on new BEM investments, at least in the short-term, give the current capacity expansion all the earmarks of a classic speculative over-extension, where supply far outpaces demand as large groups of investors try to gain an early-mover advantage at the same time. In our headquarters interviews we found a corporate imperative to quickly establish "beach heads" in emerging markets at nearly any cost. Such imperatives are only sharpened when competitors make similar moves. What should decrease the attractiveness of a market, increased competition, is instead spurring automakers to redouble their efforts. Such is the irony of speculative bubbles, when a "herd mentality" rules investment decisions. If the threat of severe overcapacity is real then, the relevant question becomes: what are automakers doing to reduce their exposure to this risk? Since forgoing investments in BEMs is not seen as a viable option at most automotive assemblers, what other measures

that are being taken? After a discussion of the factors driving the new investment in Section Three, Section Four will try to provide some answers to this question.

3) Driving Factors

New vehicle assembly plant investments in BEMs and PLEMAs are being driven by slow growth and market saturation in LEMAs, where the bulk of manufacturing capacity currently exists. After growing steadily during the mid-1980s, world-wide annual sales of new passenger cars were stagnant from 1989 to 1995. According to Wards, worldwide annual sales of passenger cars grew at an average annual rate of 3.7% from 1983 to 1989, and then turned negative with an average annual rate of -.4% from 1990 to 1995 (see Table 4 and Figure 2 in the appendix).

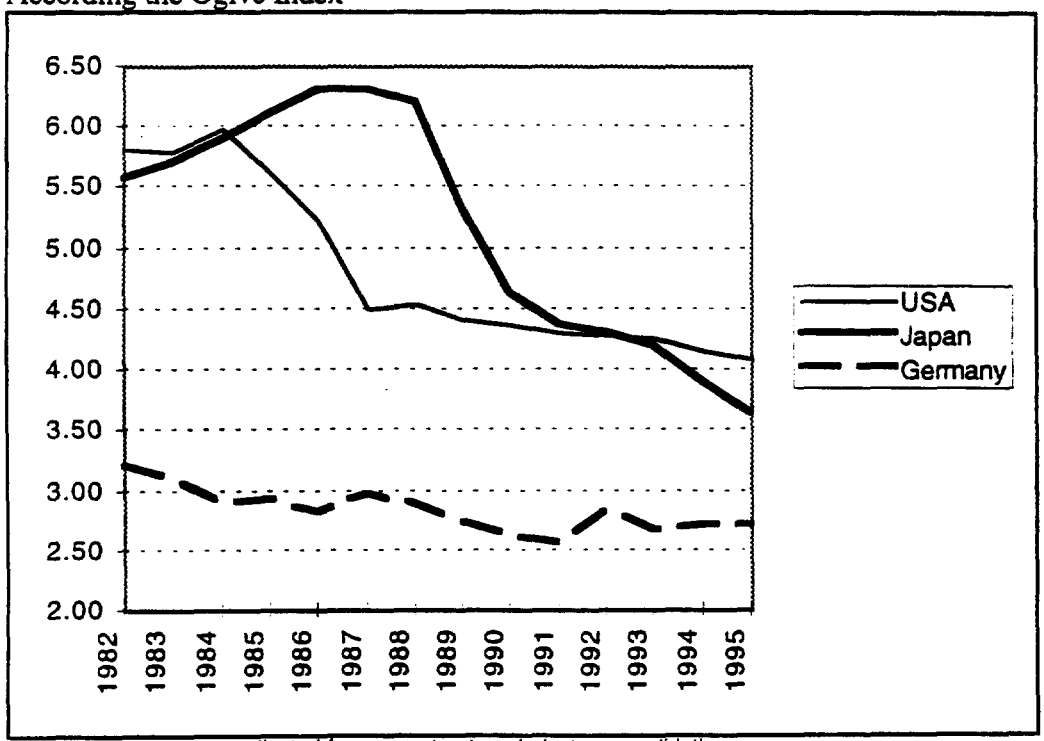
Growth is slow because market penetration is very high in LEMAs (as a general rule, we can say that a market with fewer than three people per car is saturated), leading to the obvious conclusion that future growth will occur in BEMs, particularly in countries with the largest populations, such as China and India. Table 5 in the appendix presents an international ranking of market penetration, measured as people per car in each country. The LEMA locations of the United States, West Europe, and Australia all had more than one car on the road for every three people in 1993, while the BEM locations of Vietnam, China, Pakistan, the Philippines, and India each had fewer than one car on the road for every 100 people. Vietnam tops the list with 986 people for every car in operation.

Beyond slow growth, LEMAs have become much more competitive. There has been an increase in the number of automakers selling cars in mature markets such as the United States, Germany, and Japan. Figure 1 presents an analysis of passenger vehicle sales in the United States, Japan, and Germany according the Ogive Index of diversity. The Ogive index would be zero if market share was evenly distributed among automakers. The index would be equal to the number of automakers (27) if a single company had 100% of national market share. Thus, the lower the index the more diverse the market. Figure 1 shows an across-the-board increase in market diversity in the United States, Japan, and

Germany, revealing the reason for the heightened competitive pressure that automakers have been experiencing in their home markets. Germany, as with most European countries, has long had a diverse automotive market due to the interpenetration of Europe's car markets by European automakers as well as the active presence of American firms. However, strong sales by Japanese automakers have brought the index down further since the late 1980s. In the United States, inroads by Japanese automakers increased the competitive pressure dramatically beginning in the early 1980s. In Japan, increased market diversity has come almost entirely from the success of smaller automakers such as Mitsubishi and Honda, and the declining dominance of Toyota and Nissan, as they "hollow out" domestic production by substituting exports with local production in LEMAs.

So, slow growth, market saturation, and increased competition at home have turned the attention of automakers to BEMs to tap growth markets and to a lesser extent, to PLEMAs to reduce the costs of selling in LEMAs.

Figure 1. Passenger Vehicle Sales in the USA, Japan, and Germany: Market Diversity According the Ogive Index



Note: the data was not adjusted for new entrants or industry consolidation.
Source: calculated from Wards Decade of Data.

Globalization is creating an increasingly complex organizational problem for automakers. As automakers stretch geographically, their organizational capacity becomes stretched as well. Each new plant that comes on-line must have everything needed to produce automobiles, including buildings, production equipment, personnel, material and components. Negotiating with host governments, establishing new plants, and building the local supply-base are all difficult and risky activities.

However, globalization is one of several strong trends driving change and adaptation in the automotive industry. First, automakers are trying to improve their organizations, particularly their manufacturing operations, by implementing the tenets of lean production. Following the path of continuous improvement requires a great deal of attention and monitoring. Second, with the issue of the environmental impact of motorization looming over the industry, automakers see an imperative to develop vehicles with low- or zero-emissions. Lastly, markets appear to be further fragmenting, putting additional pressure on automaker's design, distribution, and marketing capacity. All of these forces, globalization, lean production, environmental concerns, market fragmentation are increasing the development, process, logistics, and market complexity in the industry. The strategic responses to these pressures are outlined in the following section.

4) Strategic Responses: Standardization, Simplification, and Outsourcing

Automakers are employing a variety of measures that may have the effect of reducing the risk of over-investment. While some of these measures are explicitly intended to hedge against excess capacity, others are being pursued for different reasons but may have the complementary effect of reducing investment risk as well. In the former category are the practices of developing common "global" platforms, deploying common processes, and testing new markets with small but expandable plant designs. In the latter category are the practices of centralizing control and development functions in core locations, simplifying the final production process through modularization, and increasing

outsourcing to larger, more global suppliers. Taken together, these measures have the goal of simplifying the process of developing, manufacturing, and selling automobiles. Just as increasing the number of production locations creates complexity, a push for minimization in other areas of the enterprise can lead to simplification. Automakers are minimizing the size of their new investments, minimizing the number of unique parts in the automobiles they sell, minimizing the variety of the design and production tools they use, and minimizing the number of components they make in-house.

All the automakers we interviewed are, to some extent, creating global platforms to improve internal (proprietary) product and process standardization. Cars based on global platforms will then be tailored to fit local market conditions. Some automakers are attempting to take the further step of standardizing production fixtures across all similar-sized passenger vehicle platforms and models. The aim is to make productive capacity less model-specific. The more "generic" manufacturing capacity is, the less vulnerable it is to overcapacity problems. With enough standardization better selling models could be substituted on the production lines of underutilized plants on short notice. Standardization among manufacturing operations would also make the transfer of learning across a widely dispersed organization more likely.

The lowest risk approach to entering new markets is to test them by importing finished vehicles, but besides increasing prices dramatically, this approach is too slow when competing with firms that are making investments to "build-where-they-sell.". Most of the automakers we interviewed are trying to reduce their investment risk in new markets by building plants that can manufacture a range of products (to test market acceptance of various models before increasing model-specific investments), and that can be scaled up from low- to high-volume production in the face of increasing demand. This means that initial investments are for smaller, simpler plants (see Table 2, bottom row). Labor intensity, and therefore capital investment requirements, can initially be very low (in BEMs, low labor costs make this an even more attractive approach); dependence on suppliers and existing plants for modules subassembly and module kits can be initially

high; and capital-intensive processes (e.g. stamping, body welding, and body painting) can initially be done at existing plants and components shipped to new ones. Other approaches to investment risk reduction and market testing are complete-knock-down (CKD) kit assembly plants, with kits coming from "consolidation centers" that draw on existing plants and suppliers; consignment-style contract manufacturing, where kits are assembled by third party contract assemblers (e.g. the Astra Group in Indonesia and Steyr in Austria); and jointly operated plants, where capacity is shared among two or more automakers (e.g. Fiat and Peugeot in Argentina and Ecuador). Although small plants can grow bigger over time, the indication we got from our headquarters interviews was that maximum plant sizes are indeed shrinking. As one manager put it: "We will never build another monster [400K units/year plant]."

The automakers we interviewed that have had operationally independent international divisions are now attempting to centralizing corporate governance, purchasing, and development function in core locations. With development and purchasing centralized in core locations, new investments can confined to production, distribution, and service organizations. Centralization makes the process of developing common products and processes easier. Platforms designed centrally can then deployed on a global basis. Centralized purchasing can better strive to make the components, production equipment, and design tools that the company buys more common.

Automakers are also trying to simplify the final assembly process by increasing the number and complexity of sub-assemblies manufactured off the final assembly line. (Ironically, the increased throughput from modularization has the potential to exacerbate overcapacity problems.) With less complexity, line speed can be increased and the number of worker-hours spent assembling each vehicle can be reduced. Modularization allows final assembly lines to become smaller, simpler, and less expensive, per unit capacity. When combined with the concepts of common platforms and common production fixtures discussed above, the idea of modularization and line simplification becomes part of a powerful vision, where different car models can be assembled in any plant in any location

because the required production equipment is the same. While modular final assembly can well be pursued as an in-house production strategy, at most automakers the move to modules has been intimately connected to increased outsourcing.

Automakers are working with fewer, larger suppliers, and giving them a greater role in product and process development. Some component and module design tasks, as well as Tier 2 and Tier 3 supply-chain management, are being passed outside automaker organizations to Tier 1 suppliers. A recent wave of mergers and acquisitions shows a consolidation and intermingling of the North American, South American, and European supply-bases at the Tier 1 level. The Asian supply-base remains largely separate for now.

Tier 1 suppliers are also embarking on a wave of new plant construction in emerging markets, and, because they serve a variety of automakers, the largest and most global have facilities located in more places than any one of their customers. Highly capable suppliers with global operations reduce the size of the investments that their customers need to make to manufacturing in new markets. We call such suppliers "turnkey" because they provide a wide range of services that allow automakers to take a "hands-off" approach in the relationship. Besides design, turnkey suppliers purchase the parts needed for the modules they assemble. In the context of a plant in a BEM location, where the supply-base is likely to be poorly developed, the supplier takes on a significant amount of the responsibility for meeting local content goals, including the tasks of finding and developing Tier 2 and Tier 3 suppliers, and managing the logistics for the parts it must import.

An established base of internationally operating suppliers is a welcome thing to automakers locating production in new markets. Table 7 in the appendix provides a list of cities where three or more assembly plants owned by different automakers are located. The entire list, except for the PLEMA location of Setubal, Portugal, consists of BEM locations, and the average plant output is very small (25.5K units in 1995). The implication is that the new, smaller plants in BEMs are more interdependent, and share the supply-base in their immediate surroundings to a degree unheard of in LEMA locations.

Conclusion

Are there "best practices" associated with the globalization process? The headquarters interviews that we have conducted so far suggest that there may well be a consensus emerging among automakers about how best to create an efficient and flexible global-scale organization. However, as already pointed out, globalization is occurring in the context of other strong trends in the industry. The elements of this possible consensus, along with the other strong trends operating in the industry are presented in Table 3.

Table 3. Automobile Production: A Possible Consensus on Globalization Best Practices and Other Strong Trends in the Industry

Globalization Best Practices?	
	- Recognize unique market requirements - Develop vehicles that can be tailored to various markets - Manufacture locally - Build smaller plants that are flexible and expandable - Hire very selectively and build workforce loyalty - Attract existing suppliers to new plant locations - Transfer what is learned in one place to others - Move personnel from location to location
Other Strong Trends	
	- Modularization of final assembly - Lean production - Increased outsourcing

Source: Globalization Project Headquarters Interviews

The severity of future over-capacity problems depends on how effective automakers are in implementing and managing the complexity will arise from pursuing the mix of strategies listed in Table 3, some of which heighten the risk of investment. For example, rising productivity from lean production can increase the effective capacity of existing plants, exacerbating problems with excess capacity. But if done well and very, very quickly, some of the strategies outlined in Section Four could reduce the risk of over-investment. It may be that the capacity that is being deployed in BEMs is very different from what has come before.

Appendix

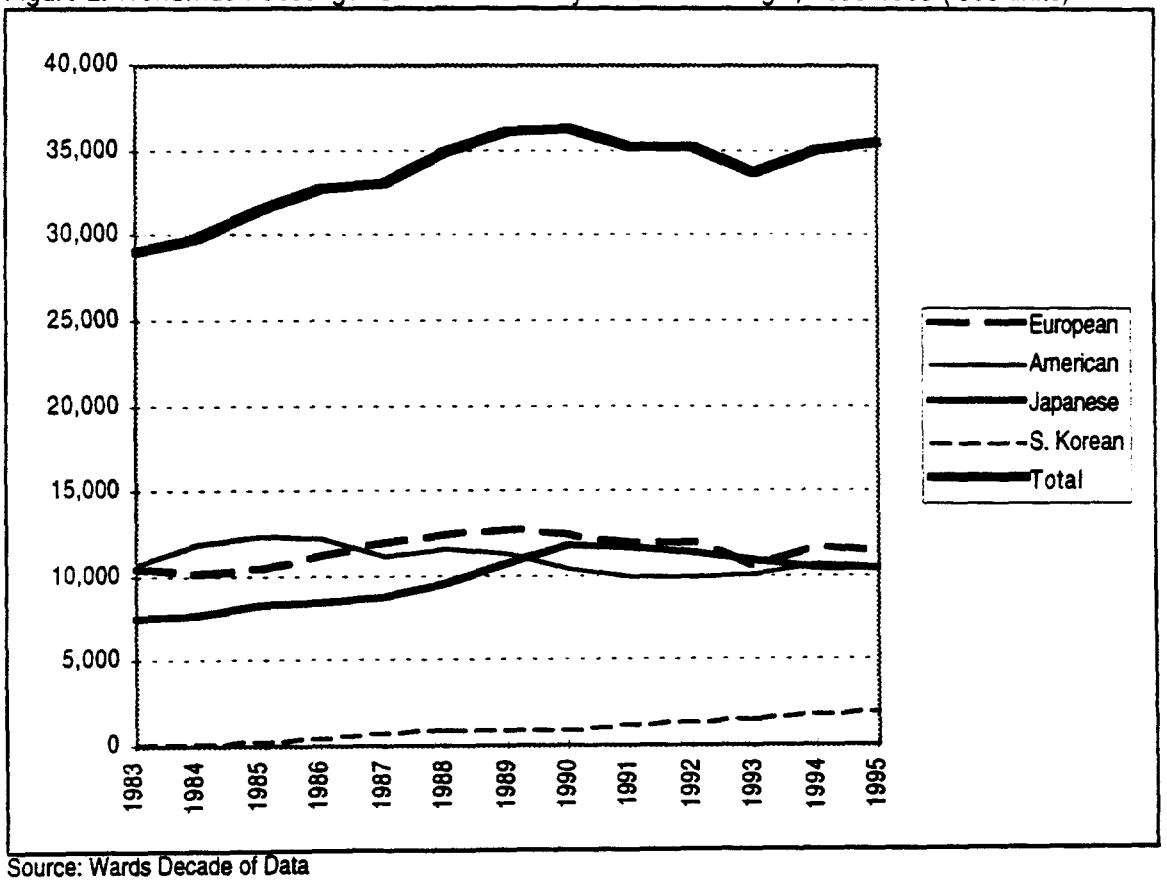
Table 4. Worldwide Passenger Car Production by Automaker Origin, 1983-1995 ('000 units)

	1983	1984	1985	1986	1987	1988	1989
European	10,461	10,062	10,434	11,244	11,880	12,440	12,645
American	10,752	11,905	12,401	12,194	11,222	11,605	11,353
Japanese	7,545	7,595	8,240	8,495	8,784	9,442	10,670
S. Korean	122	159	264	457	793	872	887
Others	172	230	275	362	489	516	558
Total	29,052	29,951	31,614	32,752	33,167	34,876	36,112
% change	9.3%	3.1%	5.6%	3.6%	1.3%	5.2%	3.5%
AAGR '83-'89							3.69%

	1990	1991	1992	1993	1994	1995
European	12,357	11,968	11,887	10,597	11,590	11,544
American	10,496	9,909	10,009	10,188	10,656	10,641
Japanese	11,777	11,594	11,409	10,820	10,431	10,474
S. Korean	994	1,186	1,322	1,607	1,806	2,006
Others	638	602	665	511	610	837
Total	36,263	35,260	35,291	33,723	35,094	35,503
% change	0.4%	-2.8%	0.1%	-4.4%	4.1%	1.2%
AAGR '90-'95						-0.42%

Source: Wards Decade of Data

Figure 2. Worldwide Passenger Car Production by Automaker Origin, 1983-1995 ('000 units)



Source: Wards Decade of Data

Table 5. Market Penetration by Reverse Ranking: People per Car by Country

Rank	Country	People/Car	Rank	Country	People/Car
1	Vietnam	950.2	21	Portugal	4.4
2	China	487.9	22	Ireland	3.8
3	India	244.9	23	Czech Republic	3.5
4	Pakistan	154.0	24	Slovak Republic	3.5
5	Philippines	118.2	25	Japan	2.9
6	Indonesia	107.9	26	Spain	2.8
7	Thailand	54.0	27	Netherlands	2.6
8	Columbia	36.5	28	Belgium	2.4
9	Turkey	21.2	29	Puerto Rico	2.4
10	Russia	15.9	30	Sweden	2.4
11	Brazil	13.2	31	France	2.3
12	Venezuela	12.6	32	United Kingdom	2.3
13	Mexico	11.2	33	New Zealand	2.2
14	Chile	10.8	34	Australia	2.1
15	Singapore	8.9	35	Austria	2.1
16	Korea	8.4	36	Canada	2.0
17	Argentina	6.7	37	Germany	2.0
18	Poland	5.5	38	Italy	1.9
19	Taiwan	5.3	39	Luxembourg	1.7
20	Hungary	4.9	40	United States	1.7

Source: Calculated from Country Statistical Yearbooks and Wards PARC.

Table 6. Passenger Vehicle Production Location Types: Market Penetration, Auto Sector Wages, Sales Growth, and Production Growth (note: unweighted averages underrepresent large markets)

Location Type/ Country	People/Car 1993	Weekly Wages 1991	Average Annual Sales Growth AAGR '85-'95	Sales Growth AAGR '90-'95	Avrg. Ann. Production Growth AAGR '85-'95	Production Growth AAGR '90-'95
Large Existing Market Areas	**2.2**	**578.4**	**-0.6%**	**-3.1%**	**0.8%**	**0.0%**
	1.7 to 2.6	480 .0 to 712.7	-5.3 to 3.4%	-10.5 to 1.7%	-8.9 to 3.9%	-9.3 to 4.1%
United States	1.7	682.1	-2.4%	-1.5%	-2.2%	0.9%
Italy	1.9	471.9	-0.2%	-6.1%	0.2%	-5.4%
Canada	2.0	646.7	-5.2%	-5.5%	2.2%	4.1%
Germany	2.0	712.7	3.4%	1.7%	0.2%	-3.2%
Australia	2.1	480.0	-0.8%	1.1%	-2.0%	-2.8%
New Zealand*	2.2	564.4	6.0%	-1.7%	-8.9%	-9.3%
France*	2.3	683.3	0.9%	-3.5%	0.1%	-3.5%
United Kingdom	2.3	522.5	0.6%	-0.6%	3.9%	3.4%
Belgium	2.4	UA	-0.5%	-5.4%	1.7%	0.1%
Sweden	2.4	522.3	-4.3%	-5.9%	-2.3%	-6.7%
Netherlands	2.6	564.7	-1.0%	-2.3%	-0.9%	-3.7%
Finland*	UA	512.2	-5.3%	-10.5%	-5.5%	-6.5%
Home Markets	**3.8**	**560.8**	**5.9%**	**1.1%**	**5.6%**	**3.1%**
	1.7 to 8.4	273.0 to 733.6	-2.4 to 23.1%	-3.7 to 12.3%	-2.2 to 22.4%	-5.2 to 15.7%
United States	1.7	682.1	-2.4%	-1.5%	-2.2%	0.9%
W. Europe	2.3	554.4	-0.6%	-3.7%	2.4%	0.8%
Japan	2.9	733.6	3.7%	-2.7%	0.0%	-5.2%
S. Korea	8.4	273.0	23.1%	12.3%	22.4%	15.7%
Peripheral to Large Existing Markets	**5.8**	**174.2**	**1.5%**	**-7.7%**	**5.4%**	**3.5%**
	2.8 to 11.2	51.9 to 433.6	-7.0 to 7.2%	-19.6 to -0,4%	1.8 to 9.6%	3.2 to 4.0%
Spain	2.8	433.6	4.1%	-3.2%	4.9%	3.2%
Portugal	4.4	178.1	7.2%	-0.4%	1.8%	4.0%
Hungary**	4.9	75.0	UA	UA	UA	UA
Poland**	5.5	51.9	UA	UA	UA	UA
Mexico	11.2	132.3	-7.0%	-19.6%	9.6%	3.2%
Big Emerging Markets	**149.4**	**109.3**	**16.9%**	**16.1%**	**13.8%**	**15.8%**
	6.7 to 950.2	20.5 to 384.6	-4.4 to 52.6%	-9.7 to 42.3%	-5.2 to 51.1%	-11.2 to 50.0%
Argentina**	6.7	384.6	UA	UA	4.5%	22.8%
Malaysia	7.6	78.2	UA	UA	UA	UA
Chile	10.8	UA	UA	UA	UA	UA
Venezuela	12.6	96.3	UA	UA	UA	UA
Brazil***	13.2	UA	6.3%	15.7%	5.6%	14.9%
Russia/CIS	15.9	UA	-4.4%	-9.7%	-5.2%	-11.2%
Turkey	21.2	195.7	UA	UA	15.0%	6.1%
Colombia***	36.5	53.8	UA	UA	UA	UA
Thailand	54.0	76.4	UA	UA	UA	UA
Indonesia	107.9	20.5	UA	UA	UA	UA
Philippines	118.2	43.5	UA	UA	UA	UA
Pakistan	154.0	UA	UA	UA	UA	UA
India	244.9	34.8	13.0%	16.1%	11.8%	12.5%
China	487.9	UA	52.6%	42.3%	51.1%	50.0%
Vietnam	950.2	UA	UA	UA	UA	UA

* Transport Sector, 1991; ** Transport Sector, 1993; *** Transport Sector 1992.
Sources: People/Car: calculated from country statistical yearbooks and Wards PARC; Weekly Wages: OECD; Sales and Production Growth: Wards Decade of Data

Table 7. Geographic Clustering of Passenger Vehicle Assembly Plants in Big Emerging Markets.

Firm	Country	City	1995 Production
Ford	Brazil	Sao Bernardo	212,000
General Motors	Brazil	Sao Bernardo	9,500
Toyota	Brazil	Sao Bernardo	4,500
General Motors/Suzuki/Isuzu	Colombia	Bogota	38,000
Hyundai	Colombia	Bogota	2,000
Mazda	Colombia	Bogota	25,500
General Motors/Suzuki	Ecuador	Quito	6,000
Mazda/Mitsubishi	Ecuador	Quito	5,000
Suzuki	Ecuador	Quito	8,000
Isuzu /Astra Group	Indonesia	Jakarta	8,146
Toyota /Astra Group	Indonesia	Jakarta	75,512
Daewoo	Indonesia	Jakarta	2,456
Honda/Prospek	Indonesia	Jakarta	5,400
Mitsubishi/Krama Yudha	Indonesia	Jakarta	20,908
Nissan	Malaysia	Kuala Lampur	21,430
Proton	Malaysia	Kuala Lampur	9,177
Suzuki	Malaysia	Kuala Lampur	6,604
Ford	Malaysia	Kuala Lumpur	9,414
Ford/Mazda	Malaysia	Shah Alam	8,079
Proton	Malaysia	Shah Alam	148,823
Renault	Malaysia	Shah Alam	0
Toyota	Malaysia	Shah Alam	24,544
Ford	Portugal	Setubal	190,000
Renault	Portugal	Setubal	25,327
Volkswagen	Portugal	Setubal	41,201
Chrysler	Thailand	Bangkok	856
Peugeot/BMW	Thailand	Bangkok	7,500
Volkswagen	Thailand	Bangkok	300
Chrysler	Venezuela	Valencia	4,000
Ford	Venezuela	Valencia	20,500
General Motors	Venezuela	Valencia	28,050
Honda	Venezuela	Valencia	500
BMW	Vietnam	Hanoi	31
Daihatsu	Vietnam	Hanoi	0
Mazda/Ford	Vietnam	Hanoi	1,119
Renault	Vietnam	Hanoi	148
Toyota	Vietnam	Hanoi	0
Average 1995 Production			25,526

Source: Globalization Project Assembly Plant Database (based on Automotive Industries and other sources).