

**The Decline of the Japanese Automobile Industry  
-Domestic and International Implications-**

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**ABSTRACT**

The upheaval in the U.S. auto industry this past decade obscured a fundamental shift in the cost base of the Japanese industry. Wages there in dollar terms more than doubled, to levels slightly higher on average than in the U.S. At the same time the U.S. industry was improving its management, bettering efficiency, quality and the vehicle design process. Now little gap remains there either. This paper explores the sources and implications of these changes in the industry in the two countries, both for assembly and parts manufacturing, and for bilateral trade.

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## I. Introduction<sup>1</sup>

It is now common knowledge that the use of “lean” production systems together with flexible factories gives the Japanese automotive manufacturers an almost insuperable advantage in world markets. To the superior management highlighted in *The Machine That Changed the World*,<sup>2</sup> most would add low labor and capital costs and an exceptionally supportive government. Japanese firms are also held to be willing and able to engage in dumping and other “unfair” competition with relative impunity, given the laissez faire attitudes of successive Republican administrations. In sum, but for limited political intervention on the trade front, what remains of the auto industry in the U.S. would soon vanish, and the European industry would soon follow an equally inevitable path to oblivion.

Indeed, the past decade has been traumatic for the U.S. auto industry. The term the “Big 3” is now a misnomer. In the U.S. passenger car market in 1991, GM and Ford held the #1 and #2 spots, as they have for decades, but Honda was 3rd and Toyota 4th. Chrysler in 5th place maintained a comfortable lead only over Nissan, the laggard of what should now be termed the Big 6. Similarly, General Motors may still be #1 world-wide basis, but the United States industry proper has lagged behind Japan in total output since 1980, and in 1991 was behind the European Community as well. We have seen equally dramatic changes in automotive technology, the composition of the market (at least within the U.S.) and the volume of trade. During the next decade we are likely to again see immense flux in the world automotive industry, as the geographic locus of production moves south and trade patterns again shift, while technical change continues apace. The most notable of these will be the rise of North American production alongside the decline in world markets of the Japanese industry, which I take up here. We will also see the reorganization of the European industry, and the growth of production in the ASEAN countries and East Asia. I do not address these latter three changes here.

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1. Unless noted otherwise, data are converted at ¥125 = U.S.\$1.00. To maintain simplicity and stylistic variation, I use “American” and “U.S.” though in most places I mean U.S. and Canadian but not Mexican.

2. Womack, Jones and Roos (1990), the report of the MIT International Motor Vehicle Project.

While Japanese management is better, it is not uniquely Japanese, and is no longer central to bilateral differences in competitiveness. Instead, the traditional elements of comparative advantage—primarily labor costs—are now at play, and here Japan is in a poor position. Furthermore, despite half-hearted government attempts to slow down investment in the industry, major additions to capacity are now coming on-stream within Japan. The timing is abysmal, because home and foreign markets are stalled, while the bonds issued to fund this expansion must now be refinanced at much higher interest rates. But the red ink that is starting to appear is not primarily a function of the current recession in Japan. It is, rather, an indicator of the rapid loss of competitiveness of the Japanese industry, and will not readily be reversed. Indeed, to pick a point of current concern in the U.S., over the next decade the bilateral automotive trade deficit will shrink to insignificance. This is of concern in Japan, because 45% of their automotive production is exported, accounting for 22% of total exports. Furthermore, with the industry accounting for 13% of manufacturing output and 2.8% of total employment, any rapid shift in automotive trade has potentially large domestic ramifications.

Note that while the North American industry is healthy, this does not mean that the Big 3 and the UAW will return to their former positions of glory. Japanese firms now account for 2.4 million units or 20% of assembly capacity, and there has likewise been entry by Japanese and European parts makers. The Big 3's overall loss of market share will prove permanent, particularly as GM remains weak in the high-volume middle of the market. Second, with a few exceptions the new entrants are not unionized while the Big 3 continue to "outsource" parts now made internally. This cuts into union power, and the steady decline in influence of the UAW will continue. Indeed, there will be real pressures to cut into benefit packages.<sup>3</sup> But outsourcing will not necessarily mean gains for traditional parts firms, either. As outlined below, their market has shifted in both quantitative and qualitative terms. Auto makers are less and less

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3. The latest UAW contract requires the Big 3 to continue paying 90% of wages in the event of layoffs or plant closures, pressuring them to limit outsourcing. The December-January announcement of further plant closings at GM shows that even this will not stem the tide. (However, I am not aware of any recent plant closings by either Ford or Chrysler.) As discussed later, while UAW wages are higher than the industry average, it is the generous retirement and health benefits that make the real difference. Without healthcare reform in the U.S., the aging UAW membership will generate tremendous pressure for givebacks in one or another form.

interested in purchasing simple parts, and traditional firms are on average ill suited to sell the sophisticated bundle of design and manufacturing services their customers are demanding. But again, much of this transition has now been completed.

Thus part of the recovery in the U.S. and Canada is due to new entry by more efficient firms and exit by those less capable. But the Big 3 themselves have been able to achieve levels of quality and production efficiency that are quite close to that of the Japanese firms, and more recently have improved their product development systems. (GM, however, still lags, and as the largest company in the industry this remains a cause for concern.) Given the cost of production within Japan, however, they need no longer worry about import competition, and indeed both domestic assemblers and parts producers are beginning to take export markets seriously for the first time in decades.

Several caveats are in order. First, this analysis is that of an economist, though I have organized this paper with an eye to the political implications of the changes now underway. Second, for analytic purposes I break the industry down into four categories: parts manufacturing and assembly in the U.S. and again in Japan. I thus focus on manufacturing, and do not examine distribution and marketing. Third, as should already be obvious, I define the industry on the basis of geographic locus rather than corporate ownership; for my purposes, I treat as "American" the Japanese assembly and parts plants operating in the U.S.. Not everyone will agree with this value judgment. Fourth, I will make only passing references to the EC, Mexico, Korea and ASEAN, due to space limitations and my own research interests.

Fifth, and critically, my conclusions rest upon assumptions about the future course of exchange rates, and secondarily of technology and market structure. I will not justify these at length. Still, I am (sadly) confident that the dollar will weaken; others have assured me that another oil crisis is not just around the corner; and a revolutionary change in technology is unlikely. In any event, the core of this argument will not be invalidated by the minor surprises that the future inevitably will bring. That is because what is beginning to occur in the automotive industry is but the microeconomic expression of larger macroeconomic trends. The aging of Japan's population will inevitably bring about a shift in domestic savings and trade balances. But at the micro level this will be seen as a rise in real wages and a decline in the competitive

position of tradable goods, which is exactly what is occurring in autos. My argument is thus helpful in understanding the equally dramatic changes now underway in steel and consumer electronics.

Finally, by sticking to a bilateral framework I implicitly argue that the shift I describe here will be to the advantage of the U.S. In effect, I am assuming that economies accrue to geographic concentration and hence to current producing regions (but not necessarily current producers). This is in part because of logistics, given the physical size of an automobile and its components; it is also because location near tool-and-die makers and access to other specialist manufacturing services reduces costs. Less compelling, the interaction of design engineering and the factory floor has been historically important in Japan. This may require, however, only that appropriate organizational structures be used, rather than that operations are physically adjacent. Indeed, the very shifts in industrial location that I trace for Japan and the U.S. cast doubt on the importance of geographic factors. It is thus not inconceivable that the beneficiary of change in the U.S. industry will be Mexico, while Korea and Southeast Asia will benefit most from the changes within Japan.

### Organization

In Section II below I analyze the recent history of the U.S. and the Japanese auto industries. Along with providing background for those who are not familiar with the industry, this will illuminate the underlying causes of the upheavals of the past 15 years. Section III focuses on the collision of the two industries, and its impact and the response by the assemblers and parts makers in the U.S. and Japan. The core of the paper is Sections IV and V. I argue in Section IV that the gap in management capabilities between the U.S. and Japanese industries has now been eliminated, and Section V provides data on the reversal of the cost advantage of Japan over the U.S.. Finally, Section VI sets forth what I believe to be the main implications of these shifts. One is a decline in Japanese auto-related exports to the U.S. (and a rise in U.S. exports to Japan), which will certainly ease bilateral tensions. The second is the possibility of considerable trauma in the Japanese industry. That is unlikely to be as severe or politically trying as the last fifteen

years proved for workers, shareholders and governments in the U.S.. It is useful to remember that in both the U.S. and Japan the auto industry employs over 800,000 workers, ranking second after electronics. However fraught with error an attempt to foresee the future may be, it is nevertheless important to make the effort.

## II. The U.S. and Japanese Automotive Industries in Isolation

### The United States

The late 1920s and 1930s were formative years for the U.S. automotive industry. Ford lost its initial domination of world automotive markets with Henry Ford's obstinate support of the Model T in the face of Alfred Sloan's full-line strategy at General Motors. While GM was but an agglomeration of separate firms under a holding company in 1921, by 1926 it was the market leader. Chrysler also became a major player in 1926, with the acquisition of the Dodge Brothers operation. As smaller firms gradually exited, the "Big 3" emerged to form an oligopoly that dominated the North American market until the 1980s.<sup>4</sup>

A second element in the organization of the industry was its unionization by the United Auto Workers in the mid-1930s. As an industrial union, the UAW imposed pattern bargaining: wages were fixed across the Big 3. In addition, a pattern of narrow job classifications was instituted, with seniority rules used to govern transfer among jobs. (The presence of carpenters, millwrights and other specialized trade unions further complicated matters, as each sought to maintain its jurisdiction.) Finally, the patterns implemented on the shop floor also spread to white-collar workers, even when they were not organized. Rather than a central personnel department determining job rotations and promotions as in Japan, in America white collar workers too could put in for new positions in a decentralized system. But as with blue-collar workers,

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4. This continued until about 1955, when the last of the smaller firms merged to form American Motors, itself never very large or successful. Along the way firms such as Graham, Nash, Packard, Studebaker, Kaiser and Willys Jeep disappeared. Volkswagen assembled cars in the U.S. in the 1970s, but closed its operations in the mid 1980s. (It still operates in Mexico.) American Motors merged with Chrysler in the late 1980s, and its assembly facilities have been closed one by one; now only the Jeep and Eagle names remain.

wages were set centrally each of many job classifications. This should not hide considerable adaptability at the union “local” (plant) or white-collar office level through the ability to redefine jobs into one or another work/wage classification.<sup>5</sup> Nevertheless, until the 1980s this potential for was poorly utilized, and firms in the industry effectively could not compete with one another through changing their cost structure. In principle any change required modification in the industry pattern contract, and hence would immediately be available to competitors.

The third and final element was the adoption of a vertical integration strategy by the Big 3. Already by the 1930s Ford and GM were heavily involved in parts production. At GM the original holding company by chance included many parts producers; on the other hand, Henry Ford for apparently idiosyncratic reasons adopted a conscious strategy of making everything, including his own rubber, steel and glass. To these factors should be added the difficulties that the Big 3 encountered in developing strategic alliances with the suppliers of major components (e.g., GM with Fisher Body), the threat posed by labor strife at firms not under organized by the UAW, and the attractiveness of in-house manufacturing as a means of controlling the lucrative afterparts market.<sup>6</sup> In any event, purchased materials and parts comprised only about 50% of manufacturing costs at GM and 60% at Ford, versus 70-75% in Japan.<sup>7</sup> Of course, this meant that the suppliers of the principal components were internal divisions with no outside competitors, and hence faced little pressure to change. But at the same time these divisions purchased simple items from a veritable host of outside firms. (GM, for example, buys production parts from

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5. The classic here is Katz (1985), a study of GM. See also Rosenbaum (1984) on white collar workers.

6. See, respectively, Helper (1990, 1992) and Crandall (1968). Outside suppliers were not always willing to expand capacity at the rate demanded by their customers, and given their customers' high profits felt that they, too, should be offered a fat margin. Integration provided a way around these conflicts. Furthermore, demand for replacement parts is insensitive to price, and so that proved to be an extremely lucrative market; by the 1930s over 1/3 of overall profits of the Big 3 came from “genuine” parts they sold to dealerships. Antitrust rulings eventually gave independent producers access to distribution channels, but scale economies still permit the manufacturers to dominate the market for body stampings and complicated components, where tooling costs make it unprofitable for outside firms to produce.

7. Chrysler, with its smaller size, was the least integrated, procuring about 70% of parts and materials from outside firms.

6,000 firms, and when tooling, office supplies and so on are included, has purchasing relationships with 32,000 firms.<sup>8)</sup> Such purchasing contracts were let annually on a competitive basis against blueprints drawn up by the Big 3. This proved to be administratively efficient, and was an effective check against abuses since it limited the discretion of purchasing staff. From the standpoint of suppliers, however, this system made it impossible to count on future orders for the same part, and so constrained the ability of firms to invest in specialized production equipment, particularly in the passenger car segment. As the pace of technical change increased in the 1970s, this contributed to the gap in efficiency that developed relative to the with Japanese producers.

The net effect of these three features—a vertically integrated industry dominated by 3 companies and organized by a single industrial union—was the formation of a tight oligopoly in the domestic market. Furthermore, the destruction of Europe in World War II and the initially low level of economic development in Japan helped keep import competition weak. The fact that demand in Europe and Japan was for small cars—whereas subcompacts were a niche market in the U.S.—contributed to the dominance of the Big 3. They were thus able to charge high prices for their vehicles, while paying little attention to controlling costs. Indeed, while negotiations with the unions were highly acrimonious, fat wage settlements and bountiful fringe benefits for workers in turn meant higher pay and better benefits for management. Without outside competition auto (and steel) workers gradually came to enjoy much higher pay than the average in manufacturing. For example, from 18% above average in the 1950s, the differential for the auto industry increased to over 25% in the 1970s and 33% in 1984.<sup>9</sup> Generous health, retirement and other benefits meant the relative difference in labor costs was even greater. Meanwhile, without competition the auto companies needed pay little heed to product quality or to improving automotive technology.

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8. GM press conference, May 1991, cited in Nikkei Sangyo Shimbun, May 3, 1992. This number must involve considerable double-counting, since purchasing for most items is not centralized. Even so, the number of individual firms remains very large, reflecting as well GM's geographic dispersion.

9. Smitka (1991), p. 199.



## Japan

The Japanese industry developed along very different paths. First of all, the early postwar years saw considerable new entry into (initially) truck and (later) passenger car manufacturing. Ford and GM, the two firms that dominated the domestic market until the outbreak of the Pacific War, did not reenter. But Toyota, Nissan and Isuzu all had commenced commercial operations at the onset of the war in 1936, and resumed automotive production after the war. In addition, former aircraft manufacturers (e.g., Prince, Mitsubishi Motors and Fuji Heavy Industries), 3-wheeled vehicle makers (Daihatsu and Mazda) and motorcycle makers (Suzuki and Honda) entered the market. At the peak there were 14 firms; 11 manufacturers survive today.<sup>10</sup> Even though Toyota has been the largest firm (and Nissan #2) since the 1950s, there has been considerable flux in market shares and steadily declining prices. Vigorous rivalry prevailed, in sharp contrast to the U.S.

Second, the union structure in Japan contributed to, or at least did not inhibit, strong interfirm rivalry and internal technical change. Attempts to form an industrial union in the auto industry failed, with the final blow coming in Nissan's victory after a long, bitter strike in 1954. (Attempts in other industries were equally unsuccessful, with the exception of the seaman's union.) While annual wage demands were loosely coordinated across firms and industries in the annual spring labor offensive (shunto), interfirm differences arose in final settlements and interim bonuses, especially for firms with unusually good or bad performance.<sup>11</sup> In particular, an individual union found it hard to push for raises above those being offered the unions at rival firms. But while there were greater interfirm differences than in the U.S., at the same time the gap between automotive wages and those at large firms in other areas of manufacturing remained small. In addition, contracts did not lock firms into a rigid set of work rules. In short, unions

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10. Additional firms assemble vehicles on a contract basis, including Press Kogyo, Toyota Auto Body, Gifu Auto Body and at least six other companies, none of which has an independent marketing operation. Separate from these, Hino Motors (which otherwise produces only trucks) and Daihatsu assemble cars for Toyota and Fuji Heavy Industries (Subaru) assembles cars for Nissan. In all, such firms assemble 50 different models; such contract assembly accounts for 45% of all of Toyota's vehicles. See Mary Ann Maskery, "Japanese Farm Out Production," Automotive News, March 16, 1992.

neither restrained competition among numerous rival producers, nor imposed barriers to technical change, nor set autos apart from other industries in terms of wages and benefits.

Finally, during the early postwar period the industry shifted away from vertical integration into the systematic procurement of parts and components from outside firms. One reason was to economize on capital expenditures by taking advantage of excess capacity in machining and other manufacturing that existed through the mid-1950s. During an era when the auto makers were constrained in their ability to borrow from banks, output thus could be expanded without the companies themselves or their suppliers needing to invest in new machinery. A second advantage was that subcontracting served as a counter to the strength of the assemblers' unions, by limiting the need to hire new workers. In addition outside suppliers typically paid their employees lower wages.<sup>12</sup> In any event, the auto companies themselves concentrated on final assembly, body and chassis stampings, engines, and the transmission. Small stampings, electrical components, engine parts, interior and exterior trim and pumps and other mechanical components were all purchased from suppliers.

Given the low production volumes of the 1950s, both suppliers and assemblers initially relied on general-purpose machine tools. Work could readily be shifted to new suppliers, while suppliers could just as readily work for firms in different industries. But this began to change as production volumes increased. In 1959 Toyota built the first specialized assembly plant in Japan, and Nissan followed soon thereafter. With the implementation of mass production methods, achieving high volumes became important to spread the costs of specialized machinery and tooling. This encouraged automotive assemblers to limit the number of suppliers, and to contract for the duration of production, which typically meant four years. Of course, specialized production

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11. While a crude indicator, given variations in compensation systems and interfirm variations in overtime, average annual contracted cash compensation (monthly wages and bonuses but not overtime) differs by 13% among the Big 5 in Japan. Toyota is at the top, at ¥5.31 million [U.S.\$42,500] followed by Honda, Nissan, Mazda and finally Mitsubishi at ¥4.70 million [U.S.\$37,600]. Isuzu's average was 8.1% less than MMC, 14.1% below the top five average and a full 18.6% below Toyota. Data based on provisional spring 1992 wage settlements for the April 1992 - March 1993 period, as reported *Nikkan Kogyo Shimbun*, March 26, 1992.

12. See Smitka (1991a) for details, and Smitka (1990a) and Helper (1990) for U.S.-Japan contrasts.

facilities likewise limited the ability of parts producers to serve non-automotive customers. Parts firms and the auto makers thus became interdependent.

Over time, then, a contracting environment very different from that of the U.S. evolved in Japan. Auto companies there came to rely upon 200-300 direct suppliers that provided components and subassemblies on a long-term basis. While the auto firms guaranteed continuity of orders over the medium run, normally two or three suppliers made similar parts (headlamps, door trim) and so rivalry was maintained. (This was in sharp contrast to the Big 3, whose internal parts divisions held an effective monopoly.) Firms that were less competitive gradually saw their business decline. But because orders were not reduced abruptly (and because the auto firms often sent in consultants to help problem suppliers improve), rivalry in Japan did not become the impediment to technical change and investment by suppliers in state-of-the-art facilities that cut-throat contracting practices were in the U.S. (This is in contrast to the Big 3 in the U.S., where the internal parts-making divisions faced virtually no competition from within or without.) Indeed, Japanese suppliers came to play an increasing role in design, as their engineers worked side-by-side with those of the auto companies.

Finally, it is useful to point out that in the 1950s the state-of-the-art in Japan was far behind that in Europe, much less the U.S. Companies fully anticipated that, with a bit of work, efficiency could be improved and costs reduced. In Japan “Not Invented Here” became a statement of pride that managers had taken care to seek out better ways of doing things, rather than a derogatory rejection of a top firm of what must of course represent inferior practice. In 1970 the industry still felt sufficiently weak that several firms sought alliances with the Big 3. (GM still owns 37% of Isuzu, and Ford 25% of Mazda, though Chrysler has sold its 15% stake in Mitsubishi Motors.) Still, by the late 1970s this process of change, supported by the overall contracting environment, brought the Japanese industry ahead of best-practice in the U.S. and Europe in manufacturing, during an era when Japanese wages (and steel prices) were lower than in the West. The combination meant a significant advantage in costs, estimated at up to \$1,200 per car in the early 1980s, despite lower volumes.

Thus in Japan direct suppliers are comparatively few in number, and produce subassemblies and components rather than simple parts. Furthermore, their technical skills enable them to play

an integral part in the design and engineering of new models. “Primary” suppliers in turn have their network of “secondary” subcontractors that manufacture individual parts to their customers’ specifications. These 2nd-tier firms thus resemble in function and scope that small suppliers that numerically dominate the U.S. parts industry, while the role played by direct suppliers in Japan resembles that of the internal parts divisions of the Big 3. Indeed, the Japanese auto firms themselves account for only 22% of industry employment; relative to the U.S., in Japan parts makers are more important.

### **III. The U.S. and Japan Automotive Industries in Collision**

The 1970 Muskie Law, placing limits on automotive exhaust emissions, marked the onset of change in the North American industry. This was followed by many other individual changes, particularly the two oil crises of the 1970s, the net effect of which was to provide a beachhead for foreign—largely Japanese—producers to sell subcompacts in the U.S. market. During the 1970s and 1980s a series of policy changes, combined with the differing management capabilities of the Japanese and U.S. industries and the still-low cost structure of the Japanese industry, allowed this beachhead to be expanded into other segments of the market. Indeed, in 1991 nearly one of three passenger cars sold in the U.S. was made by a Japanese-owned firm. Increasingly, however, this production takes place in North America; while the Big 3 have declined, that is not necessarily true for the U.S. industry as a whole. New entry, though, has proven to be a traumatic process, even when it takes place through local production rather than imports: most such entry involved in a shift in the location of production, and hence a loss of both jobs and investor’s capital.

To return to the early 1970s, after a long rear-guard action the Muskie Law passed and in short order the Big 3 were forced to invest in developing either cleaner engines or, failing that, catalytic converters. Second, Ralph Nader drew attention to quality and safety problems in U.S.-made vehicles. Third, the Vietnam War expansion of the late 1960s turned into a full-fledged economic boom in the early 1970s. In the ensuing inflation, the automatic cost-of-living adjustment (COLA) clauses in the UAW contract led to rapid increases in wages, opening a large gap over the course of the 1970s between automotive and other manufacturing wages. (In the 1980s, the Big 3 in turn came to rue the extremely generous health benefits that were standard in the

industry.<sup>13)</sup> Finally and most important, the simultaneous boom in Japan, the U.S. and Europe made it possible for OPEC to quadruple the price of oil.

For the first time subcompacts came to constitute a sizable slice of the market; at the peak, following the second oil crisis of 1979, this niche widened to comprise one-third of all passenger cars sold in the U.S. The Big 3, however, initially made no small cars. Instead, most of this demand was met by Japanese vehicles. Furthermore, it was easier for small cars to pass the emissions hurdles. Indeed, Honda with its CVCC engine did not even require a catalytic converter, which simultaneously reduced manufacturing costs and, by reducing weight, improved fuel economy. This became even more advantageous when the CAFE corporate average fuel economy regulations took effect in 1987. Next, in California Japanese cars had already obtained a reputation for sturdiness and a good repair record. Quality problems at the Big 3 were already significant enough by 1973 for the UAW to try to launch a campaign at GM; at the time, however, management viewed this as an intrusion on their prerogatives, and squashed the attempt.<sup>14</sup> Last but not least, inflation in Japan, which had been higher than that in the U.S. throughout the postwar period, was quickly brought down to a low level by late 1974. Thus while Japanese costs continued to decline, given productivity increases and a weak yen, they escalated sharply in the U.S. as wages increased, productivity growth stalled and the dollar regained strength.

As a result, imports of Japanese vehicles increased from 500,000 units at the start of the 1970s, to 1 million units by 1975 and nearly 2 million units following the second oil crisis in 1979. The latter jump coincided with the “Volcker” recession in the U.S., magnifying the impact. For the first time since the 1920s, there were significant new players in the market that the Big 3 could ignore only at their peril. The immediate response, however, was political. A “voluntary” export restraint (VER) of 1.68 million units was negotiated in 1980, when under the impact of price competition and recession Chrysler teetered on the brink of bankruptcy. (Ford in

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13. Note that because of favorable tax treatment, firms and workers have a strong incentive to increase the share of compensation received in the form of benefits. Such distortions seem to matter less in Japan.

14. This anecdote is told of Irv Bluestone in the short note, “The baddest old days.” *UAW Ammo*, (1992), 9. My thanks to Mr. Ogiso of the Japanese Auto Workers for sharing it with me.

fact posted even greater losses in its domestic operations.) The implementation of the VER led immediately into higher prices. The Big 3 hoped to limit Japanese inroads, and wait until Americans lost their taste for small cars, as had happened previously with the Rambler, the Corvair and the Volkswagen Beetle. In the interim, however, pollution and fuel economy (CAFE) regulations were forcing the Big 3 to rapidly downsize their entire fleets, an extremely costly and unexpectedly difficult proposition. Higher prices could at least limit the pain.

But the VER proved to be a mixed blessing. While higher prices helped the Big 3 to stem red ink, it led to high profits for their Japanese rivals. In the late 1970s Japanese producers held a large cost advantage in subcompact production, but there was fierce rivalry in both the domestic and export markets; low prices reflected this. The VER, however, effectively mandated the Japanese producers to organize a cartel and fix prices in the U.S.. (The VER was specifically drawn up to be immune to U.S. antitrust laws.) And raise prices they did, by \$1,000 or more a car. These profits, furthermore, went straight to their bottom line; from the mid 1980s, Toyota's nickname in Japan has been Toyota Bank.<sup>15</sup> Second, the VER provided strong incentives for the Japanese producers to move up-market into the medium-sized cars that were the bread-and-butter of the Big 3: if they could only sell a limited number of cars, it was more profitable to sell big cars than small ones.<sup>16</sup> Finally, as had been widely expected, to avoid the VER the Japanese producers commenced assembly in the U.S. in "transplant" factories. Initially these were essentially "screwdriver" operations assembling parts imported from Japan.

Despite equity ties with Japanese firms dating from the early 1970s, the Big 3 (and the UAW) apparently knew little of their new-found rivals. They openly viewed the Japanese advantage as arising from cheap and pliant labor and an (in their eyes) undervalued yen. Furthermore, they thought that the Japanese firms would be unable to develop larger cars, and anticipated a return to the fold of the Big 3 when Americans tired of driving foreign subcompacts. Management advantages were nil. Thus while it was understood that the VER would encourage "transplant"

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15. In 1992 Toyota still had cash reserves of ¥16 trillion (\$12 billion) and no short-term debt, while interest and other financial income actually exceeded operating income.

16. Production costs change little with size, while prices and hence potential profit margins rise rapidly.

factories, the Big 3 did not believe that Japanese firms would be able to assemble high-quality small cars in the U.S. with American workers. The political holding action would thus prove sufficient.

In this they were mistaken. The Big 3 clearly underestimated the depth of appeal of smaller cars; only now, a decade later, is that market segment again shrinking to single-digit levels. But they proved to be simply wrong in evaluating the management capabilities of Japanese firms. In 1982 Honda was the first to open a U.S. factory, and it was soon followed by Nissan. But the real eye-opener came when NUMMI, the GM-Toyota joint venture, commenced production in 1984. This firm reopened the shuttered GM plant in Fremont, California with a commitment to hire from the original pool of unionized workers under a UAW contract. It was soon the highest-productivity, highest-quality assembly plant outside of Japan—and despite GM having closed it in part because of labor strife, the operation ran smoothly. As the Japanese producers in turn proved successful in upscaling their offerings, it became apparent that the management practices of the Big 3 were a large part of the problem.

In the end, then, the Big 3 faced competition not only at the fringe but also in the core of their market. Second, they faced competition not merely from imports, but also from vehicles assembled in the U.S. by American workers. The success of the Japanese in running efficient, high-quality assembly plants in the U.S. undoubtedly surprised them almost as much as the Big 3. But it made it far more difficult to bring political pressure to bear, since these “transplant” factories were spread across 7 different states and Ontario. In the end, all 5 major Japanese car firms opened plants, as well as 3 of the 4 smaller firms, starting with Honda in Ohio in 1982, Nissan in Tennessee in 1983 and Toyota in a joint venture with GM in California in 1984. There are now a full 12 firms in the industry, divided among 6 major producers and 6 smaller firms.<sup>17</sup> The U.S. market is thus competitive in a way that has not been true since the 1920s.

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17. The smaller firms are Mazda and Mitsubishi, followed by Suzuki, Hyundai, and the Subaru-Isuzu joint venture. These cover not only California, Tennessee and Ohio but also Kentucky, Michigan, Indiana and Illinois. In addition, Kawasaki has a motorcycle plant in Nebraska, BMW will open an assembly plant in South Carolina and Volvo has an operation in New Brunswick, Canada.

The Japanese producers faced strong incentives to increase local content, partly due to political pressure but primarily due to cost pressures with the sharp appreciation of the yen in 1985. However, for the structural reasons noted earlier, the American parts industry was geared to making simple items to customer specifications, whereas the Japanese auto companies purchased primarily components and subassemblies, which were in whole or in part designed by their suppliers. In many cases, therefore, the Japanese companies did not even own the blueprints, while many American suppliers had no engineers—much less engineers based in Tokyo who could work with Japanese firms throughout their product development cycle. There was thus a mismatch between what the U.S. parts industry was geared to sell and what the Japanese assemblers sought to buy.

Reflecting their lack of vertical integration in Japan, the assemblers sought to purchase the sort of sophisticated parts they were used to procuring in Japan. With 10,000 or more parts in a vehicle, even in the best of circumstances the proportion purchased locally would initially be small; differences in contracting practices and testing standards added to the frustrations. But more important was that, given the structural differences between the U.S. and Japanese parts industry, they found few traditional suppliers in the U.S. with the requisite engineering and production know-how to meet their need. Rather than attempting to help existing firms to hire engineers and learn how to meet their requirements, a process that took 25 years in Japan,<sup>18</sup> they found it much easier to encourage their suppliers at home to follow them abroad.

The result thus was a massive influx of foreign parts firms into the U.S.. The most visible portion of this was the arrival of nearly 300 Japanese firms, either directly or through joint ventures. (Less noticeable has been the arrival of a nearly equal number of European firms.) At the start these new entrants targeted the transplant factories of their Japanese customers. Such production, of course, tended to displace imports. But to achieve profitable levels of output, most also sought to sell to the Big 3, and met some success for their labors. (A shift in the strategy of the Big 3 towards “Japanese” purchasing practices—procuring more components from the outside, and asking for greater supplier engineering input—created a natural opening

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18. See Smitka (1991), especially Chapter 3.



for these firms.) The net effect has been a major blow to the traditional parts producers in the U.S. and, as the stock of Japanese vehicles on the road rises, this is also beginning to affect the firms that have specialized in making replacement (repair) rather than production parts.

Friction has thus expanded from auto assembly to all facets of the industry. The VER quota was raised in FY1985 from 1.68 to 2.3 million units, and imports increased accordingly. On the other hand, while the tariff for passenger cars is 2.5%, the tariff on trucks is 25%, effectively preventing Japanese firms from garnering a significant share in what today is the fastest growing segment of the market.<sup>19</sup> At the same time, the 2.4 million units of new capacity at the transplants began to come on line. While part of this production took the place of imports, total sales and hence market shares rose steadily. A chronic decline in the Big 3's passenger car market share thereby ensued, reflecting primarily the steady decline of GM. This forced a stream of 12 assembly plant closings at GM in the 1980s, and several since. (With the exception of the Jeep plant in Toledo, the former AMC plants at Chrysler have also been shuttered.) Of course, imported vehicles are built mainly from foreign-made components. Parts makers thus saw their car market shrink to 70% of its former size, as their traditional customers' share of the final market declined. On top of this came increased imports by the Big 3. Ironically, this was encouraged by U.S. government policy, since the CAFE regulations made it advantageous to import components from overseas so that some large car models could be reclassified as imports.<sup>20</sup> Probably more important, however, has been the new entry by transplant firms into parts production in the U.S.. In any event, this led to the designation of auto parts as one of the subjects of the 1986 bilateral MOSS (market-oriented sector-specific) talks, aimed at eliminating barriers to U.S. auto suppliers seeking to do business with the Japanese auto companies.

New entry meant the decline or demise of many existing firms, at significant cost to shareholders and managers. But new entry also shifted the geographic center of the industry. Previously assembly was heavily concentrated in Southeastern Michigan; among the new ventures,

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19. Nissan, however, has assembled pickup trucks at its Smyrna Tennessee plant since its inception, and has jointly designed a minivan with Ford (now being assembled in a Ford plant). Toyota recently completed an expansion of capacity at NUMMI, its joint venture with GM, to enable it to begin producing pickups there.

20. Taylor (1991).

only the new Mazda facility located there, in a former Ford plant. Most of the others are in the southern part of the Midwest, and parts transplants display the same tendency. Thus, while perhaps 150,000 jobs have been added by Japanese factories, most of these have been in locations remote from the sites of traditional firms. To the decline in total automotive employment of 150,000 since the historic peak in the boom year of 1979 must therefore be added the displacement of workers in one place by those in another; in all, then, over 300,000 jobs disappeared, and with recently announced plant closings the total is likely to top 400,000. It is hard to overstate the social costs this has imposed. One example is the city of Detroit. At one time Chrysler was the largest employer (surpassing even the city government); in 1990, it employed no one within city boundaries, though the new Jefferson Avenue plant is now open.

While the number of vehicles exported to the U.S. has been falling steadily since 1987, with the addition of transplant production the market share of Japanese producers continued to rise; they accounted for 31% of the passenger car market in 1991. Furthermore, the shift upscale meant that the dollar value of car imports continued to climb despite the drop in volume, while parts imports rose in line with transplant production. The net impact was an automotive trade deficit that accounted for 45% of the total bilateral deficit. All of this exacerbated political tensions in 1991, particularly with a simultaneous recession and presidential primary campaign. During the January 1992 Bush visit to Japan, the U.S. asked for an explicit commitment by the Japanese auto companies to expand their purchases of U.S. parts, along with token imports of Big 3 vehicles. The VER was also subsequently reduced to 1.65 million units, or below the initial 1981 level. As noted above, truck tariffs are already 25%, while pickups and RVs have been one of the expanding sectors of the market. Likewise, the 1991-92 minivan antidumping investigation squelched attempts to break into that market, and in June 1992 legislation made it out of committee in Congress that would raise the minivan tariff to 25%, while the MOSS auto parts talks continue. Over time, then, political tensions over automotive trade resulted in continued efforts to restrict imports.

The social costs in the U.S. of the upheaval in the auto industry in the 1980s have been huge. This rightly has been and continues to be a cause of concern to policy makers. The focus on political measures, however, diverts attention from the changing relative cost base of the U.S.

and Japanese industries. This is rapidly turning the U.S. into the most desirable place to build cars—as evinced by the recent decision of BMW to locate its new plant not in Germany nor even in Europe, but instead in South Carolina. Even without political intervention, Japanese purchases of American automotive products would increase rapidly, and American imports decline.

#### **IV. The Changing Advantage of Japanese Management**<sup>21</sup>

It is no longer accurate to view Japanese manufacturing methods as providing an absolute advantage. First, a number of unexpected difficulties with these management methods are making themselves felt in Japan. Second, and far more important, in qualitative terms the U.S. industry has caught up with “best practice” across a variety of dimensions. Nevertheless, recent attempts to elicit the direction of change in the industry continue to focus on differentials in manufacturing efficiency and management capability. This is useful for the managers seeking to improve corporate performance, but for those interested in the direction of change in the industry as a whole it obscures as much as it illuminates. Henceforth the deciding factor will be the costs of inputs—labor, materials, transport and other manufacturing services and capital costs. Below I sketch the core elements of “Japanese” management and then trace their evolution in both the U.S. and Japan. I shift the focus to input costs in Section V.

In Japan high capital led costs and low production volumes—along with the chance timing of input from a number of American consultants—led suppliers and assemblers to produce multiple parts and vehicles on the same assembly line, while trying to hold inventories in check. Union pressure to avoid layoffs, the difficulty of hiring skilled workers and the pace of technical change made it important to be able to train and redeploy workers; the lack of union work roles in return made this possible. All of this helped generate the distinctive manufacturing management practices that arose in the 1950s. (There is little “traditional” about Japanese management!) The

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21. This section draws heavily upon Smitka (1992), of which Smitka (1990b) is an earlier version. For recent survey studies in the U.S., see Helper (1991, 1991b) and Cusumano and Takeishi (1991).

industry developed at its fastest during the 1960s; not only these management practices, but also the siting of plants thus reflect decisions made long ago in a very different economic environment.

The revolution in manufacturing management—the new learning on the superiority of Japanese manufacturing practices—emphasizes the factory and labor relations, and more recently supplier relations (Smitka 1991) and the organization of product development (Clark and Fujimoto 1991). The first area to elicit widespread attention was quality control. Under the tutelage of American management consultants in the 1950s, the Japanese sought to build in quality, using numerous intermediate checks carried out by workers. This contrasts with Detroit's reliance on final inspection to detect rejects.<sup>22</sup> It proved extremely effective, given the historic educational levels and low turnover of ordinary workers, and the willingness of management to delegate responsibility to them. Together with achieving higher final product quality, it also turned out to reduce costs through the early detection of problems and substantial reductions in scrap and rework.

The most famous feature of Japanese management is probably JIT “just-in-time” production controls, a domestic innovation rather than an American borrowing. JIT uses a “pull” system of scheduling production in response to downstream requests (at Toyota, “kanban”) to reduce inventories and decentralize adjustment in response to minor variations in production volumes to the shop floor. Reduced inventories are a one-time saving, but the effort to lower inventory levels also reveals bottlenecks in the production system. JIT methods thus provides practical guidance to the efficient allocation of production engineering efforts. It also creates incentives to reduce setup times as a means of reducing batch sizes, which in turn allowed a closer matching of production and demand. (By the late 1960s, die-change times in Japan were measured in minutes instead of the hours that then prevailed in Detroit.<sup>23</sup>) Corresponding to this, the final assembly line was designed to be able to handle multiple “platforms” simultaneously. Thus the

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22. This was achieved through SPC (statistical process control), in which the mean and variance of individual production steps are controlled to guarantee that defects do not arise. In its purest form, each machine is monitored periodically to check whether accuracy has drifted beyond SPC tolerance levels. If not, then it is statistically unlikely that a bad part has been produced, and so direct inspection can be eliminated.

23. See Womack et al. (1990).

mix of vehicles within the plant could be balanced so that minor variations in demand would not affect capacity utilization, and production of “hits” could be shifted to plants making less successful models. In the late 1960s and early 1970s JIT was even extended to incorporate suppliers. Soon shipments were being made several times a day, with parts such as seats or tires sequenced by color and option level prior to delivery to match the assembly line. Given the physically small size of Japanese factories, the consequent saving on floor space was an added benefit.

Finally, human resource management, supplier management and engineering management also revealed strengths. On the shop floor, tasks were assigned to teams rather than individuals; QC (quality control) circles and self-scheduling of vacations reinforced team identity. Along with providing a measure of flexibility in job allocation, this mobilized peer pressure as an incentive. Furthermore, pay and promotion systems were designed around the individual rather than the job. There was thus little resistance from workers to retraining; indeed, “on-the-job” training through systematic job rotation was the norm.<sup>24</sup> This in turn facilitated the use of JIT and quality control techniques.

But advantages were not confined to production; the use of outside suppliers generated rivalry, reducing parts prices, the biggest single source of manufacturing costs. Furthermore, Japanese companies made heavy use of value analysis to improve the integration of disparate functions, such as design, engineering, manufacturing and purchasing.<sup>25</sup> These efforts were even extended across corporate boundaries to encompass supplier engineers. When applied in combination with a project-based rather than a task-based organization, Japanese firms proved more adept at the design process, in terms of the speed and cost at which they could develop a new model, and the ease of manufacturing of the final vehicle.<sup>26</sup>

In short, the new learning runs the gamut of manufacturing functions, from the shop floor to the organization of white collar functions such as engineering. Not all of these elements had

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24. See Koike (1988). Such patterns also mean that the personnel department has greater power than would be true of most U.S. companies.

25. See Smitka (1991), especially Chapters 1, 3 and 6.

26. See Clark and Fujimoto (1991).

been well described in 1980. But to the extent they were known, the tendency in the U.S. was to ascribe them to conditions held peculiar to Japan: lifetime employment, friendly company unions, a cultural proclivity to groups, and a willingness for workers with memories of war-related deprivation to sacrifice on their companies' behalf in return for a stable job and income. American workers would not prove so pliable or loyal, nor would unions grant flexibility. Now, ironically, portions of this system are under strain within Japan, while there are being successfully implemented in the U.S., even in union shops. The comments on management change below are largely qualitative in nature. They reflect, however, the emerging consensus of industry observers and the business press, and are matched by the concerns managers expressed in my own interviews at parts firms and assemblers.

### Manufacturing Management in Japan

The JIT system is under strain, and I suspect that quality is beginning to suffer, too. One impediment is logistics; the inadequacy of Japan's road system is making itself felt. The second is a rapid and qualitative shift in the nature of the labor force. (This is on top of the increase in wages reviewed in Section VI.) Other areas, too, are under pressure; product development teams have in two senses proven too successful.

In Japan as in the U.S., assembly and parts production is typically split among separate plants, even when (as at GM) they are divisions of the same firm. The auto industry itself is thus a major consumer of transportation services. In Japan, the lack of warehousing space adjacent to the factory floor—even were it not for “just in time” small-lot delivery practices—forces frequent shipments. But while many former industrial areas are now urbanized and car ownership expanded sharply during the 1980s, road systems have changed little. Congestion now drastically lowers the efficiency of truck delivery, the primary means of transporting materials and parts. In the Yokohama-Kawasaki area, where 3 shipments per truck per day could once be made, now only 2 are possible. This effectively raises the direct cost by one-third, while requiring additional investment in truck fleets—adding yet further to congestion! This is a particular burden on primary suppliers whose production of simple parts is spread among many small subcontractors.<sup>27</sup>

Second, many of the factories are now quite old. Such plants were often initially set just outside cities, but the subsequent growth of urbanization and the ability (and willingness) of residential neighborhoods to block new construction effectively prevents expansion at current sites. Production volumes have expanded manifold over the years, and despite frequent deliveries the need for inventory space is acute. Refitting plants also is hard. Relative to popular perception, Japanese automotive plants are often not highly automated. But labor shortages are forcing change there, and new manufacturing technologies prove also to be more intensive users of space: robots take up more room than humans. Companies are thus forced to relocate if they are to modernize their plant, and in surveys obtaining land is the main reason (along with obtaining workers) for moving to regions such as Kyushu.<sup>28</sup>

Third, the very rivalry that helped force improvements in efficiency in the domestic auto industry is now imposing costs. Along with clothing and furniture, autos are a quintessential monopolistically competitive industry. Product segmentation has proceeded vigorously, with both a multiplication of the number of platforms in production and (with a lag) on the road, and an explosion in options. In other words, any segment where one firm makes an advance encourages more rivalry, until on average no profits remain for anyone to chase. The very success of the product development process has reinforced this inherent tendency. In addition, at least to an American, cars are more an item of conspicuous consumption in Japan than a day-to-day necessity, and are accordingly loaded with unnecessary gadgets and frills. But even if engineering and tooling costs are lower than in the U.S., the excessive number of models and options lowers per unit sales even more. Maintaining all of these literally millions of separate parts in production magnifies the logistics, inventory and management problems of the entire JIT system.

The fourth item is another disadvantage of the Japanese vehicle development process, the independence of the design teams. While this made rapid development and coordination across

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27. See a survey of 117 parts firms reported in five parts in the Nikkei Sangyo Shimbum, February 13-25, 1992, where 44% mentioned logistics as exerting a serious pressure on profits.

28. Kyushu Keizai Chosa Kyokai (1992), 68.

functions possible, it at the same time lessened horizontal links to other teams, past and present. During the boom years of 1987-1991, the process got out of hand. With engineers firmly in control, the natural engineering tendency to optimize design took over. Thus while, for example, the inclusion of manufacturing on the development team meant that production problems received consideration, at the same time commonality with other models fell by the wayside. Little energy was spent to utilize existing parts and cannibalize designs from other cars, and firms are now launching efforts to reverse this. Newspapers report part number reduction targets of an astounding 30%, suggesting the extent to which engineers went wild. But for years to come this parts proliferation will make it much harder for suppliers to generate the volume to repay development, tooling and overhead costs.

Fifth, the expansion in domestic demand during the boom years 1988-91 generated an acute labor shortage. This hit the auto industry hard, because workers in general, and the young in particular, shunned factory work. The catch phrase “3K”—kitanai, kitsui, kiken, Japanese for dirty, hard and dangerous—captures this attitude. It is now the service industries, not manufacturing, that are viewed as the wave of the future. Retaining workers is hard; after 3 years, turnover rates among college graduates hired in April 1987 averaged 28.4%, and reached a full 46.2% among the new high school graduates who are the principal group sought by factory managers. Small firms in particular find it well-nigh impossible to recruit new school leavers at current wages.

Sixth, the very success of the industry has intensified such problems: much of production is concentrated in Aichi Prefecture (Toyota and Mitsubishi Motors, and much of the parts industry), or in Kawasaki-Yokohama and Western Tokyo. Firms thus compete against each other, and against new industries such as electronics, for the same shrinking pool of workers. Even where they have an adequate labor force, it is rapidly aging, while demographic change also means a shrinking pool of young workers. (Those who will enter the workforce in 2010 have already been born; the continued drop in the birthrate means that this shortage will only intensify over time.) On the other end of the same trend, the average worker at most companies is pushing age 40, and at some factories half the workers are over age 50. This has forced down the average pace of production lines at selected plants. It is not clear how significant a cost is



imposed by older workers, but managers appear to believe it is a real problem, and it is being reflected in the design of new plants and automation.

Nor are all the recruiting problems mere media hype. By 1990, the auto industry had turned to foreign workers; it is not unusual to find all the signs in a factory to be in both Japanese and Portuguese. Unfortunately no numbers are available, given the nebulous legal status or outright illegality of foreign workers, and the reticence of assemblers to admit that their factory labor force is heavily non-Japanese. (Furthermore, the variation is wide among firms, though among the assemblers Isuzu, Daihatsu, Hino, Mazda and Mitsubishi Motors utilize Japanese-Brazilians.<sup>29</sup>) But at some major companies 20-30% of those on the shop floor are now from abroad. Those that do not use foreign workers, however, rely just as heavily on more traditional sources of labor, such as seasonal workers and crews of middle-aged workers “borrowed” from other industries (e.g., steelworkers), and retirees. Along with these groups, the number of women on the factory floor is slowly expanding, something almost as unthinkable until recently as using foreign workers.

Between these expedients of temporary and foreign workers, 30% of the factory workforce is now without experience or commitment to the firm. Average worker quality is lower, and a substantial minority of workers now have little interest in participating in QC circles, a traditional training and incentive mechanism. It is thus harder to use JIT and other now-standard methods that delegate decision making to low levels in the organization, both because workers lack the experience to contribute and because they have little incentive to put forth extra effort. Most important, it constrains the ability to assemble multiple vehicle models with wide ranges of options on the same line, since that inevitably makes demands on workers’ experience and motivation. For suppliers, too, this makes efficient production of the proliferating number of parts difficult, as tasks must be increasingly standardized.

Finally, the logistic costs of running the manufacturing system are mushrooming and are not trivial; Toyota’s reported direct expenditures are 2% and Mitsubishi Motors 3%. Most of this is for the domestic delivery of vehicles, but similar costs are incurred at each step of the way,

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29. Nikkei Sangyo Shimbun, October 16, 1991.

from the steel mill to individual parts suppliers to component makers to deliveries to the assembly line. These shipping costs are born by suppliers in the first instance, and indirectly add at least another 3% to total manufacturing costs.<sup>30</sup> Together with the difficulty of retrofitting old factories and in recruiting workers, this is encouraging increased vertical integration by primary suppliers, and the location to new sites with warehouses that make possible deliveries in large lots.

These various problems do not signify a collapse of “Japanese-style” management, but they do represent non-trivial changes in the costs and constraints on producing in Japan that are by-and-large absent in the U.S.. Furthermore, the labor-related and logistic aspects can only intensify in the future at existing factories, particularly in the greater Tokyo region. As discussed in greater detail in Section VII, this is contributing to a geographic realignment of the industry within Japan that may prove nearly as great as that transpiring in the U.S.

#### Manufacturing Management in the U.S.<sup>31</sup>

In 1980 the Big 3 suffered in nearly every dimension when compared to their Japanese rivals, and the same thing was by-and-large true of the parts industry. Quality was abysmal, assembly efficiency low, the design process rigid and slow, and the ability of factories and firms to adjust their product mix to demand variations minimal. In addition, labor relations were poor at many facilities. Yet the Big 3 were being forced to compete on costs and quality, and the structure of the market and the regulatory environment was shifting rapidly, placing demands upon the design process and making it important to be able to produce a variety of items at the same facility. These pressures have induced a reformation in management in the industry. Most of the gap with Japanese “best practice” has been eliminated, though unfortunately not always in the eyes of the media and consumers.

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30. A spate of recent articles points out efforts to use ferries instead of ships, e.g., *Nikkei Sangyo Shimbun*, July 1 and July 2, 1992.

31. See Smitka (1992).

Part of this change has taken place through new entry by more efficient firms, that is, the Japanese transplants, and the closure of old and poorly performing facilities of others. After all, at the assembly level about 20% of capacity is now accounted for by “transplant” Japanese factories, which in itself would pull up the industry’s average. (No similar data are available for parts, but the proportion there must be closer to 5%, given local content ratios.<sup>32</sup>) These firms, of course, transmit their own practices to their suppliers, and are a source of training for American workers and managers. This provides a route for diffusion, as they move on to other employers over time. Diffusion also takes place through the labors of business school researchers and consultants to study and teach about “Japanese” management.

Most such change, however, stems from in-house efforts by American firms. Ultimately it was a matter of meet the competition or be met by the competition. Change, however, is costly, and only began when it was perceived to be necessary. The timing therefore has been extremely uneven across firms, reflecting the depth of the separate crises they faced. Ford, whose losses in North America in 1979 actually exceeded those at Chrysler, commenced systematic reform efforts in 1979. The attention of Chrysler management at the time was devoted to organizing the bailout package and staying out of bankruptcy. With the end of the recession and the successful launch of the K-car series, Chrysler bounded back to profitability. Larger management problems were quickly forgotten and systematic reform delayed until 1989. GM, with its grip on the lucrative large car market and its huge dealer network, maintained profitability despite continued losses in market share. Indeed, it did quite well in the mid-1980s, and built 6 totally new robotized plants and refurbishing 11 others at a cost of nearly \$40 billion. But these resources were not spent wisely; GM developed look-alike cars that were poorly received, and discovered that it knew neither how to run automated plants nor how to design cars to take advantage of robots welding and assembly. (The new plants actually had lower productivity than the low-tech ones they replaced.)<sup>33</sup> It required massive red ink to bring about the intervention of the Board to demote President Lloyd Reuss in early 1992. This has stirred GM from its

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32. This assumes that 20% of the market comes from transplant assembler production, that local content there averages 50%, and that of this 50% is supplied by transplant parts firms.

33. Keller (1989).

lethargy, and its habit of throwing money at problems rather than rethinking how it operates, but the process is only beginning in what remains a huge and bureaucratic organization. Nevertheless, an atmosphere of change and reform now dominates at the top of each of the Big 3, and at their major and many minor suppliers.

This induced innovation in management began in basic shop-floor “tools” (such as how to check for quality) rather than in the more complicated “structures” (such as product development organization). Indeed, such changes began at both Chrysler and GM long before their systematic reform efforts commenced. Likewise, labor relations experiments date back to the 1970s, though they remained piecemeal until well into the 1980s.<sup>34</sup> Ford in particular had a quality program for its factories and for its suppliers up and running by 1983, and GM was not far behind in setting up programs for its suppliers. Firms in other industries, such as Motorola, Intel and Velcro, actually learned the nuts and bolts of quality management from their automotive customers. Now virtually all significant suppliers in the industry have operating SPC programs, with the charts available to their customers.<sup>35</sup> Chrysler’s Acustar division in 1989 could accept 6.8 billion incoming parts without inspection, most on a JIT basis, and is now selling assemblies to Toyota and Nippon Denso in Japan.

These efforts have not been limited to quality. Despite the apparent blanket nature of the UAW contract, in fact many issues are officially settled only at the union local (plant) level. When the local leadership and membership are amenable, this permits tremendous flexibility, even in the face of explicit opposition by UAW headquarters that it compromised the pattern contract for the industry. Indeed, while the overall level of wages and benefits are centrally determined, promotion and work assignment practices probably vary more across plants within than same firm than is true in Japan. As *Fortune* trumpeted in a cover story in 1990, Americans have discovered teams, and the putative rigidities in the labor market have proven illusory.

Similar changes have taken place in the use of JIT, in factory organization—all of the Big 3 have at least some plants that can turn out multiple models from the same assembly line—and

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34. See Kochan, Katz and McKersie (1987) and Lodge and Walton (1989).

35. See the ongoing work of Susan Helper at Case Western Reserve University, e.g. Helper (1991, 1991b).

even in vehicle design. For example, even in the late 1980s the Big 3 required nearly 6 years to develop a new platform. Chrysler now is developing a new model on a 36-month cycle, from the approval of the stylist's sketch to Job One, the first regular production vehicle off the assembly line—and they claim to be ahead of schedule. Such changes have not diffused throughout all of GM, but at least Buick and certain component divisions (e.g., AC Rochester) have been turned around.

These results have shown up in the form of much higher vehicle quality and improved productivity.<sup>36</sup> There is now virtually no gap between the better U.S. and the better Japanese facilities. Indeed, at least one international study found the best quality operation in the world to be Ford's Hermosillo, Mexico plant.<sup>37</sup> Unfortunately, public perceptions have been slower to change, and the Big 3 suffer from the legacy of their years of poor management and outright abuse of their customers and dealers. But the gap is no longer a qualitative one, and at the quantitative level it is not always in favor of Japan or of Japanese firms. Individual firms and factories have problems, but the same is true in Japan. The parts industry in the U.S. has been slow to change, comprised as it is of many small and historically unsophisticated firms. But the competitiveness of the market means that even they now realize that if they do not come up to world standards in manufacturing practice, they must exit the auto industry. Across almost all segments of the industry the management gap with foreign competition is now sufficiently small that any manufacturing advantage is likely to accrue from the cost of labor and other inputs, not differences in productivity. Customers are willing to pay a premium for a vehicle they desire, as with Chrysler's minivan. Luck in car styling can overcome a modest cost disadvantage, but no firm has proven capable of being consistently lucky, and over time cost will tell. In the future, that will tell against production in Japan.

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36. In 1980, Harbour & Associates reported defects per car as 6.7 at Ford, 8.1 at Chrysler and 7.4 defects per car at GM, while the average for Japanese producers was 2.0 defects per car. By 1989, Ford was down to 1.5 defects per car, GM to 1.7 and Chrysler to 1.8, all better than the 1980 Japanese average. While Japanese quality had improved to 1.2 defects per car by 1989, from the purchasers' standpoint there is now virtually no gap between the Big 3 and their Japanese rivals. Cited in a Wall Street Journal, February 16, 1990 article by Paul Ingrassia.

37. Shaiken (1991).

## V. The Shifting Cost Base of the Industry

Though the U.S. and Japanese industries are on comparable footing in terms of management capabilities, relative costs still matter. Wages and interest rates are largely beyond the control of individual firms. Here the gap that is rapidly appearing is in the U.S.'s favor.

### Labor Costs

The single largest cost in any economy is labor, and in Japan these costs are on average higher than in the U.S. Of course, from the standpoint of manufacturing, wages must be balanced against productivity, but productivity increases in the Japanese auto industry have been quite modest recently and are now negative, so that most of any increase in wages shows up as an increase in costs. In contrast, the corporate reform in the U.S.—including the closure of the least efficient factories—implies that there have been and will continue to be large gains in productivity for some years. (I have no quantitative data available to me here.) U.S. wages have continued to rise, and given health care costs, labor costs have risen even faster. But Japanese wages are up much more sharply, and that increase has been amplified by the strengthening of the yen.

Most of my story is told in Table 1 and Figure 1, which provide data on Japanese wages, productivity and exchange rates, together with wage data for the U.S. As can be seen in Figure 1, wages in Japan rose very rapidly from 1985, and since 1989 have been higher in the U.S. The underlying numbers are in Table 1. The first column is cash compensation in the automotive industry, including bonuses, which is converted into an index in column 2. This is then adjusted for hours in columns 3 and 4, and for exchange rates in columns 5 and 6. Productivity for the transport industry is in column 7, and is used to calculate an index of adjusted dollar-based costs in column 8. (The transport industry includes shipbuilding and other sectors, though autos are the dominant component.) This is contrasted with U.S. auto wages in the final two columns.

In 1970, Japanese automotive wages were only 38% of U.S. levels. But with rapid economic growth (and high inflation) nominal wages rose sharply through the early 1970s. The

economy expanded more slowly after the first oil crisis, and even though inflation has been quite low, during the 1980s Japanese automotive wages rose 43% (versus 48% in the U.S., where inflation was high in the early 1980s). Increases in Japan have been particularly high the past half-dozen year, with wages rising 24% during 1985-1991, versus 14% in the U.S. during the same period. Furthermore, in Japan the 1992 annual (shunto) pay increases will add another 4.8%.

These data are based on industry-wide statistics, and thus reflect changes at parts firms and not just assemblers. While they are only rough estimates, they do at least depict general trends and levels. They are, however, own-currency wages; for traded goods, a common currency must be used. That changes the picture dramatically, because the yen has virtually doubled in strength since 1985. Even after correcting for productivity, wages in Japan have more than doubled since 1985 when measured in U.S. dollars. On an industry basis wages in Japan were thus about \$16.73 per hour in 1991 and about \$18.90 in 1992, given recent changes in wages and exchange rates. In contrast, U.S. wages averaged \$15.32 in 1991, and since the recession kept wages hikes minimal, Japanese wages are now distinctly higher.

What matters to firms, though, is their overall labor cost, not wages per se. But however problematic a comparison of wages is, given differences in labor market practices and the definitions and coverage of data, it is even more difficult to account for benefits and other non-wage costs. Survey data by the Nikkeiren (Japan Association of Employers) show that benefits and retirement contributions add another 22% to costs at the typically large firms that make up their membership; analysis of the balance sheet for Toyota yields a similar figure of 20%. (See Figure 2 for trends in Japanese benefits.) In contrast, in the U.S. I estimate that on the one hand benefits add 35% to costs for non-union firms that split the burden of insurance and retirement programs with employees,<sup>38</sup> while firms that offer no insurance coverage can hold benefits to 10%. At the Big 3 on the other hand, benefits for current employees and retirees add a full 100% to labor costs. This offsets the impact of low-benefit firms, and industry-wide data

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38. This assumes (i) a policy with a deductible and an employer contribution of 50% of premiums at (ii) a wage rate of \$14 per hour plus (iii) 8% as a retirement contribution. Base data on insurance and similar costs is drawn from Washington and Lee University's compensation program.

from the Bureau of Labor Statistics show benefits were 35% of wages during 1987-89.<sup>39</sup> Correcting 1990 data for benefits gives a crude industry-wide estimate of labor costs of \$17.70 in Japan and \$19.28 in the U.S. Extrapolating data to 1992 gives costs of \$22.67 in Japan and \$21.30 in the U.S., a difference of 6.4% at ¥125 and 8.1% at ¥123.<sup>40</sup>

For the industry as a whole, then, labor costs are now slightly higher in Japan than in the U.S.—it is best not to claim more of the data. In both countries labor costs at the assemblers are higher than at parts firms. The gap, however, is much bigger in the U.S. than in Japan. Labor costs at Big 3 assembly plants are now just under \$40 per hour, almost double the U.S. industry average. The gap is far smaller in Japan, under 20%. For example, at Toyota, the best-paying firm in the industry and hence where the gap is widest, labor costs are about \$27 per hour (19% higher). The essence of an average implies, then, a large cost advantage for the U.S. parts industry.

But the assemblers are only one portion of the industry, and account for a smaller portion of the cost of a car than do parts makers. And if costs at assemblers are higher than the industry average, then costs at parts firms must be less than the average. Furthermore, because American assembler costs are far above average, costs at parts makers must be well below the industry average. In other words, while costs in the two countries differ only somewhat at the industry level, parts firms in the U.S. enjoy a distinct advantage over those in Japan. The advantage would be especially great at non-union parts plants paying minimal benefits. Of course, for the industry as a whole parts and materials purchases are 50% or more of all manufacturing costs, so this has major implications for the relative competitiveness of the two industries. Any further rise in the yen would shift labor costs even more distinctly in favor of the U.S.

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39. The Motor Vehicle Manufacturers Association *Facts and Figures '91* and earlier provide Bureau of Labor Statistics data on wages and benefits; the data for Japan are of unknown provenance. In any event, for Japan these data show ¥1762 in wages and ¥310 (15%) in benefits for 1987, ¥1685 in wages and ¥446 (21%) in benefits for 1988, and ¥1807 in wages and ¥354 (16%) in benefits for 1989. Similar data for the U.S. are \$13.57 in wages and \$6.96 (34%) in benefits for 1987, \$13.90 in wages and \$8.05 (37%) in benefits for 1988, and \$14.28 in wages and \$7.23 (35%) in benefits for 1989.

40. For Japan, I assume that a 4.8% rise in wages held over reported 1991 levels and benefits of 20%. For the U.S. I assume a 3% rise in wages over 1991 levels and benefits of 35%.



### The Yen

The yen remains volatile, having risen by 10% during the first 8 months of 1992. A major depreciation would counterbalance the increase in wages within Japan. My own judgment, however, and that of Salomon Brothers and many other analysts, is that even over the short run the yen will strengthen further. Certainly over the medium run the U.S. macroeconomic imbalances will encourage a weak dollar, while mirror image situation of Japan speaks for a strong yen. Of course, empirically the current exchange rate is a better predictor of the future than the crystal ball of economists. With the dollar at or below ¥125 for most of 1992, that too implies that the yen will remain well above the average of the past 3 years.

### Capital Costs

During the late 1980s and into 1990, there was an ongoing debate about the competitive advantage that accrued to Japanese manufacturers due to their low cost of capital. One element was the government provision of accelerated depreciation and other tax breaks. Relative to the U.S., this must be set against a slightly higher corporate income tax rate; the net effect is both quantitatively small and qualitatively unimportant. Second, a finger is normally pointed at the banking system, which could be a reliable and steady source of capital. Again, the coziness was real, but it is dubious that this accounted for any real difference in costs, or even contributed to longer time horizons.<sup>41</sup> The main difference stems from the level of interest rates, an outcome of macroeconomic policy, and the structure of the equity market. Both Japan and the U.S. have seen huge swings in these areas in the past decade.

With the rapid appreciation of the yen in 1985-86, the Bank of Japan eased up on monetary policy. Its discount rate fell to a low of 2.5%, and was matched by declines in lending rates, with short-term loan rates dropping from 5.8% in 1985 to 4.0% during the period June

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41. Auto companies, after all, must inevitably plan on at least an 8-year horizon, the average duration between the time a decision is made to launch a vehicle and the time when production eventually ceases. GM launched its Saturn subsidiary with no expectation of any revenue for the first 7 years, much less a profit.

1987 through February 1989. This contributed to an economic boom led by a sharp appreciation of asset prices, both of land and on the stock market. The boom spilled over into car sales, and this encouraged a wave of investment by the auto industry, funded by cheap loans and equity finance. The Big 5 assemblers along with 5 large parts firms, for example, floated warrant bonds on the Euromarket at near-zero interest rates, given the expectations of further highs on the Tokyo Stock Exchange. By 1989, however, the government became concerned both that the economy would overheat and produce inflation, and that financial speculation had gotten out of hand. Monetary policy was tightened, and by December 1990 short-term loan rates doubled to 8.0%. (Call market and bill discount rates show an even wider swing.) Stock prices plummeted, and continue to decline in mid-1992, over two years later. In the face of the current recession, interest rates are now back under 5%. But I sense a great deal of caution on the part of the Bank of Japan of touching off another bubble, and expect interest rates will rise again when the current recession ends.

Now equity finance is no longer feasible, and given the huge number of investors who suffered losses in the decline of the market, it is hard to imagine that the heady days of 1989 will return any time in the next 20 years. Banks and institutional investors are similarly hurting, and must pay more attention to returns—including that of their stock portfolio. Furthermore, the equity-related bonds issued at the height of the boom were not converted into shares of stock and are now falling due for redemption. These bonds must be refinanced at market rates, either through new bond issues or bank loans. For example, Toyota has drawn down its financial assets to finance investment, and at ¥1.6 trillion they are one-third less than their peak in 1990. In 1992 the company issued \$1 billion in medium-term Eurobonds as earlier warrant bond issues approach redemption. Few firms were able to resist the temptation of plowing some of their borrowings into the stock market; today that represents an outright loss. Again, at Toyota reportedly 10% of assets were also invested in stock-market related funds, which potentially have lost up to half their value. For many firms much of their borrowings that did not go into speculation were invested in long-term projects (such as new factories) that only made sense at very low interest rates. These investments, in other words, are not generating the cash flow needed to cover the now-higher cost of the funds that were used to finance them. Thus what looked like virtually costless capital up front is proving on average to be anything but low in cost. Cheap money is a

thing in the past, and at least one major parts firm (Ikeda Bussan, with ties to Nissan) and two Toyota dealerships have required bailouts by their “parent” companies due to losses from financial speculation. That is costly capital, indeed!<sup>42</sup>

### Summary

Any comparison of industry-wide costs is inevitably crude. Nevertheless, the gap between the management capabilities of the U.S. and Japanese industries is small and shrinking, Japanese firms no longer face low capital costs, and labor costs in Japan are higher. The latter, of course, reflects not just wage increases but also the decline in the value of the dollar since 1985. As will be noted below, many qualitative indicators bear out the trends indicated by these data. Thus, for example, we are seeing the start of rapid increases in exports from the U.S. to Japan, that result from commercial and not political concerns.

## VI. The Decline of Japan and the U.S. Revival: Implications

### Introduction

The Big 3’s loss of their oligopoly in North American was traumatic, and even though a dozen years have now passed, adjustment to this newly competitive environment continues. Dramatic changes are now underway in Japan as well, though I do not foresee an outcome as tragic as that in the U.S. and Canada. The picture in the U.S. is now bright, as the relative cost structure has shifted in its favor, and as Americans have shifted to buying vehicles in segments where the Big 3 are strongest. On the other hand, Japan is now a high-cost manufacturer still highly dependent on exports. With recessions both at home and in major export markets, the short run picture is

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42. While real estate prices are down 30% to 50% from their peak, they still remain the highest of any major industrial country, again making expansion potentially quite costly when an existing site cannot be sold. On the other hand, firms with near-idle factories, such as Fuji Heavy Industries (Subaru), are still capable of enduring long periods of operating losses without enduring layoffs or other restructuring costs.

not bright. Little points toward a rapid improvement even when the current downturns end. Indeed, exports will continue to fall, and imports rise. This section sets forth these trends, and ponders their implications. As in the preceding sections, the analysis will focus in turn on the U.S. assembly and parts industries, and then the Japanese assembly and parts industries. The conclusion addresses both the narrow area of bilateral trade issues, and the general issues that this analysis raises for the future of the Japanese economy.

Along the way one final digression into the recent history of the industry is needed. In particular, the 1980s saw a large investment in new capacity in both the U.S. and Japan, and in both assembly and parts manufacturing. (This boom continued into 1991 in Japan.) Measuring capacity is very difficult, even for assembly, but for parts there is no common denominator. Nevertheless, the essence of the story is that capacity has grown far more rapidly than demand. That requires that adjustment over time occur somewhere. The most visible aspects will be red ink on Japanese balance sheets, and a rapid shift in trade patterns. In contrast to the 1980s, in the 1990s most of the negative impact will be felt within Japan.

#### The Industry Moving South: The U.S.<sup>43</sup>

New entry in the U.S. began in 1982, with Honda's plant in Marysville, Ohio. Including GM Saturn there are now 12 new firms in the U.S. and Canada, producing 1.8 million vehicles in 1991.<sup>44</sup> (BMW's recently announced entry will raise this to 13.) In all, this represents 2.8 million units in added assembly capacity. With exports yet small and the aggregate market growing only slowly, this required (and continues to require) a decrease in imports and the closure of existing plants. Indeed, imports are down by over 25% from their peak in volume terms, while at least 16 assembly plants have closed. (I do not have precise figures here.)

With the rapid rise in the strength of the yen in 1985, a strategy of running plants that

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43. See Helper (1991a) and Mair, Florida and Kenny (1988), and Jones and North (1991) on the U.K.

44 I have not included Ford's Hermosillo plant, even though most of its output is exported to the U.S.. GM also built or refurbished 11 plants in the latter 1980s.

relied on imported parts was no longer viable. Given the structural mismatch between the existing universe of U.S. parts makers and the new entrants, traditional parts manufacturers could not immediately fulfill their needs. The Japanese, furthermore, did not believe they had the leeway to gradually build up an appropriate U.S. supplier base, a process that after all took 25 years within Japan. They thus encouraged their existing suppliers to follow them to the U.S. Of course, Japanese (and European) suppliers saw this as an opportunity to expand their own business. Including the Europeans, over 300 new plants resulted. (Traditional suppliers have likewise built new factories.) Again, this has resulted in the closure of many firms, whose difficulties have been accentuated by a shift in the purchasing strategies at the Big 3 towards “Japanese” patterns of buying subassemblies and asking for greater supplier involvement in the development process of a new vehicle.

Equally significant, not only has new entry taken place in both parts and assembly, but this entry occurred to the south of the previous center of the industry. Indeed, many parts firms have located in the maquiladora region of Mexico, and Ford also has its newest assembly plant in Hermosillo. (Chrysler’s newest plant, however, is located within the city of Detroit.) The closure of old and inefficient plants in the North has thus been traumatic, since no “sunrise” industries moved into Michigan to take their place. But the bulk of this transition is now over.

### The Industry Moving South: Japan

Few overseas observers are aware that similar changes are underway in Japan. First of all, the boom in domestic sales in 1987-1991 came on top of continued strong exports. This encouraged investment in new plant and the upgrading of existing facilities (along with the proliferation of models). In particular, the southern island of Kyushu is emerging as a new center within Japan, alongside the Nagoya region (Toyota and Mitsubishi) and the Tokyo-Yokohama region.<sup>45</sup> Honda

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45 Mazda was located in Hiroshima, Suzuki in Shizuoka Prefecture between Yokohama and Nagoya, and Daihatsu is in the Osaka area. The factories of Nissan, Honda, Hino, Fuji Heavy Industries, Nissan Diesel and part of Mitsubishi’s operations are all located in or near the Tokyo-Yokohama (Kanto) area. See Kyushu Keizai Chosa Kai (1992).

is concentrating all of its motorcycle assembly and some engine and transmission manufacturing there, while Nissan, Toyota and Mazda all have or will soon open new plants, and Daihatsu has announced plans for one by 1996. Alongside ones under construction elsewhere, this represents at least 1.4 million units of new capacity. With exports of 5.7 million units, there is a potential for catastrophic excess capacity.

New entry has not been limited to assembly. In Kyushu alone 128 firms have built new factories or undertaken major expansion of existing facilities during the past 2 years; previously only 107 plants were located there. Another group of plants have opened in the Tohoku (Northeast) region, following Toyota's plans for an electronics plant near Sendai.<sup>46</sup> Finally, plants in Tokyo have been moving to the fringes of the Kanto (Tokyo-Yokohama) plain, as community pressure makes it almost impossible to expand at existing urban sites. (A similar but less pronounced trend is visible for plants in the Nagoya region.) During January-June 1992, 35 firms announced new plants outside of Kyushu, and 25 in Kyushu. If this 7:5 ratio is representative, then 210 plants have been set up in other regions since early 1989. Together with the 150 plants in Kyushu, this gives 360 new or expanded factories. (This total does not include plants in Southeast Asia that make wire harnesses and other items exclusively for export to Japan.) No systematic data are available on plant relocations, but newspaper coverage suggests that 10% are mere replacements of older facilities.

New plants are being built for a variety of reasons. But the choice of location is determined by the availability of above all labor, followed by land and transport infrastructure. Recruiting is now impossible in urban areas, but that is not true of traditionally poor farming districts such as the Northeast (Tohoku) or Kyushu. Ironically, so many firms have moved into northern Kyushu that latecomers such as Toyota are finding recruiting hard. A second aspect is government incentives.<sup>47</sup> Unlike the U.S. with its Federal system, local governments in Japan

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46 Isuzu also has a plant in Hokkaido. Three affiliates of Toyota are constructing plants, Kanto Automotive in Iwate Prefecture, Central Automotive near Sendai and Toyota Auto Body in Mie Prefecture.

47. *Nikkei Sangyo Shimbun*, October 21, 1991. On the U.S. see Yanarella and Green (1988). Complaints are now being voiced in South Carolina over the generous terms of the BMW agreement.

have little leeway to provide tax abatements, but they can construct infrastructure. In the medium term this still may not be matched by increased tax revenues, a common complaint in the U.S. To the consternation of the various Kyushu governments, Toyota and several other major ventures are being set up as subsidiaries with independent books. The initial high levels of depreciation will inevitably mean a loss, and thus no profit tax payments, of which local governments would otherwise receive a portion.

### The Future of the U.S. Industry: Assembly

North America imports from Japan have fallen continuously since 1986 to hit 2.36 million units in 1991. This level is down 36% from the peak of 3.72 million cars and trucks 6 years ago, and the deterioration continues unabated. Total imports nevertheless rose initially in value terms, as the composition of exports shifted from subcompacts to larger cars; the total value of imports from Japan is now declining as well. Indeed, while the U.S. economy is gradually improving and auto sales are up sharply, Japanese manufacturers have not seen a proportionate increase in their sales. On the other hand, exports to Japan are up from minimal levels but a few years ago. The top exporter, Honda of the U.S., is currently shipping 24,000 cars a year, but Toyota, Ford and Saturn have all announced plans to make right-hand drive vehicles specifically for the Japanese market. In Tokyo, Ford and Honda are both running late-night TV ads featuring prominently the American source of their vehicles, while GM ran an innovative print ad campaign. American cars will soon be appearing on Japanese roads in significant numbers for the first time since the early 1950s, after a hiatus of 40 years.

The common view is that this decline is a mere bowing to political pressure. The evidence suggests otherwise: commercial considerations are the motivating factor. One element, of course, is that from the start production within the U.S. was expected to substitute for exports, as it concentrated on high-volume cars. Thus imports automatically declined as the new plants came on-stream. But the car companies consistently failed to fill their voluntary export restraint quotas.<sup>48</sup> Political considerations also do not account for the extent of price increases since 1985, since these price increases have not been reflected in increased profits. Increases have

been substantial. Automotive News reports price increases on comparably equipped cars of 24% for the Big 3 and 45% for Japanese firms during the 6 model years of 1982-1987. The gap was particularly large after the 1985 depreciation of the dollar: Japanese car prices rose 14% in '86 and 7% in '87, versus 6% and 2% respectively for the Big 3. (Because the size of cars increased during this period, average prices rose faster, at 37% for the Big 3 and 67% for the Japanese makers.) Price increases during the four years 1988-1992 have been sharp as well, ranging from 18% for the Honda Accord to 38% for the Honda Civic, and averaging 25% overall.<sup>49</sup> All told, Japanese car prices have thus jumped at least 70% during the past 10 years.

The extent and timing of these increases clearly reflects the impact of the dramatic increase in costs in Japan after 1985. From a political perspective, note that there was no sudden increase in trade friction at that time. It is simply that it is increasingly difficult for the Japanese auto makers to profitably export from Japan. Of course two of the most lucrative segments—pickup trucks and minivans—have been closed off by tariffs and political threats, respectively.<sup>50</sup> But the blush is off the Japanese miracle.

Several minor factors contribute to this. One is the concentration of dealerships on the East and West Coasts, where the recession hit hardest. The second is that Japanese car designs are compromises, aimed at both the Japanese and the U.S. market. While external and internal trim are market specific and extra safety features are added for the U.S., the overall body design has been identical. Tastes are not. Even without the dumping investigation, Japanese minivans were selling only modestly, and both Honda and Nissan have seen major sales declines of their cars. They and Toyota are now strengthening their design centers to be able to turn out an

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48 There are too many firms in the industry to form a cartel without government backing, and MITI has insufficient clout to impose one without a reduction of the VER. There is in addition no evidence for such a cartel. One thus would expect the Japanese auto companies to have tried to fill their quota, if it had been profitable to do so.

49 Nikkei Sangyo Shimbun, July 13, 1992 citing Maryann Keller.

50 An anti-dumping suit would have been inconceivable in the early 1980s, because of the clear cost advantage and profitability of the Japanese car industry. Margins were fat enough to preclude a “guilty” verdict even given the advantage of the use of accounting definitions unfavorable to exporters.



“all-U.S.” vehicle, but only Nissan has done so to date, through its joint minivan project with Ford. (Honda will launch a “U.S.” car shortly.) In sum, the cost and quality gap are now sufficiently small (if any gap remains at all) that styling is the determining factor.

Thus despite its many problems, GM managed to turn out enough designs that matched consumer wants for its Buick division to actually increase sales during the recent recession. At the same time, the transplant factories have not always performed well, despite presumed cost advantages stemming from their younger workforce and better production systems. Mazda, Diamond Star Motors (Mitsubishi) and SIA (Subaru-Isuzu) are all operating well below capacity, and other plants have had short-term problems selling their output. Hyundai in Canada is barely functioning, while the Saturn plant is doing surprisingly well. GM is still scheduled to close several plants, but to the extent there is excess assembly capacity in the U.S. and Canada, it is not clear that the Big 3 will necessarily be the losers. And there may not be that much excess capacity, because imports will continue their steady decline, beyond that required by the new VER ceiling of 1.65 million units, while exports to Japan and Europe will increase beyond their current token levels.

In sum, imports are no longer competitive, the Big 3 have turned around their management (even GM is far better than 5 years ago), and some of the transplants are performing quite poorly. (In fact, Daihatsu is withdrawing from even selling vehicles in the U.S., having given up hope of achieving sufficient volumes to make maintaining a distribution network profitable.) Most of the transition in the assembly end of the industry is thus complete, and if a free trade agreement with Mexico is achieved, the growth in the economy and hence in local auto demand will largely offset short-term inroads into the U.S. market. In addition, because of the focus on subcompacts stemming from decades of protectionist policies, the area where Mexican firms such as Ford are strongest are areas where demand in the U.S. is actually shrinking. Absent another oil crisis, there will be no repeat of the 1970s onslaught of imports—and even with a shift in energy prices and a return to subcompacts, the Big 6 of today are far more agile and responsive than the Big 3 of the past.

The Future of the U.S. Industry: Parts

The parts end of the industry is in a greater state of flux: more firms have problems at the same time that more firms are doing well. But because of the tremendous heterogeneity of the industry, it is very hard to generalize. That is unfortunate, because given the weight of parts production relative assembly, the largest sector of the industry is therefore missed. In any event, it is on the one hand clear that the small traditional parts firms are quickly disappearing. On the other hand, the new generation of component and subassembly manufacturers are rapidly displacing imports from Japan, and in themselves becoming substantial exporters. Indeed, it would not be surprising to see a growth in total employment.

First, the influx of transplant parts producers has changed the face of the industry. Second, the larger and more technically skilled of the traditional producers have been expanding. This is particularly true of those companies that had defense industry divisions, and hence have accumulated unique technical skills. But even less flashy companies such as Dana have been opening strings of small-sized factories in rural areas. Third, with each model change, the number and complexity of components procured by the transplant assemblers in the U.S. has increased. Unlike assembly, the market for parts makers is thus growing. Finally, exports are rising rapidly. Despite the recession in Japan and the U.S., for fiscal year 1991 as a whole sales of parts to the Japanese assemblers and their transplants were up 16% in dollar terms. At least 78 companies now have representation in Japan, including firms with full-fledged engineering centers such as Garrett, Dana, TRW, Bendix, Timken and the GM parts divisions. These changes were already underway prior to the Action Plan put together for President Bush's visit in January 1992. That may have influenced timing slightly, but not the overall trend. Given the competitiveness of the domestic market, no company can afford to use large numbers of parts when that is not commercially viable. American companies are finding they can export competitively, even given 7-15% shipping costs and the 3% value-added tax. It appears that as long as the yen stays at ¥125 or stronger, exports to Japan are viable for a wide range of items. (See Figures 3 and 4, and Table 2.)

This is not to say that the parts sector is without problems. As noted, small traditional firms are losing their entire market. At the same time, new entrants are not faring as well as they

had hoped. Specifically, the transplant parts firms entered the U.S. market with the (accurate) presumption that their customers would be willing to shift purchases of parts from factories in Japan to affiliated factories in the U.S.. But on the whole the transplants also assumed that they would be able to sell to the Big 3 and to other assemblers; indeed, without such sale they would not be profitable. To date, most such firms have not achieved their anticipated levels of new sales, and are finding it extremely difficult to earn back their initial investment, or even turn an operating profit. At least two companies have folded their operations, and a half-dozen joint ventures have bought out American partners who had wanted to close down their plants rather than keep going. Press reports have mentioned that as many as 60% of transplant parts firms are losing money, though that may reflect a small sample and the expected losses on start-up rather than real problems. With the current recession and the shift in the cost structure, transplant factories are also turning into active exporters.<sup>51</sup> This helps them kill two birds with one stone, increasing capacity utilization in the U.S. while easing the strain of excess demand within Japan. Thus the transplants are helping as well to increase the export orientation of the North American auto industry, and employment is now higher than in 1990. (See Figure 5.)

#### The Future of the Japanese Industry: Assembly

Despite the current domestic recession, production levels remain higher than before the start of the boom in 1988. Thus it is surprising that four firms are running operating losses, Nissan, Isuzu, Fuji Heavy Industries and Daihatsu. In fact profits were declining even before sales nose-dived: the problems in the industry run far deeper than a temporary downturn in sales. Model proliferation and investment in new plant has been combined with tight labor markets. Steel prices, too, rose 5% in 1991,<sup>52</sup> reflecting rising labor costs there as well, but adding to the automakers' woes. They likewise had to accept parts price increases on occasion, and the traditional biannual 2-3% target price reductions by suppliers are not being met. Finally, with

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51 See, for example, an article on Sancor exports of flywheels to Japan in Nikkan Kogyo Shimbun, January 14, 1992.

52 The recession, however, will make it very hard for steel firms to increase prices again in the near future.

sluggish export demand and declining domestic sales, discounting has been steep. A quarter of all dealerships lost money in 1991, and half are expected to lose money in 1992.

With the current cost structure, however, exports will continue to decrease. Europe, the one remaining large market, is closed for political reasons, and the EC is still less than unified.<sup>53</sup> Southeast Asia and the other rapidly developing markets insist on limiting imports of built-up cars and are pushing for increased local content. Finally, while demographics suggest that car ownership rates will increase further in Japan, the underlying pace of growth remains modest (2-3% per annum). It thus will be 4-5 years until 1991 sales levels are again achieved. In the interim, given the looming cost gap, foreign firms will make inroads, too, to the tune of perhaps 500,000 cars a year—though these firms may have names like Honda of America. I am thus pessimistic that the Japanese domestic industry will realize 1991 levels of production before 1995, if ever.

This does not necessarily mean disaster for either the economy or even the domestic industry. The recent boom clearly strained capacity in the industry, and most workers will welcome a reduction in overtime. But more than that, the Japanese government in its usual hortatory manner is exerting pressure for a permanent reduction in working hours. In the industry only Honda has consistently kept overtime hours to a minimum, roughly achieving the contracted working time of 1909 hours per year. But other firms averaged 2140 hours, and several over 2200 hours. To reach the official target of 1800 hours requires a 15-20% reduction in hours—and unless employment is expanded, this would lead to a 15% reduction in output, at least partially alleviating the capacity overhang.

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53 This probably overstates the importance of protectionism. Without the benefit of the oil crisis, the Japanese producers could not have expanded so quickly in the U.S.. In Europe, however, they have no monopoly on small cars or any other market segment. Japanese firms do hold major shares (40%) in Finland and other open markets. But this ignores the fact that local producers in France, Germany, the UK and Italy still dominate their home markets, which account for the bulk of the overall European market. There are two “European” firms that are not tied primarily to one country and yet have done well, namely Ford and GM. But their achievements reflect decades of effort, and in few countries are either of them the top selling firm. Between the importance of established distribution networks and national variations in tastes, a Europe-wide strategy can as yet have only limited success, and so it remains an intrinsically hard market to crack.

Second, firms initially forecasted strong growth in demand in 1988-89 when they made their expansion decisions. Their stated intent was thus to use the new plants in Kyushu and elsewhere to permit them to shut down and refurbish older plants. Given the current market, however, the “scrap and build” policy is likely to shift to a “scrap” policy. Nissan has already moved in that direction. Plant closures will come to Japan, though they will be handled in a far more orderly manner than in the U.S. Which plants to scrap in what order has been decided, in parallel the age of the factories. Old plants are too small to readily install automation, and the shift in the labor market now requires that, even if it is not cost effective when looked at in isolation. In any event, in a quiet way the industry will end up cutting capacity.

In those cases, workers will be asked to move to other plants. Given the geographic concentration of most firms in the industry, this will prove less traumatic than in the U.S. and Canada. Furthermore, the use of contracting out of workers to other firms (*shukko*) is spreading. For example, Hitachi has recently sent a crew of workers to Hino, and New Japan Steel to Toyota.<sup>54</sup> These workers are paid by the recipient, with the sender kicking in supplemental amounts as necessary to preserve original salary and benefit levels. But it is also worth noting that despite the slowdown, the auto industry is still in the position of seeking out workers from other firms. This may be a transitional means of finding “regular” workers and allaying the need to use seasonal and foreign workers. In any case, if the average use of “temporary” and other non-regular workers is 20%, and overtime averages 10%, a substantial downturn can be met without firing anyone in the strict sense of the word, while given the rapid aging of the population and the growth in demand for services, “temporary” workers should be readily able to find new jobs.

Even if we are optimistic that the fall in demand can be covered via shorter working hours, profits cannot be maintained. It will be hard to raise prices. The passenger car market has too many firms to organize a cartel, and the plethora of options would make one virtually impossible to police. Firms in the heavy truck market were able to raise prices in September

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54 *Yomiuri Shimbun*, July 5, 1992. The article is entitled “Increased Unemployment within Firms,” with three subtitles, “Avoiding Layoffs by Finding New Jobs; Sending Workers across Keiretsu Can’t be Helped; and Unneeded Workers Rapidly Increasing.

1991 by 4.5%—the first such increase in 11 years, reinforcing the argument for qualitative change in the industry. But in this case coordination was possible, as there are only four producers and a simpler product. (Mitsubishi served as the price leader, with the other 3 matching its increase within 2 weeks of announcement.) Given the current recession, however, this will not lead to higher revenues, and the Fair Trade Commission has cracked down on price fixing among truck dealers. Discounting at car dealers, however, is already endemic.

Profits will fall in part because a reduction in capacity leads to a corresponding increase in capital costs. Under a 5-day work week and shorter working hours, the same facility will be used only 80 hours a week, instead of the 108 hours of operation under a 2-shift, 6-day week with one hour of overtime per shift. Fixed costs, in other words, must be spread across fewer units. Thus even if the industry is able to reduce capacity without layoffs, this cannot be achieved for free. Indeed, the trend is to greater automation, to permit firms to use their aging workforce effectively, to encourage younger workers to stay, and to simplify jobs for foreign and other workers. It is thus hard even to cut investment, even as it is becoming harder to make a profit on such investment. It would not be surprising if one or two firms with weak dealership networks are unable to survive these pressures on profits. If they are lucky, they will become mere subcontract assemblers. Indeed, Hino, Fuji Heavy Industries and Daihatsu have been partly that for 2 decades, building cars for Nissan and Toyota, while Isuzu is highly dependent on GM. Without the truck market as a cushion, FHI and Daihatsu are particularly vulnerable, while relative to previous size Mazda has been the most ambitious in building new assembly capacity. Only Mitsubishi Motors has seen its profits increase this past year, buoyed by several simultaneous successful product launches and a conservative investment strategy. But a string of poor-selling models could seriously weaken even the strongest of the Japanese producers.

### The Future of the Japanese Industry: Parts

As grim as the future of the assembly end of the industry may be, the transition will be more painful for parts firms. First, in the aggregate they employ 75% of the auto industry's workers, and so the quantitative amount of adjustment will be greater. Second, at least in the medium run

it will be much more vulnerable to import competition, given the ease of shipping parts, the greater labor intensity of much of parts production, and the simpler marketing task for foreign producers. Third, direct parts suppliers are continuing to integrate vertically, a trend that began 30 years ago. Fourth, the heightened pace of technical change will bring to the fore materials and technologies that will make the capacities of some firms obsolete—while providing windows of opportunity for others, particularly in electronics, new materials and systems integration. (Toyota itself is aiming to make 10% of its semiconductor needs.<sup>55</sup>) Offsetting these trends are the increasing complexity of vehicles, as the installation anti-lock braking systems, active suspensions, airbags and other safety equipment and cooling systems becomes more widespread. But exports of parts will decrease more rapidly than that of vehicles, as domestic content increases, while imports are already on a rise. (See the accompanying tables on parts purchases from the U.S.) Hollowing out appears inevitable.

New capacity, as noted above, is now coming onstream. Profits have already been falling. In a recent survey of 49 of its larger members, the Japan Auto Parts Industry Association found that 25 had decreased profits despite increased sales. Likewise, the industry average decreased from a peak of 4.2% at the onset of the boom in 1988, to 2.4% in the fiscal year ending March 1992. In other words, profits have fallen steadily in the face of an overall increase in sales. Labor costs have not been matched by productivity increases, while with the proliferation of models overhead rose; R&D costs, for example, averaged 7% of sales. Even if current assembler efforts to increase parts commonality bear fruit, it will take some time before this would help profits. Such changes can be put into effect only as new models are launched, while parts must be kept in production for 10 years after the last new car is assembled. The excesses of the “bubble” will be felt by parts suppliers for years to come.

Again, these problems are intensified by shifts in trade. In yen terms, parts imports doubled from ¥76 billion in 1988 to ¥153 billion in 1990, though this was as yet but 1% of

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55 Ironically, one of the reasons for this is to offset the power of Nippon Denso. Toyota has no clout, despite the latter's origins as an operating division of Toyota, with Toyota remaining its largest shareholder. *Nikkan Kogyo Shimbun*, November 27, 1991 and interview at Toyota and Nippon Denso, summer 1991.

production. On the other hand, as local content increases the growth of exports to the U.S. has virtually halted, going from \$8.55 billion in 1989 (¥1.18 trillion) to \$8.49 in 1990 (¥1.23 trillion). In fiscal year 1991 total parts exports (to all destinations) actually decreased 3% in yen terms.<sup>56</sup> Given the underlying trends in wages and exchange rates, the structure of parts trade will soon shift enough to be felt strongly throughout the industry.

As in the U.S., it will be the smaller parts firms that will be hurt the most. Such firms have faced the most rapid increase in labor costs, and have had great difficulty merely recruiting workers, particularly in the Tokyo region. As technology shifts and vertical integration increases, they will find their former customers less interested in continuing to purchase high-volume items. They will also be the most affected by imports, because of their general tendency to be on the labor intensive side of the industry.

Current data on such firms are difficult to find; the Census of Manufactures, which gives the most comprehensive picture (as well as permitting geographic shifts to be traced) is only published with a 3-4 year lag. The membership of the Japan Auto Parts Industry Association is comprised solely of larger, direct suppliers. Likewise, newspaper coverage focuses above all on companies listed on the stock exchange. Nevertheless, the wave of investment in new plants noted earlier means that not even larger firms will be immune.

## VII. Summary

Both the parts and the assembly end of the Japanese auto industry suffer from a shift in their labor costs that is rapidly eliminating their competitiveness in export markets. This is particularly true when viewed against the United States. The Japanese industry now faces a recession, following a period of large additions to manufacturing capacity. While the social costs of adjustment will be lower than in the U.S. because of tight labor markets, many firms will

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56 Data are from Nissan (1991).



inevitably run into serious management difficulties. Even in the best of cases, profitability will remain low into the foreseeable future.

The changes in the auto industry are even more visible in other industries. Most VCR decks are now made in Southeast Asia, and the same is true for compact cameras and many other items inextricably linked in foreign consumers' eyes with Japan. The obverse side, of course, will be a gradual decline in exports and an increase in manufactured imports. This is, after all, one of the inevitable consequences of an aging population, which brings about a relative decrease in the working-age population in the face of increased demand for services. Labor costs in manufacturing thus rise. Affluence also brings a greater desire for leisure. The ability to rely on overtime as a buffer against shocks in demand will weaken. This will change the nature of the business cycle, and together with the shift in the age and skill structure of the population will bring an end to the "classical" Japanese large-firm employment system of the 1960s. It is not yet clear in what direction it will evolve. One distinct possibility is a vast increase in immigrant labor; five years ago it would have been inconceivable to most observers that there would be 500,000 illegal workers in 1992. That, too, will bring about a qualitative shift in labor relations. In short, the Japanese economy is changing quite rapidly, though as yet only a partial outline of its future structure can be discerned.

Over the next five years autos will fade as a bilateral issue between the U.S. and Japan. That will not mean an end to change within the North American auto industry, particularly as production in Mexico has now passed the 1 million mark, nor will it mean a collapse and social turmoil on the Japanese end. Still, few could have imagined this reversal a few years ago. Indeed, many are not yet aware of its full extent.

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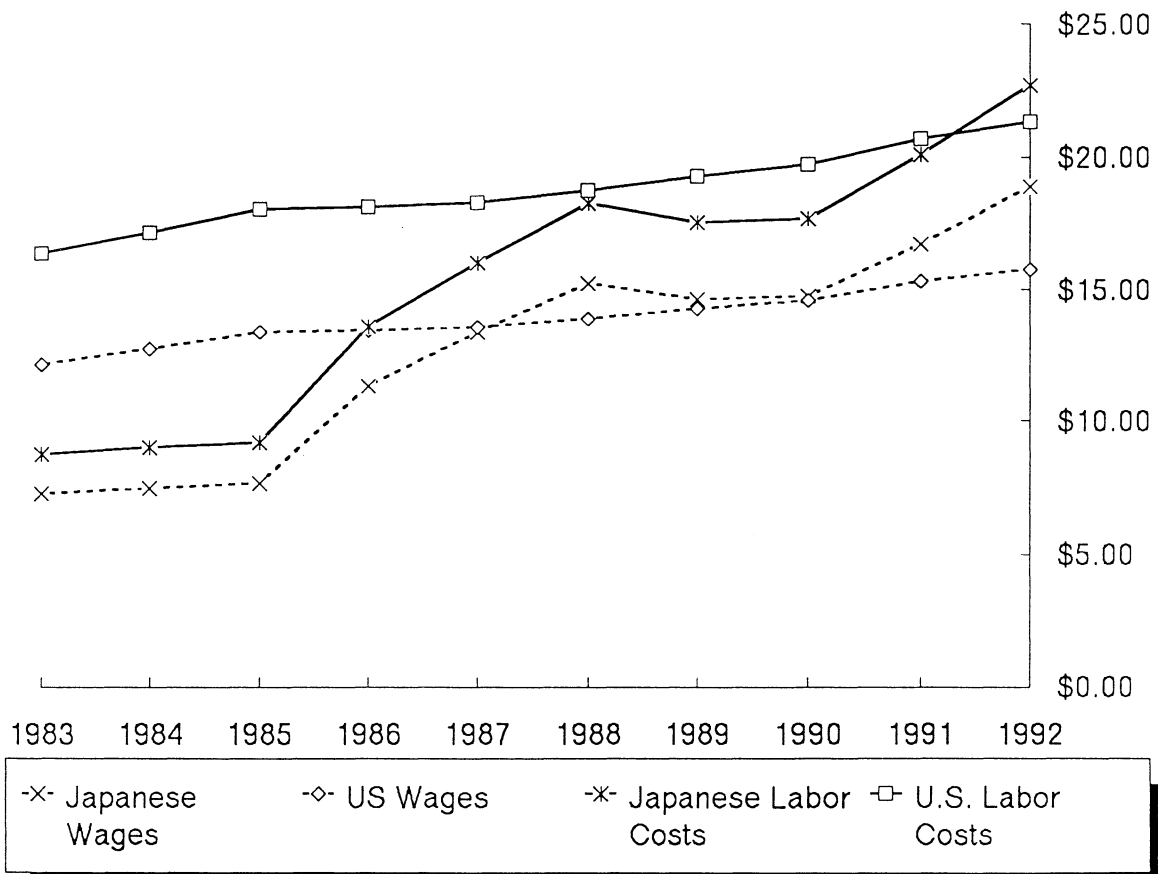
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Wages and Labor Costs, U.S. and Japan

Year	Japanese Wages	U.S. Wages	Japanese Labor Costs	US Labor Costs	Gap Japan/US
1992	\$18.90	\$15.78	\$22.69	\$21.30	106%
1991	\$16.74	\$15.32	\$20.09	\$20.68	97%
1990	\$14.75	\$14.61	\$17.70	\$19.72	90%
1989	\$14.65	\$14.28	\$17.57	\$19.28	91%
1988	\$15.24	\$13.90	\$18.29	\$18.77	97%
1987	\$13.36	\$13.57	\$16.03	\$18.32	88%
1986	\$11.33	\$13.45	\$13.60	\$18.16	75%
1985	\$7.66	\$13.39	\$9.19	\$18.08	51%
1984	\$7.49	\$12.73	\$8.99	\$17.19	52%
1983	\$7.28	\$12.14	\$8.73	\$16.39	53%

US and Japan: Automotive Wages and Labor Costs

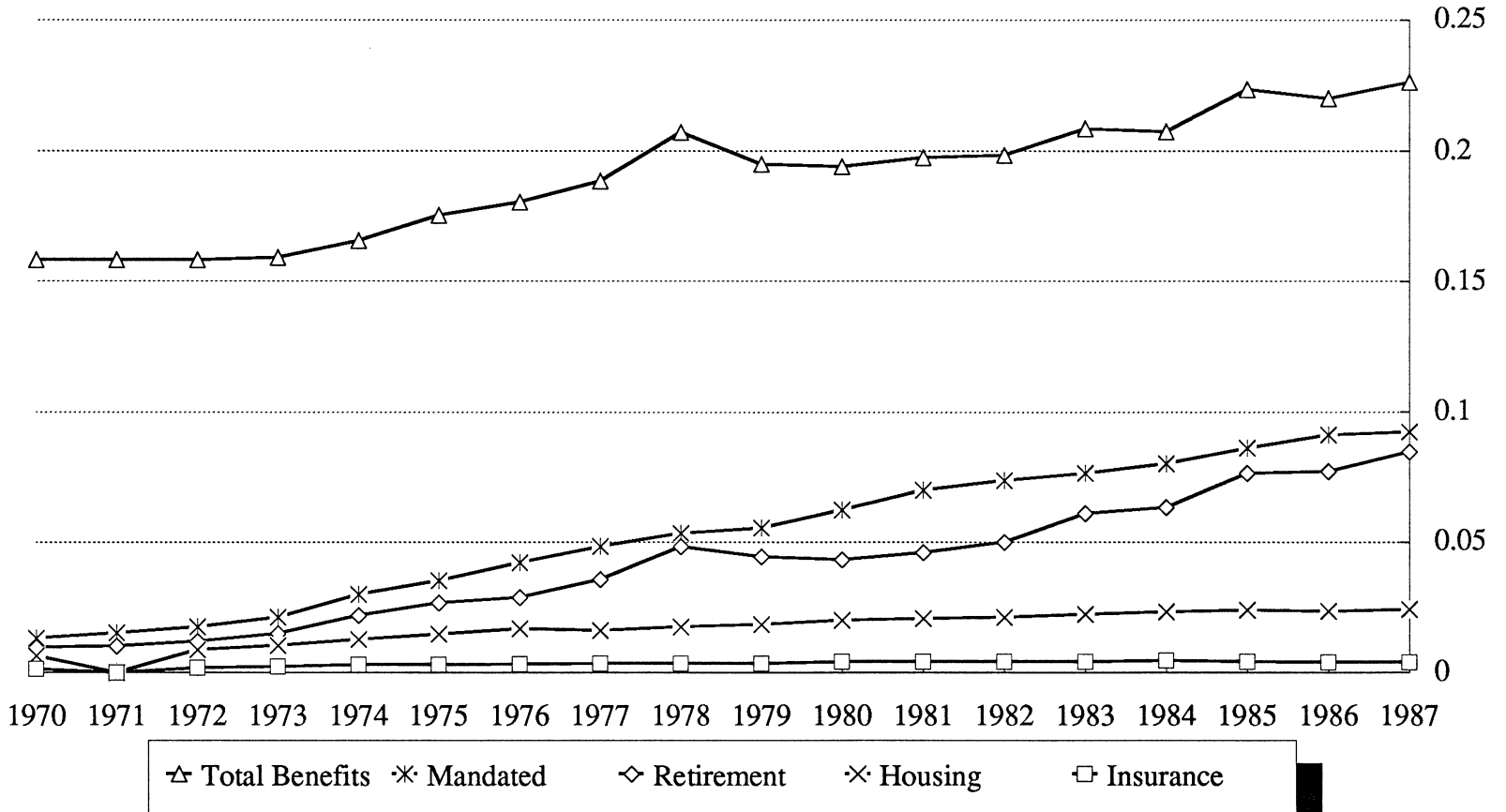


### Changing Japanese Wage Structure, Automotive Industry

Year	Monthly Cash Compensation	Index 1985=100	Hours per month	¥ per Hour	Forex ¥ / \$	Japanese Auto Wages \$ per hour	\$ Index 1985=100 (A)	Productivity 1985 = 100 (B)	(A)/(B)	US Wage Index	US Auto Wages	US Produc- tivity	Year
1991	—	—	—	¥2,254**	¥134.7	\$16.73**	218.4**	111.5	195.9**	114.4	\$15.32	—	1991
1990	¥399,039	116.3	186.7	¥2,137	¥144.9	\$14.75	192.7	113.0	170.5	109.1	\$14.61	108.6	1990
1989	¥383,521	111.7	189.6	¥2,023	¥138.1	\$14.65	191.3	107.0	178.8	106.6	\$14.28	109.1	1989
1988	¥368,514	107.4	188.6	¥1,954	¥128.2	\$15.24	199.1	105.7	188.3	103.8	\$13.90	109.6	1988
1987	¥352,767	102.8	182.7	¥1,931	¥144.5	\$13.36	174.5	100.0	174.5	101.3	\$13.57	106.6	1987
1986	¥347,421	101.2	182.4	¥1,905	¥168.1	\$11.33	148.0	99.2	149.2	100.4	\$13.45	100.4	1986
1985	¥343,223	100.0	188.3	¥1,823	¥238.1	\$7.66	100.0	100.0	100.0	100.0	\$13.39	100.0	1985
1984	¥332,470	96.9	186.8	¥1,780	¥237.6	\$7.49	97.8	97.7	100.1	95.1	\$12.73	95.2	1984
1983	¥315,468	91.9	182.5	¥1,729	¥237.5	\$7.28	95.1	93.7	101.4	90.7	\$12.14	90.4	1983
1982	¥303,701	88.5	179.8	¥1,689	¥249.3	\$6.78	88.5	91.7	96.5	86.8	\$11.62	79.7	1982
1981	¥291,992	85.1	183.1	¥1,595	¥220.5	\$7.23	94.4	95.5	98.9	82.3	\$11.02	76.6	1981
1980	¥278,381	81.1	186.0	¥1,497	¥226.8	\$6.60	86.2	87.3	98.7	73.6	\$9.85	80.4	1980
1979	¥258,848	75.4	183.7	¥1,409	¥219.1	\$6.43	84.0	70.1	119.8	67.7	\$9.06	70.5	1979
1978	¥239,994	69.9	181.0	¥1,326	¥210.4	\$6.30	82.3	60.5	136.0	63.5	\$8.50		1978
1977	¥223,317	65.1	181.3	¥1,232	¥268.5	\$4.59	59.9	63.9	93.7	58.6	\$7.85		1977
1976	¥202,052	58.9	178.6	¥1,131	¥296.6	\$3.81	49.8	65.5	76.0	52.9	\$7.09		1976
1975	¥173,333	50.5	170.0	¥1,020	¥296.8	\$3.44	44.9	63.3	70.9	48.1	\$6.44		1975
1974					¥292.1			64.0		43.8	\$5.87		1974
1973					¥271.7					40.8	\$5.46		1973
1972					¥303.2					38.3	\$5.13		1972
1971					¥347.9					35.3	\$4.72		1971
1970	¥76,317	22.2	191.7	¥398	¥358.1	\$1.11	14.5	51.2	28.4	31.5	\$4.22		1970

Notes: Data are derived from the *Monthly Labor Statistics* published by the Japanese Ministry of Labor (毎月勤労統計) for the automotive industry. Labor productivity data are based on Japan Productivity Center data as published in their quarterly statistical series and in the *Japan Statistical Yearbook*. The weighting is revised every fifth year, and for older data I have linked these separate series at the endpoints. In addition, these data are for the transport machinery industry (of which shipbuilding is a significant component), rather than exclusively for the automotive industry, which is however the dominant component. Foreign exchange rates are as reported by Toyo Keizai in their *Annual Economic Statistics*. US wage data are from the Bureau of Labor Statistics for SIC 371, as reported in the US Motor Vehicle Manufacturing Association *Facts & Figures '91* and earlier. **\*\*Japanese 1991 data are an extrapolation using the 5.5% average auto wage settlement and actual exchange rates and productivity figures.**

### Growth of Japanese Benefits





## Japanese Purchases of U.S. Auto Parts

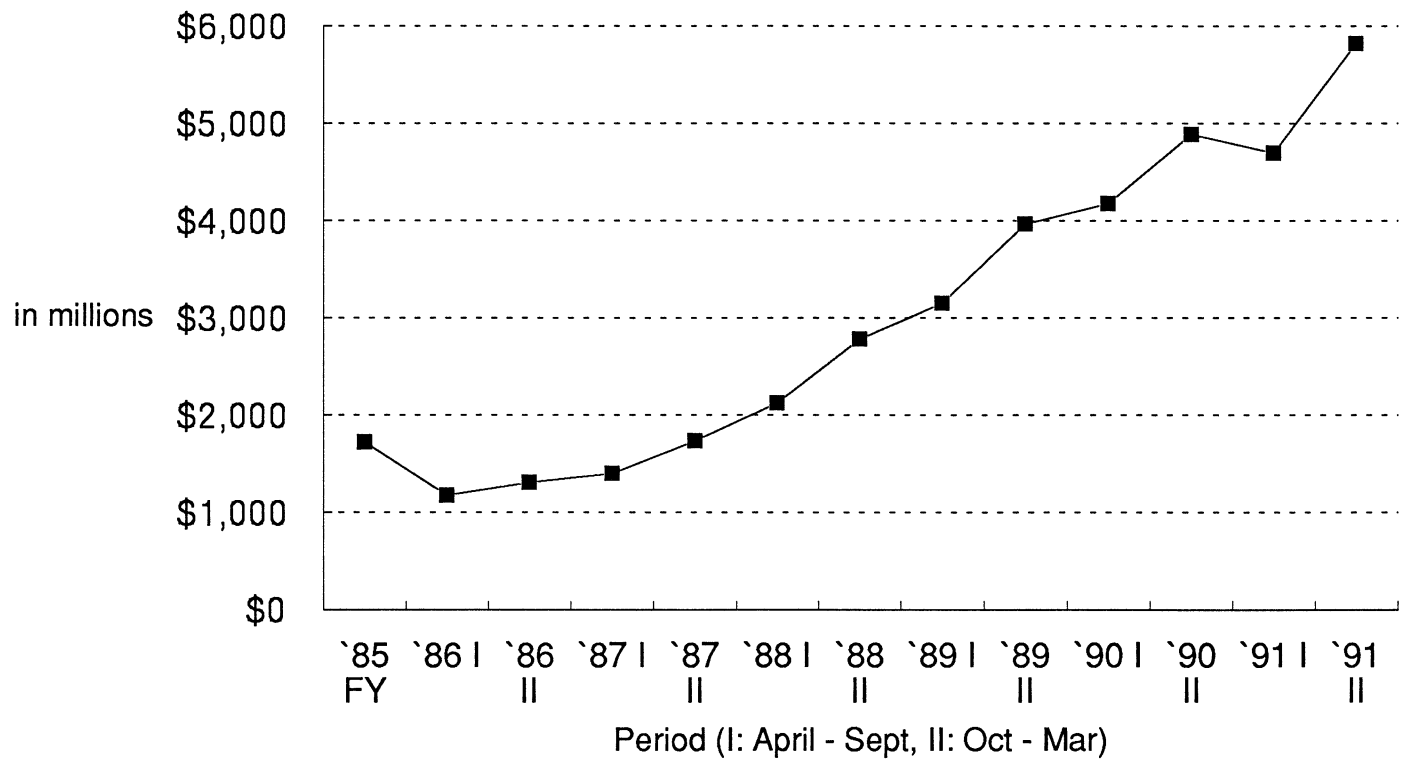
Period	TOTAL	Change	Engine Parts	Change	Chassis and Drivetrain	Change	Body Parts	Change	Electrical Parts	Change	Accessories	Change	Materials	Change
'85 FY	\$1,726		\$206		\$188		\$396		\$685		\$76		\$176	
'86 I	\$1,177	*36%	\$119	*16%	\$95	*1%	\$347	*75%	\$438	*28%	\$57	*50%	\$121	*37%
'86 II	\$1,313	12%	\$120	1%	\$111	17%	\$429	24%	\$478	9%	\$50	-12%	\$126	4%
'87 I	\$1,400	7%	\$128	7%	\$130	17%	\$461	7%	\$459	-4%	\$41	-18%	\$180	43%
'87 II	\$1,735	24%	\$189	48%	\$156	20%	\$596	29%	\$540	18%	\$48	17%	\$207	15%
'88 I	\$2,128	23%	\$161	-15%	\$224	44%	\$783	31%	\$553	2%	\$133	177%	\$273	32%
'88 II	\$2,781	31%	\$215	34%	\$308	38%	\$1,039	33%	\$773	40%	\$84	-37%	\$361	32%
'89 I	\$3,153	13%	\$265	23%	\$362	18%	\$1,215	17%	\$835	8%	\$100	19%	\$375	4%
'89 II	\$3,969	26%	\$442	67%	\$531	47%	\$1,518	25%	\$945	13%	\$102	2%	\$432	15%
'90 I	\$4,183	5%	\$451	2%	\$549	3%	\$1,576	4%	\$1,037	10%	\$100	-2%	\$471	9%
'90 II	\$4,891	17%	\$600	33%	\$645	17%	\$1,777	13%	\$1,210	17%	\$111	11%	\$549	17%
'91 I	\$4,702	-4%	\$596	-1%	\$639	-1%	\$1,807	2%	\$1,044	-14%	\$109	-2%	\$506	-8%
'91 II	\$5,826	24%	\$776	30%	\$842	32%	\$2,214	23%	\$1,373	32%	\$123	13%	\$499	-1%

Source: Data from the U.S.-Japan MOSS Automotive Parts Followup. Units are US\$ million.

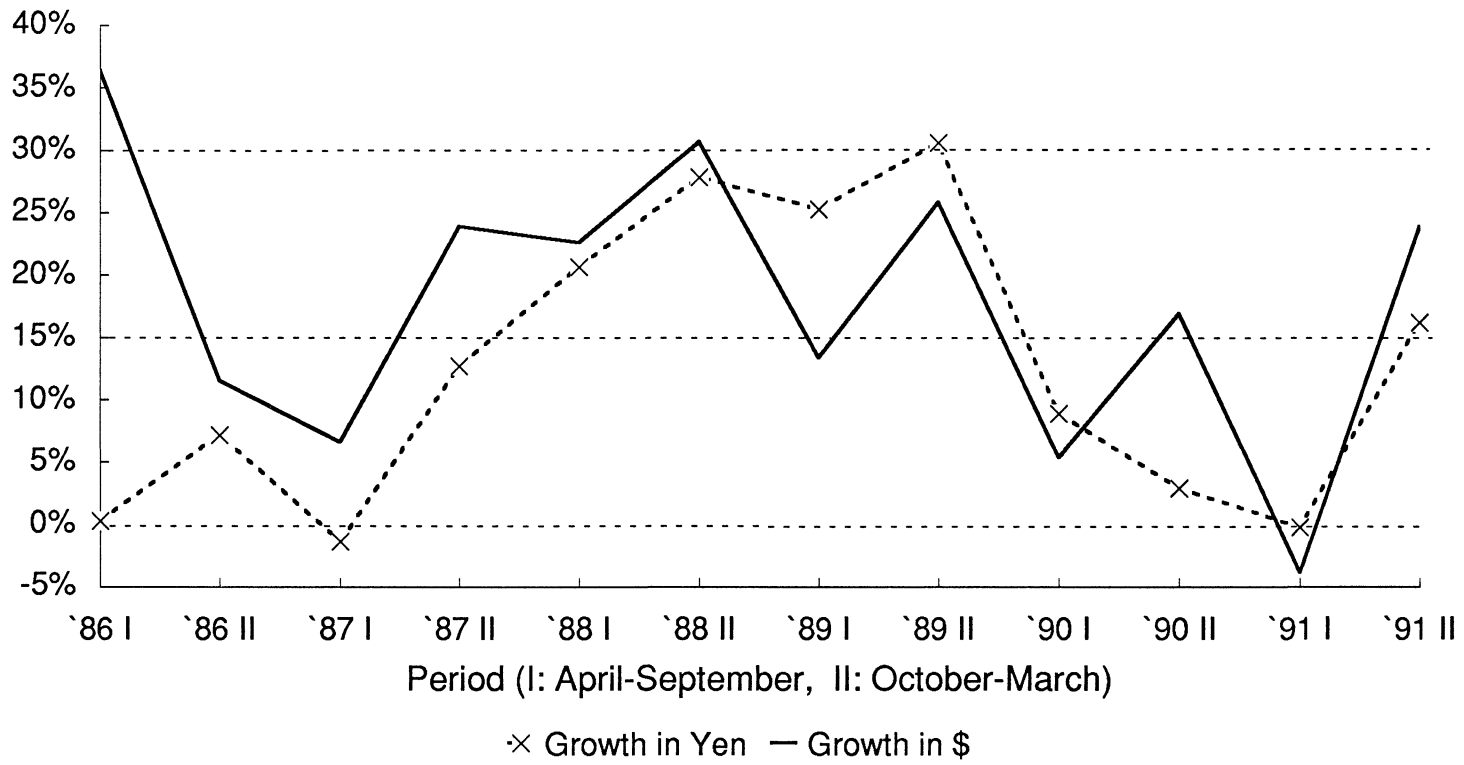
I - April - September

II - October - March

### US Auto Parts Sales to Japanese Makers

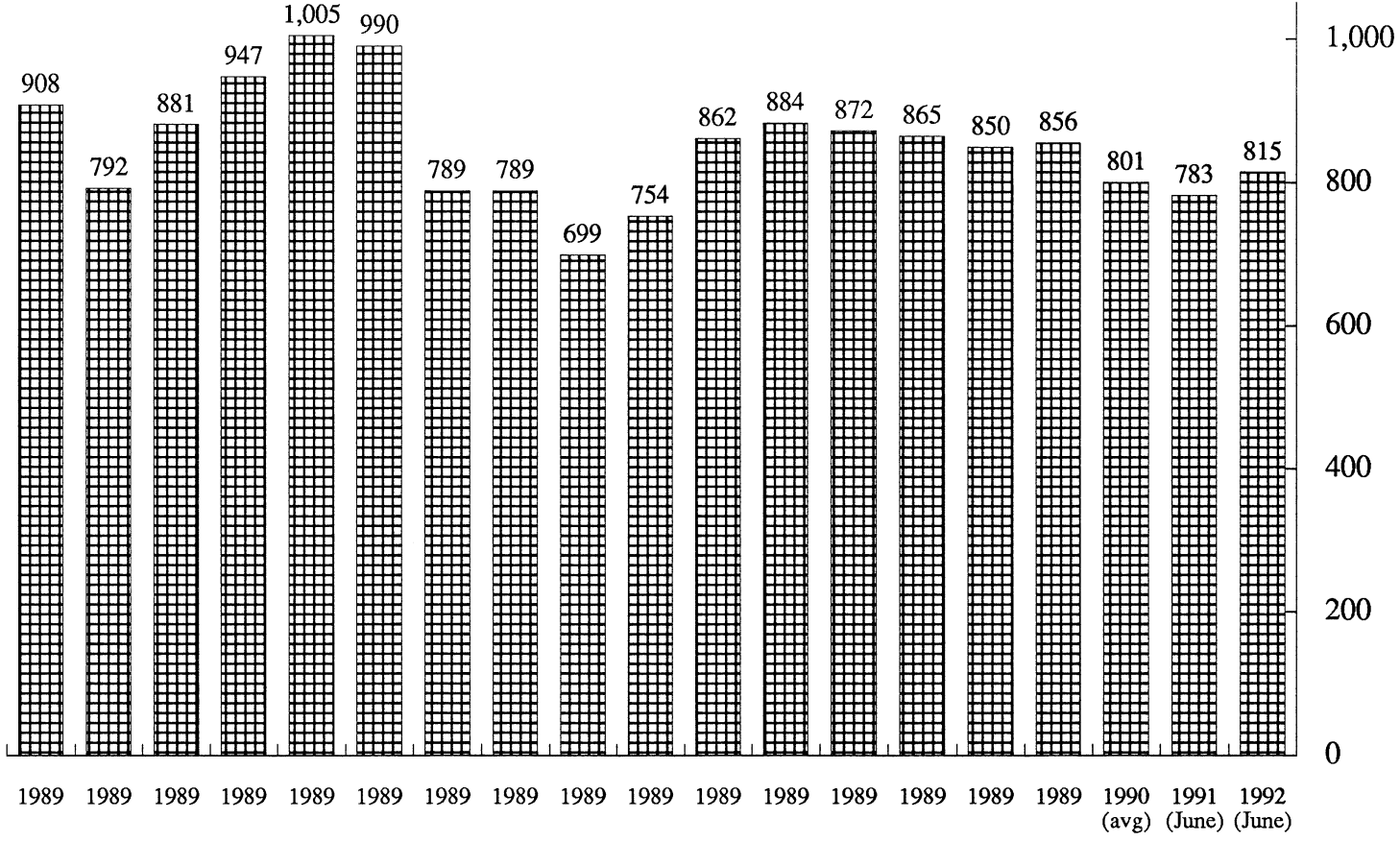


### Growth of U.S. Auto Parts Purchased by Japanese Automakers



# US Auto Industry Employment

thousands



### Final Perspectives: Bush in Japan, 1991

The Japanese comic below is drawn from the *Nikkei Sangyo Shimbun*, January 1991. It depicts a high school student in the last days before college entrance examinations, bleary-eyed and befuddled from studying. Illness at that critical time is disastrous, since exams are only given once a year. The poster on the wall is an exhortation, "Pass!" Frequently parents and/or students will buy a good luck charm at a local Shinto or Buddhist temple. Here the concerned mother is offering her son a President Bush doll. The caption reads: "Here's an American good luck charm for you. Even if you collapse you'll be back on your feet right away, and if you catch a cold, you'll recover with just a night's sleep." The second is from the *Chicago Tribune*.

