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Industrial Competitiveness of the Auto Parts Industries in Four Large Asian Countries: The Role of Government Policy in a Challenging International Environment

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Abstract

Rationalization and stabilization following the Asian financial crisis of the late 1990s combined with the expansion and liberalization of regional and global trade to create significant parts industries in the Republic of Korea, China, and Indonesia. Conventional policies of stabilization and liberalization, however, cannot fully explain growth patterns. Japan and Korea grew into major players before liberalizing trade and investment, while even after extensive liberalization Indonesia has yet to move from extensive to intensive growth.

These anomalies suggest that to explain success in the auto parts industry we need to move beyond liberalization to look at policies and institutions promoting economies of scale, skill formation, quality upgrading, supplier-linkage cooperation, and innovation. In Japan, the regional and global leader, innovative assemblers led industrial development and supported key suppliers, but the government also supported diffusion of quality control techniques and new technology to small and medium enterprises, and encouraged stable employment among core employees. Korea remains weaker on both SME and employment fronts, but government-encouraged consolidation around a small number of business groups, an extended period of protection, and support for export promotion led to economies of scale. Liberalization of foreign investment after the financial crisis helped ameliorate the excessive statism of earlier policies and strengthened the parts industry. In China, liberalization for WTO entry, rapid expansion in demand, and strong support by local governments encouraged a wave of foreign investment in both assembly and parts. In contrast, institutional weaknesses continue to constrain development opportunities in Indonesia.

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Introduction

The automobile industry is among the most important industrial sectors in the modern economy. Many other manufacturing industries depend upon autos, including steel, rubber, glass, machine tools, robots and, increasingly, electronics and software. Auto parts and assembly are also linked to many service industries, such as retailing, finance, insurance, and repairs. Cars are prominent to consumers and thus to voters and governments, not least those in East Asia where promotion of the auto industry has become a major focus of attention. The manufacture of auto parts is an important part of this focus. While assembly firms such as General Motors (GM), Toyota and Volkswagen take responsibility for overall design, assembly, sales, and service (and usually produce a few key parts themselves), the bulk of value in an automobile actually resides in the myriad of parts that go into it. Indeed, it is their great variety, as well as their potential for generating jobs, foreign exchange, skills, and backward linkages, that has made the production of automotive components such an important focus of national auto policies in East Asia. In addition, the entrance of Western assemblers, intensified competition for the region's growing markets, and shorter product cycles have pushed global automakers to expand parts manufacture in East Asia as part of regional and global production networks.

But if these networks constitute new opportunities for local parts production, they also impose steeper entry barriers. Components must meet tough performance requirements because today's large, expensive, and complex vehicles face high demands for reliability, safety, energy efficiency, clean operation, and after-sales service. These performance requirements in turn require ongoing innovation by producers. Yet innovation in the auto industry is generally incremental and cumulative, based as much on tacit skills as formal research and development. Leapfrogging incumbents is much more difficult than in the many electronics industries that are periodically reshaped by radical innovations. Successful parts production also requires a

combination of independence and tight linkages with suppliers. In recent years, assemblers have required first-tier suppliers to take increasing responsibility for the production of complete modules. And yet the design of these requires intensive interaction between assembler and supplier. Some parts, such as tires, wheels, and batteries, are relatively independent of the design of the overall vehicle and other parts, but most are tightly integrated. Auto assemblers, component suppliers and lower-level parts producers are thus enmeshed in complex networks balancing cooperation and competition.

In addition, the policy environment surrounding the industry has grown even more challenging, especially for late-developers. All home markets are now subject to international competitive pressure as continuing progress in transportation and communications has made it increasingly feasible to procure most components from any part of the world. The growing international consensus on the desirability of free trade in manufactured goods and (to a lesser extent) unimpeded foreign investment has reduced the scope for the protectionist measures that historically accompanied the growth of virtually all national auto industries, from the United States and Germany in the first half of the 20th century to Japan and Korea in the second half.

Moreover, in the last decade, increasing international transactions, ever-greater economies of scale and scope, and persistent global overcapacity have led to a significant consolidation of the global auto industry. A raft of major assemblers, from Saab and Volvo to Chrysler, Nissan and Mazda, have surrendered their independence to the half-dozen or so remaining major auto companies. First-tier suppliers, under tremendous pressure from the consolidating assemblers to cut costs, are themselves consolidating (as are major material suppliers such as steel companies). Thus, heightened responsibility for design development on the part of suppliers has meant that consolidation in the components sector is taking place in parallel with assembler consolidation (for a review, see Doner, Noble, and Ravenhill 2004). These factors have led to the domination of auto parts production and assembly by large

companies headquartered in the most advanced countries, such as the United States, Japan, Germany, and France. Despite some trends toward multinationalization, almost all leading firms still conduct the overwhelming majority of their business strategy, design, and research and development activities in their home countries, and derive the bulk of their revenues from one or at most two regions of the world, typically either Europe and North America or Japan and North America.

Auto parts producers in East Asia thus face formidable challenges. At the same time that increasing global trade and rapid expansion of demand in developing countries are opening up new market opportunities, the technical tasks are becoming ever more difficult, the global producers are becoming more concentrated, and the governmental policies that once protected and promoted national and regional markets are increasingly constrained. In addition, increasing global competition, persistent overcapacity in an industry marked by weak exit mechanisms and the declining effectiveness of protectionism and promotional policies pose severe challenges to would-be new entrants and incumbent producers alike. And yet, East Asia offers some advantages. In this, the most populous and rapidly growing region in the world, American, Japanese and European automakers meet on reasonably even terms in the once closed but now increasingly open Korean and Chinese markets, and while Japanese firms have long dominated Southeast Asia's auto markets, Western assemblers and parts makers are making concerted inroads there as well. The large populations, rapid economic growth, and technological dynamism of the major East Asian countries mean that the perennial problems of economies of scale, scope, learning, and agglomeration are not insuperable.

To take advantage of these opportunities, governments and firms in the region must address three major challenges: acquiring and diffusing technology; attaining adequate economies of scale; and improving quality and efficiency through incremental innovation. Success in these areas depends first and foremost on firm-level strategies. But as numerous

studies have demonstrated, firm strategies (and their effectiveness) are strongly affected by public policies and the national "comparative institutional advantages" that influence the formulation and implementation of such policies (Hall and Soskice 2001; Rodrik 2004). This paper provides a comparative overview and analysis of firm and policy performance in four of East Asia's leading auto parts producers: the two leading incumbents, Japan and Korea, and the largest countries in Northeast and Southeast Asia--China and Indonesia, respectively.

The four countries fall neatly along a spectrum of auto development. Japan is the world's most efficient and high-quality auto production site. Under pressure from the United States, it made the transition to relatively free trade and investment back in the 1980s. The Japanese auto industry faces numerous challenges—stagnant domestic demand, the shift of production abroad, an aging workforce, and increased price competition—but so far it has responded remarkably effectively. Production and employment are stable, and Japanese firms have pioneered new propulsion systems. Japan thus provides a useful template for evaluating the strategies and prospects of the later developers in addressing the challenges of technology acquisition, scale economies and incremental innovation for suppliers, workers, and governments. Japan's experience with regard to supplier development sheds light on the possibilities and challenges of combining extensive public and industry support with opportunities for scale economies and intense exposure to competitive pressures. With regard to labor, the Japanese case highlights the challenges of developing a flexible work force without sacrificing commitment, stability, and skill development. Finally, because supplier and workforce development in Japan took place within fairly close industry-government relations, the Japanese case also illustrates possible responses to the task of minimizing the rent seeking and collusion common in such relations.

Korea is second only to Japan as the most successful post-war entrant to the auto industry, and production and then exports soared in the 1990s. Korea remains weaker in design,

parts and quality, however, and doubts about the stability of the Korean political and labor systems remain deep. The most dynamic and controversial auto producer in the developing world is China. In 2003 China overtook Germany as the third largest market for and passed France as the fourth largest producer of motor vehicles, largely thanks to joint ventures with virtually all of the world's leading auto assembly and first-tier parts suppliers. Growth in production has been extraordinary, but many observers worry about weak labor and management skills, particularly in the ubiquitous state-owned enterprises; rigid financing arrangements; and the possibility that domestic demand may not keep up with ballooning aggregate capacity. Indonesia, another poor but populous country, while less burdened with the legacy of state-owned enterprises, until recently has been highly protectionist and politicized. Demand and production have largely recovered from the financial crisis of the late 1990s. Liberalization has opened the way for consolidation and streamlining of parts production under increased Japanese control. Given problems in skill formation and technology support, however, there remain significant questions as to local participation in such an expanded, efficient industry.

We presume neither a convergence in national components production nor a one-size-fits-all approach to supplier development. But we do presume that the growth of components production will reflect national policies, institutions and politics. In the conclusion, we draw on the material presented in this chapter to suggest potential national trajectories and the policy/institutional requirements for their implementation.

Performance

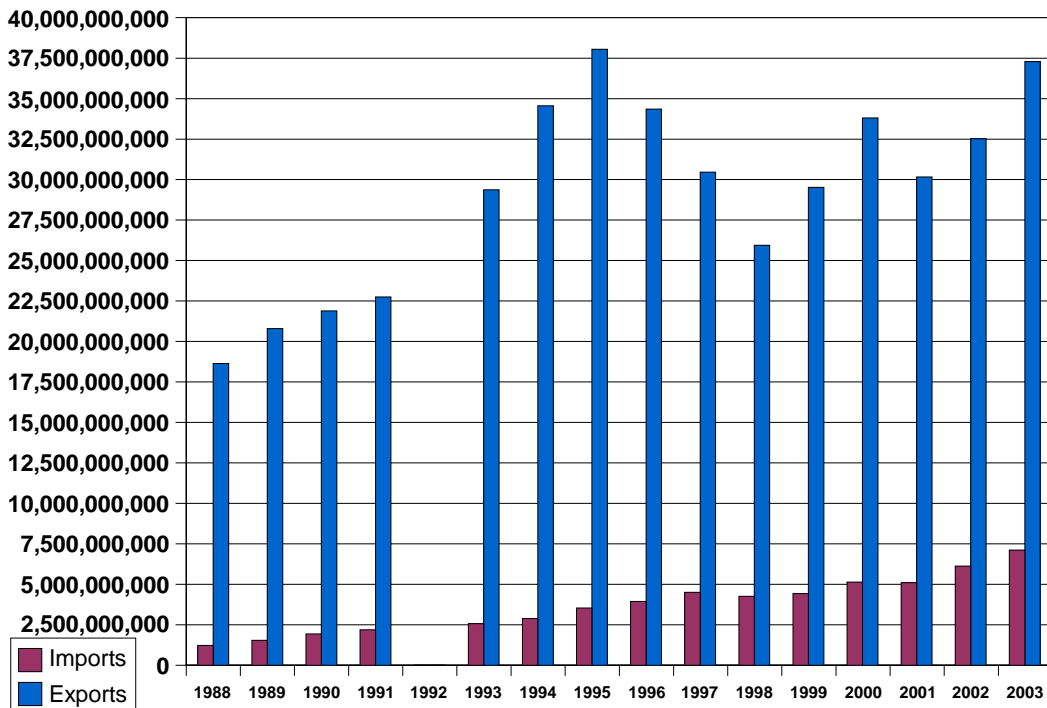
Comparing auto parts industries is complicated by national differences in definition and coverage, reporting, and currencies, as well as the speed of change in developing countries. In this section we provide an overview and standardized data on auto parts trade; more detailed but sometimes less directly comparable statistics appear in the discussion of individual

countries, below.

The Japanese automobile parts and assembly industry is the global model and the most internationally competitive of all industrial sectors in Japan. Motor vehicle production, after falling somewhat in the early 1990s as the Japanese economy stalled and overseas production, particularly in the United States, displaced some exports from Japan, stabilized at about ten million vehicles per year, second only to the United States. Parts production, buoyed by sales to the overseas assembly sites of Japanese assemblers, displayed even greater stability, holding almost exactly steady from 1990 to 2000 at about USD \$145 billion dollars (assuming, for simplicity, a constant exchange rate of 120 yen/dollar). Over the 1990s and early 2000s Japan maintained high levels of exports, accumulated huge trade surpluses despite modest but sustained growth in imports, and earned significant net royalties on automobile technology. Overseas investment in parts production proceeded briskly, while inward investment, initially virtually nill, began to increase from the end of the 1990s. Despite the shift of production abroad and the benchmarking of Toyota and other Japanese firms by foreign rivals determined to catch up, the Japanese industry reasserted its lead in quality, design speed, cost efficiency, and development of new technology such as hybrid engines (Fujimoto 2003: 61-84). By the early 2000s, Denso, Japan's leading parts producer and number three in global sales, enjoyed twice the combined market capitalization of its two larger foreign rivals, Delphi of the US and Germany's Robert Bosch.

Japan's Trade in Auto Parts

Japan's Trade in Auto Parts

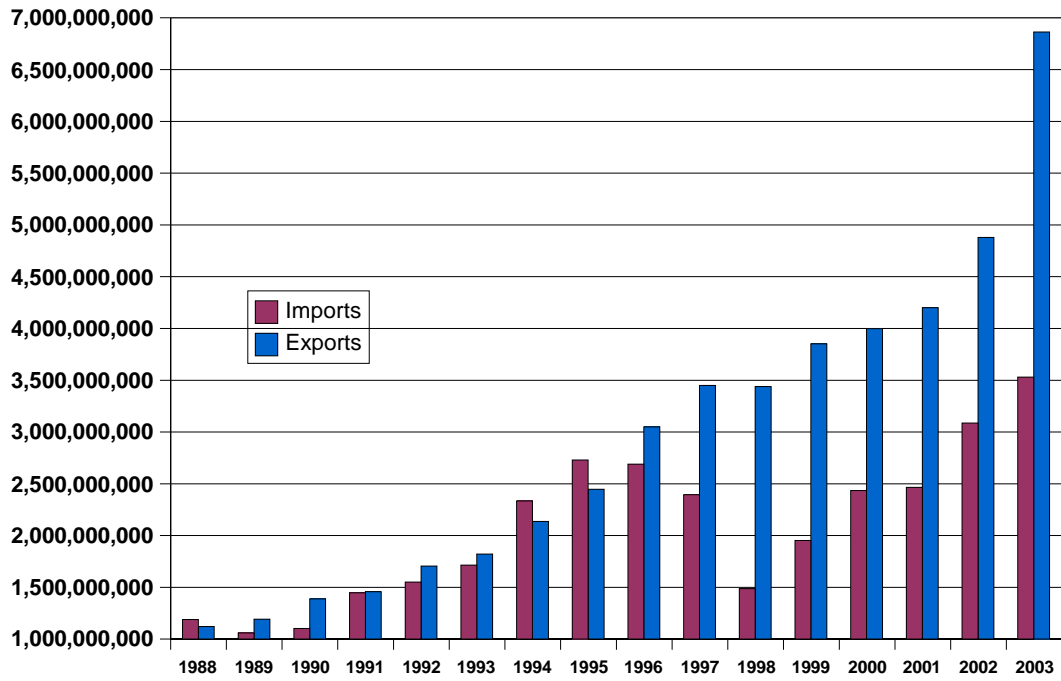


Source for this and the following graphs: UN Comtrade Data accessible at <http://unstats.un.org/unsd/comtrade/default.aspx>

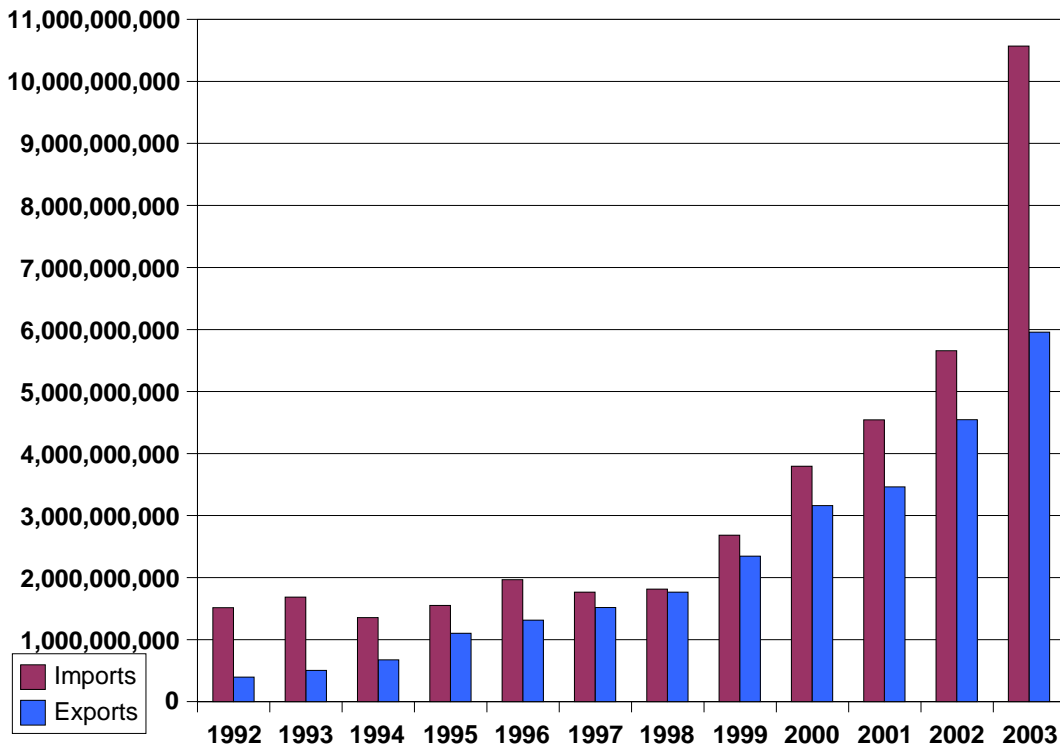
The Korean auto industry grew impressively after making the breakthrough to mass production in the mid-1980s. The financial crisis of 1997-98 dealt a sharp blow to the auto industry. Domestic demand and production recovered sharply over the next couple of years, and then stagnated after 2000, leaving the Korean industry increasingly reliant upon exports and overseas production, principally in the United States and China.

After the depreciation of the won caused by the financial crisis, parts exports began to catch up with the growth of vehicle exports, and Korea started running significant trade surpluses in parts. Korea's exports of auto parts, however, are still only about one-eighth of the value of those of Japan. Inward foreign investment leaped in the two years following the crisis before levelling off again, while outward investments by parts makers increased from a low base.

Korea's Trade in Auto Parts



China's Trade in Auto Parts

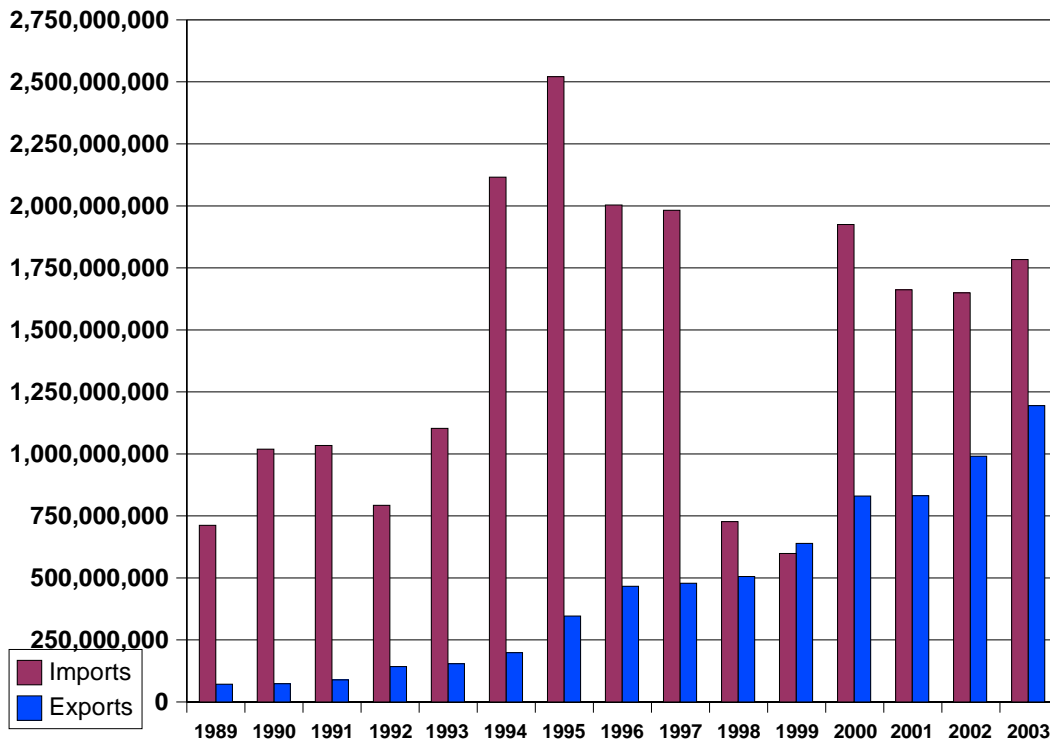


The Chinese auto industry remained tiny, scattered and backward until the entry of VW in the mid-1980s. Growth in assembly remained modest through the mid-1990s, then suddenly accelerated from the end of the decade as production and prices fell and strong economic growth lifted household income levels, particularly in the coastal cities. Through the mid-1990s, imports of motor vehicles surged occasionally, but generally remained modest, while motor vehicle exports, mostly of trucks and specialty vehicles, only began to trickle out after the turn of the century. Trade in parts, however, mirrored domestic production, tripling between 1998 and 2002. The surge in domestic demand and production induced a huge boom in inward investment, as virtually every major global assembler and first-tier parts producer scrambled to establish a presence in China. Outward investment, led by assemblers rather than parts firms, became noticeable by 2002. In 2003, China surpassed France to become the world's fourth largest producer of motor vehicles, with just under four and half million units, of which two

million were passenger cars. Even if growth rates slow dramatically, perhaps to around 15-20 percent a year, by 2005 or 2006 the Chinese market for motor vehicle will surpass that of Japan, while production levels should surpass those of Germany. Somewhere around 2010-2012, industry experts expect China to overtake Japan as the world's second largest auto producer.

Auto production in Indonesia followed a similar pattern to that in Korea, albeit at a much lower level: sustained and significant increases in assembly and parts production from the 1970s to the mid-1990s, a drastic decline after the Asian financial crisis, then a recovery followed by stagnation in domestic sales and production. Skills levels were much lower in Indonesia, leading to a large deficit in parts trade, but as in Korea a dramatic fall in parts imports accompanied the financial crisis. Unlike the recent Chinese experience, exports of parts failed to keep pace with the post-crisis surge in imports. Indonesia alone among our four cases runs a substantial trade deficit in parts. Foreign investment was significant in assembly but limited in parts and outward investment remains virtually unknown.

Indonesia's Trade in Auto Parts



COUNTRY STUDIES

Japan: Maintaining International Competitiveness

The Japanese auto parts industry grew extremely rapidly from the 1950s through the 1980s, and while production has levelled off since then, the industry has maintained its leading international position in the face of heightened competition from countries with much cheaper cost structures. Because the industry is mature and highly competitive, government policies presently have only a limited direct impact. Nonetheless, contrary to much of the received wisdom, government policies were crucial in the historical development of the industry, and even today play some role in leading areas such as new propulsion systems and regulations governing safety and emissions. The indirect effects of policy in areas such as labor also remain important.

Government Policy and Automotive Development

The common assertion that government policy had little effect on the development of the automobile industry, based largely on the relative failure of early plans to consolidate assemblers, (e.g. Tsuruta 1982), is flatly wrong, especially for parts production. Promotion and especially protection against both imports and foreign investment through the early 1980s were indispensable for the industry to build the economies of scale necessary to compete internationally (Tate 1995). The vast majority of attempts by late-developers to build national auto industries through protection and promotion have failed, however, and Japan's rise to automotive pre-eminence was not built on government support alone. Toyota, in particular, pioneered organizational and managerial innovations that provided Japan with a vital competitive edge and eventually transformed the global auto industry. Nonetheless, the role of policy was large, and it has not entirely disappeared.

If protection and promotion were central (and probably requisite) to Japan's initial success in automobiles, the country's large size and compliant, well-educated workforce helped it avoid the failures that plagued automobile protectionism in other late-developers. Japan's large population, the significant industrial base left over from wartime mobilization, high levels of education relative to wages, and rapid economic growth allowed a large number of assemblers (half a dozen for mid-size passenger cars alone) to operate at decent economies of scale, ensuring adequate competition despite protectionism. After a harrowing initial post-war reorganization and downsizing, including legendary strikes at Toyota and Nissan, the industry settled on a new labor system in which a small cadre of core workers at the major assemblers and upper tier suppliers received implicit guarantees of employment and income security in return for accepting a high degree of managerial discretion and flexibility in the design of work and limited wage premia relative to workers in less concentrated industries.

Protection against imports, particularly of small and medium-sized passenger cars,

Japan's area of special expertise, remained virtually absolute until the early 1980s, by which time Japan was already the world's leading supplier. As late as 1985, when Japan exported well over four million cars, it imported a grand total of just over 50,000, more than four-fifths of them luxury cars from Germany (*Jidōsha Nenkan Handobukku* 2002-2003: 408, 430-31).

In the early 1970s the Japanese government rebuffed a determined effort by American assemblers to invest in Japanese firms. After long negotiations with the U.S., the Japanese allowed the American firms to buy small, non-controlling shares in the weakest Japanese assemblers, the main effect of which was to facilitate exports by these weaker players to their new American partners. Foreign direct investment in the Japanese auto industry began to increase significantly only after 1999, when the Ministry of Economy, Trade and Industry (METI, before 2001, MITI) signalled its approval of Renault's effective takeover of struggling Nissan.

Japan's tax system complemented trade policy in protecting the industry and encouraging specialization. Taxes increased with engine size, discouraging consumption and imports of large foreign cars, and encouraging economies of scale in the production of cars with 1.5-2.0 liter engines.

Direct promotion of the industry was also important, particularly from the early 1950s through the mid-1960s. Government-affiliated banks provided generous funding, first to assemblers and later to parts suppliers, and provided a signal to private banks that the industry was a safe bet, since it was a high priority to the government (Odano and Islam 1994). In the 1950s and 1960s, the auto complex (motor vehicles, steel, and especially roads) accounted for virtually all of the World Bank's loans to Japan not dedicated to electricity generation (World Bank web page, projects database entries for Japan). While it is true that efforts by the government in the 1950s and early 1960s to attain economies of scale by encouraging mergers of existing assemblers and discouraging new entry met stiff resistance from second-tier

assemblers such as Mitsubishi and the entrepreneurial Honda, a powerhouse in motorcycles that expanded into autos, neither were they a complete failure (Mutoh 1988). More important, encouragement of mergers in the 1960s was considerably more successful in the auto parts industry. Mergers encouraged economies of scale and the development of special competencies. Kent Calder's *Strategic Capitalism* (1993: 174-82), dedicated to the proposition that the government, unlike Japan's private financial firms, was incapable of executing any coherent long-term promotional strategies, admits the auto parts industry as the one successful exception.

Industrial policy was of particular importance to parts firms in two additional areas: promotion of quality control and technology diffusion, and support for outward foreign investment to accompany the establishment of overseas assembly operations by large firms. Regional "public technology centers", staffed by career public servants with training in science and engineering, provided testing, evaluation, and consulting services, and served as coordinator for meetings among assemblers, parts and material firms, and associated industries. The most intensive use of these facilities occurred in the automobile belt around Nagoya, particularly Kariya and Toyota City. In the early 1950s, local centers provided exhaustive evaluations of first tier suppliers; in later years, as Toyota and other assemblers took on this task themselves, the centers switched to evaluating second and third tier suppliers, smaller firms with which the assemblers usually have little direct contact. As Tate (1999: 277) summarizes,

Although economics researchers sometimes describe the Toyota supplier system in terms of "trust", the role of public technology centers in facilitating cooperative inter-firm behavior also deserves attention. Firms in the Toyota supplier pyramid and elsewhere in Japan learned to coordinate their behavior, not because they learned to trust one another more than do economic actors elsewhere, but because coordinated inter-firm behavior had a public and institutional basis that was relatively lacking elsewhere.

Compared to technology policy in most other countries, Japanese policy has focused more on diffusion than innovation (Friedman and Samuels 1993). In few industries has that approach been more useful than in autos, where final producers rely upon thousands of parts suppliers, and incremental innovation, rather than scientific breakthrough, is the key to success.

After the early 1980s, when Japanese assemblers began to erect factories in the United States and then Europe, government policy supported overseas investment by smaller suppliers who lacked the experience and personnel to move abroad on their own. During the Asian financial crisis of 1997-98 the Japanese government mobilized tens of billions of dollars to support the Southeast Asian operations of Japanese firms, especially smaller affiliates in autos and electronics (Noble 2001).

Industrial promotion declined in importance after the auto industry reached international competitiveness in the 1970s, but it is by no means dead. The government has devoted considerable resources to funding and coordinating research. At the same time that it sets regulatory standards for safety, emissions and fuel economy it helps auto companies meet the standards. For example, the government has spent hundreds of millions of dollars on fuel cell research since the early 1990s and stimulated the formation of a private-sector consortium joining the efforts of 134 firms (Maeda 2003).

Corporate Innovations

If government policy has been crucial to the development of a viable auto industry in Japan, it does not suffice to explain the extraordinary international competitive success of the Japanese firms, led by Toyota, that essentially rewrote the global industry's competitive playbook (Cusumano 1985; Womack et. al 1990; Fujimoto 2003). As Toyota and other Japanese firms struggled to incorporate foreign technology while initially producing at low volumes, they pioneered "lean production" processes drastically reducing the amount of inventory held on the factory floor and facilitating incremental innovation in assembly operations. Tying production

more tightly to demand, reducing inventories and implementing statistical quality controls throughout the shop floor forced firms to eliminate defects by refining the assembly process rather than by fixing problems on an ad hoc basis after they occurred. A meticulous system of job rotation and performance evaluations provided opportunities and incentives for workers to enhance their skills (Koike et al 2001). Instead of treating design and production as sequential processes, Japanese auto firms delegated authority for new designs to cross-functional project teams. Product cycles fell from five years to less than two years.

The Japanese innovations were not restricted to the boundaries of the core assembly firms. Japanese auto companies remained much leaner than western firms such as General Motors, relying on affiliated but independent suppliers for all but the most critical parts. Pyramidal supply systems developed in Japan combined the advantages of coordination and information interchange characteristic of vertical integration with the competitive efficiencies generated by arms-length transactions in the market. A classic example is the relationship between Toyota and Denso. At the behest of the Bank of Japan, Toyota implemented a drastic downsizing plan during the 1949 recession that involved spinning off component divisions, including what became Denso, now Japan's leading auto supplier. Denso must compete for Toyota's business with other suppliers at the beginning of each new product development cycle, and it must repeatedly cut costs during each model cycle, but in return it receives stable orders during the cycle and intimate cooperation and engineering support from Toyota. Denso, in turn, both pressures and supports the suppliers underneath it. In most Japanese industries political protection for small firms led to inefficiency, but in autos, like electronics, tiered production systems competing in both domestic and export markets managed to combine economic and political efficiency.

New Challenges

Challenges to Japanese dominance arose in the 1980s and accelerated in the 1990s. The very

success of Japanese exports elicited a protectionist reaction abroad, and Japanese auto firms were forced to embark on investments in overseas assembly operations, which in turn required local parts investments. The sharp revaluation of the yen pushed the prices of Japanese land and labor above international levels. Sustained stagnation in the domestic market in the 1990s pushed a number of assemblers to the wall. Western competitors took effective control of Nissan, Mitsubishi and Mazda, and increased their stakes in Suzuki, Isuzu, and Subaru. Nissan and other Japanese affiliates and subsidiaries of Western assemblers increasingly adopted the global sourcing policies of their parents. Only Toyota and Honda retained their financial health and managerial independence, though Nissan accomplished a remarkable turnaround under the leadership of Renault.

First tier suppliers also faced increasing challenges and constraints. The slowdown in domestic growth and the decline in exports following overseas investments cut into demand, particularly for those firms unable to make the move to overseas production. In 1990, domestic production of passenger cars for the local and export markets totaled nearly 10 million units (9,947,972); a decade later, the total fell to little more than 8 million (8,359,434). Production of trucks, buses and other commercial vehicles slid to half its previous total (3,538,824 vs. 1,781,362) (Jidōsha Nenkan Handobukku 2002-2003: 286).

In contrast, major western competitors such as Robert Bosch grew by mergers and acquisitions. Delphi and Visteon, spun off from the parts operations of GM and Ford, became the largest independent parts makers in the world, and immediately began soliciting new business to reduce their dependence on their former parents, and acquiring promising smaller firms. Once largely confined to North America or Europe, the Western parts companies began to operate on a global basis. They viewed Asia as a particularly promising growth market, and strengthened their footholds in Japan. In response, Toyota and Honda, the leading assemblers in Japan, tightened control over their first tier suppliers. In the face of global trends towards

assigning responsibility for entire modules, such as front panels, to first tier suppliers, Toyota dispatched vice-presidents to serve as vice-chairmen of its three leading suppliers: Denso, Aisin Seiki, and Toyota Machine Works (*Shûkan Tôyô Keizai*, August 7, 1999, p. 28). Increasingly, the ability to compete globally depends not just upon the tactical strengths of the Japanese suppliers in efficient, flexible and high quality production, but on strategic capabilities such as mergers, acquisitions and global investment and management in which they have been weaker (Porter et al, 2000). In China, for example, Delphi operates three times as many plants as Denso (Noble 2002).

So far, Japanese suppliers have responded impressively to these challenges. Despite the shift of assembly abroad, domestic parts production has been stable or even slightly up since the mid-1990s. Employment seems to have stabilized after surging in the 1980s and declining less than 10% in the 1990s. Japanese parts makers continue to expand their overseas production sites at a healthy clip with the number of overseas subsidiaries increasing from 918 in 1997 to 1182 in 2002.

So far, notwithstanding the weak domestic market and the high cost of doing business in Japan, the Japanese auto industry is proving a tough target for foreign competitors, as *Business Week* noted in a recent (2003.11.17) cover story on Toyota. After the 1950s, the Japanese industry, unlike its western competitors, was never burdened with a bloated, unionized and now ageing, work force either at home or abroad. It retains a lead in product quality and design cycle speed. Japan is also handling major technological challenges successfully: Toyota and Honda have opened up a big lead in hybrid cars, and as noted above, Japan is a leader in fuel cell research. Toyota is worth more than the three North American assemblers combined, while Nissan claims to have the highest operating margins in the global industry. Among suppliers, Denso has a larger market capitalization than any other parts maker in the world, including the much larger Delphi, Visteon and Bosch. Toyota, like the successful

electronics firm Canon, remains an outspoken proponent of Japan's system of "permanent employment."

It is true that Japanese parts suppliers, particularly smaller firms at the bottom of the supply pyramid, face unrelenting pressures to cut costs (as do parts firms elsewhere), but so far they have managed to meet the challenges without huge disruptions. From 1992 to 2000 the unit manufacturing cost of Japanese auto parts declined over 10%, despite increases in reliability and sophistication (Fourin, *Kokunai Jidôsha Chôsa Geppô* 43 [October 2002]:3). From 1998 to 2002, imports increased sharply; imports of labor-intensive auto parts from ASEAN and especially China grew at a rapid clip, while those from North America and Europe declined. In a few areas, Chinese products grabbed as much as half of the Japanese market. Japanese assemblers, led by foreign-affiliated firms such as Mazda, Suzuki and Mitsubishi, announced plans to step up procurement of parts from China. (Fourin, *Chûgoku Jidôsha Chôsa Geppô* 80 [November 2002]: 8-19).

The most visible example of pressures to reduce costs came from Nissan. After the accession of Carlos Ghosn in 1999, Nissan sold its stakes in all but a handful of suppliers, and demanded price cuts from both parts makers and materials suppliers such as steel firms, backing up the demands with implicit threats to procure foreign parts and materials via the Renault network. Toyota and Honda naturally followed suit.

So far, at least, trade is not a zero-sum game, and Japan's surplus in auto parts trade with China expanded by more than 50% from 1998 to 2002 as Japanese assemblers in China ramped up production (Fourin, *Chûgoku Jidôsha Chôsa Geppô* 80 [November 2002]: 8-19). As the North American case shows, however, once domestic production in China is fully established, exports from Japan eventually could begin to decrease (cf. comments by Honda executives on the challenge from China in *Shuukan Touyou Keizai*, December 15, 2001: 48-51).

Smaller suppliers also have a difficult time mustering the capital and sparing the experienced workers and managerial talent to follow the shift of production abroad, and when they do, Japanese firms tend to have a harder time attracting and satisfying local workers and managers, most of whom would rather work for Western firms. Recruiting well-educated new workers to a mature industry with a stodgy image is also increasingly difficult.

On balance, then, the Japanese auto parts industry has responded well to the new challenges facing it. In the long run, the combination of the saturation of the domestic market, the shift to overseas production, and increasing competition from newly developing countries and reorganized rivals in other developed countries will probably cap and eventually reduce auto parts production in Japan, but for the time being the industry remains highly competitive, and the role of the government is like to remain limited until the transition to new propulsion systems begins in earnest in a decade or so.

Korea: Reform and New Challenges

Korea is the most prominent new auto producing nation since Japan emerged in the late 1950s and 1960s. While parts production initially lagged significantly behind assembly, in recent years parts producers have performed strongly. The Asian financial crisis provided a spur to domestic parts production by lowering the value of the won and encouraging the entry of foreign parts firms. After a sharp recovery in 1999-2000, domestic production and sales of assembled autos stagnated from 2001-2003. Exports and overseas production expanded rapidly, however, and component suppliers benefited from the export-led boom. Doubts remain about the quality and sophistication of Korean parts (assemblers continue to rely heavily on foreign suppliers for advanced technologies), the stability of the Korean labor system, and the capacity of domestic demand to support a major global automobile operation.

Automobiles were one of the sectors targeted by the Korean government in its First Five Year Development Plan, published in 1962. The nascent industry was nurtured by the full

panoply of trade and industrial policy instruments that the Korean state had at its disposal. The Ministry of Trade and Industry was given authority to license entrants into the automobile industry, and to regulate production costs. The Ministry banned the importation of assembled vehicles, a measure that remained in place for a quarter of a century. Tariff exemptions were given on imported components that domestic producers were not capable of producing—but only until such time as domestic capabilities were developed. In the 1960s, however, the government failed to develop consistent policies on key auto sector issues such as the number of producers to be permitted. As in other sectors, the auto industry in this period was subject to considerable rent-seeking activities.

The adoption of the Heavy and Chemical Industrialization Project in January 1973 marked a significant change in direction on auto policies. Auto production was projected to rise to 500,000 units by 1980, signalling clearly that the desired economies of scale in the sector were expected to be achieved through a new export orientation (at that time, the domestic automobile market was tiny, with only 12,751 units sold in 1973). The government offered subsidized loans and tax incentives for investments, and export subsidies including export promotion loans that enabled Korean cars to be sold in foreign markets at less than half the domestic market price. Exports began in 1977, with fewer than 10,000 cars sold abroad; by 1981 the figure had risen to 32,000, an improvement but nowhere near the target set out in the Heavy and Chemical Industrialization Project. It was not until the late 1980s that exporting began on a large scale.

The government initially attempted to foster the growth of an auto parts industry by limiting in-house production by assemblers. It permitted assemblers to produce only the engines and bodies for cars. The manufacture of power transmitting equipment, braking systems, and suspensions was reserved for component manufacturers. The Korea Auto Industries Cooperative Association, comprising 39 component producers, became the first

cooperative association designated under the 1962 Medium and Small Firms' Cooperative Association Law, making the industry eligible for subsidized finance and for protection. As part of its emphasis on targeting the auto sector as a strategic export industry at the end of the 1970s, however, the government permitted a wider range of components to be produced in-house (allowing Hyundai for the first time to manufacture transmissions and rear axles) and encouraged parts suppliers to affiliate with a single assembly company.

By the beginning of the 1980s several of the dominant characteristics of the modern Korean auto industry began to emerge: (a) heavy reliance on exports; (b) the affiliation of parts producers with only one assembler; and (c) an unusually high proportion of components being produced in-house by vertically-integrated assemblers. The success of the components industry inevitably was closely tied to that of the assemblers.

Although the eventual emergence of Korea in the mid-1990s as the world's fourth largest auto producer, the only country since Japan to make a significant breakthrough into international auto markets based primarily on locally-owned companies, points to the success of state nurturing of auto production, the state had only partial success in its efforts to shape the development of the industry. The government did succeed (until the 1990s) in blocking the entry of the largest chaebol, the Samsung group, into passenger car production. But an attempt to eject Hyundai from auto manufacturing at the end of the 1970s to consolidate domestic production in a single manufacturer (which was all that the World Bank and the Economic Planning Board believed the domestic market could support at the time) failed. For a crucial period in the industry's development after the near collapse of the economy triggered by the second oil shock and the assassination of President Park, the authoritarian Chun government did succeed, however, in limiting passenger car production to just two firms, and standardized engine size at 1.5 litres. During the period of enforced consolidation from 1981 to 1986 production quadrupled from the previous peak attained in 1979.

Given the small size of the domestic market (even though Korea has one of the larger populations of East Asian countries, the domestic car market in the early 1980s remained at c.100,000 units), exports were essential to attaining economies of scale. Encouraged by the easy availability of cheap loans, the car assemblers adopted a “go for broke” or “capacity push” strategy (Lautier 2001). Substantial investments were made in production capacity in the hope that these would ultimately accelerate technological learning and generate the scale economies required for international competition.

As in the case of Japan, while state protection of the domestic market and encouragement of exports played an important role in the ultimate success of the Korean industry, so too did the efforts of local companies. Hyundai stands out for its determination not to become overly dependent on foreign partners and the initiatives it took to develop its own technology.

All assemblers initially depended heavily on technologies licensed from foreign companies—from 1962 to 1986, for instance, Hyundai signed 57 licensing agreements with foreign partners. Reliance on foreign technology reduced the costs (and time) of developing new models. But company strategies in the 1980s diverged significantly. Hyundai, not coincidentally the assembler with the lowest foreign shareholding, sought to develop in-house technologies as much as possible—and ultimately enjoyed significant success, particularly in engine design (Kim 1997). Kia and Daewoo continued to depend heavily on their foreign partners (Mazda and Ford in Kia's case; GM for Daewoo). The divergence of firm strategies when faced with a common policy framework instituted by the state reminds us of the centrality of corporate strategy in any explanation of the development of the Korean auto industry.

Domestic component producers were squeezed by the twin strategies of the assemblers of importing core technologies to meet quality standards required for the export market, and

their attempts to develop in-house design and production facilities. The share of in-house production in total components was around 50 percent in the early 1990s, a high figure by international standards (Chung 1994). Much of the technological learning in the industry's development therefore was captured by the assemblers: Lautier (2001: fn. 11) reports that the assemblers' share of automobile industry value-added rose from 18 percent to 60 percent between 1970 and 1985.

With the exception of a few companies closely tied to a chaebol (for instance, the Mando group, part of the Halla chaebol, whose founder Chung In Yung was the younger brother of Chung Ju Yung, the founder of the Hyundai Group), components producers were overwhelmingly small and medium sized enterprises (contrary to some popular impressions and the stereotypical comparisons with Taiwan (China), SMEs do play a significant role in the Korean economy). Although the government periodically announced programs to support small suppliers, implementation remained weak and sporadic, and SMEs continued to lack resources and technology.. The insistence of the assemblers that their suppliers should not also manufacture for their competitors limited economies of scale and product standardization. And this system of separate pyramids for organizing the auto supply chain in Korea also had government support: when the government eventually allowed Samsung to enter car production in the mid-1990s, it instructed the company to establish its own supply chain independent of existing producers—a big ask even given the range of capabilities within the various members of the Samsung chaebol.

Some government agencies assisted with the development and testing of products in the auto sector. The most notable of these has been the Korea Automotive Technology Institute, which conducts a variety of fundamental and applied research into materials, power systems, etc. This Institute was not established until 1990, however, and its facilities not constructed until 1995. Moreover, for the reasons discussed in the introduction to this paper, the role of the

state in Korea in the development and dissemination of technologies was far smaller in the auto industry than in electronics. Links with companies further up the supply chain and ultimately with the assemblers themselves were the principal channel through which technology passed. Given the preference of the assemblers to control the more sophisticated technologies in-house, however, the record of technology transfer down the supply chain in Korea was relatively poor. The primary interest of assemblers was to obtain components at the lowest cost (and they often were slow in making payments to their subcontractors). In many cases, the consequence of low prices, lack of standardization and absence of economies of scale was that SMEs lacked sufficient revenue to engage in research and development activities. In contrast to the relations of trust developed between Toyota and its suppliers, those between Korean assemblers and their lower tier suppliers were frequently adversarial (Park and Jun 2001; Jang, Han and Lee 1999). And, again in contrast to Japan, no public institutions were established to provide a framework for more cooperative arrangements between large and small companies.

In turn, the low levels of technological capacity of SMEs caused quality control problems for the assemblers. Much of the negative brand image that Korean companies acquired during the early 1990s for quality control problems arose from faulty components: Lautier (2001, p. 225) notes that two-thirds of the high level of defects reported for Korean cars derived from problems with components rather than from welding or painting or assembly more generally. Moreover, the technological weaknesses of the SMEs and their lack of integration with the assemblers often kept them out of the design of new products. Hyundai estimates that even today 50 percent of its parts are designed in-house. One negative consequence was that it took far longer to develop new components in the Korean auto industry than it did in its Japanese counterpart: the management consultancy McKinsey estimated that development of new components in the mid 1990s took on average 52 months in Korea compared with 36 months in Japan (McKinsey Seoul Office, 1998).

Some of the major foreign component firms did establish subsidiaries in Korea. Before the transition to democracy however, the Korean government viewed foreign investors with considerable skepticism, compelling them to enter into joint ventures with local companies (Mardon 1990). The consequence was that foreign direct investment from foreign first tier suppliers remained relatively low, and where joint ventures were established, foreign partners were reluctant to deploy their most recent technologies for fear of leakage to domestic companies.

The unwillingness of the state (and the populace more generally) to encourage foreign investment combined with the priority given to the chaebol in development policy (which produced a bias against SMEs) and the weakness of business associations among SMEs left the government with few options other than dependence on the chaebol, the only organizations capable of supplying the capital, technology and foreign links needed to rapidly ramp up production in this priority industry. If the state had not forged an alliance with the chaebol, the Korean industry would have more closely resembled that of Taiwan (China) (FDI plus small companies), Malaysia (state-dominated companies that lacked the dynamism of the chaebol) or Indonesia (as described in a later section of the paper, a typically inefficient and rent-seeking LDC auto industry).

In sum, at the onset of the financial crisis, the Korean auto parts industry was characterized by:

- the predominance of small and medium enterprises, with two thirds of all direct suppliers having fewer than 100 employees;
- subordination of most component producers to a single assembler, reinforcing the problem of lack of scale in the industry;
- low levels of technological capability, despite the presence of high levels of engineering skills in the Korean economy;

- quality control problems, which together with relatively high costs arising from the lack of product standardization and scale economies, posed problems for the international competitiveness of the assemblers;
- a high proportion of components designed and produced in-house by the assemblers;
- a high dependence on imports for more technologically sophisticated components, with relatively low levels of production by foreign component producers within Korea.

The “IMF Crisis” and its Aftermath

Few industries have been so dramatically restructured in so short a period of time as the Korean auto industry since the financial crisis of 1997-98. The principal developments have been:

- The consolidation of the assembly industry following the bankruptcy of four of the five assemblers: Kia, Daewoo, Samsung Motors, and Ssangyong. This left one viable locally-owned company, Hyundai, which took over Kia, giving the combined firm a dominant (70 percent) share of the domestic market.
- A significant increase in foreign participation in the assembly industry following Renault's acquisition of Samsung Motors, GM's acquisition of Daewoo Motor, and Ssangyong's sale to SAIC (see China section below).
- The spin-off of in-house component production into separate companies as part of post-crisis chaebol restructuring (notably the creation of Hyundai Mobis and the various re-incarnations of Daewoo Precision).
- A very substantial increase in the presence of foreign first tier suppliers in Korea resulting from their taking majority or complete control of previous joint ventures, and through their acquisitions of some of the larger Korean components suppliers when they or their parent companies faced severe financial problems during the crisis. Close to 100 foreign companies have either increased their presence in or entered the Korean components

industry since the onset of the crisis. More than 60 companies have either wholly owned subsidiaries or majority owned joint ventures. All global first tier suppliers now have a presence in Korea.

- A substantial consolidation of the auto parts industry with large numbers of firms exiting the industry during the financial crisis. Many others remain hobbled with ongoing financial problems because of high debt ratios.

To the financial upheavals that the industry faced were added new pressures arising from technological change in the industry, most particularly the trend towards modularization. The result has been an (as yet incomplete) restructuring of the supply chain, with a dramatic decrease in the number of first tier suppliers. Moreover, in an industry that has become even more heavily dependent on international markets, with exports providing a market for more than 60 percent of Korean car production in 2003, issues of cost competitiveness and quality control in the components industry have assumed even greater importance.

Consolidation

Despite the consolidation of the industry in the aftermath of the financial crisis, it continues to be dominated by small and medium sized companies. More than a quarter of all component producers have fewer than 50 employees; more than half have fewer than 100 (Table 1: these data are from the Korea Auto Industries Cooperative Association; not all components suppliers belong to the association). Consolidation continues among KAICA members: the total number of firms in 2003 is down from 915 in 2002.

Table 1: Number of Auto Parts Suppliers by Number of Employees (2003)

<i>Size</i>	<i>Small</i>	<i>Medium</i>	<i>Large</i>			<i>Total</i>	
<i>Number of Employees</i>	<i>Less than 50</i>	<i>51~100</i>	<i>101~300</i>	<i>301~1,000</i>	<i>Over 1,000</i>		
<i>Number of Suppliers</i>	275	180	271	83	* 39	30	878

Legend: *39 companies with a workforce under 1,000 employees are classified by KAICA as “large” because their turnover is in excess of 8 billion Korean Won

Source: <http://www.kaica.or.kr/eng/industry/overview.html>

Although the entry of foreign first tier suppliers has led to some breakdown of the feudal structure of the Korean auto components industry, it remains the case that the vast majority of companies still only produce for a single assembler (reflected in the data in Table 2, which show that the assemblers report a total of 1,175 suppliers, of which there are 878 unique companies [the exact number of companies that produce for a single assembler is impossible to deduce from these data]). Again, this pattern stands in marked contrast to Japan, where a large and increasing share of parts firms supply a variety of assemblers even when they enjoy close ties of capital and management with a specific mother firm

Table 2: Number of Parts Suppliers by Company (2003)

<i>Hyundai</i>	<i>Kia</i>	<i>GM Daewoo</i>	<i>Ssangyoung</i>	<i>Renault-Samsung</i>	<i>Daewoo Bus</i>	<i>Daewoo Truck</i>	<i>Total</i>
355	395	273	243	125	140	184	1175 (878)*

Legend: * figure in parentheses is the total number of individual suppliers

Source: <http://www.kaica.or.kr/eng/industry/overview.html>

Assemblers are very conscious that to reduce costs through greater standardization and

the realization of economies of scale, and to raise the technological competency of the components sector, further consolidation of the industry will be required. Hyundai (which has combined its procurement with that of its Kia subsidiary [Kia, despite being a much smaller company, traditionally has had a larger number of suppliers than Hyundai, sourcing fewer components in-house]), aims to reduce its total number of suppliers for the merged entity from its current number of more than 750 to 400, of which 50 would be “core” producers, responsible for particular modules, 100 would be “specialty” producers, and the remainder “commodity” producers with which the company would maintain only an arms-length purchasing arrangement (interview with Hyundai-Korea officials, Seoul, September 2003).

The traditional emphasis on in-house production by assemblers, which we identify as a problem for the development of technological capabilities of lower tier suppliers has nonetheless provided one significant positive outcome to the Korean parts industry. In developing its in-house parts production and then spinning it off to form Hyundai Mobis, Hyundai has created a parts company that has the technological sophistication and size to compete internationally. Hyundai Mobis, which calls itself a 0.5 tier supplier because it is so closely integrated with Hyundai-Kia, specializes in chassis, cockpit and front end modules but also produces individual components such as brakes, wheels, airbags, and electronic equipment. In 2003, it had sales of 5.3 trillion won, generating a net income of 551 billion won (approximately \$US4.5 billion and \$US460 million respectively), exports from its parts unit of \$73.6 millions, and aspires to be in the global top ten of component suppliers by 2010. It plans to invest 140 billion won (US\$120 million) annually on research and development over the next seven years and expand the number of R&D staff from 600 to 1700 (“Hyundai Mobis to Invest W1 Tril.”, *Korea Times*, 15 March 2004). It has followed Hyundai overseas, investing in plants in the US and Alabama, and is starting to compete successfully for orders from outside the Hyundai-Kia conglomerate. Most notable here has been the contract to supply rolling

chassis modules to DaimlerChrysler for its new Jeep model, necessitating an investment of \$30 million to locate a new plant within DaimlerChrysler's supplier park in Toledo, Ohio. The venture is expected to generate annual sales of more than US\$150 million ("Hyundai Mobis Signs Pact as Supplier to DaimlerChrysler", *Seoul Economic News* 4 August 2004).

Hyundai Mobis remains the exception among Korean component producers, distinguished both by its scale and by the sophistication of its products. For the most part, the development of the technological capabilities of lower tier suppliers remains in their own hands or through their relationship with an assembler. The Korean government, however, has supported the establishment of the Foundation of Korea Automotive Parts Industry (KAP), a non-profit organization under the supervision of the Ministry of Commerce, Industry and Energy, jointly funded by Hyundai and Kia. Its membership includes the two assemblers, Hyundai Mobis, and 165 other suppliers to Hyundai. Its goal is to provide expert assistance to and to enhance the technological capabilities of component producers. It is too early to judge how effective this new venture will be in addressing the collective action problem of technological upgrading but it does represent a significant new approach to a problem that has long plagued the Korean industry. The government is also providing assistance to some components producers through tax relief for distressed industries.

Auto Parts and the Assemblers

The future of the Korean auto parts industry is inextricably tied to that of the assembly industry. More than 85 percent of the industry's output is destined for local assembly; the domestic aftermarket (overwhelmingly dominated by locally produced cars) accounts for another five percent. Although direct exports have more than doubled in value since 2001, they

still constitute less than 15 percent of all parts production by KAICA affiliates (Table 3).¹ In contrast, close to 60 percent of Korea's assembled vehicles are exported. Roughly one-third of parts exports go to aftermarket sales for Korean vehicles overseas, roughly one-third to aftermarket sales for other car assemblers, and the remainder for assembly overseas.

Table 3: Destination of Korean Parts Production (Billion Won)

Year	OEM	Domestic Market	After Exports	Total		
2001	20,658.5	1,342.8	2,034.9	24,036.2	(c.\$US	20
				billions)		
2002	23,762.2	1,544.5	2,089.0	27,395.7	(c. \$US	23
				billions)		
2003	26060.2	1824.2	4235	32,119.4	(c. \$US	27
				billions)		

Source: <http://www.kaica.or.kr/eng/industry/overview.html>

The performance of the assemblers since the financial crisis has been much better than many observers predicted during the dark days of 1997-98. Production has returned to pre-crisis levels. New foreign owners for Samsung and Daewoo provide access to their parents' worldwide distribution networks, and the possibility for Korean-sourced vehicles to be re-badged and sold under affiliates' names in foreign markets (which might otherwise have been averse to cars easily identified as manufactured in Korea: GM is selling Daewoo-sourced vehicles in the US and Europe under the Chevrolet badge). They also facilitate access to the most recent technologies of first tier suppliers.

Current developments in the domestic and global industries present new challenges for

¹ The values recorded for exports in these KAICA data do not match those in the graphs presented earlier in this paper primarily because tire manufacturers are not members of KAICA (tires constitute close to a third of Korea's autopart exports); nor are some other auto component manufacturers.

Korean parts makers, however. One is the extremely heavy reliance of the assemblers on export markets, both currently (as noted earlier, over 60% of total sales) and in their plans for future expansion. Renault Samsung, for instance, plans to export 50 percent of its production by 2010; currently its exports are negligible. Whether such a dependency on exports to foreign markets is sustainable in an increasingly competitive global industry is questionable (and may be heavily influenced by factors such as the won-dollar exchange rates, over which the government has only limited control).

Linked to this issue is the move by Korea's largest domestic producer, Hyundai (and its Kia subsidiary) to establish production facilities in some of Korea's largest export markets. Hyundai has already begun construction of a major new assembly plant in Alabama to service the US market. It is reportedly considering various sites in Europe for a plant to service the EU market. Both Hyundai and Kia have joint venture subsidiaries in China. For component manufacturers in Korea, these developments have worrying implications. Hyundai has encouraged some of its major suppliers to co-locate in the US and China. From Hyundai's perspective, the advantage of this strategy is to enable continued close cooperation with companies that have participated in the design of parts for models developed in Korea: it also renders Hyundai less vulnerable to nationalist criticism within Korea that it is "exporting jobs". To the extent that suppliers follow Hyundai overseas, the firms themselves may maintain a share of the action but whether this will continue to generate employment and contribute to the upgrading of skills in Korea itself remains to be seen. Given the significant costs of transporting most auto parts, the foreign first tier producers on whom Hyundai still relies heavily for advanced technologies are unlikely to use their Korean subsidiaries to supply the overseas plants of Hyundai and Kia. Meanwhile, the Chinese government has put pressure on Hyundai and Korea to engage in offset arrangements that require them to import Chinese components into Korea.

Addressing the China Challenge

Although an impressive doubling of Korea's auto part exports has occurred since the turn of the century, they remain predominantly low tech. The assemblers still rely heavily on imports for some of the most sophisticated components (gearboxes and airbags are the largest categories in Korean auto imports). Although the cost of parts produced by Korean SMEs is low by European, North American or Japanese standards, quality remains a significant concern. Design skills are limited. It is too early to say whether the current restructuring of the industry, with its emphasis on raising the technological competence of SMEs, will generate the desired results. A failure to move up the technology/productivity ladder will render SMEs vulnerable to competition from China despite the protection afforded by an 8 percent tariff and transport costs.

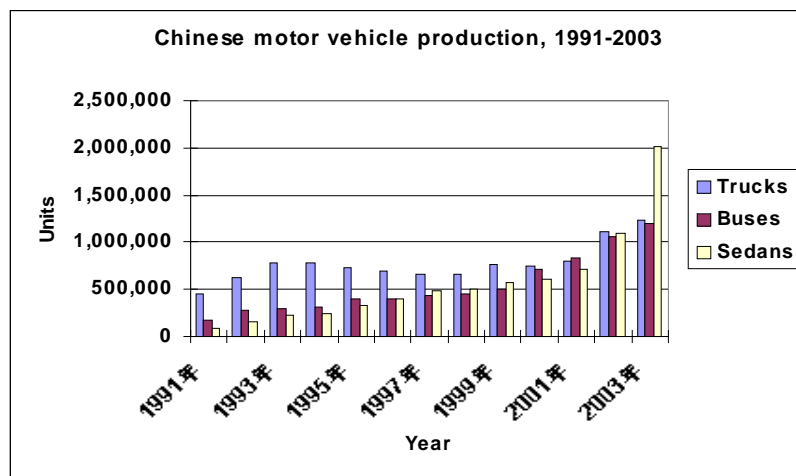
Similarly, it is too early to judge the extent to which the global first tier suppliers that have recently either enhanced their presence in Korea or engaged in local production for the first time will use their Korean subsidiaries for sourcing for regional or global assembly. Interviews with these component manufacturers produce a mixed picture. On the one hand, they are impressed with the engineering skills of the local workforce, and by the logistics available in Korea. Some are using their Korean subsidiaries to produce for markets in Asia, Oceania, and North America. On the other hand, many express frustration with the current labor market and labor laws in Korea: labor is expensive in comparison with that in less developed economies in Asia, particularly China, unions frequently adopt confrontational rather than collaborative stances, the labor market lacks flexibility, particularly in customs and regulations regarding laying off surplus workers. Together these factors are currently deterring investment and have led some companies to pull out of Korea altogether. In interviews conducted in September 2003, several executives from first tier auto parts manufacturers suggested that the components industry in Korea has a five-year window of opportunity before

China closes the skills and productivity gap.

China: Reform and Growth Amid Abiding Structural Challenges

In less than two decades the Chinese auto industry has experienced a revolutionary transformation from a dispersed collection of autarchic state-owned enterprise groups operating under a centralized socialist economy to produce low-quality trucks, busses and vans in small lots for sales to government organs, to a group of joint venture assemblers producing a variety of frequently updated passenger cars in large volumes for sale to individual households under increasingly liberalized, quasi-market conditions.

Three mileposts stand out in this transition from national trucks to global cars: approval for Germany’s Volkswagen to transfer an aging production line for the Santana sedan to Shanghai in the mid-1980s; the decision around 1997-98 that China would seek entry in the World Trade Organization (WTO) and thus would need to begin liberalization; and an acceleration of growth after about 2000 that attracted massive investment from foreign assemblers and component makers. By 2002, virtually all of the major global assemblers and first tier auto suppliers had established major operations in China. VW and GM led the way, the three largest Japanese assemblers (Toyota, Honda and Nissan) and the two major Korean firms (Hyundai and Kia), strove to make up for lost time, while Ford, Daimler-Chrysler and the



remaining major assemblers tried to maintain themselves in an increasingly crowded and competitive market.

Industrial and Trade Policy

After China used Russian aid and guidance to establish the First Auto Works (FAW) in northeastern China in the 1950s, government policy toward the assembly and parts industry fitfully moved in a more decentralized and liberal direction, without, however, ever giving up the goal of fostering powerful and independent national firms capable of competing at the global level.

In 1987 a strategic meeting of the Cabinet laid the groundwork for national development by directing the shift from trucks to cars, encouraging more joint ventures with foreign auto firms, and creating a more effective but flexible regime of protection, oriented at increasing domestic production of parts, including compulsory licensing of imports and new production facilities. The “new automotive industrial policy” of 1994, based in part on Chinese perceptions of the success of Korean industrial policy, extended these measures and attempted to enforce a consolidation of producers in order to attain economies of scale, though it had no more success than most countries (and less than in Korea); in fact, the threat of restricting production licenses probably *accelerated* the entry of foreign firms (Huang 2002). On the basis of this policy, the government’s ninth five-year plan, announced in 1995, set numerical goals for output by 2000, and instituted various measures to improve quality and upgrade technology.

Absent production at efficient scale, these measures were not particularly successful. In the late 1990s however, four factors, three of them the direct results of government policy, converged to create a massive boom in the auto industry. First, the government confirmed its commitment to join the World Trade Organization (WTO), despite the threat that liberalization inevitably would pose to many domestic interests. WTO entry served as a credible signal to foreign auto firms that the Chinese leadership was committed to liberalization and would allow

them to earn serious profits. At this point, before liberalization had progressed but with the prospect in view, China's bargaining position was at its peak. In return for licenses to commence production before the opening to the WTO, GM and Toyota agreed to introduce up-to-date models, transfer technology to their local joint ventures, and foster the development of local parts suppliers. The new models they introduced forced Volkswagen and other existing producers to speed up the pace of new product introduction, thereby upgrading local capabilities. The Chinese government relaxed its approvals for multiple producers of similarly-sized models, and effectively allowed price controls to lapse, enhancing competition.

Enlarged production and the introduction of new models put downward pressure on prices. Price cuts, in turn, combined with a second major factor, the rapid increase in household incomes along the coast, to stimulate demand for autos, particularly passenger cars. The government then enacted a range of policies to facilitate auto purchases, including massive spending on roads, highways and parking facilities, and reform of financial policies to allow consumers to offer cars as collateral for car loans.

Finally, the government began to accelerate the once glacial pace of reform of state-owned enterprises, giving management more freedom to craft corporate strategy in response to market forces, including greater flexibility in offering new models and the right to reduce the bloated work forces characteristic of SOEs. These measures also helped foreign joint ventures. Whereas VW initially ceded control of labor to its local partner, Shanghai Automotive, which favored employees from within the SAIC group, GM received a free hand: its joint venture with SAIC hired just 1,700 of 30,000 applicants, half of them college graduates (*Fortune* October 11, 1999). When Toyota opened a factory next-door to its joint-venture partner Tianjin Xiali (later acquired by FAW) shortly afterwards, it selected only 10% of workers from the partner. The average age of the new hires was only 21 (*Business Week* April 7, 2003). Rather than adopting the long-term employment practices of state-owned enterprises (and Toyota's

own operations in Japan), it introduced a system of variegated term contracts, and began hiring administrative personnel from the external labor market instead of depending only upon internal hires (Ren and Shimizu 2003). Nissan received an even freer hand in managing its tie-up with Dongfeng, finalized in mid-2003. It agreed not to lay off existing workers, but focused on expansion in new localities such as Guangzhou (*Automotive News* November 24, 2003).

In joining the WTO, China agreed to a raft of liberalizing measures, but it did not simply abandon promotion of the domestic industry. On the contrary, it succeeded in retaining the 50% limit on foreign assembly operations, and a modest pace of tariff cuts. Licensing of imports would continue for three years, and even after six years tariffs would still average 10 percent for parts and 25 percent for assembled vehicles.

Nor did the government restrict itself to slowing the pace of liberalization. In 2003 the State Council's National Development and Reform Commission circulated the draft of a new industrial policy for automobiles (*Automotive News*, June 9, 2003) requiring that:

1. The 50% limit on foreign ownership of assembly operations continue indefinitely
2. Foreign partners owning more than 10 percent in a Chinese auto firm transfer R&D, production and sales know-how
3. By 2010, half of all auto sales come from "domestic companies" owning 100% of the vehicle's technology and capable of competing on global markets.
4. Exports exceed 40% of total parts sales.

Foreign assemblers, who did not receive copies but were alerted by their joint venture partners, vigorously opposed the draft, showing particular concern about forced technology transfers that could result in the loss (and possible piracy) of their intellectual property rights. In his second annual report to the Congress on the PRC's compliance with its terms of accession to the WTO, US Trade Representative Robert Zoellick decried the "increasing use of industrial policies to encourage domestic industries at the expense of imports from abroad or

foreign businesses operating in China. This latter phenomenon is particularly apparent in the automotive sector, where a proposed industrial policy threatens to undercut many U.S. industry gains in China's market." (United States Trade Representative 2003: 5; see also 44-45). Many representatives of foreign firms suggested that the proposal was so unrealistic that the government would be forced to revise it, perhaps by including foreign joint ventures among "domestic companies." (Wall Street Journal July 31, 2003; Reuters August 28, 2003).

The draft that the government finally released in June 2004 eliminated the provisions most threatening to foreign investors and confirmed numerous promises to liberalize, but otherwise straddled the fence (Guojia Fazhan he Gaige Weiyuanhui ling dibahao, "Qiche Chanye Fazhan Zhengce" [National Development and Reform Commission Order No. 8, "Automobile Industry Development Policy," released June 1, 2004]). The new policy re-committed China to eliminating local contents requirements, foreign exchange balancing requirements and other provisions inconsistent with the WTO, pledged the central government to enforce provisions against local protectionism, and permitted assemblers to introduce new models without prior permission. Other elements remained largely hortatory or indicative, such as promotion of local brands and intellectual property, mergers and minimum economies of scale, and encouragement of energy conservation, reductions in emissions and development of new power systems.

On some key issues, however, the central government retained a strong hand, such as continuing the limit of 50% ownership and no more than two local partners for foreign assemblers (except for plants aimed primarily at exports); subjecting imports of completely knocked down kits to the stiffer tariffs applicable to assembled vehicles; and requiring parts producers and assemblers to stamp prominently on all cars and parts the name of the local manufacturer or joint venture partner rather than allowing Western and Japanese companies to market exclusively under their global brand names. While the document refers only vaguely to

specific policy tools such as tax exemptions, government loans or support for research and development, it signalled that the government reserves the right to take an active and detailed role in the development of the auto industry. And of course it did not preclude localities such as Shanghai, Guangzhou or Changchun from continuing their active promotion of local assemblers and parts firms. The Chinese government retains a serious industrial policy, and debates in the Chinese-language press reveal a strong and wide consensus in favor of supporting national firms and brands; the only question is how fast to push the transition away from dependence on foreign companies (Zhongguo Jingyingbao, December 22, 2003; Jingji Ribao, February 13, 2004).

Both joint venture firms such as Shanghai Automotive and rapidly-growing independent firms such as Anhui's Chery (Qirui) and China's only private automotive assembler, the Zhejiang-based Geely, have moved to expand output of independent brands (*China Daily* August 12, 2003; Chinacars.com December 5, 2003; *Business Week* July 17, 2003; DowJones January 7, 2004). Combining a high proportion of cheap (and often unreliable) local parts and aging chassis or engines from the Sino-foreign joint ventures, the purely domestic companies have been able to offer compact cars at prices as much as 50% lower than those of the joint venture companies, making them highly appealing in smaller cities and the hinterlands, but they have also developed impressive mid-sized sedans as well, often using Toyota or Mitsubishi engines (Auto Resources Asia 26 July 2002).

In 2003, Geely and Chery, which only began producing cars in the late 1990s, sold over 80,000 units each, feverishly expanded capacity, and began exporting modest numbers of sedans in both assembled and kit form. Though their technical capabilities are still limited and they must rely on foreign suppliers and designers, the national firms have gained valuable experience in developing their own models that the joint venture firms, which produce models introduced from abroad, generally lack. In this they follow in the tracks of Toyota and

Hyundai, which also assembled their own packages of foreign parts, designs and licenses rather than relying on a single foreign partner. They have also been able to use high salaries to lure leading executives and technical experts from state-owned enterprises and Sino-foreign joint ventures. Geely, which builds on its preceding experience as a motorcycle company, has developed its own engine and has created three institutes of higher learning, including a technical institute and Beijing Geely University, the first accredited private university in the city (<http://www.geely.com>).

Both Chery and Shanghai Automotive are beginning to invest abroad using their own brands. Chery established a joint venture assembly plant in Iran, signed an agreement to assemble cars in Malaysia, and is looking to invest in other developing countries such as Pakistan and Venezuela as well. At least initially, production would involve largely assembly of knocked-down kits of parts exported from China. At the other end of the spectrum, Shanghai Automotive spent 500 million dollars to defeat another Chinese state-owned enterprise and gain control of Ssangyong, a South Korean maker of sport utility vehicles that collapsed after the Asian financial crisis but retains valuable plants and skills—as well as a suspicious labor union initially opposed to any takeover by Chinese firms. MG Rover then revealed that SAIC had committed to putting up another two billion dollars to purchase a controlling interest in Britain's last independent auto producer (although officials in the central government indicated they might block the plan) (AutoAsia January 16, 2004; Xinlang Qiche November 12, 2004; AFP December 2, 2004).

For the next few years, the conflict over promotion of domestic production and brands probably leaves abundant room for negotiation and compromise. Foreign firms are likely to show considerably more flexibility on increasing domestic contents and exports of parts, which are increasingly cost effective given rapidly increasing sales volumes, than on countenancing infringement of patents or trademarks that could affect their worldwide operations and

reputations. Given China's large market and potential to develop into an export base, the interests of the two sides may coincide more often than in many smaller or less competitive countries. For example, both sides hope to stimulate sales by easing financing for auto purchases, only 20 percent of which have been paid for with loans (compared with 80 percent in many advanced countries). In November 2003 the Chinese government belatedly published the long-planned regulations covering non-bank financing of auto purchases. Foreigners groused about the delay and the stiff requirements for capitalization and capital adequacy, but the first three successful applicants were all foreign auto companies—VW and Toyota on their own, and GM in conjunction with partner SAIC (Reuters December 29, 2003).

Similarly, the Chinese government is developing stringent new regulations to control emissions and curb fuel consumption that will match or in some cases exceed those of Europe and North America (*The Sinosphere Journal*, 6:3, March 2003; *New York Times*, November 18, 2003). Normally, automakers would oppose, or at least attempt to water down, such proposals. In China, however, the aggregate consequences of a massive expansion in automobile use are so severe that foreign auto companies have said relatively little. Chinese cities are already severely polluted, and in 2003 China surpassed Japan as the second largest importer of oil in the world. The rapid pace of investment and growth also helps, since firms have few sunk investments in old, highly inefficient or polluting models or production processes. The new regulations will also tend to favor recent investors and Sino-joint ventures vis a vis cheap local cars built on outmoded engine technologies. As a result, China will become not only a large and rapidly growing market, but a cutting edge one as well. Indeed, demands for fuel efficiency will far surpass those in the U.S. GM, for example, has aggressively promoted to the Chinese government its technology for hydrogen cars (Reuters November 18, 2003), though hybrid cars, in which Toyota has established a commanding lead, are a more likely bet. As a result of the government's regulatory initiatives, China is likely to emerge as an early adopter of many

new technologies, despite its low income levels, making it all the more important to the global industry.

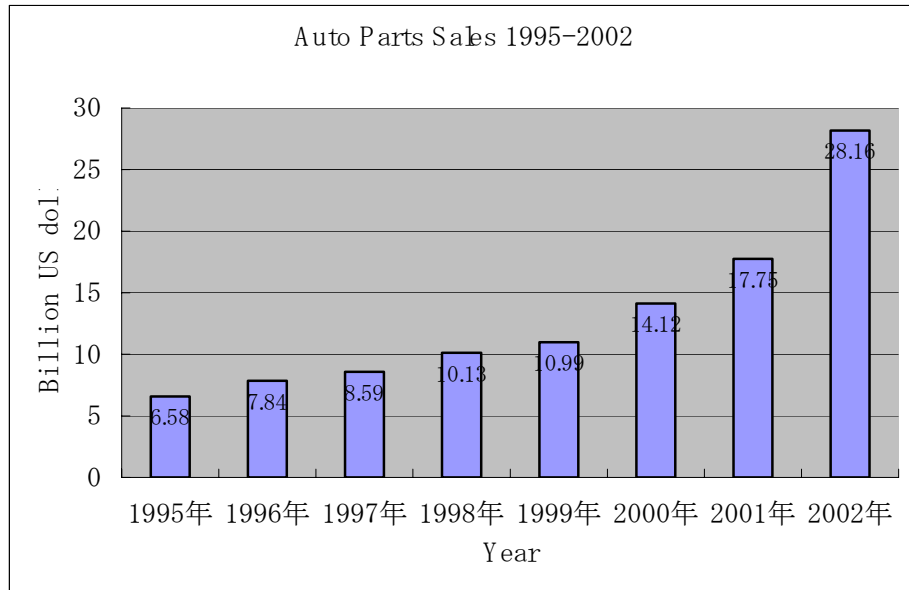
Notwithstanding China's entry into the WTO, the Chinese government's concern to strengthen the skills and eventually the autonomy of local firms is unlikely to fade. The rapidly growing domestic market and the sharp increase in local capacities give China valuable cards and the government is likely to play them aggressively. Compromise will often be possible, but as demand grows the terms likely will increasingly favor China.

Auto Parts Location and Production

Many parts producers are linked to state, provincial or municipal conglomerates, though private firms are increasingly active. Quality and delivery times, though greatly improved, are still weak, particularly at lower tiers of the supply pyramid. Even joint ventures are often plagued with excess labor. Design capacities of local firms vary but are generally low.

A survey of auto parts production in 2002 by the National Bureau of Statistics identified 4,210 firms producing 233 billion yuan, or about USD \$28.2 billion at current exchange rates, up 30.9 percent over 2001. The reported rate of profitability was 7.5 percent, up 0.8 percentage points over 2001. Thirteen of the top 50 firms reported some foreign capital, mostly from the U.S. and Germany; very little, at least among the top 50, came from Japan. Of the top ten, only two were foreign-capital related: a Visteon-Johnson Controls joint venture producing seats (number seven) and a fuel injection venture with Germany's Bosch (number nine). Foreign-capital firms were unusually profitable, however, capturing 26 of the top 50 spots for profitability and accounting for 23 percent of total industry profits. Of the top ten firms, only two belonged to SOE groups: a FAW affiliate at number six and a Dongfeng affiliate at number ten. (Fourin, *Chûgoku Jidôsha Chôsa Geppô* 88, July 2003: 14-19). A number of the largest firms were private, including three of the four largest: the runaway leader, Wanxiang of Zhejiang, a producer of bearings, CV and universal joints with an impressive commitment to

research and development; number three Chongqing Lifan, a producer of engines and motorcycles; and number four Xianghuoju, a leading maker of spark plugs that turned private in 1993.



Government policy and market pressure have resulted in considerable consolidation among the top producers of motor vehicles and their components. One survey found that the number of parts producers declined by well over half from 1996 to 1998 (5,321 to 2,321) and only increased modestly in the next few years, despite the dramatic increase in output. According to another survey, the number of firms with over USD \$600,000 in revenue dropped from a peak of 340 in 1996 to just 213 in 1999, even though the parts market grew by almost 50 percent over that period. The number of large firms barely increased over the next three years (217 firms in 2002), even though industry sales increased another 50 percent. . In other words, economies of scale at the leading assemblers and parts producers increased sharply over the late 1990s and the first few years of the new century (KMPG Transaction Services 2003).

Geographically, auto parts production is concentrated in several regions, mostly along

the coast. The failure of repeated attempts to use administrative methods to forcibly consolidate the assembly industry into two or three large groups and perhaps three smaller ones reflects the political power wielded by municipal governments that are extremely reluctant to yield control over their auto complexes. This failure left China with about a half dozen major assembly complexes, and numerous smaller ones, each surrounded by a cluster of suppliers:

1. First Auto Works, headquartered in Changchun, northeast China: joint ventures with VW and Toyota.
2. Shanghai Automotive Industry Group: joint ventures with VW and GM
3. Dongfeng (formerly Second Auto Works), centered on the interior industrial center of Wuhan with additional plants in Guangzhou: joint ventures with Nissan, Citroen, and Honda
4. Guangzhou Honda: joint ventures with Honda, Toyota
5. Beijing Automobile Group: joint ventures with Hyundai and Daimler-Chrysler

Plus smaller producers in along the Southeast coast in Fuzhou, Xiamen, in the southwest, and elsewhere.

The geographic distribution of auto parts production reveals two intertwined patterns of political influence. The first is the dominance of Shanghai and surrounding areas of Jiangsu and Zhejiang provinces; the second is the superiority of greenfield sites such as Shanghai and Guangzhou over old “brownfield” areas, particularly Changchun (FAW) and Wuhan (Dongfeng). The predominance of Shanghai reflects not only its size, central location and considerable industrial base, but also a sustained pattern of promotion by the city’s political and bureaucratic leadership that proved more successful in the auto industry, with its emphasis on mastering incremental innovation than in the science-based and radically innovative electronics industry, which has done better in Beijing. Equally important, it reflects the lack of a significant “legacy” auto industry dating back to the days of the planned economy. Within

Shanghai, latecomer GM initially enjoyed more freedom in selecting and managing relations with its suppliers, than did pioneer VW, whose Chinese managers were careful to favor traditional Shanghai suppliers (Segal and Thun 2001).

The rise of Guangzhou to prominence in parts production illustrates the strengths of unencumbered greenfield sites. Traditionally, Guangzhou was more oriented to commerce than industry. City officials failed to develop effective promotional policies for parts producers, and failed to prevent the 1998 collapse of a joint venture with Peugeot. Precisely because of the weak parts base and the failure of Peugeot, Honda received a relatively free hand in reorganizing the joint venture. Initially, it procured most of its supplies from other parts of the country, especially Shanghai. Over time, though, local production is likely to grow very substantially. Honda's Accord sedan and Odyssey minivan have proved big hits, and Honda has announced plans to expand production, partly for export to Europe, where Honda suffers from limited capacity. The new Nissan-Dongfeng joint venture will build Nissan-badged passenger cars at a plant in Guangzhou's Huadu district. The Chinese government also recently granted Toyota permission to enter into a 70/30 joint venture with Guangzhou Automobile Industrial Group to build a new plant to produce 500,000 mid-size (2-3 liter) engines, 300,000 of them for export (*Automotive News* November 13, 2003). As assembly volume increases, the incentive to nurture a group of local suppliers increases, and the fact that parts companies in Guangzhou start off fresh, with no excess workers or bad habits, is a big advantage (AutoAsia 2004.01.26). Japanese suppliers have already begun to move into Guangzhou to service the new Sino-Japanese joint ventures (AutoAsia August 7, 2003).

In contrast, the traditional parts networks of First Auto Works in the northeast and Dongfeng in Hubei carry a great deal of baggage. Many parts firms are wholly owned by their assemblers or rely on them for the vast majority of their sales. Rapid growth in assembly volumes has kept many of these firms alive, but unlike the case in Shanghai, they win few

orders from assemblers outside of their home areas. FAW and Dongfeng now have strong foreign partners, particularly Toyota and Nissan respectively, but their focus is more on producing passenger cars and engines in Guangzhou and Tianjin than in building trucks and commercial vehicles in the old SOE bases around Changchun or Wuhan. In the short run, the foreign partners are more likely to cut affiliated parts firms than help improve them, since the immediate task is to increase quality and assembly volume to meet rapidly increasing demand. The quickest solutions will be imports from abroad or other parts of the country, particularly Shanghai, or creating new, unburdened suppliers, mostly in Shanghai and Guangzhou. Over time, rising production volumes should enable some traditional FAW and Dongfeng affiliates to reduce costs and improve their operations. On balance, the prospects that many can compete successfully are not bright.

Challenges

Competitive advantages conferred by a virtually limitless supply of inexpensive labor, reasonable land prices, and rapid growth in demand, have convinced many that China will soon become a major exporter. Ford executives say that they expect to import a billion dollars in parts from China in 2004 and may begin to export vehicles from China (*Reuters* 2003.12.12). Labor unions, not surprisingly, are particularly vociferous about their concerns that a flood of Chinese parts exports could soon wash up on North American shores (*Financial Post* 2003.09.17).

Yet many close observers remain skeptical of the Chinese auto industry, especially the parts industry. Japanese analysts tend to focus on the micro problems, presumably because their own competitive advantage is based so firmly upon efficient organization of the shop floor and the supplier system. China's productivity, quality control, delivery time and reliability, and especially design capabilities all lag far behind international levels, recent progress notwithstanding. Making fundamental improvements will be extremely difficult as

long as many enterprises are saddled with inappropriate and even perverse incentive systems. The Chinese budgetary and financial systems still allocate funds without adequate consideration or pricing of risks and probable rates of return. The market for managerial talent is underdeveloped and incumbent managers often hang on despite persistent failures to improve productivity and avoid financial losses. A large research team organized and funded by METI and composed of academics, representatives of leading Japanese auto companies, and METI officials, found that when the Chinese government singled out specific technologies and firms for promotion, parts firms often purchased expensive foreign equipment before they had the skills or production volumes to make use of it—and before they had rationalized basic work processes, or even hit upon a consistent strategic focus. Much of the expensive equipment ended up in back rooms, gathering dust (Zaidan Houjin Sangyou Kenkyuujō, Kabushiki Kaisha Gendai Bunka Kenkyuujō kyōhen, 2002).

Labor is also a serious problem. Chinese parts firms, particularly those affiliated with state-owned enterprises, have too many old, poorly-trained (and often ill-motivated) workers and not enough young, highly-educated workers. Pay rolls are often grossly inflated, and (as in the US) older firms bear a heavy burden of retirees. Less noticed but just as important, few Chinese firms have emulated Japanese practices in training, job rotation and evaluation of skill and performance.

Equally problematic is the lack of Japanese-style supplier networks. Assembler-supplier relations in China tend to fall into two types. The first continues to govern largely by hierarchy, as assemblers instruct their in-house supply divisions or dependent affiliates what to produce. The other pattern is American in style: arms-length contracts for relatively short-periods, aiming at minimal commitment and maximum short-term reductions in cost. Both approaches lack what has made the Japanese system so effective: a combination of multiple suppliers, market competition, regular price cuts and periodic renegotiation with engineering support for

cost-cutting and co-development, and sufficient security in orders to allow suppliers to justify investments in dedicated equipment and long-term worker training. Polls of American suppliers, it is worth noting, consistently show that they prefer working with Japanese assemblers precisely because the Japanese offer what the suppliers regard as a fair balance of constraints, competition and support. So far, there is little sign that Japanese-style supply relations are taking root in China. The best test case will probably come in Tianjin, where Toyota brought along a passel of its parts affiliates to supply Tianjin Xiali, now a subsidiary of FAW. In addition to the shop floor weaknesses of individual firms and the lack of an effective supplier network, Japanese critics note the weakness of crucial material inputs such as high-grade steel, engineering plastics and even rubber, but as assembly volumes have increased, investments in surface-treated cold-rolled steel and other inputs have begun to catch up.

In contrast to the Japanese obsession with the mis-organization of Chinese firms and networks, Western analysts and central government officials in China are particularly concerned about overcapacity. The consulting firm KPMG estimates that excess capacity could reach 90% of demand within a couple of years (KPMG Transaction Services 2003). The extraordinary burst of investment results not just from starry-eyed foreigners jockeying for a position in the greatest emerging market, but also from aggressive moves by local firms, many of them controlled by local and provincial governments drawn not just by rapid growth and high profitability, but also the opportunity to profit from property development and land speculation. All across China local governments are feverishly laying out new “auto parks.” In some locations, such as Shanghai, Changchun and Tianjin, clustering of auto manufacturing in one park may make sense, but the motivations and outcomes may be quite different in other locations, such as Yantai and Jinan in Shandong, Yizheng west of Shanghai, or Zhuhai, near Hong Kong (see e.g. *China Daily* 4.25, 6.19, 6.30, 8.12.2003). Not surprisingly, authorities in the central government express great concern about moderating and rationalizing local

investment in the automotive sector and have ordered localities not to use government expenditures or loans to invest in the auto industry. Though the orders produced little immediate effect, the sharp decline in consumer demand following the imposition of macro-economic tightening in spring 2004 caused numerous firms to scale back investment plans.

GM and VW, the leading auto firms in North America and Europe, have particularly strong incentives to continue expanding in China. Both are under pressure from the Japanese in America and Europe, but aggressive early investments have brought them big leads in China. China will soon surpass Germany as VW's largest market, and for both GM and VW profitability is reportedly much higher in China than elsewhere, despite shrinking margins (*Wall Street Journal* 2003.10.17; *Reuters* 2003.07.03, 2003.10.20; *Dow Jones Business News* 2003.11.06; *Asia Pulse* October 21, 2003). As a member of the board of VW explained in announcing a new plant to build advanced, low-emissions engines in Shanghai, "China is the most important strategic market for Volkswagen, that's why we need to keep bringing the technical know-how into this country to realize localized manufacturing of either vehicles or auto components" (*AsiaPulse*, October 21, 2003).

Similarly, while the leading parts producer Delphi is hurting elsewhere, it has recorded strong increases in Chinese sales, estimated at one billion dollars for 2003, up 40 percent from 2002. The company announced that it would spend 50 million dollars to build a 500-person R&D center in Shanghai. Since it already exports about one-fourth of the output of its Chinese plants, if a serious capacity glut did appear in China, in all likelihood it would expand exports rather than cut production (*Reuters* December 17, 2003; *AutoAsia* December 4, 2003). Delphi's rival Visteon announced that it would move its Asia-Pacific headquarters to Shanghai from its long-time base in Yokohama, while Honeywell's Allied-Signal moved its regional headquarters to Shanghai to Singapore (*AutoAsia* July 3, August 29, 2003).

Some of the dynamics already underway will contribute to enhancing exports. The

increase in demand has encouraged global assemblers to quicken the pace of new product introduction in China, forcing them to provide more intensive support in design and quality control to their Chinese suppliers. The increased Chinese demand for upscale and up-to-date models similar to those produced elsewhere in the world will also make it easier to integrate Chinese production into global strategies.

Despite misaligned incentive systems and continuing weaknesses in management and new product development, the Chinese auto parts industry looks poised to continue to grow rapidly and to expand exports.

Auto Parts in Indonesia: Performance and Policies

Performance

Since the government began to promote local automotive manufacturing in the 1970s, Indonesia's auto parts industry has grown in volume as well as in the scope and technological level of components produced. But in terms of local value added, quality and export competitiveness, local parts production remains in an infant (industry) status.

This combination of expansion with persistent weaknesses reflects the evolution of Indonesia's overall automobile industry. Auto vehicle production grew significantly in the two decades prior to the 1997 Asian financial crisis. From under 10,000 units in 1970, production rose to 70,000 in 1976, over 200,000 in 1981, close to 300,000 units in 1990, and roughly 389,000 in 1997. The industry's share of total manufacturing also grew - from 1.6% in 1975 to 5.3% in 1990 Ito (2003: 8). Production fell drastically to 59,000 in 1998, as autos "felt the effect of the economic crisis perhaps more than any other major sub-sector" (Aswicahyono and Feridanusetyawan 2004: 17; also "Auto Market Expanding in Indonesia" 2004). But the industry then rebounded to 345,000 vehicles produced in 2000, 328,000 in 2001, 299,000 in

2002, 422,000 in 2004, 498,073, in 2005.² Growth in commercial vehicles has been especially important, with light commercial vehicles in particular accounting for roughly 70% of the market. On the other hand, even prior to the 1997 crisis, this growth has been highly erratic, with auto production falling in 1982, 1988, and 1992 as a result of unstable business cycles, industrial policies, and credit conditions. And even in periods of expansion, the auto industry has been highly fragmented (discussed below).

Owing to the auto industry's overall expansion, the number of parts producers has grown from very few to 150-200 firms in a sector characterized by significant market and geographical concentration: The four largest component firms accounted for almost 60% of value added in 1996, and greater Jakarta contributed 93% of the subsector's value added.³ The quantity and range of local products have expanded significantly over the past 30 years with quality improving as well. Until the early 1980s, the components sector, consisting largely of replacement parts of uneven quality, was actually larger than assembly in value added. This changed in the 1980s, as government promotional incentives stimulated growth in assembly, which accounted for almost 70% of the auto industry's value added in 1990. But this trend was reversed in the 1990s, as the share of components rose from 30% to 40% (Aswicahyono, Basri and Hill - ABH 2000: 225-226; Okamoto and Sjöholm 2000: 62). The resiliency of components production seemed to be evident in its post-crisis rebound: from a value of \$1.6 billion in 1997, components production fell to \$563 million in 1998 but then rose to \$2.3 billion in 1999 and \$3.1 billion in 2001.⁴ Component exports also rose, doubling from roughly

² Figures for 2000-2002 from PT Data Consult 2003, Table 1, p. 9. Figures for 2004-2005 from CEIC Data / http://site.securities.com.proxy.library.emory.edu/doc_pdf?pc=ID&doc_id=102335246

³ Figures on numbers of parts firms in the late 1990s vary from 158 (Ito 2003: 9) to 200 (PT Data Consult 2002: 2). Note that auto assembly was even more concentrated (92% in 1996) than auto parts (ABH 2000: 236-237).

⁴ "Post crisis condition of automotive component industry" 2002: Table 5. The Indonesian market for components (as opposed to production volumes) also rose to \$4.13 billion in 2001 from a low of \$1.04 billion in 1998 and a previous peak of \$3.23 billion in 1997 (Ibid.).

\$400 million in 1996 to just over \$800 million in 2001 (update based on latest UN Data).

These totals include a significant number of items for which there was no production as of the late 1970s. By the 1990s, locally assembled parts included diesel and petrol engines, cabins, chassis, various body parts, axles, seats and seat frames, clutch systems, transmissions, brake systems, fuel tanks, pistons, wire harnesses, and high-quality forged parts (ABH 2000: 232-233); and "Post crisis condition of automotive component industry," 2000). This expansion reflected increasing local content levels which, by the mid-1990s ranged from an average of 11% for sedans to 40% in light commercial vehicles, the latter includes basic utility vehicles, such as the Toyota Kijang, which provide an important market for auto body part suppliers. It merits note that although producers of auto body parts accounted for only 5 percent of the auto industry's gross output in 1995, they represented some 48% of the industry's firms and 30% of its employment.⁵

Body parts, along with radiators and axels, were also principal contributors to the growth in parts exports. The export ratio of Indonesian auto parts rose from almost 0% in 1990 to 5.2% in 1995, and the value of component exports increased from \$65 million in 1990 to almost \$110 million in 1999.⁶ Finally, measured by output per employee and total factor productivity, parts production exhibited some productivity growth between 1990 and 1995.⁷

Yet this growth has been largely a function of macroeconomic factors and policy liberalization (discussed below) and has not derived from any significant improvements in Indonesian component production. Indonesian-owned parts producers are significantly weaker

⁵ Non-body part component producers accounted for 46% of total firms, 41% of gross output and 48% of employment. Okamoto and Shoholm 2000: 62.

⁶ Data on specific export items from "Post crisis condition of automotive component industry," 2002: 22-23. Ratios from Okamoto and Sjolholm 2000: 63. Values are from ABH (2000:230), who also calculate that the export share of both vehicles and components was around 4% in 1996 (228).

⁷ Yet productivity declined for body part suppliers. (Okamoto and Shojolm 2000: 67.)

than foreign producers with regards to technological intensity, process technology, and human resource development. The only area in which there are no local-foreign differences is in research and development, a fact that may be more of a reflection of the lack of incentives for any firms to conduct R&D rather than local strengths (Rasiah 2004). Thus, although component exports have grown, Indonesia's figures remain well below those of Korea and China as well as Thailand, and Indonesia has run significant trade deficits in auto parts both prior to and after the Asian financial crisis. Indonesia also trails its Asian neighbors with regard to the number of parts firms.⁸ Although productivity has improved in component production, locally based firms are still unable to manufacture (as opposed to assemble) major functional parts. This is indicated by the fact that three product categories—combustion engines and parts, steering equipment, and other parts constituted 90% of imported components during the 1990s (ABH 2000: 229).

Local parts production has thus remained heavily dependent on imported intermediates. Unlike the assembly industry, where imports as a share of inputs fell from 81% in 1980 to 30% in 1995, imported components comprised 89% of intermediates in 1995, roughly the same as in 1980 (ABH 2000: 230). This import dependence continued after the crisis: Imports of auto components and equipment rose almost three-fold from 1999 to 2000, and while imports declined slightly in 2001, this was due to an increase in imports of completely built-up (CBU) vehicles. Thus, the rise in market value of Indonesian component production *after* the crisis reflected not so much a broad recovery than price increases stemming from a combination of continued reliance on imported intermediates and Indonesia's currency devaluation ("Post-crisis condition" 2002).

The most important proximate source of these weaknesses is the auto industry's extensive fragmentation. This market structure has limited scale economies for parts producers

⁸ In 1999 Thailand had some 700 producers (Legewie 1999).

and discouraged assembler-supplier linkages. This set of problems in turn reflects government policies and institutions, which have themselves been a function of broader political pressures.

Market Fragmentation, , Inter-Firm Linkages, and Parts Firm Capacities

Auto assembly in Indonesia exhibits a combination of foreign influence, corporate concentration and brand / market fragmentation. Japanese brands dominate the market, with Toyota, Mitsubishi and Suzuki accounting for roughly three quarters of the total market (Toyota accounted for 28% of all car sales in 2003). Until recently, the assembly of various brands came under the purview of a small number of Indonesian business groups, of which three (Astra, Indomobil, and Krama Yudha) controlled "brand holder sole agents" accounting for 90% of vehicles assembled (SICCI 2002: 6). These brand holders were selected for their political influence rather than their manufacturing capacities, and prior to 1999, they were authorized by the government to import, produce, sell, or export cars. Brand holders were also allowed to procure licenses for the production of major components. As a result, Indonesian components production is dominated by Japanese-affiliated firms operating within particular brand holders. According to Japanese data, 76 of the country's 158 component producers were Japanese affiliates.⁹ In the late 1990s, the largest brand holder, Astra, accounted for 23 of the 158 component firms and 15 of the Japanese joint ventures. Astra is the only brand holder to have procured *all* functional components internally, but other groups have followed this pattern of vertical integration with regard to component production ("Post crisis condition of automotive component industry," 2002).

Two features of this arrangement discouraged the growth of parts manufacturing capacity. The first involves market fragmentation and weak scale economies. Major brand holders controlled multiple brands and assembly operations, with one group assembling BMW and Daihatsu, another producing Mercedes and Hyundai. There was, moreover, "little apparent

⁹ Unless noted, data on the structure of components producers is drawn from Ito 2003: 9

synergy in the production activities of these groups, even at the firm level..." (ABH 2000: 219; see also Okamoto and Shojolm 2000: 68; and Doner 1991). The result was a market that was highly fragmented even by developing country standards. Thus, in 2002 there were roughly 20 major assembly operations, none of which had significant scale economies. This problem has been especially significant in the passenger car market where, in the mid 1990s, there were 17 brands for a market of under 50,000 units. The largest assembler of passenger vehicles, Toyota, produced fewer than 9,000 vehicles in 1996. The picture has been better in the dominant commercial vehicle segment, where there are fewer producers and models. Yet even here, the three dominant assemblers have operated at under 100,000 vehicles per year. Under these conditions, component producers have a difficult time achieving scale economies, much less developing the skills necessary for technological and managerial improvements.

Second, the lack of scale economies and the weak brand synergy within groups, when combined with high levels of protection, have provided little incentives for Japanese parts producers to develop close ties with joint venture partners, to upgrade local technological capacities, and/or to develop local input suppliers. As of early 2003, the component industry itself was largely an assembly operation relying on imported, semi-finished products.¹⁰

Protectionism and Politics

Market fragmentation and the attendant weaknesses in components production are themselves a result of explicit policy choices. Indonesian automotive policy has been characterized first and foremost by high levels of protection originally designed to establish full local manufacturing capacity by the mid-1980s. This policy has evolved in a number of stages (Doner 1991; Wonacott 1995; ABH 2000). In 1971, the government prohibited CBU imports to

¹⁰ ABH 2002: 219; "Post Crisis Condition..." 2002. These problems of fragmentation are especially striking in light of the relative success and stability of the Indonesian motorcycle industry, where a limited number of assemblers produce a limited number of models (five). Under these conditions, local parts producers, as well as assemblers, have maintained market share and grown in efficiency (Thee 1997; ABH 2000: 218).

Java and Sumatra. The ban was subsequently extended to the whole country in 1974 and supplemented with tariff advantages for completely knocked down (CKD) kits. In 1976, the program was expanded to include a deletion program under which specified groups of components were to be produced locally for specific vehicle groups. The policy was “progressive” in that it envisaged a gradually expanding list of increasingly complex parts to be produced locally. In the early 1980s, the emphasis on local production was supplemented by pressure on assemblers to limit in-house parts production and to develop subcontracting relationships with SMEs.

This overall strategy clearly failed. Its problems were in part a function of over-ambitious goals and a recession-induced fall in demand for autos in the mid 1980s. More critically, given tariff protection and their political influence, brand holders had little incentive to expand and deepen the base of local suppliers. Also impeding the development of local production capacity was the lack of synergy among brands (noted earlier), as well as a tariff structure that raised the cost of imported components and, as a result, discouraged the growth of an efficient domestic support industry (Aswicahyono and Feridhanusetyawan 2004: 21). And finally, the ability of local firms to absorb new automotive technologies was limited by the country's poor education and skills levels: In 2000, Indonesia scored the lowest of East Asian market economies with regard to secondary and tertiary education enrolments and among the lowest in terms of technology imports and scientists and engineers as a percentage of population (Aswicahyono and Feridhanusetyawan 2004: 22, based on World Bank data).

Indonesia was certainly not the only Southeast Asian country to undertake an interventionist, protectionist automotive strategy based on production for the domestic market. Even Thailand, Southeast Asia's best automotive performer, implemented an ambitious local content program backed up by high tariffs. What distinguishes Indonesia has been the degree and length of protection afforded to a small number of influential, local interests. Indeed, the

tardiness of Indonesia's automotive policy liberalization is arguably an important factor in explaining the low levels of foreign, especially Japanese, investment in components production during the 1990s, especially when compared to Thailand and Malaysia (ABH 2000: 239). This more protectionist strategy reflected Indonesia's particular approach to political legitimacy and nationalism backed up by easy access to oil revenues. Indonesian has always been characterized by a distinct suspicion of foreign capital, and this suspicion was intensified in 1974 when violent demonstrations, known as the Malari riots, broke out in front of a Jakarta building with a large Toyota sign in protest against the dominance of foreign, especially Japanese firms operating with Indonesian ethnic-Chinese as joint venture partners.¹¹ It is noteworthy that the Malari riot prompted the extension of the CBU ban to the entire country.

Such suspicion has been backed up by a consistent strain of economic nationalism. Architects of Indonesia's automotive policies in the late 1970s and 1980s were often engineers who saw the auto industry as the basis of national industrialization. The influence of these engineers relative to more technocratic economists varied with Indonesia's ability to finance automotive industrialization projects, such as local engine assembly. And such financing was in large part a function of the country's oil revenues. Thus, efforts to localize production of steel, engines and other major components coincided with rising state oil revenues (Doner 1991: 145). The interventionist policies to which this oil-lubricated nationalism gave rise in turn provided significant opportunities for clientelist rent seeking. These relationships evolved over time. In the 1970s and 1980s, they involved close ties between officials in the Ministry of Industry and particular firm owners. By the 1990s, the auto industry had "probably attracted more rent seeking activity than any other major manufacturing activity in the country"

¹¹ Prior to 1974, foreign entry in the auto industry through equity was relatively easy. After 1974, when the riots led to a much more restrictive investment policy, foreign investors entered through non-equity arrangements, such as licensing. Investment policy became more liberal in the 1980s and especially after 1994, as discussed below. ABH 2000: 217-218.

(Aswicahyono and Feridhanusetyawan 2004: 17; see also ABH 2000: 223).

Liberalization, Crisis and New Opportunities

In the face of the industry's persistent weaknesses, the government initiated liberalization in the 1990s. In 1993, the government replaced the ban on imported vehicles with a combination of tariffs and surcharges, reduced luxury taxes for domestically produced vehicles, and replaced the mandatory deletion program with a local content program backed by tariffs. Specifically, import duties on intermediates and raw materials would be reduced for firms with higher local content via a complex point system. In 1994, the government allowed an increase in foreign ownership, and a 1995 package cut restrictions on investments for new car production, and lowered tariff ceilings.

Liberalization did not proceed easily. Indonesia resisted regional trade liberalization stipulated by the ASEAN Free Trade Agreement, insisting that the auto industry be placed on AFTA's temporary exclusion list. Then, in 1996, one of President Suharto's sons, Tommy, launched a "national car" project in cooperation with Korea's Kia. The project, slated to embody significant local content and to benefit from extensive tariff protection and financial assistance, failed after one year in the face of Kia's financial weaknesses and significant opposition from other producers and trading partners, including challenges at the WTO (Hale 2001).

The "national car" project probably marked the last effort at extensive protectionism in the Indonesian auto industry. In the face of the 1997 economic crisis, the resulting IMF reform package and Suharto's (1998) loss of power, the government abolished the local content scheme and granted more import licenses. The government announced a new policy in 1999 that included: reduction and rationalization of tariffs on vehicles, CKDs, and raw materials for components; reduction and restructuring of luxury taxes on automobiles; an end of restrictions on importers; and relaxation of limits on production in bonded export zones. This set of

measures "served a deadly blow to the program to develop national auto industry from assembling into full manufacturing" ("ATPMs Playing Second Fiddle," 2003:1).

Indonesia's liberalization, pressure for more market opening from AFTA, and the recovery of macroeconomic stability after 1999 has created the potential for efficient, locally based component production, albeit on a much more limited and less indigenous scale than originally anticipated. First, opening up the country to imports helped to stimulate overall expansion of the auto market, as discussed earlier. This expansion has renewed attention to the fact that Indonesia, with a population of over 200 million, has a still-undeveloped auto market with great potential.¹² More important for the long run, liberalization, combined with heavy debt stemming from the 1997 crisis, has drastically reduced the role of local sole agents in auto assembly and components production. Toyota, Daihatsu, Suzuki and Hino have taken control of assembly operations from their local partners. The consolidation is resulting in local brand holders becoming "mere traders and distributors" ("Auto market expanding in Indonesia," 2004). It has also cleared the ground for Japanese firms to deepen their involvement in more streamlined local component production in line with regional production schemes. The leader seems to be Toyota: to develop Indonesia into a supply and export center for multipurpose vehicles and gasoline engines, Toyota intends to invest \$380 million in Indonesian operations, of which \$200 million will go into parts production and \$180 million into assembly. Other firms have also announced plans to produce components in line with regional or global arrangements. Honda announced plans to establish a facility to produce power train parts to be used in small vehicles.¹³

The combination of Indonesia's significant domestic market potential, its existing

¹² The vehicle ownership ratio in Indonesia in 2004 was 1:35 compared with 1:8 for Malaysia and 1:15 for Thailand. Guerin 2004.

¹³ "Auto industry needs govt to take front seat on policy," 2004.; "Honda Expands Production of Auto Powertrain Components in Asia," 2002 and "Mitsubishi resumes 'Asia car' Project" 1998.

capacity in light commercial vehicles, and Japanese involvement in regional and global production arrangements suggests potential for large scale, locally based production of major components for light commercial vehicles. The question is whether Indonesia will be able to promote this manufacturing and do so in ways that result in the growth of local skills and locally owned suppliers. The answer to this question will depend on both external and internal factors. An important external factor involves the opportunities and threats posed by the ASEAN Free Trade Area. Under AFTA, ASEAN members committed themselves to cut tariffs, including those on autos, to a range of 0-5% by the end of 2002. To be eligible for such preferential tariffs, vehicles would have to achieve at least 40% ASEAN content and be produced in at least two ASEAN countries. AFTA thus offers up the possibility of an expanding regional market for Indonesian products. But other countries, especially Thailand, are already ahead of Indonesia; indeed, Indonesia's overall liberalization, combined with a 2003 AFTA-related tariff cut, has resulted in foreign auto makers seeking to establish their brand names in Indonesia by increasing their imports of built-up vehicles with 40% ASEAN content, probably at the expense of local production (Guerin 2004, from which the rest of this paragraph is drawn). Observers have also expressed concern that, given the lack of a credible mechanism to verify the 40% ASEAN content levels, other regional producers might be able to "sneak in cars with less than the minimum content."

The capacity to take advantage of new opportunities also depends on Indonesia's domestic institutions which, at least until now, have been ineffective in terms of industrial promotion. Indonesian extension services are notoriously weak, reflecting much broader gaps in the country's technology development infrastructure. Few if any Indonesian parts producers have R&D Departments. There is little private provision of manufacturing capability support services. Government R&D institutes cater not to the private sector but to the needs of state-owned strategic industries. These institutes suffer from poor funding and management

structures. At least as of 2002, Indonesia did not have productivity centers designed to improve product quality, delivery and manufacturing methods. Nor, despite the government's emphasis on the spillover potentials of the auto industry, did Indonesia require locally used components to be tested for quality standards.¹⁴ At a broader level, Indonesia has not developed the bureaucratic expertise, the collective business arrangements, or the kinds of public-private sector consultative mechanisms typically associated with effective information exchange, signalling and monitoring required for industrial upgrading. Although institutional support is far from the only factor influencing local firm capacity, Indonesia's "underdeveloped institutional endowments" have clearly not helped to overcome the weaknesses of local producers.¹⁵

Indonesia's potential to improve its institutional capacity is in large part a function of its political conditions, and here the picture is mixed. On the positive side, the country's successful presidential elections and overall democratic transition, when combined with macroeconomic stability, constitute an attractive environment for foreign investors. At the same time, intensive party competition may undermine cohesion within and coordination across government agencies. Such fragmentation can impede the development of institutions capable of strengthening local capacities to absorb new (to Indonesia) technologies. The danger is then that auto parts production in Indonesia will grow largely as a semi-enclave of foreign producers.

Conclusion: Explaining Present Performance, Anticipating the Future

The four national auto parts sectors reviewed in this chapter range along a development continuum, with Japan clearly the most advanced, followed by Korea, then China, and

¹⁴ SICCI 40; and "Government to Issue Regulation on Quality Standards for Automotive Components" 2002.

¹⁵ Rasiah 2004: 23, on autoparts, textiles, and electronics. For a broader overview of institutional weaknesses, see Dhanani 2000: 9-10. .

Indonesia the least developed. In this concluding section, we briefly describe this cross-national variation, identify the factors accounting for it, and speculate on the future challenges these industries face and their capacities for meeting them. We suggest that while few developing country firms (China and Korea may provide some of this small number) have any hope of becoming global first-tier suppliers, developing countries can still benefit by attracting foreign first-tier suppliers who in turn provide opportunities for local firms to become second- and third-tier suppliers. But taking advantage of such opportunities requires significant improvement in local technological and innovation capacities. Such upgrading in turn requires institutional strengths in technology acquisition and diffusion.

Performance Variation

The four national industries have varying capacities for technology absorption and innovation. Japanese producers have become global leaders in automotive technology application and product design and development, with first-tier firms that supply directly to assemblers organizing these processes within pyramids comprised of second- and third-tier suppliers. Among Korean-owned firms, only Hyundai Mobis has developed the capacities to compete internationally as a first-tier supplier. Most of the other larger locally owned firms have been taken over by foreigners since the 1997 crisis. Other Korean parts firms are relatively small and these, along with virtually all Chinese and Indonesian auto and parts producers, still depend heavily on parent firms and/or technology licenses for sophisticated products.

Technology and innovation capacity contribute to differences in overall competitiveness, as reflected in export capacity and trade balances. Japan has run consistent surpluses in parts trade. With its exports having increased over twofold since 2001, Korea now runs significant surpluses, although exports still constitute only 15% of all parts produced and are only a fraction of Japanese export level. China's exports of auto parts have grown significantly since the mid-1990s, surging especially in 2004 ("China's Auto Exports

Outnumber Imports," [sic]¹⁶ *Asia Pulse* October 25, 2004), have largely kept pace with an explosive growth in imports with the exception of 2003 when an enormous increase in assembly for the domestic market occurred. The Indonesian parts sector is clearly the weakest, as reflected in significant and consistent trade deficits in parts. The assembly industry in all three countries continues to depend heavily on imports for the more sophisticated components.

Finally, the four cases differ with regard to the level of indigenous participation. Japanese component firms have maintained both international competitiveness and national ownership. But in the other three countries, liberalization and the attendant need to meet tougher market standards has ushered in greater foreign participation. In South Korea, the 1997 financial crisis led to both a significant consolidation and a substantially expanded foreign presence, especially on the part of 1st-tier global suppliers. In China, foreign assemblers trying both to reach higher volumes and improve quality will probably drop some local suppliers affiliated with Chinese joint venture partners. And in Indonesia, liberalization and weakening of local automotive groups has already begun to reinforce foreign control of the entire industry.

Explaining Performance Variation

Broadly speaking, this cross-national variation in the strength of auto parts production reflects differences in overall levels of economic development. But economic development is an imperfect predictor of automotive production capacity. Indonesia lags its ASEAN neighbor, Thailand, in vehicle and parts exports; Korea leads Taiwan (China); and China has surpassed most other large developing countries, including Indonesia. To understand why countries at similar levels of economic development perform differently in auto parts production, to evaluate how the four countries reviewed in this chapter have leveraged existing resources to construct comparative advantage in parts production, and to identify best practices that might

¹⁶ The headline of the article mis-represents the data it reports: while the growth in exports outpaced that of imports in the first nine months of 2004, the total value of imports was still in excess of that of exports.

allow the weaker countries to become stronger, it is necessary to assess the impact of key policies and institutions.

A logical starting point is the degree to which these four countries have implemented orthodox prescriptions of macro-economic stabilization, liberalization of trade and investment, and “getting prices right”. This factor can explain some, but certainly not all, of the variance in the success of Asian auto parts producers. Stabilization and liberalization have been far from consistent or complete, and the orthodox remedies ignore some of the most pressing policy issues surrounding the parts industry, including technology diffusion and labor relations.

Macroeconomic performance in our four countries varies considerably and does not correlate well with the strength of parts sectors. Inflation in Japan was relatively high during the rapid growth period, but came under control in the mid-1970s after the upheavals surrounding the “Tanaka boom” and the first oil shock. Lingering financial problems indirectly depressed auto sales in the 1990s, but by then the Japanese auto industry was increasingly oriented to exports and overseas production. Korea followed a similar pattern with a delay of a decade or so, enforcing macro-economic discipline after the excesses of the heavy-and-chemical industries push and the instability surrounding the two oil shocks and the assassination of President Park in 1979. Recurring structural imbalances in the financial system, though, led to a near-collapse of the currency during the Asian financial crisis of 1997-98. Since then, the Korean government has carried out aggressive and largely successful structural reforms, though some problems in the financial system remain.

China, whose growth has been the most rapid, also has had considerable difficulty maintaining macro stability. Inflation was a major contributor to the Tiananmen upheavals of 1989, and while the government brought inflation under control by the mid-1990s, it has made the least progress on financial and currency reforms. Even the basic property rights system remains in flux. After 2000, the resurgence of economic growth, not least in autos, led to

inflationary bubbles in property markets and unsustainably high investment in basic materials industries. Following the collapse of oil prices in the 1980s, Indonesia carried out significant reforms but political weakness and financial problems left it vulnerable to the Asian financial crisis. Post-1997 stabilization has contributed significantly to a resurgence of demand and an expansion of auto assembly. Yet improved macroeconomic conditions have not yet resulted in any significant deepening of components production.

In sum, in all of our cases, macroeconomic stabilization has been only partially and sporadically successful but only in Indonesia have macroeconomic problems been so severe as to prevent extraordinary growth in auto parts production and exports. This is not to deny that all of these countries have paid a price for macroeconomic instability. It is rather to note that periodic imbalances have only infrequently impeded growth and, conversely, that macro stability on its own does not guarantee growth in auto manufacturing. Macroeconomic stability is thus best understood as a risk factor or recurrent constraint.

The association between liberalization and national performance in auto parts production is also far from perfect. All four countries have followed a path of significant liberalization, but in China and Indonesia the process is far from complete. All four countries initially undertook aggressive programs to protect and protect the auto industry. Pressure from the United States led to reluctant liberalization, first of trade, then of investment, in Japan, particularly after about 1980, and Korea, starting in the 1990s and accelerating after the financial crisis, when foreign investors took over large chunks of the parts industry and purchased two of the country's four surviving assemblers. Protectionism in Indonesia, always an uneasy balance of rent-seeking and developmentalism, gave way to significant liberalization after the Asian financial crisis, the fall of Suharto, and the movement toward a free trade area in ASEAN. De facto responsibility for promotion of the local industry has fallen upon Indonesia's leading assembler, the Toyota group. China's early promotional policies, never

terribly successful at such crucial tasks as developing indigenous technology or consolidating production, largely gave way to phased liberalization surrounding China's entry into the WTO, though both the central and local governments retain an active role in the industry.

Extreme levels of trade and investment protectionism (as in Indonesia) constitute significant obstacles to the development of local parts production, whether under local or foreign auspices. But evidence from the other cases indicates that the development of a competitive parts sector is possible in the presence of more moderate protectionism when such assistance is made conditional on beneficiaries meeting performance criteria. But protection alone is insufficient: it needs to be accompanied by mechanisms to promote scale economies and to resolve the collective action challenges of technology acquisition and diffusion among firms and among workers. Identifying these mechanisms helps to explain why, in labor productivity and technology, Korea continues to lag Japan, while China and Indonesia are far behind.

Successful parts manufacture requires attaining the economies of scale crucial to price competitiveness without creating excess capacity in an industry notorious for its weak exit mechanisms. Our cases suggest the potential benefits and drawbacks of both market- and government-led solutions. Market forces have occasionally served to reorganize national industries struggling with excess capacity: many Korean and Indonesian parts firms failed or were acquired in the wake of the financial crisis, some smaller parts firms disappeared in China even amidst the boom and influx of foreign investors, and even Japan witnessed a degree of rationalization in the 1990s. Administrative attempts to prevent new entrants or force mergers have generally failed, albeit with some temporary and partial exceptions. Japanese government efforts to encourage mergers of both assemblers and parts producers in the 1960s promoted scale economies and the emergence of special competencies. The Korean government's efforts to enforce consolidation of auto assemblers in the 1980s laid the foundation for a growth in

scale economies for parts production.

But the fact that the Japanese and Korean cases are so rare (and even in those countries temporary and incomplete) highlights the political challenges in market consolidation: Incumbent firms have often succeeded in blocking attempts to use either administrative or market-based mechanisms to restrain aggregate capacity, thus dragging down the profitability even of efficient producers. Recent experience in Korea and Indonesia suggests that only extreme economic weakness that deprives governments of the trade and financial resources to sustain inefficient firms will result in needed consolidation. Such consolidation, especially of assemblers, can improve scale economies and, when accompanied by macroeconomic stabilization, improvements in property rights and infrastructure help attract foreign, first-tier suppliers.

Challenges of Local Supplier Development

The presence of foreign firms offers potential employment, foreign exchange earnings, and access to technology and managerial expertise. A central question is the extent to which the availability of such opportunities can generate and sustain locally owned component producers. Given the kinds of technological, financial and network resources required to be a first-tier supplier, it seems unlikely that in any but the most exceptional conditions (e. g., Hyundai Mobis, and perhaps some Chinese companies), first-tier status is out of the reach of local firms. Nor, given the global nature of the industry (and Hyundai Mobis' decision to build a new plant in Michigan), is it obvious why a locally owned first-tier firm should have any greater commitment to the home economy than a foreign subsidiary (although the local economy may still expect to retain the majority of the higher value-added activities of the corporation including research and development, and benefit from the diffusion of tacit technology).

For local firms with little experience confronting global quality, price and delivery requirements, achieving even second- and third-tier status requires significant improvements in

the acquisition, absorption, and diffusion of technologies new to the firms. Working closely with first tier suppliers and entering into joint ventures and licensing arrangements are critical channels for accessing such technologies. But the Japanese (and, to a much lesser extent, Korean) experience demonstrates that the capacity to absorb and diffuse technologies is often beyond the capacity of individual local firms.

Two sets of extra-market institutions seem especially valuable in overcoming these barriers. First, public institutions and industry associations that promote technology diffusion, quality control, testing and training are crucial inputs to an industry dominated by incremental innovation and tacit knowledge. These are strong in Japan but weaker elsewhere. Parts producers in the other countries largely depend upon assemblers such as Hyundai for assistance, but assemblers can take responsibility for but a limited set of the larger suppliers. Only Japan has created a comprehensive and highly articulated pyramid of suppliers with interfaces for technology diffusion and quality assurance at each level, and support from local testing agencies for even the smallest suppliers. In China, national institutions remain unwieldy and unstable, but some local governments, particularly in the Shanghai area, have provided a degree of support for the more important suppliers. Foreign investors have transferred to local employees and partners some expertise in quality control and cost accounting, but they are only beginning, under the stimulus of rapid growth and government pressure, to undertake significant R&D activities in China, and product design remains largely dependent upon the host company.

Second, technology acquisition and diffusion depends on the existence of a reliable, skilled, and adaptable workforce. But the three later developers have failed to match Japan's effective combination of stable yet restrained and flexible labor relations, a system devised and implemented by companies in the shadow of public policies that traditionally have been highly supportive of long-term security for core employees. The Chinese auto industry began as a

state-owned business and in the wake of democratization both Korea and Indonesia introduced employment protections so intrusive that employers hesitate to hire new workers; both governments failed to develop an adequate social safety net of unemployment insurance and retraining programs to reduce the opposition of workers to restructuring. The result: rigidity at large companies and few protections or insurance for workers at smaller companies. Ironically, China has probably moved the furthest away from the iron rice bowl, particularly in new contracts, though China, too, has an uneven record in social insurance. Equally important, none of the later developers has developed the elaborate rotation and testing systems that have contributed so greatly to upgrading the skills of Japanese workers, though Korea has probably made the most progress.

Thus, despite the very significant progress shown by Korea, China, and to a lesser extent Indonesia in developing the auto parts industry, the stability of the property rights regime and macroeconomic and financial systems has not been completely assured, and collective capacities to acquire, diffuse and upgrade technology and impose discipline on aggregate capacity remain much weaker than in the world leader, Japan. There seems little doubt that more orthodox reforms, in the presence of significant regional and local market opportunities, will attract assemblers and affiliated first-tier suppliers. Given liberalization and the dearth of locally-owned assemblers and first-tier suppliers in developing countries, it will be particularly important for governments, industry associations, and public-private organizations to develop institutions and practices to help local firms access and diffuse the know-how required to meet the international standards that assemblers and first tier suppliers require.

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