
Globalisation and the reorganisation of Japan's auto parts industry

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Abstract: One prominent feature of Japanese automobile manufacturing in the postwar period was a system of sourcing parts from closely affiliated smaller firms in long-term, stable relations. Changes in the global automobile industry have made that system too expensive. Increasing competitive pressures resulting from global excess capacity in the early 2000s have forced a transformation in the business model of the automotive industry. Modularisation and a switch to 'global best sourcing' for standard parts have turned the previous logic of Japanese subcontracting on its head, as first-tier suppliers become even closer partners of large assemblers, while small firms become replaceable. Mergers and joint ventures have changed the structure of Japan's auto part industry, resulting in larger firms that compete globally. Undergoing a transformation toward cost-cutting and increased technological capabilities in the late 1990s and early 2000s has afforded these firms a fortuitous head start in preparing for the global auto crisis of 2008/2009, which is threatening to wipe out smaller parts makers around the globe.

Keywords: subcontracting; globalisation; modularisation; transaction cost economics; Japan.

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1 Introduction

One prominent feature of Japanese automobile manufacturing in the postwar period was a system of sourcing parts from closely affiliated smaller firms in long-term, stable relations. Grown from necessity in the early 1950s and turned into a virtue with the introduction of the Toyota Production System in the 1960s, Japan's subcontracting system had mitigated problems of asymmetric information and uncertainty by turning suppliers into collaborators with a keen interest in a long-term relationship through

knowledge infusion. Thus, stable subcontracting offered a solution to the problems associated with either arm's-length sourcing or full vertical integration (e.g., Ahmadjian and Lincoln, 2001; Asanuma, 1989; Dyer, 2000; McMillan, 1990; Smitka, 1991).

However, the combination of globalisation with changes in automotive production and sourcing processes has led to a reconfiguration of Japan's subcontracting system. Beginning in the 1990s, the location of production abroad accelerated greatly, while price competition arrived in Japan as large buyers realised cost savings from global sourcing of low value-added parts. Meanwhile, modularisation meant that first-tier suppliers became much more important, especially those also charged with ODM (original design manufacturing). As large car assemblers switched to global bulk sourcing for standard parts and more extensive collaboration with first-tier suppliers for critical parts, Japan's previous pyramid-shaped subcontractor *keiretsu* began to collapse, and a new system called 'customer meshing' emerged. While the new competition threatened the livelihood of third- and fourth-tier suppliers, it also triggered a reconfiguration of Japan's auto parts industry by inviting mergers that have resulted in larger, stronger auto parts companies.

In spite of these important developments, the conventional wisdom of Japan's subcontractor structure has remained largely unrevised. This paper explains how globalisation and the arrival of competition in Japan have transformed the previous system. To fully understand Japan's automotive industry in the 21st century, we have to appreciate the deep-seated changes that have taken place since the late 1990s.

2 Theories of Japanese subcontracting

Japan's 'Law on the Promotion of Subcontracting Small Firms' defines a subcontracting relation as one where 'a larger company contracts out production, repair, creation of information deliverables, or provision of services' from a smaller company over an extended period [SMEA, (2005), p.34]. In statistics, an affiliated subcontractor ('*shita-uke*', lit.: 'lower-level order taker') is usually defined as one that sells more than 50% of its output to one larger buyer. In the automotive industry, an affiliated subcontracting relationship is considered one where the part maker sells more than 60% of output to one large client, or where the large assembler procures more than 50% of a certain part from within its subcontractor hierarchy (Kobayashi and Ōno, 2006). Thus, almost by definition, subcontractors are mostly small firms. Japan's Small and Medium-Enterprise Basic Law defines a small- or medium-sized manufacturing firm (SMM) as one with capital of less than ¥300 million or fewer than 300 employees.¹ Between the 1960s and 1990s, Japan's SMMs fell broadly into three categories:

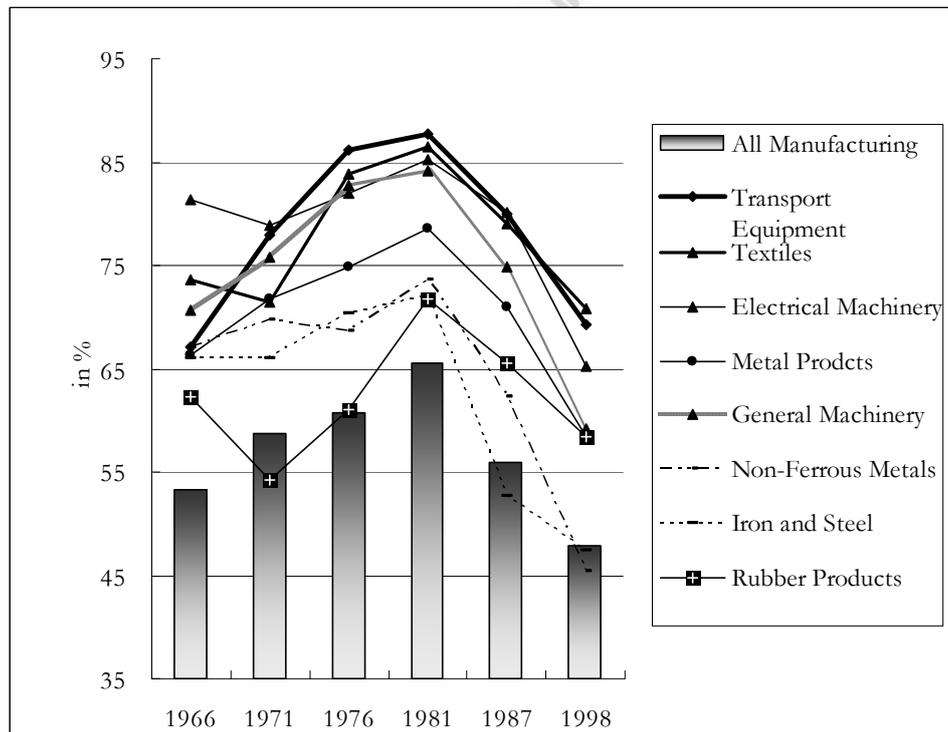
- 1 independent firms with strong technology base that sold to multiple buyers
- 2 suppliers that were exclusive subcontractors to one large buyer
- 3 very small firms with a weak technology base.

Part suppliers were a critical force in the postwar period, because some of Japan's manufacturing firms relied extensively on parts outsourcing from a hierarchy of tightly aligned companies. As Smitka (1991) and Nishiguchi (1994) have shown, Japan's subcontracting system initially grew out of necessity: In the immediate postwar years, many assembling industries such as automobiles and electronics had their production

facilities destroyed and faced a scarcity of funds, which made it difficult to build in-house expertise in a wide range of areas. In the early 1950s, a smaller workforce helped shield companies from fierce labour strikes, until a change in legislation restricted the rights of unions. Wages at smaller firms were generally lower than at larger firms. For different reasons at different times, outsourcing was preferable.

Thus, large car companies found themselves outsourcing critical parts. As transaction costs economics (Williamson, 1975, 1985) suggests, using the 'market' instead of within-firm 'hierarchy' to outsource critical components creates dependencies that have to be managed with great care, lest the supplier runs away with the technology or either the buyer or supplier exploits the dependency and squeezes the trading partner on price. One solution to guard against value expropriation, opportunism and this hold-up threat is to create long-term ties through repeated trades, technology sharing, and ownership stakes (e.g., McMillan, 1990; Coffey and Tomlinson, 2003). Many Japanese manufacturers built stable groups of first-tier suppliers that in turn relied on second-tier firms and so on, so that a large number of small firms were part of the buyer's business group, a vertical *keiretsu*. Figure 1 shows that at the height of this system, in 1981, two thirds of small manufacturing firms identified themselves as subcontractors to specific large firms. There were great differences across industries, however, and in electric and transportation equipment, the ratio exceeded 85%.

Figure 1 Trends in subcontracting



Source: Figure 2-4-1 (SMEA, 2003)

In the stable arrangements from the early 1960s through the early 1990s, suppliers formed hierarchies, led by first-tier suppliers (usually medium-sized firms with a strong core competence) that outsourced from second-tier suppliers, which in turn bought from third-tier suppliers, who relied for very low-value added parts on very small-sized family businesses. The relationship with the buyer differed depending on the tier in the hierarchy. The leading first-tier firms catered to more than one buyer and possessed significant bargaining power due to their technological know-how, whereas fourth-tier firms were low-tech, easily interchangeable and thus at the mercy of their buyers for survival.

The large car makers formed associations (*kyōryoku-kai*, cooperative supplier groups) that facilitated the exchange of product specifications and know-how. Personnel exchange with the buyer bolstered cooperative agreements. In some cases, subcontractors built cities around the main buyer, in a setup referred to as *jōkamachi*, 'castle towns' – as in the medieval period, the warlord (main assembler) attracted suppliers who made co-location their first weapon of competition. For example, in 2008 the Aichi Prefecture, where Toyota is headquartered, was home to eleven Toyota plants, the headquarters of seven main suppliers, and 57 production plants of these suppliers [Diamond Weekly, (2009), p.57].

Early research on subcontracting, mostly generated within Japan, centred on the potential for exploitation of small firms in this system. This line of research was congruent with the policy view, especially in the 1950s and 1960s, of small firms as weak and needy of government support. In the 1970s, scholars began to identify stable subcontractor relations as a source of efficiencies that helped large firms save on supplier selection and bidding, while also enhancing product quality through technological cooperation with suppliers. Risks could be shared and dependencies reduced when buyers procured from more than one supplier. Cultural values of trust, loyalty, risk aversion and saving face were sometimes invoked as contributing to close relations between buyers and suppliers (e.g., Smitka, 1991). Relations were often cemented through shareholdings, in particular by buyers that owned majority stakes in their core suppliers.

In the 1980s, studies in transaction cost economics and game theory attributed the stability of Japan's subcontractor arrangements to the logic of repeated games and reputation that prevented opportunism. Moreover, mutual investments in specific production technology and joint R&D coupled the interests of assemblers with those of suppliers, and thus mitigated the threat of holdup and resource dependence. Bargaining power, according to these insights, was equilibrated because of complementary knowledge and joint R&D. The custom of after-sales price adjustment added to close ties through welfare distribution through price renegotiations. Taken together, Japan's subcontracting ties were held as an example of successfully dealing with the problems of asymmetric information and the potential for cheating that often destabilise outsourcing relations (e.g., Aoki, 1988; Asanuma 1989; Asanuma and Kikutani, 1993; McMillan, 1990; Kimura, 2002; Schaefer, 2008).

Sociologists added an analysis of the value of interfirm networks (e.g., Lincoln et al., 1998; Ahmadjian and Lincoln, 2001). These studies emphasised the system's benefits in terms of speed, flexibility and efficiency attributed to mutual learning. Mutual investment and R&D, as well as the custom of *shukko* (dispatching employees to related firms) fostered cross-fertilisation, which was otherwise limited due to lifetime employment. Sometimes, dispatches served to support smaller suppliers in trouble by sharing

managerial talent or as a buffer during a temporary decline in demand, when the large firm suffered from excess labour.

Importantly, these analyses apply best to first-tier suppliers and perhaps some second-tier firms, i.e., those with proprietary capabilities critical to the final product. The smallest manufacturing firms, which typically engaged in mundane assembly, enjoyed much less stability (e.g., Miwa and Ramseyer, 2000). This difference in levels among tiers of suppliers became more pronounced over time, as benefits from close collaboration with a large firm accrued mainly to first-tier subcontractors. Subcontractors could increasingly be divided into innovative and competitive medium-sized firms on the one hand, and stagnant lower-tier firms on the other. Many first-tier firms, such as Denso, graduated from their supplier role and sold to competing assemblers.

Lower-tiered firms, in contrast, were often dependent on the buyer. Although the buyers rarely demanded that small suppliers were exclusive, many remained so as that reduced the need to develop marketing and other business skills, and allowed a focus on particular automobile makes and models. According to a 1987 survey, more than half of the small manufacturers were subcontractors, and 81.5% of these depended on only one buyer [Aoyama, (2001), p.124]. Kimura (2002) analyses longitudinal data from METI's Survey of Business Structure and Activity to show that the smaller the company, the more likely it was to serve as a subcontractor.

A fiercely competitive assembler – such as Toyota – could use dependency to control costs and margins for their exclusive subcontractors. During recessions buyers could squeeze suppliers, by reducing price and delaying payment. In the 1950s, the government outlawed exploitation or the extension of bill payments beyond 180 days.² After buyer transgressions intensified during the recession of the 1990s in what was labelled 'subcontractor bullying' (*shita-uke ijime*), in early 2003 the government introduced stricter rules and expanded coverage to more firms and industries. Next to proactive supportive measures, the new law increased penalty fees and prohibited a larger range of actions, including forced 'contribution monies' to be paid by the supplier, forced dispatching of redundant workforce to the supplier, and denying that a delivery had been received and refusing to pay for it. In contrast to the glamorous account of collaboration and technological progress achieved between first-tier suppliers and assemblers, these policy measures point to the negative side of low-level supplier relations.

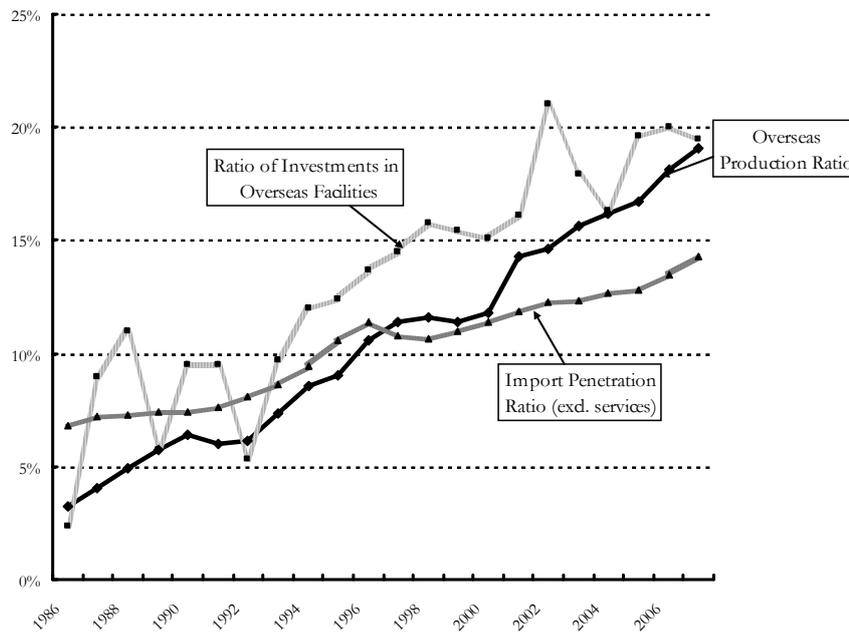
When assemblers were less strict in their negotiations, another problem developed: management slack and a limited cost awareness (Kobayashi and Ōno, 2006). More than two thirds of suppliers in the auto industry remained exclusive subcontractors over time, and repeated interaction often made it difficult to also engage in cutthroat bargaining. Even as the tie-in with one buyer helped suppliers to economise on advertising, sales promotion and R&D, it weakened the high-powered incentives of the market. Cozy relationships therefore led to what was called '*keiei no amae*' – the overindulgence of managers. Over time, the lack of competitive bidding allowed managers to find excuses why cost-cutting was less important than quality, just-in-time delivery, and 'trusted' relations.

3 Globalisation in Japan's automobile industry

Globalisation hit Japan's automotive industry in full force in the mid-1990s, and brought unprecedented pressure for cost reduction at all stages of production, in particular for the

part suppliers. The pressures of globalisation can be disaggregated into two separate forces. The first was pressure to produce abroad, initially due to trade barriers but increasingly due to cost pressures when Japan lost its low cost-country advantage in the 1980s. The second was the arrival of competing products from abroad on the domestic market. This second pressure arrived in the mid-1990s with the ascent of China as a viable competitor. Even though many parts from China were sourced from Japanese companies operating there, these lower-cost re-imports still challenged the previous supplier structures.

Figure 2 Outward-bound investments, overseas production and import penetration, 1986–2008



Source: Adapted from CAO (2004), Fig. 3-2-1 and METI (*Kaigai jigyō katsudō kihon chōsa*)

Figure 2 shows that between 1994 and 2006, the ratio of investments in production facilities overseas doubled, from 10% to 20% of total. During the same period, the ratio of manufacturing abroad climbed from roughly 7% to almost 20%, meaning that every fifth product made by Japanese firms was no longer made in Japan. Import penetration of manufactured products (including re-imports of Japanese goods) almost tripled, from about 5% in the early 1980s to nearly 15% in the late 2000s.

This process of globalisation occurred in three separate phases. A first push toward locating production abroad occurred in the 1970s, initially to South East Asia for low-cost assembly of OEM (original equipment manufacturer) products for sale in the USA and Europe. This was followed by expansion abroad in reaction to trade-frictions and local content rules, mostly into the USA. The US\$/Yen exchange rate realignment based on the Plaza Accord of 1985 led to the 'High Yen Recession' in Japan, and producing outside Japan became one way of hedging against increasingly volatile exchange rates. Trade data reveal the results of this first wave of global production: whereas in the late

1980s, roughly 30% of Japanese exports were directed at the USA, this ratio had shrunk to about 22% in the early 2000s. Over those two decades, however, 61% of Japan's cumulative outward-bound foreign direct investment (FDI) had gone into the USA, indicating that trade with the USA had been replaced by production in the USA.³ This first wave of investments in overseas plants led the media to coin the phrase *kūdōka*, the 'hollowing out' of Japan's industrial base.

The second wave of hollowing out occurred in the mid-1990s, in a turn towards Asia in search for locations with cheap labour. Trade with Asia had also become increasingly important, growing from less than a fifth of total Japanese exports in the late 1980s, to 44% in 2004. Small firms, in particular, directed 69% of exports to East Asia, but only 15% to the USA. [SMEA, (2006), Fig. 2-1-9]. At the same time, cumulative Japanese FDI into Asia had jumped to 17%, signalling the arrival of Japanese plants in Asia.

The third wave of hollowing out came with the 'China Boom' of the early 21st century. China's exports grew by 77% between 1998 and 2003, and Japan was a major buyer of these exports. In 2002, Japan registered its first trade deficit with China. The imbalance also showed in FDI: in 2001, 69 major Japanese firms shut down a total of 120 factories in Japan, and 70% of these were moved to China (Ryan, 2003). Whereas FDI into China accounted for 6.3% of total Japanese FDI flows in 1994, this share doubled to 12.9% for the year 2004.⁴ Even though accumulated Japanese FDI into China for the period 1989–2003 remained small with 5% of total, this sudden change in trajectory caused a 'China fear' in some Japanese circles, triggering everything from government 'hollowing out deliberation councils' to protectionist policy proposals. Meanwhile, opponents of the 'China fear' argued that half of China's exports were produced by overseas firms (e.g., Lincoln, 2002; Kwan, 2002). In the case of Japan, 60% of its imports from China were re-imports from Japan's electronics, car, textiles and other manufacturers (Ryan, 2003).

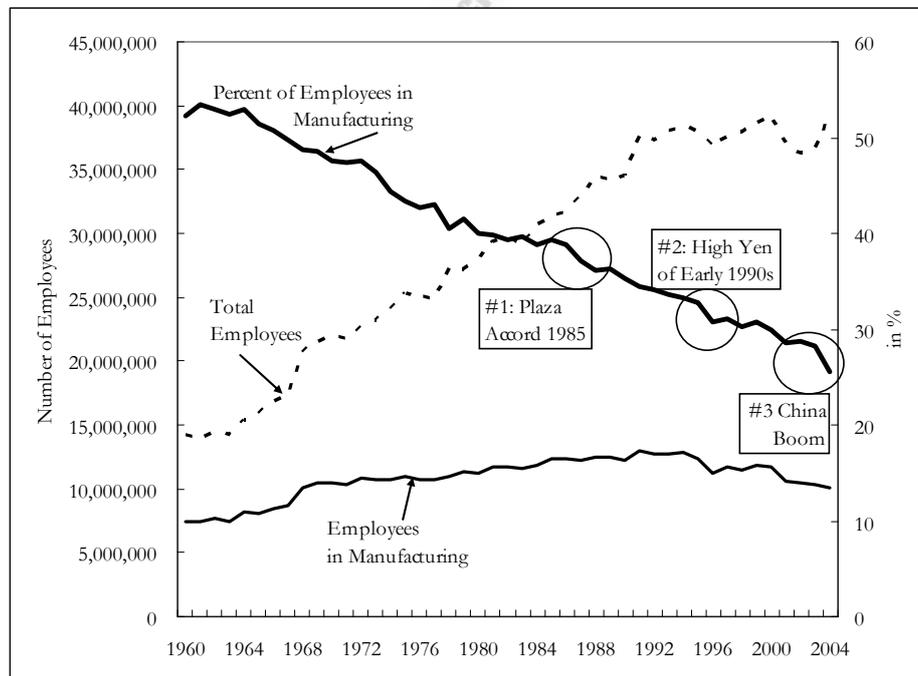
Over the course of these three waves of hollowing out, doomsday prophecies abounded. In 2002, the Fuji Research Institute estimated that between 2002 and 2010, domestic production would fall by ¥8.8 trillion (roughly \$85 billion), GDP would fall by 1.7% and employment by a further 1.25 million (Diamond Weekly, 2002). Of particular concern were the livelihood of small enterprises on the one hand, and the potential to erode R&D capabilities on the other. Moreover, Bailey (2003) and Nakamura and Shibuya (2002) describe social welfare challenges as well as threats of a deindustrialisation for Japan associated with labour-cost reducing FDI into Asia. Bailey and Sugden (2007) further suggest that off-shoring as a normal process of industrial dynamics is positive, whereas off-shoring in response to recessions is simply a sign of economic distress. From a trade perspective, this view is echoed by Itami (2004) who suggests that 'tariff-hopping' investments are complementary (being mere extensions of existing production), whereas labour-cost reducing FDI threatens to de-industrialise Japan.⁵

However, hollowing out can also trigger a much-needed weeding out of inefficient operations, such as in Japan's automobile supplier hierarchies that had been shielded from price competition for several decades. Kwan (2002) differentiates between 'good' and 'bad' hollowing out in an economic sense. The former refers to investments abroad aimed at increased economic efficiency that raises productivity and profitability in the industry, thus contributing to economic growth and the necessary reorientation of

domestic economic activities towards higher value-added activities. Japan's FDI into China with the goal to reduce labour costs by relocating simple assembly processes, while reinvesting the profits into R&D centres in Japan would be an example of such good FDI. In contrast, bad hollowing out refers to FDI abroad in reaction to trade barriers and other market-disturbing mechanisms; an example is a car plant abroad that serves the single purpose of adhering to local content rules and avoiding tariffs. Little macro-economic gain is reaped from such an investment.

Regardless of how one interprets 'good' or 'bad', the biggest impact of hollowing out in Japan has been on employment and subcontracting. Because labour is not perfectly mobile, such as in the case of very small part producers in rural areas, the shift of production abroad poses a great social challenge for at least one generation. Figure 3 shows trends in overall Japanese employment (all regular employees including part-timers, but not day labourers and other non-contracted help). The percent of manufacturing in total employment (in %, right-hand scale) decreased from over half of the private sector workforce in the 1960s, to one quarter in 2004. Figure 3 underscores the impact of each of the three waves of hollowing out on employment in manufacturing, reducing the ratio by roughly four percentage points each. In absolute terms, the first wave of the mid-1980s had little effect on the total number of manufacturing employees, but the following two episodes combined to significant job loss, reducing the number of employees from 12.8 million in 1994 to 10 million in 2004.

Figure 3 Total employment vs. employment in manufacturing, 1960–2004, and the three waves of hollowing out



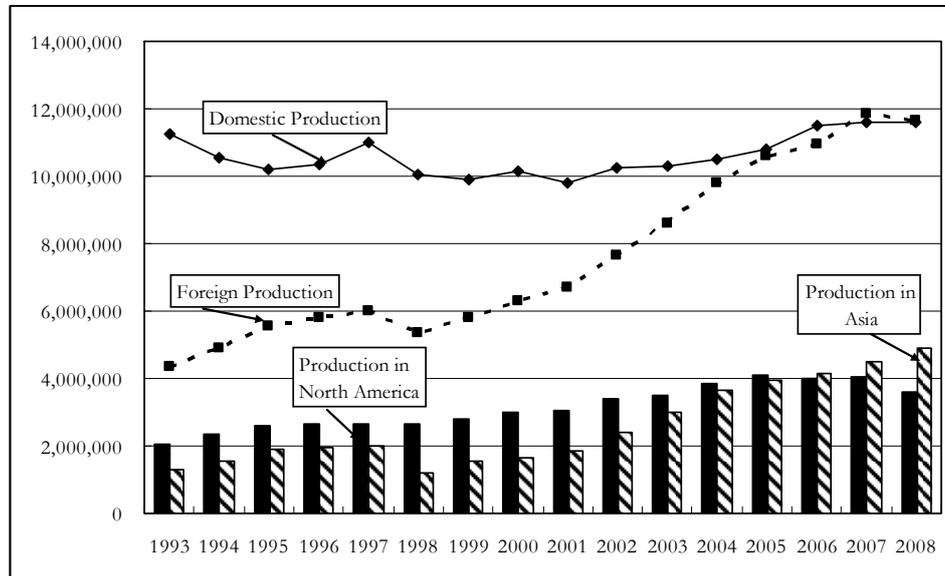
Source: Compiled from *Hōjin kigyō tōkei*

However, it is difficult to separate the effects of hollowing out from those of the recession of the 1990s. One might have triggered the other (Cowling and Tomlinson, 2000), or they might have been unrelated if job losses in manufacturing in the 1990s were not caused by hollowing out but rather the combination of depressed Japanese consumption with increased labour productivity (Itami, 2004). It is also possible that moving production abroad triggered exports of specialised plant and equipment, parts and materials, while new imports from Asia created new jobs ranging from longshoremen to trading company employees. Thus, hollowing out also needs to be appreciated for the spark it has given non-manufacturing jobs in Japan (Ryan, 2003). This latter interpretation is supported by the increase in total employment during the first two waves of hollowing out, as shown in Figure 3.

Whatever the effects on employment, hollowing out has irreversibly affected the subcontracting logic in Japan's industrial architecture. By 2003, 43% of Japan's multinationals operated production facilities outside Japan, as compared to roughly one third of all large companies. Yet, the ratio of small manufacturers with subsidiaries abroad increased from 7% in 1992, to 13% in 2002, with a steeper growth trend than for large firms [SMEA, (2004), Fig. 2-2-2]. These differences in growth trends are explained, again, by the different waves of hollowing out. By 2002, 30% of Japanese overseas subsidiaries were located in the USA, 25% in South East Asia, 18% in China, and 15% in the NIEs. Survey data indicate that two thirds of the subsidiaries in North America and Europe were established to cater to that market (i.e., to circumvent trade regulations, such as local content rules and tariffs). In contrast, more than 60% of subsidiaries in China and the NIEs were explicitly operated in order to re-import cheaper products into Japan. In particular, in South East Asia the main role of foreign subsidiaries was seen as providing parts to the local Japanese affiliates [SMEA, (2004), p.136].

Being embedded in large subcontractor hierarchies and dependent on co-location for just-in-time delivery, Japan's auto parts industry was long hesitant to locate production abroad only for cost reasons. In the early 21st century, however, investments in Asia auto production sites accelerated from a level of about ¥65 billion per year around 2000 to ¥250 billion in 2004 [SMEA, (2006), Section 2-1-16]. This jump in auto and auto parts-related investments has turned what used to be a domestic affair into perhaps the most global of all Japanese manufacturing industries. For automotive parts alone, by early 2002 imports into Japan had reached ¥145.3 billion, which represented an increase of 19% over 2001 (in particular, car part imports from China increased by 45% in that one year [Kobayashi, (2003), p.79]).

Figure 4 shows the development of Japanese-brand car manufacturing by location between 1993 and 2009, based on data by the Japan Automobile Manufacturers Association. During this period, total Japanese-brand car production increased from 15.8 million vehicles in 1995, to 16.4 million in 2000, and 23.3 million in 2008. Total domestic production remained fairly stable, growing from a level of 10 million, to a level of 11.5 million. Clearly, the growth in Japan's auto industry occurred through foreign production: Whereas in 1995, 35% of Japanese branded cars were produced outside Japan, and 38% in 2000, the lines crossed for the first time in 2007 when more than half of total production occurred abroad. Figure 4 also breaks foreign production into its two main locations, to show that production in North America increased steadily through 2005, but it was surpassed by production in Asia in 2006.

Figure 4 Total Japanese automobile production, 1993–2009, by location

Note: Data refer to calendar years.

Source: Compiled from data from <http://www.jama-english.jp/statistics/index.html>

4 Changes in subcontracting in the automobile industry

Figure 1 showed the percentage of small- and medium-sized manufacturing firms that identify themselves as belonging to a stable hierarchy of subcontractors, based on survey data collected by METI.⁶ The average for all industries is presented in vertical bars, while the lines highlight industries with above-average subcontractor rates. In 1966, when the system was still forming, about 53% of all SMM identified themselves as subcontractors, and in 1981 this ratio hit a high point with 66% (over 80% in automobiles, textiles, electronics and general machinery). The fall in the ratio since 1981 is remarkable, and by 1998 it had shrunk to 48% (and below 70% in automobiles).

Information on the opposite perspective – the degree to which buyers rely on outsourcing – is more difficult to gather, as it differs by industry, product category and the size of the buyer. However, this is particularly relevant in the automobile industry, where parts account for about 70% of value-added [Kobayashi, (2003), p.82]. For example, Ahmadjian and Lincoln (2001) show that Toyota used to outsource almost all electronics – from electronic fuel injection systems to air conditioning – from Denso, for some parts at a rate of 100%. Table 1 summarises results from four years of METI's Basic Survey of Business Structure and Activity (*Kigyō katsudō kihon chōsa*), to show that in the early 21st century, the percentage of outsourced input to total sales by manufacturing firms decreased from 16.8% to 11.9%. This annual survey covers roughly

26,000 companies with more than 50 employees, meaning that it reflects not only the final assemblers but also outsourcing activities by 1st- and 2nd-tier suppliers. Table 1 also highlights results for the automotive industry. We see a significant drop in the value of outsourced parts to total sales (from 23.7% to 10.2%) accompanied by an increase in the percentage of outsourcing from affiliated firms (here meaning subcontractors in which the buyer holds an ownership stake).

Table 1 Changes in outsourcing intensity

	2001	2002	2003	2004
<i>Total manufacturing</i>				
% of firms that engage in outsourcing	80.8	81.1	81.9	82.2
% of outsourcing purchases from affiliated firms	20.1	26.3	25.0	24.1
% of outsourcing in total sales value	16.8	12.8	12.1	11.9
Number of respondents	13,486	13,247	12,946	12,450
<i>Transport equipment</i>				
% of firms that engage in outsourcing	92.0	92.5	92.2	92.1
% of outsourcing purchases from affiliated firms	13.0	14.9	14.1	14.4
% of outsourcing in total sales value	23.7	10.9	10.9	10.2
Number of respondents	1,121	1,117	1,108	1,088
<i>Electronics</i>				
% of firms that engage in outsourcing	90.5	91.1	90.4	91.1
% of outsourcing purchases from affiliated firms	15.9	10.8	12.7	13.0
% of outsourcing in total sales value	18.0	14.8	13.5	11.1
Number of respondents	2,032	890	890	846
<i>Precision machinery</i>				
% of firms that engage in outsourcing	85.0	84.8	85.7	86.2
% of outsourcing purchases from affiliated firms	8.4	13.5	12.0	10.1
% of outsourcing in total sales value	14.0	11.5	10.8	10.2
Number of respondents	354	348	370	354

Source: Compiled from 2002–2005 editions of the Basic Survey of Business Structure and Activity, METI

While these data are only available beginning in 2001, they point to a decline in outsourcing overall, yet more outsourcing from core subcontractors. That is, outsourcing of core parts is reduced by moving it in-house, but those parts that continue to be outsourced are purchased from a smaller set of closely affiliated firms. This interpretation is backed by field research reported by Lincoln et al. (1998) who in interviews with three large companies (Toyota, Matsushita, and Hitachi) observed a qualitative shift in subcontracting towards a more strategic identification of main suppliers and a focus on

learning in outsourcing, with increased in-house production of parts central to current and future technological leadership in the final product such as electronics in cars.

In contrast, at the lower levels of the hierarchy the shift is toward price competition and independence from suppliers networks. Surveys attest to a significant increase in the number of lower-tier subcontractors per buyer, and a clear shift towards cost reduction. The ratio of suppliers selling to more than ten buyers has also increased, and in 2004, half of survey respondents reported further efforts to reduce the proportion of sales directed at the largest buyer [Aoyama, (2001), p.124; SMEA, (2005), p.35; SMEA, (2006), s.2-3-1]. The Small and Medium Enterprise Agency, in its 2007 White Paper, refers to this shift as a 'meshing' of trade relations, away from the previously fairly orderly, hierarchical 'one buyer-one supplier' structure to a multi-faceted 'multi-buyer multi-supplier' system [SMEA, (2007), Part 3].

Three main changes have occurred in the global automotive industry since the mid-1990s that explain these shifts:

- 1 'global best purchasing', due to global price competition
- 2 a shift in competition to next-generation technologies (such as fuel efficiency, safety, and information systems)
- 3 global excess capacity, thus increased cost pressures.

As of 2004, 50 countries boasted an automotive industry. Global annual sales stood at roughly 61 million cars, but global capacity exceeded 80 million cars, suggesting an overcapacity of 30% [Kobayashi and Ōno, (2006), p.4]. For Japan, these pressures combined into two major shifts in automobile production that undermined previous subcontractor relations: the shift towards modularisation, and the intensification of cost pressures.

4.1 Modularisation

The data in Table 1 can be explained with more delegation of parts assembly, and even design, to first-tier subcontractors. As large car companies outsource whole parts of the car, such as the front end or a cockpit module, relations with first-tier suppliers are becoming more critical. Ordering a complete module reduces the number of parts to be outsourced, and thus the assemblers' time of assembly, quality control costs, as well as labour and administrative costs. Importantly, modularisation may also include the delegation of product design to suppliers, which may necessitate sharing of critical technologies. This incentivises the large car company to forge closer ties with the first-tier suppliers, and even push for exclusive relations (Kobayashi and Ōno, 2006).

Therefore, the shift to outsourcing entire modules has turned the previous logic of Japanese subcontracting on its head, as relations with first-tier suppliers are becoming more exclusive, while the bottom of the hierarchy becomes more replaceable. As first-tier suppliers assume responsibility for a much larger product, only those that can upgrade their technologies and capabilities can compete at this advanced level. Loath to become dependent on this supplier for critical parts, buyers have also begun to build more of the strategically critical components in-house.

Modularisation has also directly affected ownership structures in Japan's auto parts industry. Whereas previously, large companies maintained ownership stakes in many of

their suppliers, the sell-out began in 1999 when Nissan announced its Revival Plan. One part of Nissan's plan was to reduce the number of affiliated firms (with shareholdings) from the previous 1,394 to only four over a period of three years. Other companies followed suit, and the auto part industry was swept by a merger wave when suppliers began to jockey for first-tier positions with the large auto makers.

The dissolution of ownership stakes, in turn, furthered the meshing of trade relations. Even though large assemblers often continued to outsource even from those suppliers whose shares they had sold off, these suppliers were now no longer tied to the assembler, but rather incentivised to broaden their base of customers, domestically and globally. While this was not a problem for many of Japan's first-tier suppliers, it was a water-shed event for lower-tiered suppliers that often lacked competitiveness.

This shift from exclusive to open-market trade relations has begun to trickle down through the entire subcontractor hierarchy, as first-tier suppliers, like their large clients, now employ different sourcing strategies from their own smaller suppliers. The final nail in the coffin of Japan's previous subcontractor *keiretsu* brought on by modularisation was the dissolution of the support groups among suppliers to one auto maker. In an attempt to break open their circle of suppliers and open the door to new firms, some buyers were said to have issued 'orders against *settai*' (clubby drinking outings aimed at human bonding to cement long-standing business relations) (Aoyama, 2001).

Thus, as the major parts makers were promoted from subcontractor to equal partner in development and quality design, the lower-tiered firms were asked to compete on an arm's-length, global basis. At one level, this was simply the explicit recognition of an ongoing bifurcation between hi-tech first-tier suppliers and low-tech manufacturers, but the move also pulled away the social fabric underlying subcontractor relations in Japan.

4.2 Price competition

The meshing of buyer-supplier relations was associated with new processes of bidding and spot pricing, in what came to be called *open kompe* ('open competition'). One question asked in a 2005 survey on changing subcontractor relations was what buyers valued more in 2005 than they did in 1995, and 64% of suppliers and 52.5% of buyers answered 'cost'. In contrast, the long-hailed virtues of Japanese subcontracting – such as speed of delivery, flexibility in product design, joint R&D, co-location of production facilities and joint financial or business group affiliation – were among the features considered least critical for competing in the 21st century [SMEA, (2006), Fig. 2-3-8/9].

Compared with their global competitors, Japanese car makers for many years forged only a few strategic alliances abroad, but in the late 1990s this changed dramatically, when Ford acquired a majority ownership stake in Mazda (dating back to the 1970s but increased to over 30%), Renault and Nissan structured a cross-ownership alliance, and DaimlerChrysler temporarily controlled Mitsubishi Motors (sold to Mitsubishi Corporation in 2005). Global consolidation among major car companies was driven by new competitive threats from the global entry of new companies, such as from South Korea, and an attempt to compete through economies of scale (to lower costs) and scope (to offer all types of models in all major markets) (e.g., Rhys, 2005). Even though the strategic rationale of global alliances of 'scale and scope' has since been questioned, recent technology shifts, such as toward hybrid cars, have further reinforced the trend toward alliances among large automobile manufacturers.

Japan's car companies have addressed the new cost competition with a switch to 'global best sourcing' (*sekai saiteki chōtatsu*). This means buying in bulk (instead of from at least two suppliers) on an arm's-length basis, from the cheapest bidder around the world. This reduction in parts costs was accompanied by reducing the number of parts and functions across models, combining platforms for several models, and reducing the lead time for model changes through closer cooperation with the module suppliers. Whereas in 1995, Japan's car companies led the world with 30 months of R&D lead time for a new model, by 2000 the benchmark had been lowered to only 15 months [Kobayashi and Ōno, (2006), p.66].

The alliance between Nissan and Renault is a well-chronicled turnaround success story, but it also represented a major force in reconfiguring supplier relations in Japan. One of the first measures by Renault executive Carlos Ghosn upon arrival at Nissan in 1999 was to question established trade practices in Japan's auto industry, by starting an auction for the lowest-priced steel. This was unheard of, given tight relations within horizontal business groups to certain steel companies, as well as long years of after-sales price adjustments between the auto and steel industries (Schaefer, 2008). Next, Ghosn immediately cut Nissan's supplier base by half, which meant severing ties with 600 long-term suppliers. This initially caused great posturing by Keidanren (big business' umbrella organisation, at the time headed by the Chairman of Toyota), citing the detrimental effects of Nissan's actions on Japan's social fabric. Nissan could not be deterred, and the episode underscored Ghosn's reputation as 'Le Cost Killer'. It also highlighted the negative aspect of Japan's subcontracting hierarchies of inviting slack over time. While Toyota has long been considered successful in keeping its suppliers on their toes, Nissan had been much less effective at conquering the challenges of lacking cost and competitive pressures as well as inertia that are inherent in long-term, non-market relations. Yet, within two years Nissan succeeded in reducing part costs by 30% by modifying its supplier system, cutting investments in suppliers and sourcing lower value-added parts globally while also pushing core suppliers towards increased efficiency.

Once such drastic steps had proven to be possible in the Japanese setting, there was no turning back for the entire industry. All Japanese car companies announced their own version of similar cost-cutting plans for part procurement, such as Mitsubishi's 'Turnaround' (20% in three years), Mazda's 'Millennium Plan' (30% in five years), Suzuki's 'Challenge 30' (30% in three years), and even Toyota's 'CCC 21' (30% reduction in three years). Implementation was fairly straightforward: subcontractors that refused or failed to go along were replaced by global competitors (Ghosn and Ries, 2005).

During the postwar period the logic of Japanese subcontracting built on the notion of long-term relations based on risk-sharing, network arrangements geared towards mutual learning, and the reduction of holdup risk by aligning several suppliers in each category and managing a subcontractor hierarchy. The price for this insurance was efficiency losses in scale of production. Global price competition meant that the subcontracting system had become too expensive, all its benefits notwithstanding. Undergoing this transformation toward cost-cutting and increased technological capabilities in the late 1990s and early 2000s has afforded these firms a fortuitous head start in preparing for the global auto crisis of 2008/2009, which is threatening to wipe out smaller parts makers around the globe.

5 Conclusions

Global excess capacity in the early 21st century and mounting global cost competition have forced a transformation in the business model of the global car industry, and in particular in Japan. In the 1990s, a first reaction was to form global alliances in a search for economies of scale and scope. In the early 21st century, cost competition forced increased location of car production in low-cost countries, streamlining of costs through reduction of automotive parts, and shared platforms and parts across models. For Japan's car companies, this brought a switch to sourcing generic, low value-added parts on an arm's-length global basis. According to one analysis, the new 'open price competition' led to cost savings of 3–4% if existing suppliers were used, and of 15–30% if new firms entered the market (Aoyama, 2001).

These shifts have presented Japanese automotive part makers with three options:

- 1 Follow the large auto companies to the new locations and to compete globally through technological differentiation.
- 2 Stay in Japan but upgrade to compete with imports.
- 3 Muddle through and eventually exit. At the macroeconomic level, these options have caused a simultaneous levelling-up of first- and second-tier suppliers, and a weeding-out of inefficient small parts makers.

Many first-tier suppliers followed their buyers abroad, where they were confronted with new management challenges, including the development of marketing skills, brands and sales channels, to reap economies of scale abroad and reduce the dependency on the buyer. Realising that they were unlikely to beat competitors in China on cost, even if producing there, Japanese parts makers moved to develop their own R&D and production processes to differentiate against local suppliers. As a result, hollowing out has forced many suppliers to develop new, independent business strategies. Moreover, to compete with global powerhouses such as Bosch, many Japanese auto part firms joined forces, either through mergers (such as Calsonic Kansei in 2000), acquisitions (e.g., Toyota Boshoku, of Araco and Takanichi in 2004), or joint ventures for foreign operations or joint regional supply chains. This consolidation has changed the structure of the Japanese auto parts industry, in terms of a global emergence of firms that are technology leaders, and also by turning what used to be a fragmented industry with companies dependent on certain buyers into a more consolidated group of players with increased bargaining power.

Smaller suppliers that opted to stay in Japan now face the challenge of competing against imports, which has forced them to become more efficient to win arm's-length bids. They had to become either more cost-competitive or differentiate in high value-added products. To address reduced order volume, these firms also had to develop new domestic sales channels and exporting abilities, while increasing their R&D capabilities to become ODM (original design manufacturers) suppliers. Their new aggressiveness explains the increase in the number of customers per subcontractor reported in government surveys, and the new horizontal meshing of buyer and seller relationships in what used to be a highly hierarchical, restricted and exclusive system.

For many lower-tiered suppliers, however, the exit option was the only choice at the turn of the century. A large subgroup in this category were founder firms established in the early postwar years, which faced succession issues when their children were uninterested in running a low value-added parts shop at a time when competition was increasing. Most of the record-high bankruptcies of small firms between 1998 and 2004 occurred in manufacturing and can be attributed to changing subcontractor relations. This has also altered Japan's industrial geography, as many of the 'castle towns' that grew around new green-field plants in various regions of Japan in the 1960s (such as in Yamagata, Aomori, Iwate, and Kyushu) have turned into ghost towns (Diamond Weekly 2002).

Among the remaining, competitive suppliers, roles and assignments have also changed. Historically it was the first-tier suppliers that had the most diversified client base, whereas the smaller suppliers tended to be exclusively tied to one subcontracting hierarchy. Globalisation and modularisation have turned this on its head. Whereas smaller firms sell to more buyers, larger suppliers with strong technological capabilities cooperate more closely with their buyers. In their role as core suppliers, they contribute to the buyer's product design, and in many cases mutual shareholdings have even been reinforced, such as between Toyota and Matsushita Electric in 2007.

From the large firm's perspective, the postwar logic of stable subcontracting hierarchies is history. In global markets, long-term "wet" (close, personal) relations with a complete line-up of part makers, painstakingly arranged for all to contribute to just-in-time delivery no longer supports efficient, global mass production. Production processes have been altered to support efficient production in a variety of locations around the globe.

Another ramification of modularisation is the increase in in-house production by the assemblers themselves. Throughout the postwar period, Japanese firms competed mostly with low-priced products known for reliability and clever commercialisation of new features, but not for cutting-edge technological innovation. The strategic inflection in the global car industry in the early 21st century has made differentiation through technological leadership imperative. This has elevated the role of proprietary innovation. Many large firms are reconfiguring their outsourcing strategies, not just from whom they buy, but also what they buy and in what areas to focus and build their own core competencies to compete through innovation and differentiation. What we used to know about Japanese subcontracting has become obsolete.

A final implication of these shifts comes from their fortuitous timing. Japan's auto parts industries underwent a major reorganisation between 1999 and 2003. Drastic weeding out of inefficient small firms on the one hand and strategic repositioning by large auto parts makers on the other had already occurred when the global automobile industry was hit by the 2008/2009 shock. Even though that shock has hit Japanese companies equally hard, unlike their US competitors they have already undergone reform and are therefore much better positioned to weather the storm and avoid large-scale failures.

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Notes

- 1 In wholesale, a 'small and medium-sized enterprise' has capital of less than ¥100 million or fewer than 100 employees, in services these limits are ¥50 million or 100 employees, and for retail outlets ¥50 million or 50 employees. There is no legal definition of a 'very small' firm, but in most statistics this refers to firms with fewer than 20 employees in manufacturing, and fewer than five employees in other industries. Few countries have a legal definition of 'small firms', but in Japan this was necessitated by numerous postwar small firm support policies that required an eligibility standard.

- 2 This was accomplished through the 'Subcontracting Charges Law' (Law to Prevent Extension etc. of Payments to Subcontractors), and the 'Law on the Promotion of Subcontracting SME', revised in 2003.
- 3 Based on CAO (2005); Trade Statistics of Japan; www.customs.go.jp/toukei/suii/html/time_e.htm; and Ministry of Finance web site, 'Statistics', www.mof.go.jp. See also Schaede (2007).
- 4 Japanese FDI data were calculated from the Ministry of Finance database, accessible at <http://www.mof.go.jp/english/elc008.htm>.
- 5 For an early analysis of de-industrialization, foreign trade and employment, with the UK as a case study, see Rowtorn and Wells (1987). Paprzyckia and Fukao (2008) offer a recent study of total factor productivity in Japan.
- 6 Every six years between 1966 and 1987, METI has conducted a Basic Survey on the Manufacturing Industries (*Kōgyō jittai kihon chōsa*); and this chart combines these with the 1996 Survey on Subcontractors (*Shitauke torihiki-ō jittai chōsa*) and the 1998 Manufacturing Industries Survey (*Shōkōgyō jittai kihon chōsa*).

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