Comparative Supplier Relations in the U.S. and Japanese Auto Industries: An Exit/Voice Approach

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In 1980 Japan surpassed the United States as the world's leading producer of automobiles. Not only does Japan now produce the greatest number of cars of any country in the world [9], it introduces new models with the greatest frequency [7], makes them in factories with the highest productivity [19], and dominates surveys of customer satisfaction and frequency of repair [8, 19]. Observers have attributed much of this performance to Japanese automakers' subcontracting system, an arrangement based on long-term relationships with suppliers, a great deal of information exchange, joint problem solving, and "governance by trust" [7, 10, 30].

While cultural predispositions are undoubtedly important in explaining the structure of Japanese subcontracting, in this paper I will try to explain differences in supplier relations systems based on economic factors and historical events. This is not to imply that culture and history are entirely distinct categories. For example, if historical events have shown people the efficacy of trust, they are more likely to be trusting in the future. Hence, cultural norms such as trust can be "the precipitate of history" [11, p. 91].

The first section of the paper outlines a conceptual framework based on Albert Hirschman's distinction between exit and voice [16]. The second section uses this framework to analyze briefly the evolution of supplier relationships in the U.S. auto industry and the third section examines (even more briefly) the Japanese auto industry.

Conceptual Framework

Many problems can arise in a relationship between customer and supplier. For example, suppose one party wants the other party to undertake a specific action (lower its price, improve its quality), but the other party refuses, either because it lacks the capability (decision makers in the firm do not know how to implement the proposed changes), or because it lacks the incentive (decision makers have other, more profitable, courses of action open to them). Another possibility is that one party may feel that there is a problem (the customer may find that its products aren't selling as well as it would like), and believe that changed behavior by the other party would

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contribute to its solution, but is not able to propose a specific course of action.

Borrowing Hirschman's terminology, we can identify two types of responses to problems arising in a customer-supplier relationship:[1] (1) exit, where the customer firm's response to problems with a supplier is to find a new supplier, and (2) voice, where the customer's response is to work with the original supplier until the problem is corrected. Where the exit strategy secures compliance by use of the "stick" of threats to withdraw from the relationship, the voice strategy relies on the "carrot" of increased profits for both parties due to improved products.

The key to the exit strategy is making credible the customer's threat to leave if its demands are not met. Therefore, the customer must have access to many interchangeable suppliers and/or the ability to tool up quickly for in-house production. In contrast, an extensive communications system is necessary to facilitate the rich flow of information needed for the "let's work things out" approach of the voice strategy. This information flow both requires and engenders a high degree of commitment to the relationship.[2]

Commitment between buyer and seller is important for three reasons. First, it is costly to establish and maintain extensive communication systems with multiple suppliers. Second, there is a need for trust when exchanging proprietary information. Finally, customers and suppliers can reap substantial benefits from knowledge of each other's products and processes gained by working together over time. In contrast, an exit-based strategy requires low commitment, so as to maintain the credibility of the customer's threat to leave. Therefore information exchange also must be low.

The customer's choice of method of problem resolution (exit or voice) is an important one because it affects both the customer's and supplier's relative bargaining power and their propensity to introduce new technologies of various types. The exit strategy gives the customer a great deal of bargaining power because it has little commitment to any one

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[1] The terms "exit" and "voice" originated in [16]. I have generalized this analysis to include cases where the resolution of problems requires not only more effort by the parties involved but also irreversible investments in physical and organizational capital [13, 15].

[2] A supplier has a commitment from a buyer when the supplier knows that the buyer will continue to purchase its products for some length of time. This assurance can be provided in several ways, including financial ties such as equity investment or long-term loans, long-term contracts, and parties' concern for their reputations for fair dealing. Commitment also can be provided involuntarily, as when a buyer faces an oligopolistic supplier industry. That is, if a firm can obtain an input from only a few vendors, the firm's ability to exit from a relationship with them is very weak. Contrary to the implicit assumption of much of the literature on vertical integration, equity investment in a downstream process (i.e., a decision to make rather than buy) is neither necessary nor sufficient for administrative coordination. For example, a financially independent buyer and supplier who have had long-term dealings may have closer administrative relations than would two divisions of the same holding company.

supplier. Conversely, the voice strategy reduces the customer's bargaining power by increasing its cost of switching between suppliers. On the other hand, where significant investment is required either to communicate the existence of a technical problem or to implement a solution to that problem, voice is likely to be superior. The reason is that without the detailed information and long-term commitment characteristic of a voice relationship a supplier's innovation may well be inapplicable to the customer's needs. Even if it is applicable, a supplier without some type of market power will have trouble raising capital to introduce the innovation *ex ante* and appropriating rents from it *ex post* [13, 14].[3]

I have argued that while the exit strategy maximizes customer bargaining power, the voice strategy maximizes most types of technical change. Therefore, there exists a tradeoff between customer bargaining power and industry technical change. What determines which point on this tradeoff is chosen at a particular point in time?

The driving forces in this model are the concepts of strategy and irreversibility. Strategy enters because firms with market power in their final product market can use that power to change the structure of their input markets. Such firms can not only act to minimize the cost of inputs on a given cost curve but they can also affect the location of the cost curve itself by altering barriers to entry in their supplier industries.[4] By their choice of supplier relations strategy, customer firms affect not only the prices they pay for inputs, but also the potential for technical progress by suppliers and by the downstream firms themselves.

A customer's strategy is irreversible in the short run because it leads both supplier and customer firms to develop particular capabilities and expectations in a manner which tends to be self-reinforcing. The feedback mechanisms among the forces of technical change, input market structure, and final-product market structure could make a supplier relations system quite unstable. A cycle of supplier relations systems could be generated in which each system carried the seeds of its own destruction.[5]

While the expectations and capabilities generated by a given supplier relations system tend to be self-reinforcing, the changes in final-product market structure resulting from that supplier relations system may be de-stabilizing. The scenario is that a firm would gain final-product market power at least in part through its ability to manage a voice supplier relations system. However, due to the high bargaining power of suppliers in

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[3]Of course, some inventions (such as the personal computer) required neither very much capital nor very much customers - specific information exchange. Such cheap innovations are less likely to be feasible in an industry such as autos, in which huge investments in physical and organizational capital specific to a particular way of doing things have been built up overtime [1].

[4]For more on the ability of dominant firms to alter the cost curves they face, see [25].

[5]Thanks to Kim Clark and Albert Hirschman for discussion of this possibility.

relations system. However, due to the high bargaining power of suppliers in a voice system, the firm would find it profitable to switch to the exit system in order to appropriate the returns to its favorable final-product market position. While this exit system would increase barriers to entry for domestic firms by limiting their ability to purchase engineering and coordination services on the market, it leaves the incumbent vulnerable to challenge by an entrant which is able to establish a voice system (perhaps behind tariff walls in a foreign country). The incumbent would have to either switch back to voice, or exit from the industry. In either case, the new dominant firm(s) would practice voice-based supplier relations. These firms might then try to increase their bargaining power with suppliers by switching to exit, and the cycle would begin again.

A necessary condition for such a cycle is that either the incumbent's discount rate be high or the entrant's market penetration be slow. The presence of either of these conditions would ensure that the value of the incumbent's profits during the exit period exceeds the losses due to failure to blockade entry. Alternatively, we would observe continuous exit-based supplier relations if the extent of market penetration remained low. We would see continuous voice if the incumbent's discount rate were low or if market penetration were fast. A loose oligopoly could also produce continuous voice because the oligopolists' intermediate degree of market power would give the firms both the capability to offer commitment to their suppliers and the incentive not to rest on their laurels and to continue to compete.

The case of an oscillation between exit and voice supplier relations seems to fit the history of automotive supplier relations in the United States fairly well. The Japanese experience fits the case of continuous voice.

The U.S. Experience

In the earliest days of the U.S. auto industry, assemblers were highly dependent on outside suppliers. In 1903 Ford's entire contribution to the manufacture of the cars which bore the company's name was to install bodies, wheels, and tires onto a completed chassis made by the Dodge brothers, owners of a Detroit machine shop. At first,

> as a result of the previous development in the United States of the technique of interchangeable parts manufacture...numerous establishments were in existence equipped with the tools, machines, and technical skill for the manufacture of wood and metal sub-products. Specialized automobile factories were therefore not essential. Orders for parts were given to scores of wood- and metal-working enterprises; carriage-makers were available for the manufacture of "bodies"; and the producers of rubber goods and electrical equipment soon added their contributions [27, pp. 19-20].

In this period (roughly 1899-1909) suppliers, being more established than their customers, were an important source of capital (since assembly and

sale frequently took less time than the 30 to 90-day credit provided by the supplier [24, 27]).

An important example of supplier technical proficiency was provided by the Leland, Faulconer and Norton Company. The company began in 1890 as a machine tool company. It made an important innovation in the manufacture of bicycle gears and briefly built motorboat engines. The firm entered auto production in quantity in 1901, making transmission gears for the Olds curved-dash runabout after Olds's factory was destroyed by fire. Entirely as a result of greater precision in machining, Henry Leland was able to increase the horsepower of the engine from 3 to 3.7. When further improvements yielded 10.25 hp, and Olds refused to accept them because they would have required radical change in the rest of the car's design, Leland went into the auto business for himself in 1902--and changed his firm's name to the Cadillac Automobile Company [34, 36].

Many other important innovations were made by parts suppliers in this period. Some were originally aimed at other purposes. Hyatt invented the flexible roller bearing in an attempt to perfect a sugar-cane grinding machine; Timken invented the tapered roller bearing in 1899 to reduce the need for lubrication of carriages and wagons [3, p. 15; 28, pp. 9, 60]. Others, while automotive-specific, were largely the work of individuals without sponsorship by an automaker, such as Bendix's starter drive in 1912 [12].

Due to the rapid growth of the industry, automakers and suppliers soon began to make investments specific to automobile production. At first these investments were carried out in what could be characterized as a voice relationship between financially independent customer and supplier firms. According to Seltzer, "in contrast with its more recent policy, the [Ford Motor] Company was not then averse to purchasing virtually all of its materials and parts from independent producers" in the 1909-1914 period. The automaker shared its growing management expertise with its suppliers:

> The Ford Motor Company purchased materials for its components-makers, reorganized their manufacturing processes, supervised their larger policies, and, in some cases, aided them in financing production. The Company became so dependent upon the production of its specialized suppliers that its own operations were frequently within thirty minutes of suspension because of tardy deliveries of parts or materials [27, pp. 89-90, 100].

The reduced inventories, made possible by this "just-in-time" approach, helped Ford keep his prices low.

In a similar effort to ensure supply, Durant persuaded parts makers such as Weston-Mott in Utica and Alfred Champion in Boston to move near his operations in Flint [5, p. 118; 28; 29]. Smaller automakers were even more tightly linked with their suppliers; their components designs were so specialized that the bankruptcy of one firm could mean the bankruptcy of the other as well [31].

This voice-based arrangement with outside suppliers soon proved unstable. From the partsmakers' standpoint, the combination of fast growth and industry consolidation meant that they soon found themselves holding large investments that were specific to one or two customers. For example, Alfred Sloan wrote proudly in his autobiography [29, pp. 92-93] of the large investments his firm, the Hyatt Roller Bearing Company, had made by 1916: an 80% expansion of floor area (to 750,000 square feet) in three years; three private railroad sidings; their own fire department; a staff of chemists and metallurgists who saw to it that "every step in the development of raw material into antifriction bearings was checked by scientific methods."

But this investment was highly vulnerable:

> One dismal fact was revealed by our accounting: More than half our business came from Ford, and our other big customer, General Motors, dwarfed the remainder. If either Ford or General Motors should start making their own bearings or use some other type of bearings, our company would be in a desperate situation.

When W. C. Durant invited the young company president to luncheon to discuss a proposal to buy him out, Sloan was ready to listen.[6]

Suppliers who did not make such specific investments soon found themselves to be high-cost producers. As Ford gained capital, he gradually began to make parts he had previously bought; his company "always made them cheaper than the former makers" because Ford would construct machinery "to do just that one job, whereas the outside manufacturers had to consider other products with the same machine."[7]

For the automakers, the combination of fast growth and industry consolidation gave them both the desire and the wherewithal to use voice *within* their organizations while moving toward exit relationships with outside suppliers. Fast growth left Ford and GM short of trained managers. One important source of managers was the parts industry, which was more established and better managed. Sloan, Charles Kettering, the Fisher brothers, and S. L. Mott all became important to the success of GM; they joined the firm when their parts making businesses were bought out by Durant or the DuPonts [29].[8]

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[6]The owners of Dayton Engineering Laboratories (later GM's Delco Division) had similar feelings [29, pp. 98-99].

[7]Dodge v. Ford Motor Company, 1070 Mich Sup. Ct. Briefs and Records [27, p.101; 21].

[8]Chandler and Salisbury [6] cite GM's desire to gain access to the Fishers' management skills as the reason for GM's increase of its ownership of Fisher Body from 60% to 100% in 1924. In contrast to Klein, Crawford, and Alchian 's [18] celebrated treatment of this incident, Chandler and Salisbury do not mention asset specificity as a consideration.

Industry consolidation meant that Ford and GM were able to seek supplier relationships that left them in a favorable bargaining position even at some cost to efficiency. Over the next several decades, U.S. automakers created a fiercely competitive components industry. They did this by reducing barriers to entry through such mechanisms as taking complex functions like engineering and R&D almost completely in-house. They employed several (six to eight) competing suppliers for each part, offered only short-term (one-year) contracts, and required suppliers to license major innovations. They also divided parts into small, easy-to-produce pieces, and hired managers to coordinate the assembly of these parts centrally [13, 15].

Growth and consolidation also provided the dominant automakers with the money to buy out suppliers on generous terms and to expand internal capabilities to produce, design, and subassemble parts. At Ford, these funds were internally generated; at GM they came from the external capital market. Ford was able to use these funds to gain control of his company. In particular, he was able to reduce contracting to the Dodge brothers, who initially had responded to their problem of asset specificity in a different way from Sloan (who had allowed himself to be bought out); the Dodges became Ford's direct competitors, entering the automotive business in 1914 [21, pp. 279-83; 21, pp. 104-06; 25, p. 11].

This dual system of vertical integration and exit-based relations with outside suppliers (with subsequent modifications) helped to protect Ford and GM against successful entry by domestic producers but left them vulnerable to the Japanese in the 1970s. I do not mean to imply that vertical integration by itself is necessarily inefficient; the customer commitment expressed through vertical integration may make possible significant productive investment. However, the mix of vertical integration and exit chosen by US automakers (in different proportions, but with broadly similar effects) was inefficient in two ways. First, vertical integration facilitated the use of the exit strategy (which fostered excessive competition among suppliers) by giving the automakers a credible threat to tool up for in-house production. Second, vertical integration *became* inefficient because the divisions were excessively insulated from competition: they were insulated both by their privileged bargaining position within the corporation and by the market power of the corporations within the U.S. economy [13, 15]. Domestic automakers now are trying to switch back to a more voice-based system--a difficult task given the exit/vertical integration system's legacy of mistrust, complacent automaker divisions, and weak independent supplier firms.

The Japanese Experience

Like their US counterparts, Japanese auto suppliers in the early days of their industry (1925-45), used general-purpose equipment and sold only a small portion of their output to the auto industry [30]. Japanese suppliers gradually developed knowledge and equipment specialized to the auto industry; in so doing they received financial and technical assistance from

their customers [22, 23, 30]. In Japan, this second stage has proven to be a stable arrangement.[9]

Three factors seem important in accounting for the different evolution of U.S. and Japanese automotive supplier relations systems. Relative to their U.S. counterparts, Japanese automakers had less access to capital, a more slowly growing market, and lower discount rates. Two additional factors that need further investigation are the role of government policy and the differential effectiveness of organizational boundaries in gaining access to a dual labor market.

Capital was perennially short in the Japanese auto industry of the 1950s [9, 30]. Although the industry grew quickly by normal standards, neither Toyota nor Nissan could match the booming sales that gave Henry Ford the power to buy out the Dodges and establish the great River Rouge plant. It is instructive to compare the turn-of-the-century US auto industry with the Japanese industry of the late 1930s. In 1903 the US produced 11,000 cars and trucks--not very different from the 12,186 produced by Japan in 1936. However, US production reached nearly one million in 1915, only 12 years later. Japan did not approach one million until 1962, or 26 years later.

The Japanese were not able to raise massive amounts of capital through the stock market or bond market, as did Durant and the DuPonts at GM. Using external suppliers gave the industry more access to capital than vertical integration would have, because it brought in more relatives and other informal sources of funds. By the time the automakers were able to generate significant amounts of internal funds, they had already developed skills and attitudes necessary to manage a system of "governance by trust"; the benefits of vertical integration were correspondingly reduced [30]. However, competition, growth is most beneficial to voice when it occurs in moderation. While faster growth would have reduced the time available for developing trust, no or slow growth would have forced suppliers and customers to divide a shrinking or stagnant pie.

Aside from reducing automaker earnings, moderate growth had another impact on the development of "governance by trust": it meant that the return to investments in specific assets also grew relatively slowly, giving automakers time to build commitment based on reputation for fair dealing without incurring a large cost penalty. In contrast, in the US case outside suppliers were very quickly damned if they did invest (as Sloan's above-cited worries attest) or if they didn't invest (as those who lost Ford's business because their general-purpose equipment soon led to higher costs than his specialized designs).

Despite the scarcity of capital, Japanese discount rates remained low. This was not entirely an exogenous cultural phenomenon; in part it was a result of the social relationships which produced trust. That is, a virtuous cycle developed in which a tradition of sharing gains (albeit unequally)

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[9] In this short discussion, I will overlook important distinctions among Japanese automakers' subcontracting arrangements. For more detail, see [9, 22, 23, 30].

among those who helped produce them led to a willingness to make long-term investments among various sectors of society, which created a larger pie to share, which reinforced the tendency to invest. The tradition of trust that investment would be rewarded produced a low risk premium, resulting in a low valuation of present relative to future returns--one of the conditions shown above to promote the continuous use of voice.[10]

Today there are ten Japanese automakers, sharing a total output (including exports) not much larger than the U.S.'s Big Three. A voice system of supplier relations is both effect and cause of this market structure. While Toyota and Nissan had enough market power that they could offer credible long-term commitments to their suppliers, they did not have so much that they could afford to give less weight to efficiency in pursuit of bargaining power, especially after they set their sights on becoming global competitors. The voice system perpetuates this moderately concentrated market structure by providing an infrastructure of capable suppliers which smaller automakers can draw on.

Conclusion

This paper has sought economic and historical explanations of the differences in structure and performance of U.S. and Japanese automotive subcontracting. In particular, it has explored the impact of linkages between markets for final products, components, and capital. The greater final product market power, faster growth, and better access to capital of U.S. firms made possible the use of exit-based supplier relations. Conversely, the slower advent of mass production promoted the development of voice-based relationships in Japan.

In its focus on the asset specificity of U.S. suppliers' investments as an impetus to vertical integration by U.S. automakers, the foregoing analysis is similar to that of transaction-cost theorists [18]. An important difference, however, is the historical and developmental perspective of the present paper. Voice relationships and other departures from the competitive-market model are not seen as necessarily "second-best" responses to the presence of human frailty in the form of bounded rationality or opportunism; instead, such institutional arrangements can play a key role in promoting innovation and economic development.

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[10]Although this paper emphasizes trust, it should be remembered that relationships between Japanese firms and their subcontractors rest on a fine balance between cooperation and exploitation. Japanese automakers use tiers of subcontractors not only because decentralization is an efficient way to focus attention on the myriad tasks involved in producing a car, but also because establishing such organizational boundaries allows them access to cheaper management and labor [4, 11, 22, 23].

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