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Shukko (Employee Transfers) and Tacit Knowledge Exchange in Japanese Supply Networks: The Electronics Industry Case

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ABSTRACT

Purchase-supply relations in Japanese electronics are less close and cooperative than in the automobile industry and involve less formal knowledge sharing. Our interviews with a number of major Japanese electronics firms reveal that suppliers are less involved in manufacturers' product development processes and are brought in at later stages. However, too much attention to such formal knowledge sharing events may blind one to patterns of cross-firm learning and sharing that transfer the most tacit kinds of organizational knowledge, such as the normative and affective elements of a corporate culture. Using interview information, we discuss the phenomenon of *shukko* (employee transfers) among Japanese companies. *Shukko* is often viewed as a downsizing device, although firms claim they do it mostly to exchange knowledge with partners. Our view is that it serves both purposes. However, the volume of *shukko* varies with the electronics firm. It is most common where customers and suppliers are bound to one another in equity and other "*keiretsu*" relationships. *Shukko* is an effective mechanism of cross-firm socialization, so we might expect that firms that *shukko* extensively are also more likely to develop network-wide cultures of obligation and reciprocity. An example supporting that hypothesis is "Kigyo Denki," our pseudonym for a large, old-line electronics company with strong ties to one of Japan's "big-six" horizontal *keiretsu* groups. However, some companies, such as Matsushita, have a corporate culture that appears to coordinate and motivate suppliers even in the absence of *shukko* and other *keiretsu* ties.

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Introduction

How Japanese companies manage purchase-supply relations has drawn considerable attention from scholars and practitioners. Indeed, the Japanese approach to supply chain management is now worldwide "best practice" in the automobile industry and in other strategic industrial sectors (Mitchener and Steinmetz, 1998). Close and long-term relations; high trust and mutual disclosure of information; and co-specialized investment in knowledge and other assets together comprise a supply management regime that has been much admired and copied (Womack, Jones, and Roos, 1990). In its ideal form the Japanese model averts the Scylla of low-trust contracting and the Charybdis of full vertical integration under a corporate chain of command. Outcomes include: more and earlier supplier participation in customer designs; higher quality components; higher reliability of deliveries; etc.

Precisely because Japanese supply chain practice has acquired this standing, however, it tends to be viewed as all the same. How Japanese companies and industries vary in their supply relations is seriously understudied. Moreover, the full array of coordination and learning mechanisms between suppliers and assemblers in Japan is not well documented. This paper draws attention to the phenomenon of *shukko*: the transfer of employees between firms and the role it plays in pooling the tacit knowledge stocks of supplier and customer. We also discuss a particularly tacit form of knowledge, spread by *shukko*, that enables close cooperation and smooth operation in Japanese supply chains: corporate and *keiretsu* culture.

Treatments of the effectiveness of Japanese supply chain coordination can be criticized as either too concrete or too abstract. Highly concrete are explanations that stress the role of formal systems like Just-In-Time (see, e.g., Nishiguchi and Beaudet, 1998). JIT is occasionally portrayed as an algorithm that can be "slapped on" production and procurement processes to yield good results. This ignores its embeddedness in a set of institutional arrangements, some of which are quite peculiar to Japan. *Shukko* is one such institution.

Other arguments for the success of Japanese supply partnerships place heavy stress on the role of "trust" in smoothing and stabilizing transactions (Sako, 1992; Sako and Helper, 1998; Sitkin,

Rousseau, Burt, and Camerer, 1998; Smitka, 1991). Trust is a rich concept, however, given to diverse interpretations. Economists see it as a forward-looking willingness to bet that a partner will not behave opportunistically. Psychological and sociological perspectives on trust stress its normative and affective, versus purely cognitive, side (Uzzi, 1996; Von Krogh, 1998). In this vein, Japanese management writers note the spirituality, obligation, even sentimentality that may be part of the "tacit knowledge" that one company has of another (Nonaka and Takeuchi, 1995). However, without analysis of the concrete actions that build trust—such as people from a manufacturer working hand-in-hand on-site for a sustained period with their counterparts in a supplier—trust is a "black box" defying both measurement and management.

Whether the focus is hard and formulaic models such as JIT or the soft and fuzzy ones that feature trust, research must address the processes that enable suppliers and assemblers to work with and learn from one another. In Japan, *shukko* transfers are key to how one organization in a purchase-supply relation aligns its goals and operations with another and taps the other's tacit knowledge base. *Shukko* is an observable phenomenon, although it cannot be understood in isolation. Of the conditions supporting *shukko*, the most important is cross-shareholding. A minority equity stake provides the receiving firm with investment capital, gives the equity holder some governance rights, and affirms to the outside world that a (*keiretsu*) partnership exists.

Japanese *keiretsu*-style supply relations are less contractual, arms-length, and limited (in time, scope, etc.) than is true of the West. They involve larger cross-firm flows of tacit knowledge—the inchoate, uncodified, even emotive and charismatic routines that underpin core competences. As with strong culture in a single firm, this blending of skills, habits, and values raises the speed and quality of the exchange, as each partner attunes to the work rhythms and styles of the other. An analogy is the socialization process described in symbolic interactionist social psychology as "taking the role of the other:" one organization ("ego") takes on the identity and posture of a second ("alter") through embedding its people in alter's routines (Lincoln, Gerlach, and Takahashi, 1992; Lincoln, Mason, and Ahmadjian, 1998; Mead, 1962).

<u>The Japanese electronics case</u>

We focus on the Japanese consumer electronics industry. Like automobiles, electronics has been a highly strategic sector in Japan's export-led postwar economic development. Japanese

electronics firms built up a huge competitive advantage on the strength of the quality, cost, and development time of their products. However, electronics is an industry in which the contrasts with Western component production and supply are less sharp than in the auto case. Japanese auto producers—Toyota in particular— evolved a highly distinctive model of production organization and supply chain management (Fruin, 1992). Relatively compact firms with narrow product lines (e.g., passenger sedans) specialized in design and assembly, while relying on an array of partners both to supply them with components and to fill out product offerings on a consignment or OEM basis (Fruin, 1992, Nishiguchi, 1994; Shioji, 1995). Japan's electronics corporations, on the other hand, have broad product lines, decentralized divisional structures (Beer and Spector, 1981), are vertically integrated into parts-making and subassemblies, and deal at relative arms-length with a larger base of suppliers who participate less in design and development.

Even in autos, Japanese supply relations have been weakened by globalization, heightened competition, technological change, and macroeconomic stagnation (Ahmadjian and Lincoln, 1998). As Japanese companies move operations abroad or even within Japan to such remote regions as Kyushu and Shikoku, they have the opportunity and often the obligation to develop new supplier networks and scale down dependence on old ones. Yet the pains Japanese manufacturers take to smooth this transition—by easing old partners out slowly or into tangential lines of business—testify that long-standing obligations still carry weight in Japanese economic exchange. Moreover, some electronics companies—notably Matsushita—are reversing the drift from stronger to weaker supply relations. Matsushita is managing its supply chain in more strategic fashion than in the past, building closer ties to a smaller base of elite suppliers (Lincoln, Ahmadjian, and Mason, 1998).

Although collaborative development between assemblers and suppliers by all accounts played a critical role in the rise of Japanese manufacturing (Nishiguchi, 1994; Odaka, Ono, and Adachi, 1988), the trend is to less sharing and co-specialization. With worldwide diffusion of Japanese manufacturing techniques (JIT, TQM), manufacturers take excellence among suppliers for granted much more than in the past. Countertrends exist as well: the shift in Japanese domestic sourcing to larger suppliers with R&D and engineering capability (due to rising parts standardization and economies of scale as well as global sourcing of low tech parts) has spawned a new breed of Japanese supplier able to contribute greater value to the manufacturing process.

Supplier participation in design and development

An influential paper by Imai, Nonaka, and Takeuchi (1985:351) documents close cooperation and mutual learning between Fuji Xerox, a major electronics firm, and its suppliers in the early stages of product development. Their informants said:

> "We ask our suppliers to come to our factory and start working together with us as early in the development process as possible. The suppliers also don't mind our visiting their plants. This kind of mutual exchange and openness about information works to enhance flexibility. Early participation on the part of the supplier enables them to understand where they are positioned within the entire process. Furthermore, by working with us on a regular basis, they learn how to bring in precisely what we are looking for, even if we only show them a rough sketch. When we reach this point, our designers can simply concentrate on work requiring creative thinking."

Yet such early and deep involvement of suppliers in manufacturers' product and process development is not the norm in Japanese electronics. We illustrate with case materials obtained through our and others' interviews in several prominent Japanese firms. Several reasons exist. Manufacturers make most electronic components in-house and use suppliers chiefly for lower tech materials such as packaging, plating, boxing, etc.[1] Our informants said that the very fast development times and short product life cycles in electronics made it difficult to develop close ties with external suppliers. Another factor is the modular and standardized nature of electronic components, compared to autos where parts designs are often specialized to particular vehicle assemblies. This allows parts and subassemblies to be bought "off-the-shelf" from an external vendor or wholly designed either by the manufacturer or the supplier without much input from the other.

Sanyo, NEC, Nintendo

Involvement by outside suppliers in Sanyo's product development is fairly minimal. The R&D division told us that their value engineering process does pool inputs from diverse functions, but suppliers do not participate at this stage; indeed, no outsiders do. Even after the design phase,

[1]One indicator of in-house parts supply capacity in the major electronics firms is apparent to visitors on plant

direct supplier involvement remains low. Sanyo said, however, that purchasing representatives, who know the suppliers and can represent their interests, attend the meetings.

Sanyo engineers stressed that they can and do choose outside vendors over in-house units in sourcing high value materials. For example, the Audiovisual Division in the early development stages of an LSI system chip initially approached the internal Semiconductors Division but was turned down, so the AV Division went outside. The outside suppliers were not made members of the Sanyo AV team. The AV Division discussed specs with them and negotiated prices. Sanyo said that suppliers do have the opportunity to innovate a process or product on their own, but cooperation in the actual innovation process was rare.

Nor do suppliers cooperate among themselves as in the auto industry, although formal supplier associations (*kyoryoku-kai*) are common to both industries (Lincoln, Ahmadjian, and Mason, 1998; Sako, 1996). NEC informed us that little transfer of specialized technology occurred among its suppliers. At the *kyoryoku-kai* meetings, some suppliers might present their successful technologies and allow on-site visits, but most remained very secretive. Moreover, whatever knowledge-sharing took place among suppliers occurred without NEC's participation or guidance.

Nintendo is another electronics firm with a reputation for arms-length treatment of suppliers. Nintendo managers said they are careful to avoid sole-sourcing for fear of fostering supplier dependence. Nintendo's specialized electronic games business is more cyclical and uncertain than that of more diversified makers, and it cannot be obligated to carry suppliers in lean times.

Toshiba

In his study of Toshiba's Yanagicho Works, Fruin (1997) observes that supplier involvement in Toshiba's designs depends on the maturity and complexity of the product. In rapidly evolving high tech products, where Toshiba is intent on mastering the process of development and is on a steep learning curve, suppliers simply provide low-cost production capacity. In more mature and lower value-added products where the process is well understood and does not demand Toshiba's full design and engineering capabilities, development responsibility falls mainly on suppliers. Real sharing with suppliers occurs only when a mature product requires frequent redesign and

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tours. Most of the machines in the VTR factory we visited were Sanyo-made.

modification. The design and production of key parts and subassemblies are then shifted to suppliers but their activities must be closely integrated with Toshiba's own (see also Lincoln, Ahmadjian, and Mason, 1998; Nishiguchi, 1994:14).

Matsushita

The case of Matsushita is an interesting one that we explore in detail elsewhere (Lincoln, Ahmadjian, and Mason, 1998). Even within the Japanese electronics industry, Matsushita has a reputation for arms-length dealings with a large supplier base, most of whom produced low-value parts and services (packaging, molding, painting, plating). Like Sanyo, Matsushita generally develops new products and processes with little collaboration by suppliers. Matsushita retained the designs and had suppliers build to blueprints.

Matsushita products use technically sophisticated parts and subassemblies. The suppliers are small and cannot afford the plant, equipment, and skills necessary to produce high-tech components. However, Matsushita, like other Japanese manufacturers, has been shifting its low-value sourcing overseas and eliminating domestic suppliers with low technological capability. Matsushita is training and assisting an elite corps of suppliers (the *kyoei*-kai or mutual prosperity association) for this purpose. Similarly, NEC instructs the larger companies in its *kyoryoku-kai* in new technology that they are unlikely to develop on their own. For example, when suppliers were forced to find alternatives to the use of freon gas, NEC's *gijutsu shido* (technology training) center showed them how to do it.

Compared with its old method of having suppliers work from a set of specs, Matsushita is encouraging suppliers to shape product design decisions early on. The responsibility of each Matsushita product division, encouraged and assisted by Corporate Purchasing, is to make very clear and specific requests for input by suppliers. The air conditioner division, for example, will begin with a set of drawings or paper or wood model and ask suppliers for suggestions as to product form and function. The *kyoei-kai* suppliers benefit (gain a competitive advantage) from the early information they receive on Matsushita's product development plans and procurement needs.

As Matsushita's efforts to assist and motivate suppliers in developing special competencies bear fruit, the company is absorbing new technology from the most advanced suppliers. One supplier was utilizing a very precise method of gold plating, which, we were told, would take Matsushita five

years to develop. Another had developed an innovative technique of plastic injection molding. Still another supplier of plastic television set casing had devised the method of punching tiny sound holes directly into the plastic, thus eliminating the need for speaker holes and netting. These cases exemplify suppliers' growing ability to leverage special competencies as they participate in Matsushita's product design process.

Despite this new commitment to more and earlier knowledge sharing with suppliers, our Matsushita informants saw the fast pace of the electronics industry as an obstacle to the success of the *kyoei* program. Because of ever-rising competitive pressures to shorten development times, some Matsushita managers felt they could design and build products faster if the effort to develop the *kyoei-kai* were abandoned and Matsushita simply made the high-tech parts itself.

The role of *shukko* (employee transfers) in learning

Notwithstanding Imai, Nonaka, and Takeuchi's portrait of Fuji Xerox and Matsushita's program of mutual learning with its *kyoei* suppliers, the picture these interviews paint is clear: direct participation by suppliers in manufacturers' product and process development is the exception rather than the rule in Japanese electronics. Knowledge sharing between assemblers and suppliers is less extensive and direct than in the auto industry (Asanuma, 1989). Given the greater vertical integration and product diversity of consumer electronics firms, the value added by outsourced parts is lower, as is the technological competence of suppliers.

Still, one may underestimate the level of cooperation and learning by focusing too narrowly on the direct participation of suppliers in assembler designs. The exchange of tacit knowledge through informal means probably contributes the lion's share of interorganizational learning in Japan. The means we focus on is *shukko*—employee transfers—between Japanese companies. *Shukko* is key to the process of coordination between Japanese firms' purchase-supply and other partnerships. It is the assignment of employees from one company to either permanent or temporary stints on the shop or office floor of another. With all the discussion of trust in Japanese supplier relations, it is odd that the *shukko* phenomenon has gotten so little direct attention. Our interest is in the forms and purposes of *shukko*; the conditions—such as equity relations-- that support or motivate it; and the degree to which it enables culture flows between firms.

There are two principal functions of *shukko*. One is to reduce labor costs by offloading

redundant people to affiliated companies. This is common but controversial practice, for it smacks of dual-economy (*niju kozo*) exploitation of smaller, lower-status firms by dominant core firms. Perhaps not surprisingly, Japanese managers tend to downplay this function. Government agencies such as MITI or the Fair Trade Commission are on the lookout for such abuse, as is the Japanese media, which has been highly critical of the practice (Nikkei Weekly, 1993, 1995). At an interview with Sanyo, we inquired about the use of *shukko* as a downsizing strategy. Our informant said:

> "I won't say that this does not happen, but practically, it has problems. If the parent sends excess people to the supplier because of temporary economic problems, the supplier is likely to be facing the same types of problems and then cannot take on excess people. This is not good for long term performance."

The second role of *shukko* is in interorganizational knowledge exchange. Engineers employed by an assembler will work on site at a supplier in order to assist it in meeting the assembler's quality and cost requirements (Asanuma, 1991; Clark and Fujimoto, 1991). Conversely, a supplier will locate its people at the assembler to ensure that components are designed and produced to the latter's specifications. *Shukko* also operates at higher levels as a monitoring and governance device wielded by external stakeholders such as a main bank, principal trading company, or industrial partner (Lincoln, Gerlach, and Ahmadjian, 1996). A perusal of the directors of most significant Japanese corporations will reveal a number of people who spent large portions of their careers elsewhere. Rather like the intermarriage of Europe's royal families, they were dispatched to the new site to oversee, learn from, and influence the operations of the target firm.

Another role for *shukko* in knowledge creation is diversification into new product lines (Fruin, 1992; Nishiguchi, 1994:118). Japanese companies will cultivate a new business around, for example, a product innovation, then spin it off as a partially owned *keiretsu* affiliate (Gerlach and Lincoln, 1998a; Takahashi, 1995). The former employees of the core firm are in effect *shukko*'d to the spin-off. When the international information network business of Kigyo Denki (our pseudonym for a large, old-line electronics company with strong ties to one of Japan's "big-six" horizontal *keiretsu* groups) was recently shifted to MIND, a five-year-old affiliated company, a number of Kigyo Denki employees went along.

The *tatemae* or official word on *shukko* in most Japanese companies is that learning and training are the goals. In our interview at Hitachi's Omika plant, which makes computer systems for large customers such as Tokyo Power or Japan Rail, managers stated that *shukko* was done to instruct Hitachi-affiliated companies in the use of Hitachi technology. Any cost reduction was a welcome but unintended consequence. They did acknowledge after some prodding that this depended somewhat on the affiliated company and its tie to Hitachi. *Shukko* to firms that provided lower tech engineering services (machining, plating) and in which Hitachi had no equity stake was motivated by labor reduction, and the people so transferred were mostly excess blue collar. Also, not surprisingly, the amount of downsizing *shukko* goes up in bad times (e.g., the 1990's).

From a labor cost standpoint the benefit to the dispatching firm (e.g., Hitachi) is not always great. In the case of temporary (*zaiseki*) *shukko*, it typically pays the entire wage of the transferred employee. In permanent (*tenseki*) *shukko*, the dispatching firm is responsible for the difference between the wage it paid the employee and the wage paid by the supplier. A small Kansai printing firm whose president and other executives were *shukko*'d in from "Kansai Credit" (our pseudonym for the financial subsidiary of a large Kansai-based electronics firm) pays one-half the incoming managers' salaries and Kansai Credit pays the other half. Hitachi pays 20% of the salary of the *shukko*'d employee and the affiliate pays the remainder. The payment ratio was 30/70 at Kigyo Denki. Our Hitachi informant said, "If there is a lot of *shukko*, the company has to pay a lot of additional wages. So workers' salaries do not go down. The 20% is a nontrivial cost."

The Ministry of Labor does an annual survey of over 14,000 workplaces employing more than 5 people. It contains very detailed information on employee departures including *shukko*. We present the data from the 1996 survey. 1996 is the one strong year in a period of stagnation and recession that began in 1992 after the collapse of the speculative "bubble" and is now at crisis levels.[2] We have produced but for reasons of space do not present comparable survey data for 1991.[3]

[2] GDP growth in 1996 was 3.8% and unemployment was 3.3%.

[3] The pattern of *shukko* by firm size and industry is very similar in the two years. They differ in that departures for personal reasons (*kojin teki no riyu*) declined for males from 8.6% of employment to 7.2% and for females from 17.2% to 13.7%. Upper-management mandated (*keiei j∩ no tsug∩*) departures, on the other hand, rose for males from .74% to 1% of employment and for females from .58% to .82%. The change was mostly due to increased *shukko*: *shukko* as a percentage of employment increased 27.8% for both genders. "Layoffs" (inferred as total

Table 1 presents 1996 *shukko* rates as percentages of total employment, total departures, and total mandated departures by the gender of the employee, industry sector, and firm size.[4] An important distinction in these data is that between "originating" and "returning" *shukko*. The first is employees of the surveyed firms who were transferred out by those firms during the year. The second is people who had been *shukko*'d into these firms but in 1996 returned to their original employers. Note that all "returning" *shukko* are by definition temporary (*zaiseki*) *shukko*, but there is no way of knowing whether the "originating" *shukko* are permanent (*tenseki*) or temporary.

Table 1 about here

Firms originating *shukko* are rather different from those taking them in, if we can infer the volume of "taking in" by the number of returning *shukko*.[5] Manufacturing establishments *shukko* male employees at a rate exceeding that of all industries, and (contrary to our presumption of greater *keiretsu*ization of autos), electronics firms *shukko* more than manufacturing as a whole and the automotive industry in particular. The picture is different for females: manufacturing in general and autos and electronics in particular *shukko* them at lower rates than is the norm for all industries. On the other hand, the pattern of establishment size differentials in originating *shukko* is the same for both genders. The largest firms (and plants) dispatch people and the small and medium sized firms take them. Establishments with more than 100 employees *shukko* male employees out at 2-3 times the rate of smaller organizations. The corresponding multiple for women is 3-5. These differentials show up whether *shukko* is calculated as a ratio to all employment, all departures, or all mandated departures. Nearly three quarters of all mandated departures from the largest establishments are *shukko* transfers, compared to fewer than 20% of workplaces in the 5-99 size range and around 30% in the 100-999 range. The pattern of returning *shukko* is very different. The lowest rate by far is found in the 1000+ employee size class. Large plants thus routinely dispatch their people to jobs in

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mandated departures minus total *shukko*) rose 11.7% for males and 14% for females.

[4] Other reasons for departing are, for males: contract expiration (11.8%), mandatory retirement (8.9%), for cause (*honnin no seme*; 5.6%); personal reasons (e.g., marriage, child care; 62.5%), illness or death (2.3%). The figures for females are: contract expiration (8.8%), mandatory retirement (2.7%), for cause (3.8%), personal reasons (78.4%), illness or death (1.6%).

[5] Also possible is that people *shukko*'d to big plants are more likely to remain permanently, but this is less likely.

other organizations but the reverse flow is much smaller.

Thus, for male employees, originating *shukko* rates are higher and returning *shukko* rates are lower in manufacturing than in nonmanufacturing, in autos and electronics than in other manufacturing, and in big establishments than in small ones. Among women, rates of *shukko* are lower overall (implying higher layoff rates), and lower in manufacturing than in nonmanufacturing, although the pattern of establishment size differences is similar to that of men.

Much of what these data show makes sense in terms of the operation of the permanent employment system in the Japanese dual economy. Males, employees of large firms, and employees in core manufacturing industries are less likely to be fired and more likely to be *shukko*'d to affiliated companies. Women, smaller firm employees, and nonmanufacturing employees are less likely to be *shukko*'d, thus are more likely to be laid off. But *shukko* does not simply get rid of surplus people in a fashion that keeps an elite subset of them employed. Although the composition of *shukko* as originating (out) or returning (in) shifts markedly across industry and firm size classes, the two types together account for 4-10% of all (male and female combined) employee departures. This high level of transfer activity across an array of firm types and sizes identifies *shukko* as a pervasive mechanism of interfirm coordination and knowledge sharing in Japan. Big companies in key industries can demand that smaller and dependent firms give jobs to their surplus workers. As our interviews testify, however, *shukko*'d people retain their loyalty to the dispatching firm and act as bridge between it and the receiving *ukezara*. The transferees from big firms in core industries more often play the role of *sensei*—teacher or leader-- in a learning partnership, whereas those from small firms are the *deshi* or "pupils" This accores with the asymmetry we observe in the originating and returning *shukko* flows.

A sign that *shukko* serves a learning rather than cost reduction purpose is when its volume varies with the product. A Hitachi manager noted that: "System control (software) is very customer oriented. It is common to send (*shukko*) employees to customers. In hardware, it is not so useful, so there is less *shukko*." Also, the length of time people are transferred depends on the complexity of the technology and the amount of learning required. Speaking of *shukko* to customers, our Hitachi informants said:

Our data are consistent with the common knowledge that *shukko* transfers flow down a firm size hierarchy.

> "When the product is a large industrial system the employee may stay 3-6 months, as was the case with JR. Nuclear and electrical power systems may transfer them for as long as two years. When a Hitachi employee is *shukko*'d to another company, he has to understand the precise meanings of that field so small mistakes can be avoided."

Likewise, if *shukko* is reciprocated between customer and supplier, the case for a mutual learning rationale is easier to make. In our visit to Hitachi, we saw entire sections where workers wore different colored hats from the Hitachi standard issue. These workers were on loan from affiliated firms.

Although permanent or *tenseki shukko* for labor reduction purposes carries some negative "dual economy" connotations in Japan, it is widely preferred to the main alternative: outright layoffs. Sanyo managers said they did not want to lay people off as Pioneer Electric attempted to do in 1993 (an act that elicited such strong reaction from unions, the Ministry of Labor, and the press that Pioneer backed down; Lincoln and Nakata, 1997). But it does *shukko* redundant employees to jobs in domestic subsidiaries and other Sanyo *kanren gaisha* (affiliated companies).

For similar reasons, Japanese unions rarely oppose cost reduction *shukko*. At an interview with Denki Rengo (Japan Federation of Electrical Workers), we inquired about the union position on *shukko*. In economic downturns, such as the 1986 endaka, the 1974 oil shock, and the early 90's recession, they said, *tenseki* (permanent *shukko*) and *tenkin* (internal transfer or rotation) were common. The unions did not oppose it; indeed, they counseled workers to accept the transfers without complaint (Due to weakening employment guarantees, plus a rise in dual career marriages, resistance to mandatory *shukko* has been increasing). The unions see their role as facilitating the redeployment of people into growing sectors and ensuring that the processes of transfer and rotation are done under reasonable rules. Union involvement is also necessitated because collective bargaining agreements with electronics manufacturers often extend to suppliers and affiliates as well.

<u>*Shukko* and knowledge-sharing in teams</u>

The relative ease with which Japanese companies transfer workers within companies or *shukko* them between companies contributes to intra- and interfirm knowledge diffusion. As Hitachi

managers described it, a relatively long-term on-site experience with a customer or supplier socializes Hitachi people in the tacit ways of a partner. Through direct exposure to the work rhythms and social networks of another firm, Hitachi employees develop a feel for how the partner operates without having to put that knowledge in explicit form (e.g., as a set of specs or memos). Nonaka and Takeuchi (1995) give a nice example of precisely this process. Matsushita Electric was designing an electronic bread maker but could not build one that kneaded the dough properly. Matsushita *shukko*'d an engineer on the project to work with one of Japan's premier breadmakers. Through learning and practicing on-site under the tutelage of a master artisan, the engineer was able to design a machine that effectively mimicked the baker's craft.

A downside to the *shukko* system is the "man in the middle" status of the transferred employee. Precisely because *shukko*'d people straddle the boundary between sending and receiving firms, they have difficulty balancing their dual commitments. A *shukko*'d manager at a supplier of Kigyo Denki said that people who began their careers with the "*ukezara*" (receiving; literally "saucer for catching the overflow") firm often feel resentment toward those who arrived through *shukko*. Moreover, he said, given the strong cultures of Japanese companies, it is easier to deal with people who have "grown up" in the same company, for they have developed common ways of thinking. This manager said that he still keeps in touch with Kigyo Denki, but since he was in the US for a period, he no longer knows many people there. This manager always used "we" in referring to Kigyo Denki and was forthright in saying: "I'm still a Kigyo Denki employee." He was one of approximately 100 people *shukko*'d in from the Kyoto Works of Kigyo Denki, which employed some 2500 people.

Although companies prefer to stress the positive features (technology transfer and learning) of *shukko* over the less attractive ones (offloading surplus people), most *shukko* serves a dual purpose. Companies do achieve cost savings, even with temporary transfers. But at the same time they intend that people learn from the experience— even if only by gaining a broader and more flexible outlook. Indeed, an intriguing speculation is that the recent increase in *shukko* for labor cost reasons may be raising cross-firm flows of tacit knowledge as well. Toyota told us that its transfers of employees to Toyota dealerships was not merely a cost measure but was intended to give its workers expertise in the sales end of the business, making them more sensitive to customer needs

when they returned. (Japanese observers familiar with the situation, however, say that the dealers were less than thrilled to get the Toyota people. Used to factory ways, they lacked the skills and demeanor of salespeople.)

Still, many "*ukezara*" firms receive *shukko*'d workers gladly. Being, e.g., Hitachi people, they are high quality employees, and, as noted, either Hitachi or the Ministry of Labor will make up the difference in their wages. Thus, both sides benefit. The dispatching firm sheds excess labor while installing trained people in a partner who will monitor and guide its operations. The receiving firm gets an infusion of better human capital than it could recruit on its own, along with skills and values acquired in a superior company and business partner. The *shukko*'d manager at the Kigyo Denki supplier is an example. He worked eight years in Kigyo Denki's US factory, then transferred to Oki Electric where he spent three years before moving to his present post. It is unlikely that the supplier could have recruited someone with his experience and connections. Of course, the supplier pays a price in autonomy, as the incoming *shukko*'s take over management positions otherwise held by homegrown people.

The case of a Kyoto subcontractor (*shitauke*) of Kigyo Denki shows how the various *shukko* forms intertwine. The subcontractor had several employees who had been *shukko*'d from Kigyo Denki, the production manager included. During a factory tour, we observed a number of Kigyo Denki people. The younger ones were on temporary (*zaiseki*) *shukko* and would go back to Kigyo Denki after the standard two-year term at the supplier. People over 50, whether white- or blue-collar, generally do not go back. There was some reciprocity, however, for the supplier also *shukko*'d people to Kigyo Denki (two were there at the time of our interview). These, of course, were never permanent placements but were there for engineering training, some for up to 4 or 5 years. We were told that when the supplier begins a new business or installs a new process, some employees would be sent to KD for training.

While the smaller supplier and other satellite firms are not as disadvantaged by the *shukko* system as the usual dual economy models suggest, there is still some real asymmetry in the distribution of benefits. If the interest of the dispatching firm is chiefly in lowering labor costs, it has an incentive to select the transferees from the bottom of its talent pool, so the receiving firm may not get the most productive people. The Kansai printing firm whose owner had recently made the

decision to "join" the Kansai Credit *keiretsu* illustrates. The owner's biggest worry was cash flow, a problem solved by affiliation with the Kansai *keiretsu.* Upon the sale of the printing firm's shares to Kansai Credit, the latter company sent in three people, one as president. All three were over 50 and (in the printer's view) were not particularly competent. Despite a prestigious education, the new president had no experience in the printing business and had been the least successful member of his entering cohort at Kansai Credit.[6] The founder had been pleading with Kansai Credit to send some energetic young people.

The *shukko'*d Kansai Credit employees will stay until official retirement age and be replaced by new *shukko*. The founder acknowledged that a principal reason Kansai Credit purchased his company was so it could act as "*ukezara*" for Kansai Credit *shukko*. Eventually, as his company grows, it will absorb 15 or more Kansai Credit people. He said that *shukko* is often a rationale for the creation or expansion of *keiretsu*. A family member worked for a life insurance company that had actually traded purchase prices for *shukko* rights. The insurer had an implicit agreement with a supplier of heating oil to increase the price of oil supplied by a fixed amount for every *shukko'*d employee received.

Equity ties as supportive infrastructure

As this example suggests, extensive *shukko* to a supplier or other affiliated firm rests on a stable set of *keiretsu* relationships. Particularly important is cross-shareholding: The *shukko'*ing firm is apt to have an equity stake in the *ukezara* (recipient). Such investments bestow rights to board representation, a particularly important form of *shukko* (director dispatch or *yakuin haken*). The assembler or customer, being a larger and higher-status firm, has a greater investment and more members on the board of the supplier than vice versa (Lincoln, Gerlach, and Takahashi, 1992).

Equity ties facilitate other forms of *shukko* as well. Hitachi told us that companies in its *shihon* (capital) *keiretsu* have the same union and pension system. This compatibility of personnel practices makes interorganizational transfers much easier. However, unlike the auto industry where capital relationships ((*shihon kankei*) between customers and suppliers are the rule, in electronics

[6]The status of the managers seconded to a supplier or other affiliated firm varies on the size and importance of that firm. Sanyo told us that most of its affiliated companies (*kanren gaisha*) have directors sent by Sanyo. If a firm has sales of 100 *oku* (one billion) yen or more, Sanyo will send a *torishimariyaku* (director) or *kansa*

their prevalence is highly variable.

Tables 2 and 3 present the results of an exploratory statistical analysis showing how director dispatch depends on reciprocity, equity and commercial relations, and firm size in the Japanese electronics and auto industries. The data, which pertain to 1993, are imperfect for this purpose since they refer to 21 electronics firms and 20 motor vehicles firms that were among Japan's 259 largest corporations (50 financials, 200 industrials, and 9 trading companies; see Lincoln, Gerlach, and Takahashi, 1992). The observations are dyads—pairings of each firm in the industry with every firm in the set of 259. This would yield 5439 electronics-based dyads and 4980 autos-based dyads but the actual *N*'s are reduced due to missing data.

The means on the director, equity, and trade ties *sent* by electronics and autos firms are essentially the same. The means on equity and trade ties *received*, however, are somewhat higher in the autos case. The Table 2 regressions reveal more contrast between the industries. As expected under the assumption of greater *keiretsu*ization of the Japanese auto industry, the effect of firm *I* owning an equity stake in firm *J* on the probability of *I* sending a director to *J*, while positive and significant in both industries, is much stronger in autos. The effect of a selling relationship—trade(*I*)-- is also greater in autos, although the difference is smaller. There is no evidence of reciprocity in director exchange--the director(*J*) effect—in either industry. Similarly, a buying relationship--trade(*J*)—does not condition director *shukko* in either industry.[7]

Tables 1 and 2 about here

The taking of equity stakes in the Japanese electronics industry typically occurs at the time of contracting with new suppliers. Buying shares as a way of cementing an existing relationship is more typical of autos (Asanuma, 1989). For example, the television production operations of Tokyo Sanyo Denki moved to Gunma prefecture in 1959. At that time, Sanyo made investments in various local companies in order to develop them as suppliers. The technological level of this area was already high, as it had been an aviation and textile center. Sanyo provided equity to help local firms

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yaku (inside auditor). Firms below this size receive a *jigyo bucho* (operating division head).

[7]This is a surprising result, since we would expect customers to *shukko* top managers to suppliers rather than the reverse. Such a pattern of buyers controlling sellers, however, is quite strong in regressions (not shown) in which equity tie is the dependent variable.

convert their plant, equipment, and people so that they could serve Sanyo's procurement needs. Sanyo subsequently increased its capital participation in several cases but had not reduced it.

As Japanese companies move operations offshore, they face problems finding suitable suppliers and may use capital investments as a development tool. Equity ties with foreign suppliers and distributors also help to overcome legal barriers or to gain entry to established business networks; e.g., to build links to Chinese merchants in southeast Asia.

As our data suggest, companies without equity stakes in suppliers do less *shukko*. Matsushita, as noted, deals with a large number of suppliers in fairly arms-length fashion. Matsushita said that they do not send equity, loans, or managers to suppliers. "We have no *keiretsu*," our informants in Matsushita Corporate Purchasing (Shizai Center) asserted.

NEC managers also told us that they rarely take equity stakes in suppliers, for NEC, too, claims to have no *keiretsu* of the auto industry sort and adheres strictly to a multi-sourcing rule. Their few capital investments in suppliers were made long ago. One originated with a bailout; two others were NEC spinoffs; still others are subsidiaries in lines of business that NEC hoped to expand (e.g., Toyo Tsushin in telecommunications). NEC has very little equity invested in small assembly subcontractors. However, in recent years several such firms had reached sufficient scale to be listed on the stock exchange. These requested and received NEC equity investments. Consistent with its infrequent use of capital relations, NEC *shukko*'s sparingly. NEC does send personnel into suppliers on special missions -- to improve quality, for example—but managers said such cases were rare. NEC will, however, assist suppliers in various ways. It will lend them equipment and help with overseas purchasing of hard-to-procure items.

On the other hand, Kigyo Denki, which *shukko*'s extensively, holds shares in nearly 1000 companies. Kigyo Denki also serves as a bank for its supplier network. Its loans go chiefly to troubled affiliates, since strong ones can get good terms from banks. Our informants felt the loans were a good investment, despite the low interest. Banks, they said, lend at a higher interest rate but tolerate more risk. If Kigyo Denki lends to a supplier, however, there is no risk, since KD will provide the company with business and not allow it to go bankrupt.

Shukko and knowledge sharing

Shukko is an extension of the familiar Japanese practice of rotating people through jobs and

functions over a long (under the permanent employment system) career with the firm (Brinton, 1991). As a mode of knowledge diffusion both within and between firms, it rests on some important facilitating conditions. One is acceptance of team effort and sharing. Teams are the building blocks of Japanese organizations, and most observers agree that such collaborative pooling of skills and effort has figured significantly in Japanese competitive success. Team process is fundamental to organizational learning, our informants said. Discoverers of new technology will spread it to others, thus growing the knowledge base of the company. A key channel whereby new knowledge flows into existing teams is through the addition of *shukko*'d people with experience in a partner firm.

Our informants said that they had little difficulty getting employees to share innovations or ideas with others. We asked Hitachi why an employee might not hoard or appropriate knowledge in hopes of leveraging it in an entrepreneurial start-up, Silicon Valley style. "No," they said. "This doesn't happen in Japan. An employee cannot leave to start his own company. In Japan, he has to stay in a big company."

Outside Japan, however, the norms differ, and managers expressed concern that globalization—offshore operations and recruitment of local employees—was bringing more people into the company who thought only of themselves. One manager said that when Hitachi instructs Chinese partners in new technology, they expect the technology to spread within China, as it would within firms and up and down supply chains in Japan. But the Chinese just hold the technology and do not spread it. This, he said, was very frustrating to the Japanese.

Managers also acknowledged that the weak economy and the decline of employment security were taking their toll on the Japanese knowledge sharing system. When *katatataki* (the tap-on-the-shoulder signal that an employee should "voluntarily" resign) is prevalent, the innovator is much more likely to try to make himself valuable by hoarding knowledge.

One factor in the prevalence of *shukko* in Japan is that the permanent employment system severely constricts the interfirm flows of people and skills that in California's Silicon Valley, say, are governed by the labor market processes of firing, quitting, and hiring. Midcareer recruitment of employees with experience and know-how at other companies generally has been taboo in Japan, although corporations are stepping up such hiring, particularly in hard-to-fill specialist fields (Lincoln and Nakata, 1997).

The Japanese practices of *shukko* (transfer) and *tenkin* (rotation) arguably show how *keiretsu* governance combines the best of market and organization principles (Dyer, 1996; Williamson, 1985). In *shukko*'ing people to another firm, a Japanese company gains access to the knowledge base of the transaction partner. Even when the *shukko* is permanent (*tenseki*), the relocated employee still identifies with the dispatching company and stays in regular contact with it. Since *shukko* is administratively managed in a way that labor markets are not, it is likely that organizations, not just individuals, capture a significant share of the transferred knowledge assets and the returns they produce.

By contrast, when a skilled person quits or otherwise vacates a U. S. job, her tie to that company is effectively severed, and her loyalties (such as they are) quickly shift to the new employer. Not only may she thus deliver proprietary knowledge to a competitor, but her departure deletes a critical node in the knowledge network. A Hitachi manager who had worked in the U.S. at General Electric noted this problem. GE employees, he said, individually "owned" technology. A key person left a project this manager was on, thereby destroying it. No one else had the same grasp of the project. The GE team approached the departed employee for assistance, but he had lost interest in helping GE.

Culture diffusion as tacit knowledge sharing

Shukko transfers tacit knowledge between firms through socialization: employees of one follow the routines, perform the tasks, and forge personal ties in the other. As noted, *shukko* assumes the Japanese training model: people acquire broad skills and norms through job rotation and on-the-job doing. Some of what is learned this way also could be acquired through explicit knowledge sharing (e.g., classroom training), particularly of the technical or cognitive routines of innovation or production. It is apt to be least true of the normative and affective elements of an organizational culture. The "empathy" that one Japanese organization exhibits toward another—devotion, obligation, and commitment-- like all sentiments is highly tacit. It is also a powerful force aligning the transacting organizations' strategies and operations, as it promotes in each high sensitivity to the requirements and rhythms of the other. In this last section, we give examples from our interviews of such cross-firm cultural processes. Our hypothesis is that *shukko* facilitates such flows; i.e., more *shukko*, greater cultural affinity.

Shared values and sentiments are strongly implied in the idea that "trust" is essential to Japanese purchase-supply relations. Such normative or affective facets of trust augment or substitute for the cognitive and rationalist facets stressed in economics thinking. If people of one organization identify with and feel obligation to a second, less experience- or reputation- testing is required in order to forego hard contractual safeguards.

At Kigyo Denki, the culture that supports supply relations is much less that of the individual corporation than that of the horizontal *keiretsu* group of which Kigyo Denki was a part (Gerlach, 1992). Our informant said that Kigyo Denki, like its business group as a whole, is very conservative. People are smart but do not know how to use their abilities, e.g., to enter new industries. However, Kigyo Denki's culture is supportive of someone who has an idea and puts effort into developing it. Kigyo Denki's affiliated companies have more young people with entrepreneurial drive. There is thus a certain symbiosis between the cultures of Kigyo Denki and its affiliates.

Part of *keiretsu* culture is the fictive kinship ideal of a cohesive "family" of corporations. This strengthens the network and ensures smooth, reliable transactions among members. A Kigyo Denki executive commented that such family values promote preferential trading: people want to keep purchases in the "family" (of *keiretsu* or equity-linked companies).

An example of interorganizational empathy and reciprocity is a Kigyo Denki manager's description of his efforts, as a *shukko'd* employee, to make Nihon Shohin (a pseudonym) profitable, a company in which KD had a 20% investment. The manager was pouring time into this, not merely because it was a good business venture, but because he felt a moral obligation to assist Shohin and its employees. Shohin had served KD well in the past, so KD was bound to reciprocate:

> "Once Kigyo Denki makes an investment in a company, we have a very important social responsibility. Nihon Shohin has 800 people and I see the faces of all of these people and their families. I will do everything I can to make Nihon Shohin an excellent company. The employees of this company made a very nice contribution during the bubble years, so we are not going to cut them loose during a downturn. The ultimate goal is to make Nihon Shohin employees happy."

Our Kigyo Denki informants said that when suppliers are 100% dependent, they feel a strong

sense of obligation to them. An equity relationship further increases that obligation. This, they said, is the distinctive "wetness" in Japanese economic relations. It is hard for a Japanese company to tell a long-term supplier that it can offer it no more business. This "*kimochi*" (mood, sentiment) is based on personal relations of *giri* and *ninjo* (obligation and human feeling).

Hitachi, on the other hand, told us that their corporate culture, both of the parent firm and of the larger Hitachi "group" of companies, was rather weak, compared, say, to Kigyo Denki or Toshiba. The reason was Hitachi's decentralized, very *kojo* (factory) - oriented, structure. Formally, Hitachi had a *jigyobu-seido* (divisionalized system). In the usual case, the factory is part of a division (*jigyobu*). But at Hitachi, the factories are autonomous, and the *jigyobu* are weak. When each factory charts its own course, corporate- or division-level product strategy is hard to formulate. Thus, Hitachi lacks the strong corporrate culture of a Kigyo Denki or Toshiba that it could leverage to control or coordinate suppliers. Moreover, being a prewar company it cannot invoke the charismatic vision of a postwar founder such as Matsushita Konosuke. A Sanyo manager said that the memory of the partnerships that built the business fostered cultural cohesion among postwar companies such as Sanyo. As he put it, "we grew up with our suppliers after the war, and thus we want to help them. Our *kimochi* (feeling, sentiment) is to preserve friendly relations with our suppliers."

Indeed, our Hitachi informants suggested that a benefit to them of *shukko* to customers and suppliers was the reform of Hitachi's somewhat hidebound culture. In our interviews, they made repeated candid allusions to Hitachi's rigid organization. By exposing Hitachi young people to the ways of other companies, they hoped that the next generation of Hitachi managers might be more flexible and open-minded than the present one.

Since purchase-supply relations are hierarchical and asymmetric—the customer has more power to fix the terms of the transaction—the source of such encompassing beliefs is often the culture of the customer. Matsushita's corporate culture, for example, derives mainly from the vision and teachings of the company's founder and first president, Matsushita Konosuke. In our visit to one sole-source Matsushita supplier of metal plating, the owner and co-founder (an *obaasan*—grandma—type dressed in kimono) talked at length about the great "heart" of Matsushita Electric and how inspired she had been by the teachings of Matsushita Konosuke. These "spiritual" qualities, she said, were the reason she and her deceased husband had devoted their lives to becoming reliable

members of the Matsushita supply network.

Given Matsushita's reputation for "dry," even *kibishi* (strict, harsh) supplier relations, her comments were particularly interesting. The Matsushita supply chain does not have an encompassing culture apart from that of Matsushita Electric itself. However, that corporate culture is sufficiently strong and charismatic that it functions as a source of power and discipline over individual suppliers.

Descriptions of a parent company's relations with suppliers and affiliates as warm and personal, "wet" with emotion (*uetto*) versus cold and "dry" (*dorai*) came up often in our interviews with Japanese suppliers and customers. Some of Matsushita's reputation for being "*dorai*," even "*kibishi*" (severe, strict) stems from the Japanese stereotype of Kansai (Osaka area) firms and business people as colder, more money-oriented, and more prone to business haggling than was true of Kanto (Tokyo area) business. Sanyo, another Kansai firm, likewise was reputed to be dry and *kibishi* in its dealings with suppliers (Lincoln, Ahmadjian, and Mason, 1998; Roehl, 1989).

Although our NEC informant did not imply that its source was NEC's Sumitomo group attachment, he did say that NEC group suppliers and affiliates had a culture that was very strong. NEC firms strongly identify with NEC and see themselves in competition with, say, the Kigyo Denki Group. This common identity kept the group competitive: a supplier cannot assume that because it is an NEC affiliate it can slack off and and NEC will always buy from it.

The examples of Matsushita and NEC suggest that alternative modes of supply chain governance may be functional substitutes. These companies make little use of equity ties and *shukko* and tend to deal with suppliers at relative arms-length. On the other hand, their strong corporate cultures serve to promote cohesion and coordination across their supplier networks.

Conclusions

The widespread use of *shukko* in Japan has some significant implications for patterns of interorganizational learning. *Shukko* moves people up and down supply chains and to other affiliated firms such as spun-off product divisions in which the parent firm maintains an equity stake (Gerlach and Lincoln, 1998a). For obvious reasons, *shukko* does not channel people and knowledge between competitors. Nor, given Japan's traditional permanent employment system, do external market processes move many experienced workers between competing employers. The stigma of disloyalty that the employee and his family must endure is a sizable deterrent, but a greater obstacle

is the reluctance of companies to hire midcareer people and treat them as regular employees. In the U. S. and other economies with more open and "efficient" labor markets, such labor flows are the routine consequence of employees quitting or losing jobs with one company and taking up new ones with a competitor. Much of the vibrancy and dynamism of Silicon Valley, for example, is credited to the role of established corporations like Hewlett Packard or Intel in training and grooming people who at some point jump ship (or less often are pushed overboard) into the arms of a competitor eager for the knowhow and sometimes the proprietary knowledge of the former employer. Other such people might apply their skills and energies to the founding and nurturing of an entrepreneurial start-up that may grow to pose a significant competitive challenge to the established company they left. Our informants at Hitachi felt that, for these among other reasons, American companies were better at learning from competitors:

> "Hitachi observes the new products that competitors produce but it is hard to get information on their technology. That's why we go to America. In the U. S, yesterday's competitor is today's ally. The U. S. is more business-oriented. It doesn't work that way in Japan."8

As a method of coordinating goals and operations and exchanging knowledge and skill between affiliated or transacting organizations, however, the *shukko* mechanism may be without peer. It plays a major (if generally overlooked) role in forging the strong partnerships among banks, customers, suppliers, distributors, and even government ministries that have been an earmark of the Japanese network economy (Gerlach and Lincoln, 1998b).

8. Clearly our informant had in mind *Japanese* competitors. Japanese firms go to considerable lengths to contain knowledge and skills from spilling over to competitors. Labor market rigidities, *keiretsu* obligations, and nontransparent auditing and reporting practices facilitate such secrecy. Obviously, Japanese firms have long been adept at borrowing and learning from Western competitors.

REFERENCES

Ahmadjian, Christina L. and James R. Lincoln: Christina L. Ahmadjian and James R. Lincoln: "Changing firm boundaries in Japanese auto parts networks." Pp. 179-200 in Mark J. Roe (ed.): Corporate Governance Today. New York: The Sloan Project on Corporate Governance at Columbia Law School, 1998.

Asanuma, Banri (1989) "Manufacturer-supplier relationships in Japan and the concept of relation-specific skill." Journal of the Japanese and International Economies, 3:1-30.

----- (1991): "Japanese manufacturer-supplier relationships in international perspective: the automobile case." In Paul Sheard (ed.): International Adjustment and the Japanese Firm. New York: Allen & Unwin in association with the Australia-Japan Center.

Beer, Michael, and B. A. Spector, 1981. Matsushita Electric. Harvard Business School Case #9-481-146. Based on Matsushita Electric Industrial Co. Ltd.: Management Control Systems by H. Ishido and K. Takahashio, Keio University, Japan.

Brinton, Mary C. (1991) "Sex differences in on-the-job training and job rotation in Japanese firms." Research in Social Stratification and Mobility, Volume 10, pp. 3-25. Greenwich, CT: JAI Press.

Clark, Kim B. and Takahiro Fujimoto (1991): Product Development Performance. Boston: Harvard Business School Press.

Dyer, Jeffrey H. (1996): "Specialized supplier networks as a source of competitive advantage: evidence from the auto industry." Strategic Management Journal, 17:271-291.

Fruin, Mark (1992): The Japanese Enterprise System: Competitive Strategies and Cooperative Structures. Oxford, England: Oxford University Press.

----- (1997): Knowledge Works: Managing Intellectual Capital at Toshiba. New York: Oxford University Press.

Gerlach, Michael L. (1992a): Alliance Capitalism: The Social Organization of Japanese Business. Berkeley: University of California Press.

-----and James R. Lincoln (1998a): "Economic organization and innovation in Japan: Networks, spinoffs, and the creation of enterprise." Forthcoming in Georg von Krogh (ed.): Knowledge Management: Comparative Perspectives (tentative title). London: Macmillan.

----- and James R. Lincoln (1998b): "The structural analysis of Japanese economic organization: a

conceptual framework." In W. Mark Fruin (ed.): Networks and Markets: Pacific Rim Strategies. New York: Oxford University Press, 1998.

Imai, Ken-ichi, Ikujiro Nonaka, and Hirotaka Takeuchi (1985) "Managing the new product development process: how Japanese companies learn and unlearn." Pp. 337-376 in Kim B. Clark, Robert H. Hayes, and Christopher Lorenz (eds.): The Uneasy Alliance: Managing the Productivity-Technology Dilemma. Boston, MA: Harvard Business School Press

Lincoln, James R., Michael L. Gerlach, and Peggy Takahashi (1992): "*Keiretsu* networks in the Japanese economy: a dyad analysis of intercorporate ties." American Sociological Review 57:561-585.

Lincoln, James R., Christina L. Ahmadjian, and Eliot Mason: "Organizational learning and purchase-supply relations in Japan: Hitachi, Matsushita, and Toyota compared." California Management Review 24 (Spring, 1998): 241-264. Special Issue on Knowledge and the Firm. Edited by Robert E. Cole.

Lincoln, James R. and Yoshifumi Nakata: "The transformation of the Japanese employment system: nature, depth, and origins.≅ Work and Occupations 24 (February, 1997): 33-55.

Mead, George Herbert (1962): Mind, Self, and Society. Edited and with an introduction by Charles W. Morris. Chicago: University of Chicago Press, 1962.

Mitchener, Brandon and Greg Steinmetz (1998). "After a prolonged skid, Mercedes is regaining much of its prestige. " Wall Street Journal, July 6, 1998.

Nikkei Weekly (1993) "Businesses should seek other options before resorting to personnel cuts." November 8, 1993.

Nikkei Weekly (1995) "Blue-chip firms tighten hiring, shift workers to subsidiaries." June 12, 1995.

Nishiguchi, Toshihiro (1994): Strategic Industrial Sourcing : The Japanese Advantage. New York : Oxford University Press, 1994.

----- (1996). Managing Product Development. New York: Oxford University Press, 1996.

Nishiguchi, Toshihiro and Alexandre Beaudet (1998): "Fractal design: self-organizing links in supply chain management." Paper presented at the Conference on Knowledge Creation and Transformation, University of St. Gallen, Switzerland, June 26, 1998.

Nonaka, Ikujiro and Hiro Takeuchi (1995): The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation. New York: Oxford University Press, 1995.

Odaka, Konosuke, Keinosuke Ono, and Fumihiko Adachi (1988): The Automobile Industry in Japan: A

Study of Ancillary Firm Development. Tokyo: Kinokuniya.

Roehl, Thomas (1989): “A comparison of U S.-Japanese firms’ parts-supply systems: what besides nationality matters?” Pp. 127-154 in Kichiro Hayashi (ed.): The U. S. Japanese Economic Relationship: Can It Be Improved? New York: New York University Press.

Sako, Mari (1992) Prices, Quality, and Trust: Inter-firm Relations in Britain and Japan. New York: Cambridge University Press.

----- (1996) “Suppliers’ associations in the Japanese automobile industry: collective action for technology diffusion.” Cambridge Journal of Economics, 20:651-671.

Sako, Mari and Susan Helper: (1998) “Determinants of trust in supplier relations: Evidence from the automotive industry in Japan and the United States.” Journal of Economic Behavior and Organization, 34:387-417.

Isaka, Satoshi (1995) "Automakers consider worker swaps: flexible use of labor becomes vital issue in effort to maintain employment leels in car industry." The Nikkei Weekly, October 16, 1995, p. 8.

Shioji, Hiromi (1995): "'*Itaku*' automotive production: an aspect of the development of full-line and wide-selection production by Toyota in the 1960's." Kyoto University Economic Review, 65:19-42.

Sitkin, Sim B., Denise M. Rousseau, Ronald S. Burt, and Colin Camerer (eds): The Academy of management Review. Special Topic Forum on Trust In and Between Organizations. V. 23, 1998.

Smitka, Michael J. (1991) Competitive Ties: Subcontracting in the Japanese Automotive Industry. New York : Columbia University Press.

Takahashi, Peggy K. (1995): Strategic Spin-offs and Organizational Change in the Japanese Electric and Electronic Equipment Industry. Berkeley: Unpublished Ph.d. Dissertation, UC Berkeley.

Uzzi, Brian (1996): “The sources and consequences of embeddedness for the economic performance of organizations – the network effect.” American Sociological Review, 61:674-698.

Von Krogh, Georg: “Care in knowledge creation.” California Management Review: Special Issue on Knowledge and the Firm. Edited by Robert E. Cole. 40:133-153.

Williamson, Oliver E (1985): The Economic Institutions of Capitalism. New York: Free Press

Womack, James P., Daniel T. Jones, and Daniel Roos (1990): The Machine that Changed the World. New York: Macmillan.

Table 1. *Shukko* rates estimated from a survey of ≅14,000 establishments in 1996.

	Males						Females					
	Originating *shukko*			Returning *shukko*			Originating *shukko*			Returning *shukko*		
	As % of employment[a]	As % of all departures[b]	As % of mandated departures[c]	As % of employment	As % of all departures	As % of mandated departures	As % of employment	As % of all departures	As % of mandated departures	As % of employment	As % of all departures	As % of mandated departures
All industries	.335	2.9	32.6	.279	2.5	27.5	.103	.59	12.5	.06	.35	7.42
Estab. Size 1000+	.677	9.0	73.6	.096	1.3	10.5	.281	1.44	29.3	.03	.17	3.42
300-999	.229	2.7	30.4	.295	3.4	39.2	.043	.25	10.3	.04	.22	8.97
100-299	.278	2.6	31.2	.320	3.0	36.0	.023	.12	4.2	.06	.32	11.02
30- 99	.206	1.5	15.8	.387	2.8	29.7	.057	.32	5.9	.11	.60	11.03
5- 29	.218	1.4	18.5	.346	2.2	29.4	.031	.19	3.1	.06	.36	5.63
All manufacturing	.386	4.1	37.7	.126	1.3	12.3	.077	.50	6.9	.02	.12	1.67
Electronics	.502	8.5	42.6	.234	3.9	19.9	.069	.45	3.4	.01	.09	.69
Automobiles	.389	4.5	59.3	.073	0.9	11.1	.058	.40	8.3	.00	.00	.00

[a]*Shukko* departures as a % of male (female) employment; [b]*Shukko* departures as a % of male (female) departures; [c]*Shukko* departures as a % of male (female) departures made "at the convenience of upper management" (excludes contract expirations, mandatory retirement, and expulsion for cause).

Source: Ministry of Labor Survey of Employment Trends, 1996, Table 30.

Table 2. Definitions of variables and descriptive statistics for observations on pairings of 21 electronics firms and 20 motor vehicles firms with 259 large Japanese financial and industrial firms in 1993.

Variable	Description	Electronics (N=4913) Mean (SD)	Motor Vehicles (N=4876) Mean (SD)
Director(*I*)	director on *J*'s board came from *I* (= 1; else 0)	.0043 (.0653)	.0045 (.0667)
Director(*J*)	director on *I*'s board came from *J* (= 1; else 0)	.0062 (.0787)	.0060 (.0774)
Equity(*I*)	log percent equity in *J* held by *I* if *I* a top ten shareholder (else 0)	.0008 (.0167)	.0008 (.0128)
Equity(*J*)	log percent equity in *J* held by *I* if *I* a top ten shareholder (else 0)	.0011 (.0115)	.0022 (.0163)
Trade(*I*)	*I* sells to *J* (=1; else 0)	.0111 (.1047)	.0109 (.1038)
Trade(*J*)	*J* sells to *I* (=1; else 0)	.0154 (.1230)	.0189 (.1361)
Size(*I*)	log total assets of *I*	13.762 (1.014)	13.159 (1.025)
Size(*J*)	log total assets of *I*	13.040 (.982)	13.043 (.984)

Table 3. Probit regressions of director transfer [director(*I*)] on reciprocity [director(*J*)], equity ties, trade ties and firm size for observations on pairings of 21 electronics and 20 motor vehicles firms with 259 large financial and industrial firms.

Explanatory variable	Electronics Industry N=4913†	Motor Vehicles N=4876†
Director(*J*)	.260 (.780)	.081 (1.549)
Equity(*I*)	7.023** (2.600)	44.388*** (3.47)
Equity(*I*)	2.042 (1.432)	2.801 (5.159)
Trade(*I*)	1.08* (.532)	1.642* (.724)
Trade(*J*)	.555 (.318)	-.503 (.272)
Size(*I*)	.116 (.109)	.301 (.216)
Size(*J*)	-.075 (.039)	-.159 (.098)
Autoregression Term	48.547 (27.500)	48.281 (34.214)
Constant	-3.838** (1.386)	-5.992 (3.888)
X^2 (8)	65.48***	13767.38***
Pseudo R^2	.439	.827

Note: Table entries are probit regression coefficients with robust standard error estimates (adjusted for clustering by firm) in parentheses. The autoregression term additionally controls for same-firm effects over dyads (see Lincoln, Gerlach, and Takahashi, 1992).
*p<.05; **p<.01; ***p<.001
†Reduced by missing data.