Michigan Law Review

Volume 98 | Issue 8

2000

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Recommended Citation

Yoshiro Miwa & J. M. Ramseyer, *Rethinking Relationship-Specific Investments: Subcontracting in the Japanese Automobile Industry*, 98 MICH. L. REV. 2636 (2000).

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RETHINKING RELATIONSHIP-SPECIFIC INVESTMENTS: SUBCONTRACTING IN THE JAPANESE AUTOMOBILE INDUSTRY

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Longer ago than either of us cares to remember, one of us attended junior high in Tokyo. On Saturdays, he worked at a printed circuit factory. Or maybe "factory" makes it all sound too grand. A small building in back of a gas station, it had three or four punch presses. The "president" supervised matters (though he actually spent more time hanging out at the gas station), together with a sidekick who did assorted odd jobs besides. Several middle-aged women with no apparent technical education or skill ran the presses.

The junior high kid spent his time trimming the sheets to which others would eventually attach the transistors. The women then punched the holes and margins onto the boards, and the president's sidekick loaded the finished boards onto a truck. Periodically, he returned them to the firm that had ordered the work and brought more sheets to punch along with any press dies the firm needed. The punch presses were standard generic affairs, and the buyer seems to have kept title to the dies.

Thirty years later, the other one of us knows the president of a factory near Nagoya. For many years, the firm has done machining work for a first-tier Toyota subcontractor. Unfortunately for the firm, Toyota has increasingly substituted integrated plastic units for the steel shock absorber parts the firm machines. Worried that the Toyota-bound work might disappear, the president has begun to move the firm toward machining materials for computer hard disks on the side.

A machining firm can make a wide variety of products, the president seemed to explain. His firm could make products for the automobile industry or otherwise, Toyota-bound or otherwise. If the demand for shock-absorber parts fell, well then it would simply make computer disks instead.

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What neither of us saw in either firm was any evidence of investments that were specific to the firm's trading partners. Yet whether such relationship-specific investments ("RSIs") structure the arrangements firms make matters. Indeed, for at least two independent reasons, whether they structure the Japanese automobile industry matters crucially.

Within law and economics, the prevalence of RSIs matters because of the way the issue goes to the heart of market contracting. At root, RSI theory challenges our routine assumption that straightforward market contracting produces something close to socially optimal arrangements. Although the theory is clear, the empirics are less so. Scholars have looked hard for evidence of governance arrangements driven by large relationship-specific investments. To date, they have reached only mixed conclusions. They find substantial evidence of the relation between RSIs and governance within idiosyncratic industries like public utilities, aerospace, and defense. Although they find some evidence of the relation within "ordinary" industries, they find considerably less. In that empirical vacuum, the Japanese automobile industry has stood as a prominent exception — an important example of RSI-driven extra-contractual governance arrangements in an "ordinary" industry.

Within Japanese studies, RSIs provide a convenient theoretical rationale for taking the conventional tales of "socially embedded" contracts and relational stability at face value. To date, all too many scholars have been all too happy to "explain" these tales by citing strong cultural norms of integrity or obligation. The theoretically more astute justifiably find the "explanations" hollow. For them, RSIs have offered an analytically coherent incentive-compatible rationale for exactly the same tales.

In this Article, we argue that the usual accounts of the industry are myth. Notwithstanding those accounts, the industry does not contain widespread, substantial physical-asset or human-capital RSIs. To the extent that we are right, theorists might do well to rethink the empirical role RSI theory has played over the past two decades. We do not argue that firms never make RSIs or that contracts will always solve incentive problems. Far be it from us to make such a claim, especially since this Article is only about one industry in one country. Neither do we claim that RSI theory is wrong as theory. Neither of us is a theorist, this is not a theoretical paper, and the intuition behind RSI theory has generally made sense to us anyway. Instead, we make a more modest point: that modern production may require lower levels of idiosyncratic investment than we have usually supposed; that market contracting may work better than usually asserted; and that, as a result, RSI theory may explain less of the contracting and governance patterns in place than scholars have often asserted.

In this Article, we argue that RSIs in the Japanese automobile industry are usually quite small and usually play a minor role. Toward that end, we begin by summarizing the implications RSI theory poses for contract theory (Section I.A) and surveying the empirical evidence (Section I.B-C). We then turn to the Japanese automobile industry. First, we anecdotally canvass the practices at Honda (Section II.B), and provide a background to the industry as a whole (Section II.C). Second, we examine the evidence of RSIs among second- and third-tier suppliers (Section III.A). Finally, we examine the evidence among first-tier suppliers (Section III.B).

I. SPECIFIC-INVESTMENT THEORY

A. *The Idea:*

Relationship-specific investments matter — and matter deeply — argue Oliver Williamson, Benjamin Klein, Robert Crawford, and Armen Alchian.¹ Dozens of scholars have since repeated the logic they pioneered, and today it graces such mainstream sources as the industrial organization text of Dennis Carlton and Jeffrey Perloff and the management text of Paul Milgrom and John Roberts.² According to this intuition, the scope and size of RSIs can directly affect the governance arrangements firms choose. Whether business partners negotiate long-term contracts, spot contracts, equity investments, franchise arrangements, or even mergers can depend vitally on the RSIs at stake.

Crucially, investments specific to a relationship generate appropriable quasi rents. In a world of incomplete contracting, as Scott Masten, James Meehan, Jr., and Edward Snyder put it, that appropriability may increase the “resources expended attempting to negotiate a favorable distribution of the gains from trade.”³ In the words of Klein, Crawford, and Alchian themselves, “[a]fter a specific investment is made and such quasi rents are created, the possibility of opportunistic behavior is very real.”⁴ To avoid such rent-seeking and

1. See OLIVER E. WILLIAMSON, *THE ECONOMIC INSTITUTIONS OF CAPITALISM: FIRMS, MARKETS, RELATIONAL CONTRACTING* (1985) [hereinafter WILLIAMSON, *THE ECONOMIC INSTITUTIONS OF CAPITALISM*]; Benjamin Klein et al., *Vertical Integration, Appropriable Rents, and the Competitive Contracting Process*, 21 J.L. & ECON. 297 (1978); Oliver E. Williamson, *Transaction-Cost Economics: The Governance of Contractual Relations*, 22 J.L. & ECON. 233 (1979) [hereinafter Williamson, *Transaction-Cost Economics*].

2. DENNIS W. CARLTON & JEFFREY M. PERLOFF, *MODERN INDUSTRIAL ORGANIZATION* chs. 2, 13 (2d ed. 1994); PAUL MILGROM & JOHN ROBERTS, *ECONOMICS, ORGANIZATION AND MANAGEMENT* ch. 9 (1992). The theory plays an even more pronounced role in DAVID BESANKO ET AL., *THE ECONOMICS OF STRATEGY* pt. I (1996).

3. Scott E. Masten et al., *The Costs of Organization*, 7 J.L. ECON. & ORG. 1, 6 (1991).

4. Klein et al., *supra* note 1, at 298.

rent-avoidance costs, firms may sometimes introduce governance arrangements that are otherwise unnecessary (and probably problematic, given the way most of them weaken market incentives). RSIs can potentially transform a competitive market exchange into a bilateral monopoly, in other words. When appropriate contractual arrangements are infeasible, that transformation may call forth arrangements that otherwise would be superfluous at best.⁵ Or as Klein, Crawford, and Alchian write:

The crucial assumption underlying the analysis of this Article is that, as assets become more specific and more appropriable quasi rents are created (and therefore the possible gains from opportunistic behavior increases [sic]), the costs of contracting will generally increase more than the costs of vertical integration. Hence, *ceteris paribus*, we are more likely to observe vertical integration.⁶

B. *The Evidence*

1. *GM-Fisher Body*⁷

Consider a short summary of the anecdote Klein, Crawford, and Alchian used to popularize this analysis: the 1926 merger between General Motors and Fisher Body. Before 1919, claim Klein, Crawford, and Alchian, car companies used wooden or wood-and-metal coaches. Making these early coaches involved standard tools and standard knowledge. Making a good one took skill, but it was a skill a coachmaker could use as easily to fit a coach onto a frame by assembler *A* as onto one by assembler *B*. Conversely, assembler *A* could as easily use a coach from coachmaker *X* as from coachmaker *Y*.

In this pre-1919 world, continue Klein, Crawford, and Alchian, assemblers and coachmakers traded on what was virtually a spot market. In doing so, they took little risk. If a coachmaker stopped selling, the assembler could buy its coaches elsewhere. If an assembler stopped buying, the coachmaker could sell its coaches elsewhere. As neither had invested much in either assets or skills that were specific to the relationship, neither had much to lose from switching contract partners.

By the next decade, Klein, Crawford, and Alchian write, car makers started to make standardized coaches out of steel. Fashioning these steel coaches required dies. In turn, these dies cost large sums,

5. See Williamson, *Transaction-Cost Economics*, *supra* note 1, at 241-42.

6. Klein et al., *supra* note 1, at 298.

7. After this Article was written but before it went to press, we received a copy of Ramon Casadesus-Masanell & Daniel F. Spulber, *The Fable of Fisher Body*, 43 J.L. & ECON. 67 (2000). We urge readers interested in the Fisher Body example to consult the extremely careful account in Casadesus-Masanell & Spulber. Many of our own conclusions about the relevance of RSI theory track their conclusions.

and could be used only for specific models. Now, the assembler and coachmaker faced the prospect of investing in an asset that paid off only within the relationship. As such, the asset generated appropriable quasi rents: if the coachmaker bought the die, the assembler could threaten to end the relationship in order to shift the terms of the deal in its favor.⁸

Rather than risk this opportunism, reason Klein, Crawford, and Alchian, assemblers and coachmakers integrated vertically. In 1919, Fisher Body and General Motors entered into a long-term contract. Alas, given the problems inherent in long-term contracts in the real world, opportunism-related problems persisted. By 1926, GM simply acquired Fisher Body outright. Given the large RSIs involved, the two firms found it paid to eliminate the risk through vertical integration.

2. RSI Taxonomy

To Klein, Crawford, and Alchian, the risk of opportunism in the GM-Fisher Body relationship lay in the investment in large stamp dies: "The manufacture of dies for stamping parts in accordance with the above specifications gives a value to these dies specialized to [the assembler], which implies an appropriable quasi rent in those dies. Therefore, the die owner would not want to be separate from [the assembler]."⁹ Yet such physical assets are not the only RSIs that theorists identify. Oliver Williamson, for example, cites several types of RSIs, of which we consider three here:

site specificity — e.g. successive stations that are located in a cheek-by-jowl relation to each other so as to economize on inventory or transportation expenses;

physical asset specificity — e.g. specialized dies that are required to produce a component; [and]

human asset specificity that arises in a learning-by-doing fashion . . .¹⁰

The evidence of occasional site specificity may well be the strongest. If a utility company builds a generating plant near a coal mine, for example, the utility and mine lock themselves into a relation close to a bilateral monopoly. Sometimes, this affects the governance structures they choose.¹¹

8. In fact, Casadesus-Masanell & Spurber, *supra* note 7, at 84-86, point out that Fisher Body did not begin to produce exclusively metal bodies until the late 1930s.

9. Klein et al., *supra* note 1, at 308.

10. WILLIAMSON, *THE ECONOMIC INSTITUTIONS OF CAPITALISM*, *supra* note 1, at 95 (emphasis added). Williamson also discusses a fourth category of "dedicated assets." See *id.*; see also Williamson, *Transaction-Cost Economics*, *supra* note 1.

11. See Keith J. Crocker & Scott E. Masten, *Mitigating Contractual Hazards: Unilateral Options and Contract Length*, 19 RAND J. ECON. 327 (1988); Stephen J. DeCanio & H.E. Frech III, *Vertical Contracts: A Natural Experiment in Gas Pipeline Regulation*, 149 J. INSTITUTIONAL & THEORETICAL ECON. 149, 370 (1993); C. Paul Hallwood, *On Choosing*

The evidence of human-capital specificity is more tenuous, though here too some scholars claim to find evidence on point. Marketing scholars, for example, argue that employees sometimes invest in brand-specific knowledge in ways that affect the governance choices firms make.¹² Others claim that employees invest in relation-specific manufacturing know-how to similar effect.¹³

By contrast, observers tend to find less evidence (though more than zero, to be sure) of the sort of physical-asset specificity Klein-Crawford-Alchian use to explain the GM-Fisher Body merger. Granted, Keith Crocker and Kenneth Reynolds conclude that physical-asset specificity affects the structure of defense procurement decisions.¹⁴ Scott Masten makes the same point about government aerospace purchases.¹⁵ Yet if ever there were idiosyncratic procedures, the defense and aerospace industries would be the place to find them. In

Organizational Arrangements: The Example of Offshore Oil Gathering, 38 SCOT. J. POL. ECON. 227 (1991); Jean-Francois Hennart, *Upstream Vertical Integration in the Aluminum and Tin Industries*, 9 J. ECON. BEHAV. & ORG. 281 (1988); Paul L. Joskow, *Contract Duration and Relationship-Specific Investments: Empirical Evidence from Coal Markets*, 77 AM. ECON. REV. 168 (1987); Paul L. Joskow, *Price Adjustment in Long-term Contracts: The Case of Coal*, 31 J.L. & ECON. 47 (1988); Paul L. Joskow, *Vertical Integration and Long-term Contracts: The Case of Coal-burning Electric Generating Plants*, 1 J.L. ECON. & ORG. 33 (1985); Scott E. Masten & Keith J. Crocker, *Efficient Adaptation in Long-Term Contracts: Take-or-Pay Provisions for Natural Gas*, 75 AM. ECON. REV. 1083 (1985); J. Harold Mulherin, *Complexity in Long-term Contracts: An Analysis of Natural Gas Contractual Provisions*, 2 J.L. ECON. & ORG. 105 (1986); Russell Pittman, *Specific Investments, Contracts, and Opportunism: The Evolution of Railroad Sidetrack Agreements*, 34 J.L. & ECON. 565 (1991); Pablo T. Spiller, *On Vertical Mergers*, 1 J.L. ECON. & ORG. 285 (1985).

12. See Erin Anderson, *Transaction Costs as Determinants of Opportunism in Integrated and Independent Sales Forces*, 9 J. ECON. BEHAV. & ORG. 247 (1988); Erin Anderson & Anne T. Coughlan, *International Market Entry and Expansion via Independent or Integrated Channels of Distribution*, 51 J. MARKETING 71 (1987); Erin Anderson & David C. Schmittlein, *Integration of the Sales Force: An Empirical Examination*, 15 RAND J. ECON. 385 (1984); Jan B. Heide & George John, *The Role of Dependence Balancing in Safeguarding Transaction-Specific Assets in Conventional Channels*, 52 J. MARKETING 20 (1988); George John & Barton A. Weitz, *Forward Integration into Distribution: An Empirical Test of Transaction Cost Analysis*, 4 J.L. ECON. & ORG. 337 (1988); Gary L. Lilien, *Advisor 2: Modeling the Marketing Mix Decision for Industrial Products*, 25 MGMT. SCI. 191 (1979).

13. See Henry Ogden Armour & David J. Teece, *Vertical Integration and Technological Innovation*, 62 REV. ECON. & STAT. 470 (1980); Marvin B. Lieberman, *Determinants of Vertical Integration: An Empirical Test*, 39 J. INDUS. ECON. 451 (1991); Scott E. Masten et al., *Vertical Integration in the U.S. Auto Industry: A Note on the Influence of Transaction Specific Assets*, 12 J. ECON. BEHAV. & ORG. 265 (1989); Kirk Monteverde & David J. Teece, *Supplier Switching Costs and Vertical Integration in the Automobile Industry*, 13 BELL J. ECON. 206 (1982); Gary P. Pisano, *Using Equity Participation to Support Exchange: Evidence from the Biotechnology Industry*, 5 J.L. ECON. & ORG. 109 (1989).

14. See Keith J. Crocker & Kenneth J. Reynolds, *The Efficiency of Incomplete Contracts: An Empirical Analysis of Air Force Engine Procurement*, 24 RAND J. ECON. 126 (1993).

15. See Scott E. Masten, *The Organization of Production: Evidence from the Aerospace Industry*, 27 J.L. & ECON. 403 (1984).

more ordinary industries, however, observers have found much less evidence of physical-asset specificity.¹⁶

Consistent with the difficulty in finding widespread evidence of the ties between physical-asset specificity and governance, the GM-Fisher Body story raises its own problems as well. If relation-specific dies were the problem, GM could have mitigated it contractually by owning the dies itself — a tactic modern car companies routinely use.¹⁷ So long as it owned and could repossess the dies, it faced little more risk through contract than it did through vertical integration.

More basically, by 1919 GM already held a majority interest in Fisher Body anyway.¹⁸ Absent any unusual arrangement, as a controlling shareholder, GM could have appointed the entire board and, through the board, could have mandated all policy.¹⁹ Whether the coaches were steel or wood and whether GM owned the dies or Fisher Body did, neither GM nor Fisher Body would have faced the risk of any opportunism justifying an otherwise *non-cost-justified* merger between of the two firms.

Indeed, GM seems to have done perfectly well with independent suppliers for other specialized products. A.O. Smith, for example, was already making automobile frames for GM and others in the early 1930s. Half a century later, A.O. Smith was still the largest automobile frame manufacturer, was still independent, and still had GM as a principal customer. "Major model changes involve[d] substantial ex-

16. See Kirk Monteverde & David J. Teece, *Appropriable Rents and Quasi-Vertical Integration*, 25 J.L. & ECON. 321 (1982), however, find that it does lead the buyer to retain title to the dedicated physical asset used in the production process. Other studies claiming to locate evidence of physical-asset specificity include David T. Levy, *The Transactions Cost Approach to Vertical Integration: An Empirical Examination*, 67 REV. ECON. & STAT. 438 (1985) (claiming that advertising intensity proxies for RSIs); Ian C. MacMillan et al., *Uncertainty Reduction and the Threat of Supplier Retaliation: Two Views of the Backward Integration Decision*, 7 ORG. STUD. 263 (1986) (using multi-industry "Profit Impact of Market Strategies" database); Thomas M. Palay, *Comparative Institutional Economics: The Governance of Rail Freight Contracting*, 13 J. LEGAL STUD. 265 (1984) (discussing idiosyncratic freight cars).

17. On the GM-owning-the-die tactic, see, for example, WILLIAMSON, *THE ECONOMIC INSTITUTIONS OF CAPITALISM*, *supra* note 1, at 95; Masten et al., *supra* note 3; Monteverde & Teece, *supra* note 16. Klein himself acknowledges this point in Benjamin Klein, *Vertical Integration as Organizational Ownership: The Fisher Body-General Motors Relationship Revisited*, 4 J.L. ECON. & ORG. 199, 205 (1988).

18. See R. H. Coase, *The Nature of the Firm: Influence*, in *THE NATURE OF THE ORIGINS, EVOLUTION, AND DEVELOPMENT* 61 (Williamson & Winter eds., 1991); Klein et al., *supra* note 1, at 308 n.25.

19. Others have claimed that the Fisher brothers controlled this stock through a voting trust. Although that would indeed have removed GM's voting control, in most states the disability would have been temporary. State statutes generally limit the terms of voting trusts to 10 years or less, which would have ended the Fisher Body trust by 1929 at the latest. See ROBERT CHARLES CLARK, *CORPORATE LAW* 777 (1986); HARRY G. HENN & JOHN R. ALEXANDER, *LAWS OF CORPORATIONS AND OTHER BUSINESS ENTERPRISES* 531-32 (1983). In fact, Casadesus-Masanell & Spurber, *supra* note 7, at 80, point out that the actual Fisher Body voting trust ended in 1924.

penses by A.O. Smith for new tooling, the arrangement of production lines and learning time for production employees,” reports Ronald Coase, but contractual and reputational constraints kept opportunism to manageable levels.²⁰

C. Japan

Despite the apparent shortage of evidence showing widespread extra-contractual governance mechanisms driven by large physical-asset specificities, RSIs have played an increasingly prominent part in academic discussions of Japan. The story begins with the late Banri Asanuma. Asanuma devoted much of the 1980s to studying the automobile industry, and throughout the decade reported his results in both Japanese and English. He also maintained a long-standing interest in Williamson's work, translating *Markets and Hierarchies* into Japanese.²¹

According to Asanuma, the relationship between Japanese automobile assemblers and suppliers is long-standing, and long-standing for reasons that closely reflect the Williamson-Klein-Crawford-Alchian logic. First, the parties trade in “customized parts.” Second, the parties can produce these customized parts efficiently only by investing in “relation-specific skills.” Third, through those skills they produce a “relational quasi rent” and — to return to the original point — that rent creates an incentive to maintain the relationship long-term. How the parties prevent the rent-seeking and rent-avoidance activities that trouble Williamson and Klein-Crawford-Alchian, Asanuma seems not to have addressed.²²

Relying in part on Asanuma's field work, Masahiko Aoki similarly argues that Japanese manufacturers and subcontractors rely on RSIs.²³ Subcontractors invest heavily, explains Aoki, in skills that are specific to their relationship with a given manufacturer. To make money on such investments, a subcontractor must be able to expect long-term returns. By the logic of Williamson and Klein-Crawford-Alchian, the insecurity inherent in the appropriability of the quasi rents should

20. See Coase, *supra* note 18, at 71-72. Perhaps reflecting some of these issues, Klein switched much of his explanation for the 1926 merger to human-capital investments ten years after the original article. See Klein, *supra* note 17, at 208.

21. See Banri Asanuma, *Nihon ni okeru meekaa to sapuraiyaa to no kankei* [The Manufacturer-Supplier Relationship in Japan], in *SAPURAIYAA SHISUTEMU* [SUPPLIER SYSTEM] 1, 37 n.* (Takahiro Fujimoto et al. eds., 1998). The translation appeared as *SHIJO TO KIGYO SOSHIKI* [MARKETS AND FIRM ORGANIZATION] (1980).

22. See Banri Asanuma, *Manufacturer-Supplier Relationships in Japan and the Concept of Relation-Specific Skill*, 3 J. JAPANESE & INT'L ECON. 1 (1989).

23. See MASAHIKO AOKI, INFORMATION, INCENTIVES, AND BARGAINING IN THE JAPANESE ECONOMY 216-17 (1988); see also Masahiko Aoki, *Toward an Economic Model of the Japanese Firm*, 28 J. ECON. LIT. 1 (1990).

drive the subcontractor to merge with the manufacturer. In Japan, they do not. This presents a puzzle to Aoki, who solves it by arguing that Williamson and Klein-Crawford-Alchian overstate the problem of opportunism and that, generally, a firm will keep its promises out of concern for its own reputation.

Jeffrey H. Dyer finds the extensive use of RSIs crucial to the very success of the automobile industry in Japan, since they lead to "lower costs, higher quality, and greater profits":

[A] key to the success of Japanese network relationships is the practice of dedicating supplier assets to the customer. That is, Japanese auto-parts suppliers send engineers to work at the customer's site, locate plants near the customer, or invest in customized physical assets.²⁴

All told, concludes Dyer, "dedicated assets provide Japanese manufacturers with substantial competitive advantages."²⁵

This analysis also appears in legal scholarship. In an intriguing recent study of Japanese cross-shareholdings, leading corporate law scholars Ronald Gilson and Mark Roe argue that firms buy stock in each other when they make heavy RSIs in each other.²⁶ Where Aoki primarily stresses the relationship-specific human capital investments, Gilson-Roe suggest that Japanese production (including the automobile industry) involves high degrees of all three Williamsonian RSIs: human-capital specificity, site specificity, and even physical-asset specificity.

Like other scholars in this tradition, Gilson and Roe note that RSIs generate appropriable quasi rents. Where Aoki argued that reputational effects largely prevent opportunism, however, Gilson and Roe turn to the cross-shareholdings. Because (they argue) Japanese business groups (namely, the *keiretsu*) often own controlling interests in manufacturing firms, groups can collectively control their members. Should any one member behave opportunistically, the group can collectively intervene. The RSIs in the industry are large, in short, and generate distinctive extra-contractual governance arrangements.²⁷

24. Jeffrey H. Dyer, *Dedicated Assets: Japan's Manufacturing Edge*, HARV. BUS. REV. Nov.-Dec. 1994, at 174, 174.

25. *Id.*

26. See Ronald J. Gilson & Mark J. Roe, *Understanding the Japanese Keiretsu: Overlaps Between Corporate Governance and Industrial Organization*, 102 YALE L.J. 871, 884 (1993). A similar argument is made in David Flath, *The Keiretsu Puzzle*, 10 J. JAPANESE & INT'L ECON. 101 (1996). An assertion similar to that made by Gilson & Roe is also made in J. Mark Ramseyer, *Cross-shareholding in the Japanese Keiretsu*, in CONVERGENCE IN CORPORATE LAW: THE EMERGING QUESTIONS (forthcoming 2000). Not to put too fine a point on it, the claim here is that the argument about the automobile industry in Ramseyer, *supra*, is wrong.

27. See Gilson & Rose, *supra* note 26.

II. THE INDUSTRY

A. Introduction

Such is the theory. The question is how much of the governance patterns in the Japanese automobile industry it actually explains. We confess to being skeptical. What we know of the industry suggests that RSIs are modest, and what we know of Japanese contracting practice suggests that the parties could solve most of their problems by contract.²⁸ RSI theory, however, posits that parties will negotiate extra-contractual governance mechanisms primarily when they find large RSIs juxtaposed with significant barriers to contract.

To begin to examine these issues, we pose two necessarily interrelated empirical questions: (a) whether assemblers and suppliers make large RSIs; and (b) whether any RSIs they make lead to extra-contractual governance arrangements. We are the first to admit that we lack direct measures of RSIs. We do, however, have a variety of indirect measures (however imperfect). In this Article, we combine them with an investigation of when and how the parties negotiate what sort of extra-contractual governance mechanisms.

B. *Subcontracting at Honda*²⁹

1. Introduction

To give a feel for the industry, we begin this analysis of Japanese subcontracting by describing five firms in the Honda network. We realize that the statistically inclined will be impatient with the discursive account. Because much of the misunderstanding about the industry results from the way most scholars understandably lack an intuitive sense of the "shop floor," however, we begin with some anecdotes.

28. Contracts could potentially solve the problems whether enforced through the courts or through reputational mechanisms. On reputational sanctions in the industry, see YOSHIRO MIWA, *FIRMS AND INDUSTRIAL ORGANIZATION IN JAPAN* 75-76 (1996).

29. Generally in this Section, we rely on NIHON RODO KENKYU KIKO, SANGYO BUNGYO KOZO TO RODO SHIJO NO KAISO SEI [THE STRUCTURE OF THE DIVISION OF LABOR IN PRODUCTION, AND THE CLASS STRUCTURE OF THE LABOR MARKET] (1992), as well as conversations with the original investigators. We update the data through FUYUMI MIYOSHI, JIDOSHA GYOKAI HAYAWAKARI MAPPU [EASY-TO-READ MAP OF THE AUTOMOBILE INDUSTRY] (1999); NIHON KEIZAI SHIMBUN SHA, NIKKEI KAISHA JOHO [NIKKEI COMPANY INFORMATION] (relevant years); and SHUKAN TOYO KEIZAI, KIGYO KEIRETSU SORAN [OVERVIEW OF FIRM KEIRETSU] (relevant years) where appropriate. For information on the supplier system generally, see MIWA, *supra* note 28, at § 4.2. On the lack of important government aid to the industry, see John Creighton Campbell, *The Automobile Industry and Public Policy*, in *THE AMERICAN AND JAPANESE AUTO INDUSTRIES IN TRANSITION* 79 (Robert E. Cole & Taizo Yakushiji eds., 1984).

The points we make are not unique to Honda. Instead, they apply to contracting relationships in other manufacturing networks as well.³⁰

Founded a half century ago, Honda conquered the motorcycle world in the 1960s.³¹ It remains near the apex of that industry, and now stands as Japan's third largest automobile producer. Where Toyota sold 3.2 million cars in 1998 and Nissan 1.6 million cars, Honda sold 1.2 million. Where Toyota had 1998 sales of 7.8 trillion yen and Nissan 3.5 trillion yen, Honda had sales of 3.1 trillion yen. Where Toyota had a workforce of 70,000 and Nissan 40,000, Honda had a workforce of 29,000.

Honda buys components from approximately 280 firms. It maintains long-term ties with about eighty of these, and has equity stakes in a third of the eighty. It pays its suppliers amounts equal to about 80% of its sales. In many cases, these subcontractors are substantial firms in their own right: Keihin (carburetors, fuel injection systems; sales of 144 billion yen and 4,000 employees), for example, or Nippon seiki (gauges; 87 billion sales and 1,700 employees), and Yutaka giken (exhaust systems; 72 billion sales and 1,100 employees).

Honda buys shock absorbers from three firms, but relies most heavily on A_1 .³² With sales of 103 billion yen and 2,800 employees, A_1 is one of Honda's largest subcontractors. In turn, A_1 buys from over 200 suppliers. Many of A_1 's suppliers (the steel producers, for instance, or rubber) are large and do not rely heavily on A_1 sales. Others (like the stamping and machining firms that make peripheral products) are much smaller.

Generally, A_1 buys peripherals from eight stamping and thirteen machining companies. Of the eight stamping firms, three sell less than 20% of their output to A_1 , two sell 40-60%, and three sell over 60%. Of eleven machining firms (we lack data on two), three sell under 10% of their output to A_1 , two sell 10-30%, three sell 50-60%, and three sell over 70%.

Among these second-tier subcontractors, B_1 runs stamping operations and B_2 machining operations. In turn, B_1 buys from sixty-two suppliers, and B_2 from fifteen. Among these third-tier subcontractors, C_1 does spot-welding jobs and C_2 stamping work, both for B_1 . We begin with these third-tier firms and turn then to the second- and finally the first-tier.

30. Discussions of the Nissan network in RODO, *supra* note 29, reflect this, and Miwa's own interviews confirm this. Contrary to many claims, the contracting practices by the firms in the industry (including Toyota) are standard and used routinely by firms in a variety of other industries as well. See MIWA, *supra* note 28, at 64-68. To test the common Toyota-is-different hypothesis, we add a Toyota dummy in the regressions below.

31. See MIWA, *supra* note 28, at 64.

32. Because of the assurances of confidentiality the original researchers gave their interviewees, we do not identify the firms involved in the following examples.

2. *Third-tier Subcontractors*

C_1 . Established in 1968 as a welding operation, C_1 initially consisted of the president, his wife, and two part-time employees. Together, they produced television parts. They started selling to B_1 in 1985, and by 1989 had annual sales of 78 million yen, eleven workers, and seventeen welding machines. The firm now sells half its output to B_1 . The rest of its output involves electrical equipment, water heaters, and automobile accessories like audio and lighter parts.

On the 27th or 28th of each month, B_1 gives C_1 the next month's order plan. Twice a day, it sends a truck with the materials for C_1 to weld and picks up any finished work.

For all practical purposes, only the president at C_1 has any engineering expertise. Of the eleven workers, three are family members and eight are nonfamily employees with less than ten years' experience. When faced with a new product from B_1 , the president personally determines the technical specifications of the manufacturing process: what voltage to set for the weld, for instance, how much time to use, and what pressure to apply. After he does, the employees follow his instructions.

C_2 . Firm C_2 began in 1973 with five workers. For several years, it did stamping work for air conditioners and vending machines. As demand fell the president asked B_1 for work. When B_1 agreed, C_2 bought the new equipment necessary. Within a year, it had fifteen employees and sent 70% of its work to B_1 .

Of the fifteen people at C_2 , three are family members, five are full-time employees, and seven are part-time. The work is sufficiently simple that virtually any employee can do it with little experience. B_1 pays C_2 on a piece-rate basis, and charges it for the supplies and stamping dies it needs.

C_2 sends some of its work (10-20% of its sales) to four other firms. These fourth-tier subcontractors too are mostly family operations. Typically, they have one or two non-family employees.

3. *Second-tier Subcontractors*

B_1 . The creation of an ex-Nakajima Aircraft employee, B_1 began in 1947. Initially, it produced agricultural machines, but in 1954 took up stamping work. It adopted its current corporate status in 1962, and began selling door-handle parts two years later.

In 1971, B_1 began doing stamp work for A_1 . By 1984, it had eighty-five employees (including seven part-time) and sales of 2.13 billion yen. It pays its suppliers amounts equal to 40% of its sales. It sells two-fifths of its output to A_1 and two-fifths to another firm that incorporates the work into brake assemblies bound for Honda. The remaining fifth it sells elsewhere. It owns its own stamp presses.

When A_1 and B_1 negotiate a new job, they set the expected quantity and price, and calculate a depreciation charge for the stamp dies. On the 20th of each month, A_1 announces its projected demand for the next ninety days. Within each month, when necessary, it can change orders on five days' notice.

B_2 . As of 1987, second-tier subcontractor B_2 had fifty-five employees and 667 million yen in sales. Established in 1964, it had started as a machining firm for a textile machine producer. Because the president knew the president of first-tier subcontractor, X , it shifted to automobile parts the next year.

In 1970, with fifteen to sixteen employees, B_2 began trading with A_1 . At the time, X had no objection to its doing so. When B_2 's orders from A_1 began to rival its sales to X , X still did not object. By 1987, B_2 sold half of its output to A_1 .

B_2 specializes in precision machining. Of its fifty-five employees, thirty-seven are "regular" employees (twenty-seven male and ten female; twenty-seven full-time and ten part-time). Of the twenty-seven full-time regular employees, twenty have less than ten years' experience.

The part-time employees are primarily housewives from nearby farms. They do the same labor-intensive manufacturing work as their full-time counterparts. Although the company would prefer that they worked full-time, they remain part-time to preserve the option of staying home during the peak agricultural work season.

In 1987, B_2 hired a retired A_1 director as a technical advisor. He advised the firm twice a week on equipment investment, negotiations with A_1 , and assorted other managerial issues. B_2 holds title to its own equipment. It buys from its own subcontractors products worth a quarter of its total sales.

4. *First-tier Subcontractor A_1*

Founded in 1938, A_1 began by manufacturing aircraft parts. In 1953, it switched to motorcycle shock absorbers for the young Honda firm. When Honda moved into automobiles, A_1 followed. In 1970, it experienced financial problems, and Honda responded by buying an equity stake (now 35.8%). It has since listed its stock on the Tokyo Stock Exchange. Its president and about half its directors are from Honda.

A_1 currently makes shock absorbers and a variety of other air- and oil-pressure-related goods. By product, 61% of its 1998 sales go to cars or trucks, 33% to motorcycles, and 8% to boats. By buyer, 72% of its sales go to Honda, 8% to Suzuki, and smaller amounts to such firms as Kawasaki, Yamaha, Fuji Heavy Industries (maker of Subarus), Mazda, and Mitsubishi Auto. Purchases from its own suppliers count for about 63% of its sales.

A₁ regularly designs products in collaboration with Honda and sends its people to Honda as guest engineers. In developing these new products, A₁ and Honda generally ignore the lower-tier subcontractors (who, as the discussion above suggests, lack much engineering expertise anyway).

Honda models are subject to a four-year product cycle, with minor annual changes. Many of A₁'s products are subject to the annual changes.

C. *Industry-wide Data*³³

1. *Firm Size*

We turn now from this discursive account to aggregate statistics on the industry and consider first some information on firm size (Section 1) and supplier associations (Section 2). Although (as the account above implies) many second- and third-tier suppliers are small, some first-tier suppliers are larger even than a few of the assemblers.³⁴ As noted earlier, Toyota has 70,000 employees and annual sales of 7.8 trillion yen. Mazda has only 24,000 employees and 1.5 trillion yen in sales; Suzuki has 14,000 employees and 1.2 trillion yen sales; and Daihatsu has 11,000 employees and 783 billion yen sales.

By comparison, Denso (maker of air-conditioning and other automobile-industry electrical units) has 40,000 employees and sales of 1.3 trillion yen. Asahi Glass has 8,000 employees and 855 billion yen in sales; Aishin seiki (running gear) has 12,000 employees and 521 billion yen sales; and Kyocera (high-tech ceramics) has 13,000 employees and 492 billion yen in sales. Indeed, several first-tier suppliers are multinational conglomerates that swamp the smaller automobile assemblers: Hitachi (69,000 employees and annual sales of 4.1 trillion yen), Toshiba (66,000 employees and 3.7 trillion yen in sales), and Matsushita Electric (46,000 employees and 4.9 trillion yen in sales).

Nor should one think suppliers simply make ashtrays and brakes for Toyota and Honda to bolt onto their cars. Sometimes the "assembler" out-sources even the assembly itself. A "Toyota" car, for example, might well have been assembled by Toyoda Automatic Loom,

33. In this Section and elsewhere, we obtain general information on firm sales, employees, and the like from NIHON KEIZAI, *supra* note 29; TOYO KEIZAI, *supra* note 29; NIHON KEIZAI SHIMBUN SHA, KAISHA SORAN [ANNUAL CORPORATION REPORTS] (relevant volumes and years); NIHON NO JIDOSHA BUHIN KOGYO (1998 NEN BAN) [JAPANESE AUTOMOTIVE PARTS INDUSTRY ASSOCIATION, 1998] (Nihon jidosha buhin kogyo kai & Oto toreedo jaaneru eds., 1998) [hereinafter JAPIA]; TOYO KEIZAI SHIMPOSHA, SHIKIHO: MUJOJO GAISHABAN [SEASONAL REPORTS: UNLISTED COMPANIES] (relevant years).

34. These are not mutually exclusive categories. The same supplier may be a first-tier supplier with respect to one assembler but a second- or third-tier supplier with respect to another. Teikei kikaki sells both to Aisan kogyo (a supplier) and to Yamaha (an assembler); Aisan sells directly to Toyota (an assembler) but also to Denso (a supplier).

Toyota Auto Body, or Kanto Automobile Works. All told, Toyota consigns the entire assembly of nearly half its cars. At times in its history, Toyota even consigned the development of some of its cars to other firms.³⁵

We have less data on the second-, third-, or fourth-tier suppliers. The Japan Automotive Parts Industry Association ("JAPIA") does not maintain a list of these suppliers, and even if it did their small size would make information on them hard to collect. The annual government *Census of Manufactures*, however, does collect data on manufacturing establishments (each plant within a firm is a separate unit), and this census confirms the small size of most automobile supplier plants. In Table 1, we give plant size in the transportation equipment sector. Of the 7,533 establishments, 4,236 (56%) have ten to twenty-nine employees. Only 128 establishments (1.7%) have more than 1,000.³⁶

2. Supplier Associations

Most assemblers maintain associations of first-tier suppliers.³⁷ The suppliers in these associations meet from time to time to exchange information with each other and with the assembler. Obviously, suppliers will find membership most worthwhile if they are producing customized goods for the supplier. Toyota, for example, has 189 suppliers in its network, Nissan has 234, and Mitsubishi 377.

35. See Haruhito Shiomi, *The Formation of Assembler Networks in the Automobile Industry: The Case of Toyota Motor Company (1955-1980)*, in *FORDISM TRANSFORMED: THE DEVELOPMENT OF PRODUCTION METHODS IN THE AUTOMOBILE INDUSTRY* 28, 30-31 (Haruhito Shiomi & Kazuo Wada eds., 1995); KANTO JIDOSHA KOGYO, KANTO JIDOSHA KOGYO 40 NENSHI [40-YEAR HISTORY OF KANTO JIDOSHA KOGYO] 118, 153 (1986).

36. HEISEI 9 NEN, KOGYO TOKEI HYO: SANGYO HEN [CENSUS OF MANUFACTURES: REPORT BY INDUSTRY, 1997] (Tsusho sangyo sho ed., 1999). Not all data are available broken down at the three-digit sectors. However, of the 13,518 establishments in the two-digit transportation equipment sector, 9,964 are from the three-digit automotive sector; of the 907,000 employees in the two-digit sector, 770,476 are in the three-digit automotive sector. The correlation coefficients between the two-digit transportation and three-digit automotive sectors are: (a) for distribution of employees, by establishment size — 99.96%; and (b) for distribution of establishments, by establishment size — 99.97%.

37. On supplier associations, see MIWA, *supra* note 28, at 70-72. In several cases, the assembler maintains more than one association. Toyota, for example, has three associations divided on the basis of geography. Honda does not maintain a formal association; here, we use its list of suppliers instead. For our database, we rely on the 1998 JAPIA list of 1,649 firms. See JAPIA, *supra* note 33. The list primarily includes JAPIA members but includes some prominent non-member parts manufacturers and excludes some members who do not make parts (e.g., scrap dealers) or wholesalers who deal primarily in other goods. See *id.* at 251.

TABLE 1: ESTABLISHMENT SIZE AND INVESTMENT LEVELS IN THE TRANSPORTATION EQUIPMENT SECTOR (1997)

A Estab. size (emp's)	B Capital	C Employees	D Establishments	B/C	B/D
10-29	302,800	76,410	4,236	3.96	71.5
30-49	192,900	39,093	1,000	4.93	192.9
50-99	421,900	72,251	1,032	5.84	408.8
100-199	547,900	80,549	589	6.80	930.2
200-299	373,700	48,422	198	7.72	1,887.4
300-499	637,400	72,940	186	8.74	3,426.9
500-999	1,160,700	116,503	164	9.96	7,077.4
1000-	3,766,900	363,618	128	10.36	29,428.9

Notes: Capital is in million yen, excluding land.

Establishments are those in the 2-digit transportation equipment sector.

Source: HEISEI 9 NEN, KOGYO TOKEI HYO: SANGYO HEN [CENSUS OF MANUFACTURES: REPORT BY INDUSTRY, 1997] (Tsusho sangyo sho ed., 1999).

Observers frequently cite these associations as evidence of automobile industry "keiretsu," and assume that the groups are exclusive. In fact, they are anything but. Consider a simple correlation matrix of association membership. Yamaha, Suzuki, and Honda also make motorcycles, and thus draw on a different set of suppliers. Among the other assemblers, however, all correlation coefficients except one are above 0.20, and among Subaru, Daihatsu, and Mazda all coefficients are above 0.50. Even the membership correlation coefficient for archrivals Toyota and Nissan is 0.22. Put another way, of the 189 Toyota and 234 Nissan association members, sixty-eight suppliers are in both associations.³⁸

Or consider the following: 1,098 firms are in one or more of the Toyota, Nissan, Mitsubishi, Subaru, Mazda, Daihatsu, Hino, Isuzu, Yamaha, Suzuki, and Honda networks.³⁹ Among these firms, the mean association membership is 1.91. Seven hundred thirty-eight firms are in only one association; 135 are in two associations; 135 are in three-to-five associations; sixty-two are in six-to-eight associations, and twenty-eight are in nine or more.

Nor are these associations peculiar to the assemblers. Many suppliers also maintain associations of *their* suppliers. For example, Denso (air conditioners; 40,000 employees and 1,375 billion yen in sales) has an association of sixty-seven suppliers; Koito (lighting

38. Toyota has a 20% equity interest in Hino and a 34% interest in Daihatsu. As one might expect given this equity network, the correlation coefficients among the supplier associations for these three firms are higher — ranging from 0.30 to 0.44

39. The Honda network is not a formal organization like the others. However, we follow the categorization of JAPIA, *supra* note 33, which lists some firms as regular suppliers to Honda.

equipment; 4,600 employees and 148 billion yen in sales) has an association of sixty-eight suppliers; Akebono Brake (2,900 employees and 108 billion yen in sales) has an association of seventy-nine suppliers; and Kayaba (oil pressure equipment; 4,200 employees and 177 billion yen in sales) has an association of 270 suppliers.⁴⁰ More generally, of the 373 firms on which the JAPIA provides data, 188 (50%) maintained their own supplier associations. Among the firms with 500 or fewer employees, the figure was 39% (sixty-two firms); among those with 501-1,000 employees, 53% (forty-six firms); among those with 1,001-5,000 employees 67% (seventy-two firms); and among those with 5,001 or more employees, 40% (eight firms).

III. RELATION-SPECIFIC INVESTMENTS

A. *Smaller Firms*

The discussion of the Honda network suggests two preliminary points about the level of RSIs at the smaller suppliers. First, they invest very little in relationship-specific human capital. We know they invest little in relationship-specific human capital because they invest little in human capital at all. In many of these firms, only one or two people know any engineering. The other employees are so new that if they did have any expertise, it would be general rather than specific to the firm or its partners.

Second, small as they are, the firms can and do sell to buyers in several distinct industries. Not only do they not sell to a single firm, they do not even sell to a single industry. Depending on their niche, they stamp, they machine, they assemble, they weld. If the price is right, they will stamp, machine, assemble, and weld Honda-bound products. But they can apparently do the same for aircraft, air conditioners, boats, textile equipment, television sets, and vending machines.

Loosely to be sure, industry-wide data confirm these impressions. First, employee tenure at the small firms is notoriously short. Consider data from the government's annual census of wages (Figure 1).⁴¹ Among the smallest firms (those in the two-digit transportation equipment sector with ten to ninety-nine employees), nearly 40% of

40. See NIHON DENSO, NIHON DENSO 25 NEN SHI [A 25-YEAR HISTORY OF NIHON DENSO] 243-44 (1974); KOITO SEISAKUSHO, KOITO SEISAKUSHO 70 NEN SHI [A 70-YEAR HISTORY OF KOITO SEISAKUSHO] 42 (1985); AKEBONO BUREEKI, HANSEIKI NO AYUMI [A HALF CENTURY OF PROGRESS] 347 (1979); KAYABA KOGYO, KAYABA KOGYO 50 NEN SHI [A 50-YEAR HISTORY OF KAYABA KOGYO] 284-86 (1986).

41. See RODOSHO, CHINGIN SENSASU, HEISEI 9 NEN CHINGIN KOZO KIHON TOKEI CHOSA [BASIC SURVEY ON WAGE STRUCTURE 1997] (1998). In compiling this figure, we use data provided to us by the ministry, which breaks down industry into smaller categories than those used for the final published survey.

the workers have been at the firm for less than four years. Another 20-odd percent have worked there five to ten years. Even among the firms with 100-999 employees, half have less than ten years' tenure.

Second, the small firms lack substantial physical-asset investments of any sort, much less relationship-specific physical assets (Table 1). At the smallest plants, capital investment per employee is a mere 4 million yen — at 120 yen/dollar, about \$33,000. Even among plants with 200-300 employees, the figure approaches only 7.8 million yen, or about \$65,000.

Finally, as we explain in more detail immediately below, among automobile suppliers of all sizes, most technology is general rather than specific. Those investments that are specific, in turn, are specific not to a relationship but to a model. As such, they necessarily have, at most, four years' duration.

FIGURE 1: EMPLOYEE TENURE IN THE TRANSPORTATION EQUIPMENT SECTOR (1997)

Note: L — firms with 1,000 or more employees; M — firms with 100-999 employees; S — firms with 10-99 employees.

Source: RODOSHO, CHINGIN SENSASU, HEISEI 9 NEN CHINGIN KOZO KIHON TOKEI CHOSA [BASIC SURVEY ON WAGE STRUCTURE 1997] (1998). In compiling this figure, we use data provided to us by the ministry that disaggregate the industry into categories smaller than those used for the final published survey.

B. *Larger Firms*

1. *The Logic*

Given this lack of substantial investments among second- and third-tier suppliers, if any suppliers in the Japanese automobile industry have large RSIs, they must be among the larger first-tier suppliers. At least there, according to Table 1 and Figure 1, the levels of capital investment are relatively high and employee tenures long. At least there, physical assets *could* be substantial and relationship-specific, employees *could* have significant relationship-specific expertise, and those investments *could* affect the governance arrangements the firms adopt. And at least there, the assemblers sometimes make equity investments: as we show in Table 4, the probability that an assembler invests in a supplier increases with supplier size.

Yet even here, basic logic should give one pause. First, these firms make products common to all cars everywhere. All cars have windshields, shock absorbers, headlights, seats, piston rings, and cigarette lighters. They may come in different sizes and different shapes, but if a supplier can make these sorts of products for one assembler, it could probably make them for another assembler.

Put another way, any asset-specificity in production seems model-specific rather than relationship-specific. Suppose a supplier needs to invest in idiosyncratic equipment or training to make Camry-bound tail lights. If those investments would not transfer to Accord-bound tail lights, they probably would not transfer to Corolla-bound ones either.⁴²

Second, any model-specific investments are short-lived. For most assemblers, a model lasts only four years. As a result, even if a subcontractor does own a specialized asset, it usually will not generate quasi rents long-term. Instead, it will generate them for four years at most. Yet the subcontractors sign contracts with the assembler that last for the term of the model. If any firm earns model-specific quasi rents on its investments, it can readily protect them by contract and by the prospect of market competition at the end of the model cycle.

Third, by simple geography and component size, even any site specificities should be minor. Japan is small, and so are most components. The entire country covers roughly the size of California, and Toyota city is a scant 200 miles from Tokyo. Other than car bodies and completed engines, moreover, most automobile parts are easy to ship. Given the elaborate networks of railroads and super highways,

42. As implied in Asanuma's own discussion. See Asanuma, *supra* note 22, at 4.

suppliers everywhere should be able cost-effectively to deliver components to assemblers anywhere.⁴³

Fourth, if the biggest companies potentially have the largest RSIs, they are also the ones least likely to let that specificity affect fundamental aspects of governance like equity ownership. They are simply too big and too diversified. Among the suppliers, take the 248 stock-exchange listed firms. These firms maintain memberships in a mean 3.2 supplier associations. Or take the firms for which we have data on sales to automobile assemblers (again, about 250). On average, these firms sell about half their output to their lead customers in the automobile industry. Even if such firms did make large RSIs, they would rarely want to structure their basic governance mechanisms to deal with firms buying only half their output.

2. *Cross-shareholdings*

a. Introduction. Turn from these broad impressions to firm-level data on the first-tier suppliers. To explore the role that RSIs play in this environment, we first identify those contractual ties where logic predicts large RSIs would most likely exist, if they exist anywhere. We then ask whether the parties to those ties negotiate the extra-contractual governance mechanisms (like equity investments) that RSI theory dictates.

Note the limits inherent in this exercise. Necessarily, we examine a composite hypothesis: (i) that RSIs are large enough to create significant problems of opportunism, (ii) that contractual solutions to such problems are infeasible, and (iii) that the RSIs and contracting problems lead to the predicted governance mechanisms. Suppose that, despite having good proxies for RSIs, we fail to observe the predicted governance mechanisms. In itself, that result would not tell us whether the hypothesis failed because RSIs were small, because contracts worked, or because RSI theory did not apply. Note too that we ask readers to table the social scientific custom of focusing on regressions as the key test in an article. To us at least, the most relevant material on RSIs is the least technical: that which we obtain by observation and industry-wide data. We present the regressions below only as supplementary evidence.

We reason that in the automobile industry, as in most industries, large RSIs most likely will exist in transactions in which suppliers have close, exclusive (or nearly exclusive) ties to a given assembler. Sup-

43. The high cost to consumers of shipping materials around Japan through the commercial transportation industry is irrelevant. Automobile assemblers are large enough that if such shippers (whether because of regulatory restrictions or because of cartelization) charge more than the average cost of transportation (a function only of tolls, fuel, driver wages, and truck maintenance and repair), the assembler can provide the transportation services in-house.

pose that to produce a given part for Assembler *A* requires heavy, idiosyncratic equipment. *A* could itself pay for the equipment, or Supplier *S* could pay. Either way, in order to plan for the investment *A* and *S* will communicate with each other extensively. Provided the idiosyncratic investment generates returns to scale, they will also try to maximize *S*'s sales to *A*.

If production involves large RSIs for which *S* pays, then by RSI theory *S* will need protection against *A*'s ex post opportunism. *Inter alia*, it could try to obtain a controlling equity interest in *A*. This does not happen. Even the largest Japanese suppliers do not buy controlling interests in Toyota, Nissan, or even Suzuki.⁴⁴ Neither do they seem to negotiate other controls over *A*'s governance.

Alternatively, assembler *A* could pay for the RSI. To prevent opportunistic action by *S*, it might then negotiate a controlling equity interest in (or other control mechanisms over) *S*. Our testable hypothesis follows: if large RSIs structure the Japanese automobile industry, assemblers will tend to negotiate control over those suppliers who have the closest ties with them.

b. The Test. To examine whether suppliers with the closest ties to an assembler are subject to extra-contractual governance mechanisms, we regress:

an assembler's equity investment in a supplier (both a dummy for investments of 10% or more [**SubEqInv**] and a continuous variable [**Eq%**]), on

- (i) the fraction of its output which that supplier sells to the assembler (both a dummy for sales of 50% or more [**SubSales**] and a continuous variable [**Sales%**]), and
- (ii) whether the supplier is a member only of that assembler's supplier association (**LoneClub**).

For controls, we include:

- (x) a dummy for whether *S* lists its stock on an exchange (**Listed**),
- (y) a dummy for whether *S* is a member of no supplier association (**NoClub**), and
- (z) as a measure of firm size, the number of employees at *S* (**Employees**).⁴⁵

44. The exception may be Toyoda Automatic Loom, which assembles some Toyota automobiles. This firm (founded by the father of the founder of Toyota Motor) antedates Toyota Motor. It initially specialized in producing automated weaving machines for Japan's booming pre-war cotton textile industry. With 5.1% of the stock, it is the largest shareholder of Toyota Motor; and Toyota Motor owns 24.7% of Toyoda Automatic Loom. In January 1999, Toyoda Automatic Loom's interest in Toyota Motor was worth about 560 billion yen; Toyota Motor's interest in Automatic Loom was worth about 140 billion yen.

45. We also used total sales by the firm but did not generate substantially different results.

Because many observers claim that Toyota maintains unusually close ties with its suppliers, we add a dummy for whether the assembler involved is Toyota (**Toyota**).⁴⁶ We include more precise definitions of the variables in Table 2, summary statistics and sources in Table 3, and regression results in Table 4.

TABLE 2: REGRESSION VARIABLES — DEFINITIONS

Dir: 1 if the assembler that buys the largest fraction of a supplier's output has a seat (including a seat held by a former assembler employee) on the supplier's board of directors; 0 otherwise.

Employees: The number of full-time employees at a supplier.

Eq%: The percentage of a supplier's stock held by the assembler that buys the largest fraction of the supplier's output.

Listed: 1 if a supplier lists its stock on either the Tokyo or Osaka Stock Exchange; 0 otherwise.

LoneClub: 1 if a supplier is listed in JAPIA data as a member of only one assembler's supplier association; 0 otherwise.

NoClub: 1 if a supplier is listed in JAPIA data as a member of no supplier association; 0 otherwise.

NumDir: The number of directors that the assembler buying the largest fraction of a supplier's output has on the supplier's board (including seats held by former assembler employees).

Sales%: The percentage of a supplier's output bought by the assembler that buys the largest fraction of the supplier's output.

SubSales: 1 if a supplier sells 50% or more of its output to a single assembler; 0 otherwise.

SubEqInv: 1 if the assembler that buys the largest fraction of a supplier's output owns 10% or more of the supplier's stock; 0 otherwise.

Toyota: 1 if the assembler that buys the largest fraction of the supplier's output is Toyota; 0 otherwise.

c. The Results. Perhaps the biggest surprise in Table 4 involves the radically different effects that **SubSales** (and **Sales%**) and **LoneClub** have. On the one hand, the coefficients to **SubSales** (and **Sales%**) suggest that the parties do adopt extra-contractual governance mechanisms: the coefficients are consistently positive and significant in regressions (a), (c), (d), and (f). On the other hand, the coefficients on **LoneClub** suggest nothing of the sort: the coefficients are insignificant in all specifications and do not even consistently have the same sign.

46. According to Table 4, Toyota is distinctive only in that it is located in the same prefecture (Aichi) as many of its suppliers.

TABLE 3: REGRESSION VARIABLES — SUMMARY STATISTICS

	<i>n</i>	<i>Min</i>	<i>Mean</i>	<i>Max</i>
Dir	209	0	0.368	1
Employees	700	7	1,848	68,947
Eq%	462	0	11.750	100
Listed	1,648	0	0.150	1
LoneClub	1,648	0	0.447	1
NoClub	1,648	0	0.346	1
NumDir	209	0	1.536	14
Sales%	249	0.6	48.7	99.8
SamePref	477	0	0.344	1
SubSales	249	0	0.510	1
SubEqInv	462	0	0.286	1
Toyota	479	0	0.251	1

Sources: The data — when possible from 1998 — is variously assembled from the relevant years of NIHON KEIZAI SHIMBUN SHA, *NIKKEI KAISHA JOHO* [NIKKEI COMPANY INFORMATION] (1998); SHUKAN TOYO KEIZAI, *KIGYO KEIRETSU SORAN* [OVERVIEW OF FIRM KEIRETSU] (1998); TOYO KEIZAI SHIMPOSHA, *SHIKIHO: MIJOJO GAISHA BAN* [SEASONAL REPORTS: UNLISTED COMPANIES] (relevant years); NIHON KEIZAI SHIMBUN SHA, *KAISHA SORAN* [ANNUAL CORPORATION REPORTS] (1998); NIHON NO JIDOSHA BUHIN KOGYO (1998 NEN BAN) [JAPANESE AUTOMOTIVE PARTS INDUSTRY, 1998] (Nihon jidosha buhin kogyo kai & Oto toreedo jaaneru eds., 1998).

The difference between **SubSales** and **LoneClub** is surprising, because one might have thought that the variables would identify roughly the same suppliers. One would have thought, for example, that if *S* were affiliated only with *A*'s supplier association (**LoneClub**) it would disproportionately sell to *A* (**SubSales**). The suppliers in these associations meet from time to time to exchange information with each other and with the assembler. Obviously, suppliers will find membership most worthwhile if they are producing customized goods for the supplier. If so, then the two variables would be heavily correlated and generate similar results in Table 4. In fact, the correlation coefficient between the two is only 0.13.⁴⁷

For our purposes, the resulting question becomes: If there were significant RSIs in the industry, would **SubSales** or **LoneClub** more likely signify their presence? If the answer is **SubSales**, then Table 4 suggests that the transactions involve substantial RSIs. If the answer is **LoneClub**, then the very absence of equity investments suggests either that large RSIs do not exist or that they do not structure governance patterns.

47. Adding a variable interacting **LoneClub** and **SubSales** results in a significant, positive coefficient on **SubSales** but insignificant coefficients for both **LoneClub** and the interaction term.

TABLE 4: SALES DIVERSIFICATION AND EQUITY INVESTMENTS

RHS:	SubEqInv				Eq%	
	(a)	(b)	(c)	(d)	(e)	(f)
SubSales	.421 (6.02)		.435 (6.02)			
Sales%				.361 (7.65)		.358 (7.39)
LoneClub		.011 (0.22)	-.067 (0.85)		2.716 (1.24)	.736 (0.26)
Employees	.0001 (3.48)	.00001 (2.07)	.0001 (3.30)	.002 (2.49)	.0005 (1.57)	.002 (2.50)
Listed	.061 (0.74)	-.089 (1.86)	.054 (0.65)	.860 (0.29)	-5.678 (2.55)	.938 (0.31)
NoClub	-.031 (0.19)	-.124 (1.53)	-.067 (0.42)	1.86 (0.35)	-3.667 (0.97)	2.239 (0.41)
Toyota	.052 (0.71)	.085 (1.67)	.039 (0.52)	2.298 (0.82)	3.116 (1.34)	2.447 (0.86)
Constant				-6.261 (1.91)	11.340 (5.93)	-6.554 (1.89)
Adjusted R ²	0.19	0.02	0.19	0.23	0.02	0.22
n	248	462	248	248	462	248
	Probit	Probit	Probit	OLS	OLS	OLS

Notes: For the OLS regressions, we give the coefficients, followed by the absolute value of the t-statistics on the line below.

For probit regressions, we give the probability of a change in the dependent variable given a one-unit change in the independent variable. We give the absolute value of the z values for the underlying coefficients on the line below.

For probit regressions, we give the pseudo-R² rather than the adjusted R².

Sources: See Table 3.

Reasons linked to technological innovation suggest that **LoneClub** more plausibly proxies for RSIs than does **SubSales**. We discuss that hypothesis in Subsection 3 below. We turn to the possibility that **SubSales** better proxies for RSIs in Subsection 4.

3. RSIs and Technological Innovation

a. Introduction. Firms that invest heavily in RSIs will prefer to deal with suppliers who avoid selling customized components to their competitors. All else equal, off-the-shelf technology is cheaper than new. As a result, firms will not invest in idiosyncratic technology unless doing so generates a competitive advantage. If it does generate that advantage, they (the investing firms) will want to do what they can to keep that technology from their rivals.

Once an investing firm's supplier sells similarly sophisticated products to the investing firm's competitors, however, the odds increase dramatically that the technology will leak. After all, given the new improved technology, the supplier has an incentive to adapt the technology in a way that will let it win business from those competitors. Only by limiting its ties to suppliers who restrict their other customized sales to buyers outside the industry can the investing firm slow the technological leak. The conclusion: large RSIs most likely will exist (if they exist anywhere) in situations where the supplier sells customized components only to one automobile assembler.

b. An Example. Perhaps an illustration would help. Suppose a subcontractor, with the aid of Toyota engineers, develops a new, more cost-effective Camry shock absorber. Given that Nissan and Honda do not use such a shock absorber (the technology is still secret, after all), the production process is, by definition, specific to Toyota trades. Like virtually all automobile parts, though, shock absorbers themselves are common to all assemblers, and many technological innovations are not patentable. As a result, even if only Toyota cars were to use this improved technology, the supplier could potentially win orders from Honda and Nissan by adapting it to Accords and Maximas. Often, Toyota would want to keep this technology from its competitors.⁴⁸ To lower the risk of a technological leak, in turn, it may have an incentive to develop the new technology only with suppliers who do not make customized components for those competitors.

What this logic ignores, of course, are those RSIs that are simple adaptations to model size and shape rather than real technological improvements. For those RSIs, the assembler will not worry about technological leaks to competitors. No matter how mundane a shock absorber it may be, a Maxima shock absorber will not fit an Accord. In this sense, the technology behind any Maxima shock absorber is specific to trades with Nissan, but it is also technology that Nissan will not try to keep secret.

Crucially, however, for such size and shape specificities, the amount of the RSI is also quite small. Given the essential interchangeability of most shock-absorber technology, most suppliers who now make Maxima shock absorbers will be able to shift production to Accord shock absorbers with relative ease. They will incur some transitional costs, to be sure, but probably little more than they would incur in shifting among Toyota models — from, for instance, a Camry shock absorber to a Corolla shock absorber.

c. Technology and Table 4. Consider, then, the implications of this analysis for the importance of **SubSales** and **LoneClub**. Firm size held

48. Not always, of course. Sometimes Toyota is happy to let the supplier market it elsewhere, in exchange for a lower price on the new technology.

constant (as in Table 4), when **SubSales** and **LoneClub** firms differ, they will differ primarily in whether they:

- (a) sell customized products to multiple automobile assemblers, or
- (b) sell customized products only to one automobile assembler and fill the rest of their output with either general open-market products within the automobile industry or products for buyers outside the industry.

To see this, consider several possibilities:

(i) *SubSales* = 1, *LoneClub* = 1 (30 firms). If most suppliers sold primarily to one assembler and no one else, then for most suppliers both **SubSales** and **LoneClub** would equal one. In Table 4, the two variables would then have similar coefficients. They do not.

(ii) *SubSales* = 1, *LoneClub* = 0 (58 firms). Suppose a supplier sells more than half its output to one assembler, but is a member of multiple supplier associations (**SubSales** = 1, **LoneClub** = 0). That it has ties to other assemblers sufficiently close to justify association membership indicates that it probably sells significant amounts (even if less than half) of sophisticated, customized goods to others in the industry.

(iii) *SubSales* = 0, *LoneClub* = 1 (69 firms). By contrast, suppose a supplier sells a low fraction of its sales to its principal automobile assembler buyer, but is a member only of one supplier association (**SubSales** = 0, **LoneClub** = 1). That it has joined only one association suggests it produces few customized products for other assemblers in the industry. That it nonetheless sells a high fraction of its output to other firms suggests that it must either (i) be selling outside the industry, or (ii) be selling non-customized goods to other assemblers.

(iv) *The Result*. Consequently, the factor driving the different coefficients on **SubSales** and **LoneClub** in Table 4 would seem to lie in the degree of extra-industry (or noncustomized, intra-industry) sales. If a supplier sells to firms other than its lead assembler buyer, does it sell customized goods to other buyers in the industry? Or does it instead sell only either generally available open-market goods or customized goods to those outside the automobile industry? If production involves large RSIs, then the assembler should prefer the latter group of suppliers over the former. If so, the key variable for our purposes would be **LoneClub** rather than **SubSales**. From the coefficients to **LoneClub** in Table 4, a simple bottom line then follows: RSIs do not explain equity cross-holdings in the automobile industry.

4. *Sales Diversification and RSIs*

We hesitate to push this interpretation too hard. Readers of earlier versions complained (perhaps justifiably) that in doing so we were belittling inconvenient results. Might it not be, they asked, that the lack of sales diversification *did* signal the presence of RSIs, while the

supplier associations were trivial social clubs? If the associations performed no significant information-transmission function, might the lack of sales diversification not signal the presence of RSIs after all? And is not the stability of the relationships itself evidence of large RSIs?

a. Equity Investments. Perhaps — but in pursuing this line of attack one can easily miss several key bits of evidence. Most basically, one can exaggerate the pervasiveness of the extra-contractual governance mechanisms in place. More specifically, one can exaggerate the pervasiveness of the cross-shareholdings in the industry. For in truth, the level of cross-shareholdings is low.

We have equity ownership data on 462 suppliers (162 listed firms and 300 unlisted). In 57% of the suppliers (262 firms) the lead automobile assembler buyer owns no equity. In an additional 15% (sixty-eight firms), it owns under 10%. In only a quarter of the suppliers does it have at least a 10% interest, and in only 5% does it own a majority interest.

One might plausibly ask whether equity investments are not more pervasive in the suppliers on whom we lack the data. After all, we have data disproportionately on the larger firms. And yet, stock exchange listing held constant, the assemblers are more likely to invest in the larger firms than the smaller (as we will show in Table 4, regressions (a)-(c)). Thus our data, though they disproportionately derive from the larger firms, give us reason to doubt that equity investments are more common among suppliers as a whole.⁴⁹

b. Sales diversification. One can also exaggerate the extent to which suppliers fail to diversify their sales. We have sales data on 249 suppliers (firms with 67 to 11,574 employees; mean employees of 1,260). In only 127 of these firms (51%) did the lead assembler buyer buy 50% or more of the supplier's output. In only seventy-four (30%) did it buy 70% or more.

Given that we disproportionately have information on the larger, listed firms, here too we should worry about sample bias. Curiously, stock listing held constant, the bigger firms are less likely to diversify sales; more predictably, firm size held constant, the listed firms are more likely to diversify sales:

$$\text{Sales\%} = 55.00 + 0.0011\text{Employees} - 24.35\text{Listed} + e,$$

(23.92)
(2.48)
(6.49)

where $n = 249$, the absolute value of the t -statistics are in parentheses, and the adjusted R^2 is 0.14.

49. Note, however, that the effect is still ambiguous: disproportionately, we have information on the listed firms, and regressions (b) and (d) suggest that, size held constant, the assemblers are more likely to invest in unlisted firms.

Because we have data disproportionately on the larger, listed firms, the effect among suppliers as a whole is hard to predict. Other surveys (Table 5) indicate that the smaller, unlisted firms tend to diversify less than the larger firms. Bear in mind, however, both that these smaller firms produce a relatively minor fraction of the industry output and that even they diversify significantly. According to Table 5, for instance, firms with less than 10 billion yen in sales constitute the smallest 40% of the firms but produce less than 7% of the industry total. Even these firms, however, still diversify: only a quarter sold all their output to one firm, and over half sold to three or more firms.

c. Relational Stability. Nor does the stability of these relationships reflect large RSIs. First, so long as switching costs are not zero, people generally expect most relations to be stable. This holds in a wide variety of settings and for a wide variety of reasons — whether employment contracts, marriages, or a businessman's loyalty to his barber. In equilibrium, stability will be the norm.

Second, Japanese subcontracting relations are ruthlessly competitive. To the extent that they are stable, they are stable only because — in equilibrium — the existing trading partners will be the firms that do the job better than their potential rivals. As one Toyota director explained:

Our policy of maintaining double- and multiple-sources is not an opportunistic one. It follows from the notion that a reasonable level of competition is good. We're all human, after all. It's through competition that we'll get improvements in quality, in price, in managerial coordination.⁵⁰

Suppliers understand this. Only by winning the perpetual tournament will they maintain — let alone expand — their business with any given assembler. Take one stamp press firm in the Toyota network. It sold a variety of stamped and plastic products to Toyota, and had for years. But it did not wait for Toyota to place orders. At its own cost, on its own initiative, and with no explicit or implicit commitment from Toyota, it regularly and aggressively explored new technologies. When the supplier found something it thought Toyota might want, it proposed the product to Toyota. If Toyota liked the idea, the supplier obtained a contract. If Toyota did not, it went back to the lab.⁵¹

50. Shoichi Matsuo, *Buhin seisaku wa ikkan shita "koyzon kyoei" [Consistency Turns Parts Policy into One of "Co-existence and Co-prosperity"]*, in JAPIA, *supra* note 33, at 138-39.

51. Interview by Yoshiro Miwa with president of a 20-employee stamping firm, fall 1999 (identity not disclosed for reasons of confidentiality).

TABLE 5: SALES DIVERSIFICATION IN THE AUTOMOBILE SECTOR,
BY FIRM SIZE (1996)

Firms, by Sales Vol. (billion yen)	Number of Domestic Buyers to Whom Firm Sells					F Output
	A 1	B 2	C 3-4	D 5 or more	E Total firms	
10 or less	42 (27.1%)	23 (14.8%)	40 (25.8%)	50 (32.3%)	155 (40.9%)	920 (6.8%)
10-30	21 (18.9)	12 (10.8)	24 (21.6)	54 (48.6)	111 (29.3)	2,101 (15.5)
30-50	3 (6.3)	3 (6.3)	4 (8.3)	38 (79.2)	48 (12.7)	1,916 (14.2)
50-100	1 (2.4)	0 (0)	7 (16.7)	34 (81.0)	42 (11.1)	3,158 (23.3)
100-200	0 (0)	1 (7.1)	0 (0)	13 (92.9)	14 (3.7)	2,007 (14.8)
over 200	0 (0)	0 (0)	0 (0)	9 (100)	9 (2.4)	3,436 (25.4)
Total firms	67 (17.7)	39 (10.3)	75 (19.8)	198 (52.2)	379 (100)	13,538 (100.0)

Notes: For all but the numbers in the two far-right columns, the table gives the number of firms in each row (firm size) that sell to the number of sellers given at the top of each column, followed by the percentage of all firms in that row. Column E gives the number and percentage of all firms (379) in that size category. Column F gives the output in billion yen (and percentage of total industry output) produced by firms in that row.

For reasons of data availability, Column F includes firms that do not directly sell to assemblers. This distinction is primarily relevant only to the top two rows. Thus, Column F row 1 includes data on 237 firms rather than 155 firms; row 2 on 121 firms; row 3 on 50 firms, row 4 on 43 firms, row 5 on 15 firms, and row 6 on the same 9 firms.

Source: *NIHONNO JIDOSHA BUHIN KOGYO (1998 NEN BAN) [JAPANESE AUTOMOTIVE PARTS INDUSTRY, 1998]* 16-17 (Nihon jidosha buhin kogyo kai & Oto toreedo jaaneru, eds., 1998).

Third, in the end, the relationships are not necessarily stable anyway. Although firms often do keep their existing trading partners, often does not mean always — or even nearly always. Second- and third-tier firms are particularly prone to shifting partners. These firms are frequently family firms. Like family firms everywhere, they come and go as the talents and interests of family members ebb and flow in generational cycles. Even first-tier contractors shift subcontracting ties. In 1998, the JAPIA listed 189 suppliers in the Toyota supplier network. Of these, only 122 (65%) had been members in 1973. Conversely, of the 150 firms in the association in 1973, twenty-eight (19%) had disappeared by 1998.

5. Board Seats

Equity investments are not the only extra-contractual governance mechanisms that assemblers can use. They can also take positions on their suppliers' boards. Primarily, however, whether an assembler obtains such a seat depends on its equity investment.

Again, one can exaggerate the prevalence of assembler representatives: only exceptionally do assemblers put their representatives on supplier boards. Among Japanese automobile parts suppliers, we have information on the board composition of 209 firms. In 132 of these firms (63%), the assemblers had no board representative. When an assembler did have a board member, the modal number was one (twenty-six firms, or 12%). At only twenty-seven of the suppliers (13%) did the principal buyer among the automobile assemblers have five to nine board members, and at only five (2%) did it have ten or more.

Whether an assembler has a representative on a supplier's board depends critically on the equity stake that the assembler holds in the supplier. If we compare the predictive effect on the number of assembler representatives (**NumDir**) of (i) the fraction of *S*'s sales made to *A* (**Sales%**) and (ii) *A*'s equity investment in *S* (**Eq%**), the latter predicts far better:

$$\text{NumDir} = -2.85 + 0.090\text{Eq}\% + 0.019\text{Sales}\% + 0.0003\text{Employees} + 2.89\text{Listed} + e,$$

(4.96) (5.79) (1.93) (2.99) 5.79

where $n=120$, the absolute value of the *t*-statistics are in parentheses, and the adjusted $R^2 = 0.55$.⁵² Moreover, a regression of **NumDir** on **Eq%** yields a coefficient of 0.10, a *t*-statistic of 12.25, and an adjusted R^2 of 0.42; a regression on **Sales%** yields a coefficient of 0.05, a *t*-statistic of 6.01, and an adjusted R^2 of 0.23. For predicting the presence of assembler representatives on a supplier board, the investment an assembler makes in a supplier's stock matters greatly. The fraction of its output the supplier sells to the assembler matters far less. Obviously, one does not need RSI theory to explain why director seats should correlate with stock holdings.

IV. CONCLUSIONS

Within industrial organization, scholars increasingly integrate RSI theory into their analysis of the way firms structure their affairs with each other. Suppose that production requires large idiosyncratic investments and that detailed contracts are infeasible. In such a world, production would generate quasi rents, and the quasi rents would in

52. Running the same regression with the Toyota dummy as well does not substantially change the results; the *t*-statistic on Toyota is 0.018.

turn create the risk of ex post opportunism. To mitigate that risk, scholars reason, firms may negotiate governance mechanisms they would otherwise avoid.

Although the theory sparked a promising research program, scholars generally have found less evidence of large-scale RSIs than one might suppose — particularly of physical-asset specificity, and particularly in industries outside of aerospace, defense, or public utilities. Accordingly, Ramon Casadesus-Masanell and Daniel F. Spulber recently concluded that “asset specificity and opportunism in contracts fail in a fundamental way to explain vertical integration.”⁵³ Pierre-Andre Chiappori and Bernard Salanie observe that “[i]n the last 20 years contract theory has developed at a rapid pace. . . , [but] empirical applications have lagged behind.”⁵⁴ They then suggest that scholars have exaggerated the more general problem of asymmetric information in contracting: studying the French insurance market, for example, they find “no evidence of asymmetric information.”⁵⁵ These findings are consistent with our findings that standard competitive market models apply straightforwardly to developing economies.⁵⁶

Within this empirical context, the Japanese automobile industry has offered hope. There, at least, observers thought they would find the combination of large RSIs and extra-contractual governance mechanisms (particularly equity cross-holdings) that RSI theory had suggested.

Not so. In the Japanese automobile industry RSIs are low, and so are equity cross-holdings. We make this point with a mix of indirect evidence. We are the first to admit that we lack firm-level direct measures of RSIs. Instead, we bring to the enterprise a wide-ranging mix of observational evidence and industry data. To that mix, we add a set of supplementary regressions.

From this evidence, two points stand out. First, among the smaller firms (which is to say, most firms), the levels of RSIs are low for a simple reason: all investment levels are low. This simply is not a capital intensive sector. Second, among the larger firms (which is to say, the most productive firms), investment levels are higher — but these investments seem not to be idiosyncratic, and cross-holdings are low. These larger suppliers broadly diversify their sales outlets, and seldom issue significant equity blocks to assemblers.

53. Casadesus-Masanell & Spulber, *supra* note 7, at 69-70.

54. Pierre-Andre Chiappori & Bernard Salanie, *Testing for Asymmetric Information in the Insurance Markets*, 108 J. POL. ECON. 56, 56-57 (2000).

55. *Id.*

56. See Yoshiro Miwa & J. Mark Ramseyer, *Corporate Governance in Transitional Economies: Lessons from the Prewar Japanese Cotton Textile Industry*, 29 J. LEGAL STUD. 171 (2000).

Through this, we do not purport to disprove RSI theory as theory. After all, the theory predicts that firms will create distinctive governance mechanisms when RSIs are large and contractual solutions infeasible. If production technology is standard and contracting straightforward, they will solve any problems by contract. And in the end, that is pretty much what we show in Japan. Our claim is instead more modest: that perhaps RSI theory explains a narrower band of phenomena than we have thought.