THE ROLE OF RELATIONSHIP SCOPE IN SUSTAINING RELATIONAL CONTRACTS IN INTERFIRM NETWORKS

Nicholas Argyres
Olin Business School
Washington University in St. Louis
St. Louis, MO

Janet Bercovitz
Leeds School of Business
University of Colorado Boulder
Boulder, CO

Giorgio Zanarone
CUNEF
Madrid, Spain

November 2018

Abstract: The strategy and related literatures suggest a number of ways in which a buyer can benefit by concentrating its supplier base. Extant theories, however, suffer from one or more of the following limitations: they focus on dyads and therefore do not consider networks; they focus on suppliers and hence do not consider concentration of partnerships with commercial buyers or producers of complementary goods (complementors); they consider cooperation by one side of an exchange relationship only; they rely on strong assumptions about the presence of "non-calculative trust". We develop a general theory of partnership scope in interfirm networks that addresses these deficiencies. We show how, by broadening the scope of business it conducts with a partner (supplier, complementor or commercial buyer), a firm can sustain a self-enforcing exchange relationship with that partner (a "relational contract") in which both parties cooperate with each other repeatedly, thereby maximizing the value created by the relationship. We provide several examples of settings in which our model applies, and discuss suggestive evidence consistent with it from franchising, and from supply chains in the automobile industry.

We thank attendees at the 4th Workshop on Relational Contracts for helpful comments, especially Bob Gibbons, Alan Schwartz, Dan Barron, and Susan Helper. We also thank seminar/conference session participants at NYU, Tulane, the Society for Institutional and Organizational Economics Conference. We also thank JP Eggers, Hanna Halaburda, Francine Lafontaine, Desmond Lo, and Aks Zaheer.

It has long been recognized that firms can benefit from reducing the number of suppliers with which they do business. By concentrating its supplier base, a buying firm can improve incentives for suppliers to invest in relationship-specific assets (Heide & John 1988; Anderson & Weitz 1992; Bakos & Brynjolffson 1993; Dyer 1996; Helper, MacDuffie & Sabel 2000); capture gains from economies of scope based on suppliers' specific knowledge about the buying firm (Chatain 2011; Moeen, Somaya & Mahoney 2013); reduce buyer-supplier coordination costs (Novak & Stern 2009); and reduce transaction costs by stimulating norms of reciprocity, non-calculative trust and mutual learning (e.g., Bradach & Eccles 1989; Zaheer & Venkataraman 1995; Dyer 1997; Zollo, Reuer & Singh 2002; Lincoln & Gerlach 2004; Gulati & Nickerson 2008).

In this paper, we develop a theoretical model of the optimal scope of partner relationships that proposes an as yet unexplored benefit (and cost) of concentrating a focal (hereafter "central") firm's business among fewer partners. We refer to this as "broadening the scope" of partner relationships. The benefit of broader relationship scope in our model is that by reducing externalities among partners, broader scope facilitates greater mutual cooperation in a long-term, interfirm exchange relationship and enhances value creation (Brandenburger & Stuart 1996). This benefit is particularly salient in situations in which the partners and the central firm have incentives to take advantage of each other. The potential cost is that by motivating partners to create more value, broad relationship scope can strengthen the central firm's incentive to opportunistically expropriate such value when the relationship is not long-term oriented.

Our approach to analyzing relationship scope is more general than existing theories in two important senses. First, our model identifies a value creation benefit of

broad relationship scope that can be gained even if asset specificity and economies of scope are insignificant, coordination costs are not large, and non-calculative trust (i.e., trust based on emotions or norms) is not present and is difficult to establish. Second, our theory applies not only to supply chains but to all types of interfirm network relationships involving a central firm and its partners, including suppliers, (commercial) buyers, and "complementors" (i.e., sellers of complementary products; see Brandenburger & Stuart 1996).

Our model of scope in interfirm relationships applies in situations in which there is a combination of two-sided moral hazard and externalities in these relationships. Two-sided moral hazard refers to relationships in which both parties are tempted to withhold cooperation ("defect") at some point in the relationship (e.g., Battacharyya & Lafontaine 1995). The externalities we study arise when defection by one partner toward the central firm not only damages the central firm's business directly, but also damages the businesses of other partners in the network. Because the literature on inter-organizational relationships and contracting naturally tends to focus on dyads, the implications of this type of externality amongst a central firm's network of partners has been relatively understudied.[1] We examine whether and how concentration of a central firm's partner network – i.e., broadening the scope of business it conducts with certain partners – can reduce moral hazard on both sides of each individual firm-partner relationship by internalizing externalities within the network, and therefore enhance overall cooperation and value creation in the network.

[1] The supply chain management literature has studied externalities amongst suppliers of complementary inputs, but focuses on inventory management in particular, and does not consider (as we do here) the combination of two-sided moral hazard, cooperation in repeated relationships, and optimal relationship scope (e.g., Zhang 2006).

To illustrate the broad importance of two-sided moral hazard and externalities in interfirm partnerships, consider online retailers selling through Amazon, or independent producers of video games for Sony Playstation. On one hand, moral hazard and externalities are generated by partners' behavior: if an individual Amazon retailer or independent game producer were to offer poor quality products, Amazon's or Sony's business could be hurt because the poor quality could be attributed (at least in part) to the platform. In turn, deterioration of the Amazon or Playstation brands could hurt other independent sellers on Amazon, or other producers of Playstation games, and this would further damage the Amazon and Sony platforms. On the other hand, externalities could also be generated by the central firm: Sony and Amazon could take actions that hurt many of its partners' businesses, such as by upgrading their systems in ways that make partners' products incompatible with, or otherwise no longer value-adding to, their platforms.[2]

Notice that in these examples, once the central firm shares the details of its platform or processes (e.g., application programming interfaces) with its partners, there is relatively little need for further directed cooperation between the partners, and additional buyer-specific knowledge may be insignificant. Moreover, partners may already be highly motivated to make buyer-specific investments because the buyer's platform or brand is dominant in the market. Finally, norm-based trust may be difficult to establish in these contexts because of frequent entry and exit, globalization of the industry, very large

[2] When introducing a new system, producers of video game consoles must sometimes trade off backward compatibility of older games with improved performance of the new system. Another example of moral hazard by the central firm is when it faces incentives to compete with its partners by producing similar complementary products itself. Google's entry into the Android app market is an example (Wen & Zhu 2018).

numbers of partners, and the like. It therefore seems important to understand the benefits of broader relationship scope when non-calculative trust, asset specificity, and economies of scope are not important sources of those benefits.

In developing our theory, we build on research in economics on self-enforcing agreements, often labeled "relational contracts" (e.g., Klein & Murphy 1988; Klein 1995; Baker et al. 1994, 2002; Levin 2003; Gibbons 2005; Gibbons & Henderson 2012).[3] According to relational contracting theories, cooperation can be sustained in an ongoing interfirm relationship even though the parties are purely self-interested and calculative. Cooperation is sustained through a judicious mix of informal economic incentives and formal contractual mechanisms. These theories are therefore useful when non-calculative trust is difficult to establish, or when it makes trustors unacceptably vulnerable. For example, calculative trust has been shown to lead to better supplier performance than trust based on norms or emotions when a supplier's inputs or activities cannot be easily observed by the buyer (Poppo, Zhou & Li 2016). Thus, we model a setting in which firms have an interest in sustaining a long-term exchange relationship with one another, but there is no pre-existing trust, and any trust that develops over time is calculative only – i.e., it is based on each partner estimating its benefits and costs from continuing to cooperate (Williamson 1996).

Our model shows how central firms that interact repeatedly with a network of partners can facilitate cooperative self-enforcing agreements by broadening the scope of

[3] The definition of relational contracts in economics (i.e., agreements that are not enforced by courts) overlaps with, but also differs from, the definition of relational governance used by scholars in the management and legal studies fields. We discuss the management literature on relational contracting below. The legal literature tends to view relational contracts as contracts that govern long-term relationships and are therefore enforced using customized, nonstandard legal rules (e.g., McNeil 1978; Schwartz 1992).

business they conduct with individual partners – that is, by concentrating their partner base. The key mechanism operating in the model is that by broadening relationship scope, externalities between partners are internalized (and thereby reduced), so that central firms can use lower-cost informal and formal incentive mechanisms to elicit cooperation by partners and thereby enhance value creation. The more novel (and less intuitive) implication of our model is that by reducing the magnitude of incentives needed to elicit partners' cooperation, broader relationship scope reduces the central firm's overall gains from defecting on the relationship with its partners, thereby also stimulating cooperation by the central firm. Importantly, we show that this result holds even in those cases in which the central firm has a clear incentive to take advantage of (rather than cooperate with) a highly cooperative partner. Thus, our model suggests a general reason for broader relationship scope that to date has not been appreciated; namely, to help establish and sustain value-increasing cooperation in self-enforcing relational contracts.

Literature Review

The large literature on inter-organizational relationships has been informed by approaches rooted in economics, sociology, and organization theory. Sociological approaches emphasize the importance of trust and norms of reciprocity in determining the success of such relationships, recognizing that these relationships are typically embedded in larger social systems (e.g., Granovetter 1985; Larson 1992; Ring & Van de Ven 1992; Gulati 1995). Such approaches tend to be skeptical of the value of formal contracts in improving relationship performance (e.g., Uzzi 1997; Dyer & Singh 1998; Gulati 1998). However, the strategy and organizations literatures have also highlighted the limits of relying on emotion- or norm-based trust in inter-organizational relationships – limits

including excessive vulnerability, and difficulties in the establishment and repair of trust (Gulati & Singh 1998; Lewicki, McAllister & Bies 1998; Noteboom 2002; Katila, Rosenberger & Eisenhardt 2008; Kim, Dirks & Cooper 2009; Kramer & Lewicki 2010; Poppo, Zhou & Li 2016).

Economic approaches to relational contracting, in contrast, assume that trust in interfirm relationships is purely calculative in nature (Williamson 1996), and therefore can be modeled in game theoretic terms. According to these approaches, parties to a transaction will act purely according to their self-interest. By shaping transaction attributes appropriately, however, the discounted future value of cooperation can be increased above the present value of defection. Therefore, cooperation between purely calculative partners can be achieved even in settings where formal contracts are incomplete (e.g., Grossman & Hart 1986), non-verifiable (e.g., Baker et al., 1994), or limited by the costs of relying on court enforcement (e.g., Bernstein 2016; Hadfield & Bozovic 2016). This economic approach to relational contracting has spawned an extensive theoretical literature (Baker et al. 1994, 2002; Levin 2003; MacLeod 2007; Malcomson 2013), and a small but growing empirical literature (see Gil & Zanarone 2017).

A key insight from the economics literature on relational contracting on which we build is the following. Because formal contracts are imperfect, they may succeed in reducing a firm's gains from withholding cooperation in an inter-organizational relationship. However, these contracts are often unable to fully deter such defection by the firm. In such cases, a parallel "relational contract" that specifies informal incentives in additional to formal contractual terms can help to keep the overall agreement within its

"self-enforcing range" (e.g., Klein 1995; Baker et al. 1994, 2002). That is, a formal contract that stimulates cooperation only weakly can facilitate the self-enforcement of a superior, complementary, relational contract, thereby ensuring that value enhancing cooperation is achieved. Thus, the economic approach to relational contracting emphasizes specific economic mechanisms underlying what is studied in strategy under the broader rubric of "relational governance" (e.g., Dyer & Singh 1998; Poppo & Zenger 2002; Poppo, Zhou & Li 2008; Shepker et al. 2014).

As noted above, however, relational contracting models based on this "calculative trust" approach focus on cooperation by one party in a dyadic relationship; they do not consider the network level of analysis.[4] Therefore, the relational contracting literature in economics has not considered how cooperation is affected by the scope of partnerships in the network.[5] Our model therefore extends the literature on relational contracts to explore the role of partnership scope in facilitating bilateral cooperation -- particularly in interfirm networks characterized by calculative trust, two-sided moral hazard, and externalities among partners. This is a significant contribution given the importance of externalities and two-sided moral hazard in interfirm networks in general.

[4] An exception is Baker et al. (2011), which shows how an appropriate allocation of formal control rights among partners helps relational contracts become self-enforcing. We build on Baker et al.'s (2011) approach by explicitly modeling network externalities and how they are affected by relationships scope, thereby delivering testable predictions on optimal scope.

[5] In relational contracting models by Board (2011), Calzolari and Spagnolo (2017), and Calzolari et al. (2017), loyalty (i.e., continuing to exchange with the same suppliers) is necessary to sustain self-enforcing agreements only when the relationship between a buyer and a supplier has limited expected duration. While those models do not consider relationship scope *per* se, their implications for scope run counter to those of our own model. Another difference is that in our model, the central firm relies on fewer partners in order that they internalize horizontal externalities and thereby reduce their present gains from defection. Unlike the literature on loyalty, the central firm in our model does not aim to increase the future quasi-rents from cooperation, as those rents are generated and distributed via monetary payments. Therefore, nothing in our model prevents the central firm from allowing competition among suppliers if it is cost-efficient.

Indeed, as noted above, externalities among partners can be important in platform-based industries ("ecosystems") in which complementors' decisions about product quality or features can significantly affect the revenues of other complementors in the network (Gawer & Cusumano 2002; Adner 2017). However, such externalities can also be important in more conventional industries in which the partners in question are suppliers or commercial buyers rather than complementors. For example, in industries such as auto, aerospace and construction, a supplier that sells poor quality or time-delayed products to the central firm may undermine the final product or upset the production schedule, and thus also negatively affect the central firm's demand for other suppliers' inputs (Helper, et al. 2015). Similarly, a franchisor may sell the rights to its business format to a franchisee (a commercial buyer), whose decisions about product quality again affect the revenues of other franchisees in the system through their impacts on the customers' perception of the franchisor's brand (Brickley & Dark 1987). Moreover, in all of these examples moral hazard is two-sided because the central firm could take opportunistic actions that would negatively affect its suppliers or commercial buyers. For example, an auto firm could change its car model specifications in a way that devalues a supplier's business, or a franchisor could allow a new franchisee to encroach on an older franchisee's geographic location (e.g., Klein 1991; Kalnins 2004).

In the next section, we provide a verbal description of our theoretical model. The mathematical version is contained in Appendix 1.

Model

Environment: interfirm networks and externalities

The model includes a single central firm, a network of N potential partners, and N +1 assets. The central firm owns one of the assets, whereas ownership of the remaining N assets may be allocated among the partners by the central firm's choice of relationship scope (number of assets per partner). Without loss of generality, we maintain the simplifying assumption that partners and assets are identical, and that there are only two potential partners – that is: $N = 2$.

The relationships between the central firm and each of its partners are plagued by externalities. These externalities arise because, by assumption, complete, formal (i.e., court-enforceable) contracts contingent on the central firm's and the partners' actions, or on the outcomes of such actions, are infeasible (see the discussion below). In addition, the value of each asset is assumed to be affected by both the central firm's actions and partners' actions. In our main model, the central firm can take actions that diminish the value of a partner firm's assets, as when, for example, Nintendo introduces a video game that competes directly with a game sold by an independent game developer (a Nintendo partner), or introduces a new hardware platform with which a partner's games are incompatible. In an alternate model, the central firm's actions exert positive externalities on the partners – as, for example, when Burger King advertises nationally in a way that benefits all Burger King outlets. On the other hand, each partner can take actions that increase both the value of his own asset and the value of the central firm's asset. For instance, higher quality video games produced by a developer can increase the developer's profits, while also positively affecting Nintendo's sales. Similarly, the local

advertising or sales effort of a Burger King franchisee positively affects the franchisor's royalties from that franchisee's store by increasing the revenues generated by the franchisee. Because each side in the relationship bears the cost of choosing cooperative actions, but shares the benefits with its counterpart, we say that these situations involve "central firm-partner externalities."

A second, and more novel, feature of the model is that the actions taken by each partner affect the values of the other partners' assets. These "partner-partner" externalities have been highlighted in some empirical studies on franchising (e.g., Brickley & Dark 1987) but are usually not incorporated into formal theoretical models. For example, a Burger King franchisee that maintains an unclean store reduces the value of the Burger King brand as perceived by transient customers, and therefore the sales of other Burger King franchisees. Similarly, an independent game developer of Nintendo video games that develops a poor quality game, by damaging the value of the Nintendo brand, will also hurt the business of the other developers of Nintendo games. As another example, if one of Delta Airlines' regional partners accumulates delays and provides poor in-flight service on a certain set of outsourced routes, passengers may be discouraged from flying with Delta on other routes, thereby reducing Delta's demand for the services of its other regional partners (Forbes & Lederman 2009). Similar externalities operate in supply chains, technology alliances, and the like. See Table 1 for a summary of examples of central firm-partner and partner-partner externalities.

[PLACE TABLE 1 HERE]

Key Assumption

A key assumption of our model is that the central firm and partners cannot rely solely on formal contracts to induce the desired cooperation, and therefore must employ self-enforcing agreements. We make this assumption not because we believe that interfirm networks operate without formal contracts, but rather to capture in a simple fashion the fact that formal contracts are limited in their effectiveness and scope.

Scholars in management, economics, and law, have pointed out many reasons why collaborating firms complement, and sometimes substitute for, formal contracts with informal, self-enforcing agreements. The first reason is the imperfect ability of courts to verify contractually specified actions, contingencies, and outcomes. This may induce courts to deny enforcement of certain formal contractual provisions, or perhaps more intriguingly, to enforce the contract in a way that differs from the parties' intentions (Bernstein 1996), thereby creating an incentive for gaming (e.g., Kerr 1975; Holmstrom & Milgrom 1991) and holdup (e.g., Klein, Crawford & Alchian 1978; Grossman & Hart 1986). For example, an opportunistic franchisee may shirk on sales effort or customer care knowing that the franchisor cannot produce objective evidence about this performance by monitoring it (due, for example, to privacy concerns). Even if the franchise contract includes incentives contingent on objective performance measures, such as store revenues, customer satisfaction, or inspections, the franchisee may game those provisions by shirking on the performance dimensions that are harder to measure (for instance, the satisfaction of non-repeat customers). Finally, franchise contracts are necessarily incomplete regarding the definition of how and when service standards and products should be upgraded in the future, and usually allocate broad decision rights to the franchisor (e.g., Arruñada et al., 2001; Zanarone, 2013). This may create an incentive

for the franchisor to abuse its authority, which could be mitigated by relying on an informal agreement to cooperate.

A second limitation of formal contracts is given by (direct and, most importantly, indirect) litigation costs, which occasionally make the threat of court-enforcement not credible. For example, a videogame platform provider may prefer not to sue a game developer for suboptimal quality for fear that sensitive financial or technological information may be revealed in the discovery process that is necessary to compute damages (Ben-Shahar & Bernstein 2007). In the extreme, parties to a transaction may avoid taking a dispute to court out of concern that court adjudication would effectively end the parties' relationship entirely (Lumineau & Oxley 2012; Harmon, Kim & Mayer 2015).

A third limitation of purely formal contracting is that it often involves costs of negotiating or renegotiating the agreement ("haggling costs") at arm's length (Klein et al., 1978; Williamson, 1991). These costs may be triggered by negotiation breakdown due to asymmetric information (Bajari & Tadelis 2001), which is especially likely under time constraints; by rent-seeking behavior (Masten 1988); or by the loss of morale and outright hostility that may arise when parties do not obtain from the negotiation what they feel entitled to (Hart & Moore 2008). Haggling costs may be the reason, for example, why major and regional airlines do not use spot formal contracts to exchange slots during adverse weather events, despite the fact that slot exchanges are potentially verifiable by courts (Forbes & Lederman 2009).

These limitations of formal contracts may prompt sophisticated firms to rely on informal, self-enforcing agreements as a complementary mechanism to govern their

collaborative networks, or even to refrain from using formal contracts entirely. To capture this insight in stark way, and to keep our analysis simple, our model assumes that once property rights over assets are allocated in a network (via the choice of scope), the firms in the network rely solely on informal agreements. Allowing for imperfect formal contracts would not alter our results in a major way.

Spot market contracting

We begin by considering the case in which the central firm and its partners transact at arm's length, which we call "spot market contracting". In this case, the central firm and the two partners behave as if their transaction were one-time only – that is, as if they were in the last period of their relationship. Spot market contracting is believed, for instance, to have governed the relationships between U.S. automakers and their suppliers (Helper & Henderson 2014).

In any given period, the central firm and partners formally agree on the scope of their relationship, which can be either broad (in which case the central firm deals with only one partner, who owns and controls both assets) or narrow (in which case the central firm deals with both partners, each of whom own and control one asset). Moreover, the parties may formally agree on a set of fixed, upfront payments to split the surplus generated by the chosen governance structure. Next, both parties choose their actions. Finally, the central firm and partners receive their payoffs as a function of the parties' choices of actions and relationship scope.

Our model then identifies the conditions under which both parties will be willing to participate in the exchange, and if they do participate, which actions they will simultaneously choose. In game theoretic terms, we identify the conditions for a Nash

equilibrium, in which each party selfishly chooses his/her action, given the other parties' choices.

Analyzing the spot market case leads to the following results. First, and not surprisingly given the presence of externalities, the level of cooperation achieved by all firms is in general suboptimal. The central firm causes more harm and/or provides less valuable inputs to the partners, and the partners provide less valuable inputs, products or services to the central firm, compared to the hypothetical "first best" scenario in which all firms choose to cooperate, maximizing total surplus (i.e., maximizing value creation). Second, the choice of broad scope leads to increased cooperation by the partner relative to a choice of narrow scope. That is, broad scope leads the partner to provide higher quality inputs, products or services to the central firm, thereby moving closer to the first best. Third, and quite surprisingly, broad scope may actually *decrease*, rather than increase, cooperation by the central firm.

The mechanism underlying these results works as follows. With broad relationship scope, a partner firm becomes responsible for more inputs to be sold to the buyer (in the supply chain example), or more complementary products to be sold to the platform (in the platform ecosystem example), or more franchise outlets to own and run (in the distribution network example). Because of this, the partner will internalize the partner-partner externalities that would arise under narrow scope due to the partners' shared stakes in the central firm's brand, and hence will be more motivated to cooperate. Narrow scope partners may also produce good quality inputs or products, but their motivation to do so will not be as strong as for broad scope partners because, given the

partner-partner externalities, narrow scope partners have less to lose from providing low quality.[6]

Note, however, that if the central firm's non-contractible actions damage, rather than increase, the value of the partners' assets, the increased partner cooperation induced by broad scope *will not* induce the central firm to cooperate more. In fact, if the central firm's benefit from acting opportunistically and damaging the partners increases in the value of the central firm's assets (analytically, if the central firm's and partners' actions are complements in the value of the central firm's asset), then the central firm will be even *more* willing to defect on a broad scope partner than on a narrow scope one.

For example, Nintendo might introduce a new game platform, and to stimulate demand for the games it produces for that platform, it might decide to make existing games sold by partners incompatible with the new system. Moreover, it will arguably be more valuable for Nintendo to hold up the existing partners in this way the more valuable is the Nintendo brand. Thus, broad scope partnerships, by inducing developers to increase their efforts in ways that enhance the value of Nintendo's brand, actually increase Nintendo's temptation to defect, relative to narrow scope partnerships.

Thus, an important implication of our analysis is that under spot market contracting, broad scope may be a more or less efficient network governance structure than narrow scope, depending on how damaging the central firm's opportunism is for the partners, and how much the partners' value-creating actions increase the central firm's returns from acting opportunistically toward them. In particular, broad scope will be optimal when the central firm's actions are overall beneficial, or at least not too harmful,

[6] This result is similar to that in Brickley (1999) in the context of franchising.

for the partners, or when despite being harmful, their effect on the central firm's asset is not enhanced much by the partners' cooperative actions. When this is not the case, and therefore the negative effect of broad scope on the central firm's cooperation outweighs its positive effect on the partners' cooperation, narrow scope will be the optimal governance structure for the network.

Thus, under arm's-length contracting, the internalization of partner-partner externalities is simultaneously a source of benefits (increases partners' cooperation) and of potential costs (reduces the central firm's cooperation) of broadening partnership scope in a network. This is a novel result of our model, which may be applied to understand the optimal choice of scope in interfirm networks, such as traditional U.S. car manufacturers' supply chains, where transactions are primarily governed by arm's-length contracting.

Relational contracting

Our model next develops the case of relational contracting, and compares it to the case of spot market contracting analyzed above. As mentioned before, we deliberately restrict attention to relational contracts sustained by "calculative trust" (Williamson, 1996). Under calculative trust, the parties may perform cooperative actions insofar as the future value of continuing the relationship with their partners outweighs the present gains from defection, such that the relational contract is self-enforcing (e.g., Klein 1995; Baker, et al. 1994, 2002). The purpose of our analysis is not so much to examine whether a self-enforcing relational contract between the central firm and the partners improves cooperation relative to the spot market (it surely does!), but rather to examine which formal governance mechanism – broad or narrow partnership scope – is best suited to

facilitate self-enforcement of such relational contracts, as a means to augment value creation and support non-opportunistic value appropriation.

Relational contracting is potentially enabled by two assumed features of the interfirm network in our model. First, the central firm and the partners can observe each other's actions, and hence can condition continuation of their collaborative relationships on the observed actions. Second, the central firm and the partners can interact repeatedly, so in any given period, continuation of the relationship is potentially valuable to them.

As under spot contracting, at the beginning of any given period the parties formally agree on the scope of their relationship (broad or narrow), and on a set of fixed, upfront payments that split the surplus in a way that ensures mutual participation. Unlike in the spot market case, however, the parties also informally agree on the actions they will choose later on, and on a set of discretionary bonus payments to be paid conditional on whether the informally agreed actions are undertaken. Next, each firm chooses its actions, and hence whether to honor the relational contract or defect. If a firm cooperates, it receives an informal bonus payment from the other firms in the network (Levin 2003). If a party ever defects, the informal bonuses are not paid, and all firms revert to spot market contracting forever after (Baker et al. 1994, 2002; Levin 2003).

In game theoretic terms, the relational contract must constitute a subgame perfect equilibrium of the infinitely repeated game. Our model identifies several conditions that must be fulfilled in order for this equilibrium to exist. First, the central firm and both partners must be willing to participate in the exchange; that is, the payoffs to each of continuing in the relationship must exceed the payoffs from spot market contracting (the default option). Second, the payoff to each firm from cooperating at each stage of the

game, given that the other firms are cooperating, must exceed its payoff from defecting at the expense of the other firms.

The main result from analyzing this relational contracting case is that, unlike in the spot market case, a broad scope relationship (i.e., one in which a single partner owns and controls both assets) leads to cooperation by *both the central firm and the partners*. This implies, in turn, that when relational contracting is feasible, broad scope governance unambiguously dominates narrow scope governance from an efficiency standpoint. This result follows from three intimately related facts. First, a broad-scope partner has lower temptation to defect (that is, to renege on the informally agreed cooperative actions) than a narrow-scope partner because he internalizes the partner-partner externalities, and therefore has more to lose from defecting (as pointed out above for the spot market case). This implies that a given set of informally agreed-upon cooperative actions by the partners is more likely to be self-enforcing under broad scope than under narrow scope, because under broad scope, the future cooperative rents those actions generate must outweigh a smaller partners' reneging temptation than under narrow scope.

Second, when partners are honoring the relational contract and hence cooperating, the central firm's gains from defection are the same under broad and narrow scope. This is sharply different from the spot contracting case; there, it is common knowledge that all firms in the network choose their actions non-cooperatively, so the central firm's gains from defecting on the partners depend on which actions the central firm expects the partners to take in equilibrium, and hence on scope. In the relational contracting case, by contrast, the central firm's gains from defecting do not depend on scope.

Third, because broad scope reduces the partners' reneging temptation without affecting the central firm's one, it makes it possible to transfer the portion of the partners' cooperative rents in excess of their reneging temptation to the central firm. This, in turn, ensures that compared to the narrow scope case, a higher level of central firm's cooperation is potentially self-enforcing and can therefore be incorporated into the relational contract. This "incentive subsidization" from the partner to the central firm can be implemented in several ways: for example, by increasing the informal bonus that the central firm receives upon cooperating; by decreasing the bonus the central firm agrees to pay the partner if the partner cooperates; by increasing the fix upfront payment to the central firm; by decreasing any fixed payment to the partner firm; or through some combination of these four options. In other words, broad relationship scope increases the overall "slack" in the relationship, which can then be used to make higher levels of cooperation by both sides of the network self-enforcing. This is a novel result of our model: because of the possibility of relational contracting, broad scope relationships can be used to stimulate more cooperation by *both* central and partner firms than narrow scope relationships. That is, broad scope allows for greater value creation in the systems, and the informal payments determine the levels of value appropriation by all parties to the transaction.

This result, however, and the unambiguous optimality of broad scope it implies, is subject to a limitation. In particular, it only holds when relational contracting between a central firm and partner is feasible. Relational contracting is infeasible if either or both parties perceive little value in a long-term relationship with each other relative to a short-term relationship (i.e., when the rate at which they discount the future is too high, or the

default option of spot market contracting is too attractive). Thus, our model *does not* predict that firms in a network will or should pursue broad scope relationships always and everywhere. Instead, in environments where relational contracting is feasible, the model predicts that in the presence of two-sided moral hazard, positive partner-partner externalities, and negative central firm-partner externalities, broad scope relationships will be optimal, and will feature better mutual cooperation, than narrow scope relationships. In contrast, broad scope relationships may be suboptimal, and decrease the central firm's cooperation more than it increases the partners' cooperation, in environments where relational contracting is not feasible.

[PLACE TABLE 2 HERE]

Table 2 highlights two sets of testable predictions generated by our model. In a first exercise (row 1), one could focus on networks in the same industry that are characterized by strong negative externalities from the central firm to the partners, and examine whether the effect of broad scope governance on the central firm's cooperation switches from negative to positive, and the likelihood that broad scope governance is adopted increases, when the network's expected time horizon or its present discounted value increases (that is, when the contracting environment moves from spot to relational). Recent empirical research has developed direct and indirect approaches for measuring the time horizon and present value of collaborative relationships, which could be used to test these predictions from our model (e.g., Gil & Marion, 2013; Barron et al. 2017). In the next section, we discuss empirical examples in which broad scope improves mutual cooperation when central firm-partner externalities are strong.

In a second exercise (column 1), one could focus on networks governed by arm's-length contracting (such as traditional supply chains in the U.S.), and examine whether the effect of broad scope governance on the central firm's cooperation switches from negative to positive, and the adoption of broad scope governance increases, when negative externalities from the central firm to the partners exogenously decrease in strength. Examples of such decreases in negative externalities include the introduction (or strengthening) of laws protecting franchisees from termination (e.g., Brickley et al. 1991), or of laws protecting small suppliers from "abuse of economic dependence" by large customers (laws that are common in Europe).

Finally, if data on monetary payments between the central firm and its partners were available, one could test for the specific "incentive-subsidization" mechanism in our relational contracting model by examining whether, following a switch from narrow to broad scope, payments are readjusted to increase the central firm's long-term incentives to cooperate.

In the next section, we discuss suggestive evidence from franchising, and from buyer-supplier relations in the auto industry, as a way to gauge the empirical plausibility of our model, and to guide future empirical tests of it.

Discussion: Applications and suggestive evidence

Business Format Franchising

Our first piece of suggestive evidence is drawn from the context of business format franchising. This evidence supports our model's prediction that mutual cooperation by a central firm and its partners is greater with broader relationship scope when central-partner externalities are strong and the expectation of future interaction is

high. (Recall that the reason is that broad scope relationships better support relational contracting). We begin by presenting the context for this evidence.

Business format franchising is an arrangement which a franchisor contracts with franchisees for 10-20 years each, and in which renewal of these long-term contracts is frequently observed. Therefore, expectations of future interaction are usually high. Franchisees are residual claimants of store revenues and costs, and are therefore more financially motivated than if they were employees of a company-owned outlet. The agency-theoretic literature has emphasized this incentive alignment between franchisee and franchisor as the primary reason for the prevalence of franchising as an organizational form (e.g., Brickley & Dark 1987; Brickley et al. 1991; Bhattacharyya & Lafontaine 1995).

However, while there is some incentive alignment between franchisor and franchisees, such alignment is far from perfect. In particular, there are strong negative externalities between franchisors ("central firms") and franchisees ("partners"). For example, when a franchise contract comes up for renewal (and after the franchisee has invested in developing his/her business), a franchisor may seek to raise the prices of goods, services or leases (relative to their costs) that the franchisees are required to purchase from the franchisor. Franchisors might also seek to increase, *ex post*, the sales quota or renovations that the franchisee must make in order to keep the franchise, or require the introduction of new products, store layouts, and advertising campaigns that franchisees do not value.[7] If the franchisee fails to accept these new terms, the franchisor

[7] For instance, KFC franchisees sued KFC in 2010, arguing the KFC management ignored franchisees' concerns that its new grilled chicken product didn't warrant shifting advertising expenditure from its core fried chicken products.

can choose not to renew the contract. A franchisor may also choose to not renew a franchisee if it believes that the franchisee is exerting less effort to maximize franchisee revenue than an alternative franchisee would exert. In the extreme, an opportunistic franchisor might strategically not renew in order to benefit from the goodwill generated by the franchisee in his local community, and/or acquire the franchisee's lease and physical assets at fire-sale prices. Finally, franchisors can also undermine a franchisee by opening a new unit in a location that is close in distance to an existing franchisee, thereby increasing franchisor revenues from the area, but lowering the existing franchisee's profits. Kalnins (2004) found empirical evidence that this "encroachment problem" can be quite significant. In sum, negative central firm-partner externalities can be severe.

Franchising may occur through broad or narrow scope relationships. That is, franchisors may limit franchisees to owning one or a few units each in a given chain (narrower scope), or may encourage franchisees to own many units – as many as 30-50 in some large chains (broader scope). It has been frequently observed that such "multiunit franchising" is prevalent in franchise systems. Multiunit franchising poses something of a puzzle for the agency-theoretic literature on franchising, because the incentive benefits of franchising would seem to be significantly attenuated under multiunit franchising. The reason is that multiunit franchising creates a collection of mini-chains in which most outlets are run by employees (i.e., salaried managers), rather than residual claimants.[8]

[8] Besides weakening effort incentives for franchisees, scholars have cited other reasons why multiunit franchising might be detrimental to franchisors' interests. For example, compared to single-unit owners, multiunit franchisees may have less incentive to compete aggressively (Hadfield 1991). Multiunit owners might also be better able to exert bargaining power over franchisors, especially if they control units that are clustered in a specific geographic area (Lafontaine & Slade 2001).

Our model suggests that an important explanation for multiunit franchising may be that by providing for a broad scope relationship between franchisee and franchisor, it can better support relational contracting between them, and therefore induce better mutual cooperation and greater value creation. In Appendix 2, we describe a regression analysis of 114 franchise agreements in the U.S. (one agreement per franchisor/franchise system), suggesting that in franchise systems featuring greater multiunit franchising (i.e., selecting broader scope), there was a higher level of cooperation by both franchisees *and the franchisor* than in systems featuring less multiunit franchising, and the differences were statistically significant.[9] Cooperation was measured as the inverse of the number of times that the franchisee (franchisor) was found by a court, arbitrator, or through a settlement agreement, to have attempted to take advantage of the franchisor (or the franchisee). This finding provides suggestive evidence that multiunit franchising improves the incentives of both franchisees and the franchisor to cooperate, implying that it may be helping to establish a relational contract. It is thus consistent with our model's main prediction that by broadening the scope of exchange with each other, central firms and their partners can stimulate cooperation between them.

Buyer-supplier relationships in the Automobile Industry

A second piece of evidence supporting our main prediction that broader scope of partner relationships sustains relational contracting comes from buyer-supplier relations in the Japanese and U.S. automobile industries. As with franchising, negative central firm-partner externalities are important in the auto industry. As mentioned above, for

[9] We present this analysis in Appendix 2 because the data were insufficient for us to firmly establish causality between multiunit franchising and cooperation. A copy of additional analyses of the data is available from the authors upon request.

example, automakers can change designs and impose new requirements on inputs in ways that devalue suppliers' investments. One indicator of negative central firm-partner externalities is the frequency of lawsuits filed by suppliers against automakers. The number of such suits varied between 70 and 120 per year over the period 1970-1990 in the U.S., despite a consensus among observers that U.S. auto suppliers in that period tended to avoid suing their customers in order to preserve business with them (Kenworthy, Macaulay & Rogers 1996). Auto analysts suggest that the willingness of suppliers to sue automakers increased in the 1990's and early 2000's (Kosdrosky 2004).

While the potential for automakers to take advantage of their suppliers is significant, evidence suggests that Japanese automakers are less likely to do this. Indeed, more than simply avoiding opportunism, Japanese automakers are more likely to actively cooperate with their suppliers. For example, researchers have detailed how Japanese automakers made extensive efforts to train suppliers, and to transfer information and knowledge to them to help them improve productivity, whereas such efforts by U.S. automakers were much fewer (MacDuffie & Helper 1997; Dyer & Nobeoka 2000; Takeishi 2002; Dyer & Hatch 2006). In addition, Japanese buyers sometimes buffer suppliers from adverse demand shifts (Admadjian & Oxley 2013). Japanese suppliers have also been found to be more cooperative than U.S. suppliers. For example, Japanese suppliers were found to have had sold parts with far fewer defects to Japanese automakers than parts sold by U.S. suppliers to U.S. automakers (Dyer & Hatch 2006). More cooperative buyer-supplier relations have of course been long cited as a key reason for why Japanese automakers gained and sustained competitive advantages over their U.S. rivals (e.g., Helper & Henderson 2014).

Our model explains the greater cooperation in Japanese buyer-supplier relations as based in part on the broader scope of business that suppliers maintain in their relationships with buyers, relative to their U.S. counterparts. Data shows that from the 1950's through the 1990's, Japanese automakers relied much more on "partner suppliers" than did U.S. automakers. Partner suppliers sold a higher volume of their parts production, and more different types of parts, to a single buyer, than did "arm's length suppliers" (Dyer 1996). Such broader scope incentivizes Japanese partner suppliers to take into account the effects of their quality-determining actions on multiple shipments of the same parts, and on other kinds of parts that they also sell to the same buyer. Recognizing this, buyers in turn increase their cooperation because the suppliers' increased gains from cooperation can be partly passed on to them through a readjustment of intra-network monetary payments (such as a reduction in the implicit performance bonuses due to suppliers).

There are of course other explanations for the better cooperation in Japanese versus U.S. buyer-supplier relations in the auto industry that have been offered in the literature. For example, scholars suggest that Japanese automobile buyers and suppliers perceived themselves to be in longer-term relationships with each other than did their U.S. counterparts, and that therefore (put in terms of repeated games) each side's discount rate was lower in Japan than in the U.S., thus encouraging greater cooperation (e.g., Womack, Jones & Roos 1990; Smitka 1991) and perhaps the development of tighter networks. This explanation is supported by the observation that Japanese buyers were concerned with supplier performance, and occasionally punished suppliers who ceased cooperating (Helper & Henderson 2014). Thus, any greater trust that was

established was not entirely based on pervasive cultural norms of reciprocity alone but also had an important element of calculation.[10]

Our own explanation is complementary to this one, as it also based on calculative trust and repeated interaction. However, our explanation highlights the particular role of relationship scope in helping to establish relational contracts between buyers and suppliers. In that sense, we suggest that our own explanation adds a more precise logic and greater specificity to what to date has been a rather general relational contracts-based argument.

A second explanation that has been offered for the better cooperation in Japanese buyer-supplier relations in auto is based on dependence balancing (e.g., Heide & John 1988; Anderson & Weitz 1992). Like our own explanation, the dependence balancing explanation emphasizes the role played by the broader scope of buyer-supplier relationships in Japan in keeping the parties' performance commitments self-enforcing. It argues that by concentrating its supplier base, a Japanese automaker balances the dependency that suppliers would otherwise have on it (Ahmadjian & Oxley 2005). As the buyer becomes more dependent on the supplier, it stands to lose more upon defecting on the supplier, and therefore is less likely to defect.

This second explanation suffers two weaknesses, however. First, concentrating the supplier base does not necessarily increase buyer dependency, because new suppliers can easily be added when car models are re-designed, and this possibility is well understood by Japanese suppliers (Admadjian & Oxley 2005). Second, even if concentrating the supplier base did succeed in increasing the buyer's dependency, this

[10] Dore (1983) and Sako (1992) are among those who argue that cooperation in Japanese auto supply relationships is primarily a cultural phenomenon.

would simultaneously reduce the buyer's ability to punish any defections by the supplier. Thus, concentrating the supplier base could *increase* the supplier's incentive to defect. Therefore, the net effect of dependence balancing on bilateral cooperation – and hence on the overall supply chain's efficiency – is *a priori* ambiguous. Indeed, this kind of ambiguity highlights the benefit of specifying a formal model like ours relatively to relying on verbal theorizing alone.

A third explanation for the relatively cooperative buyer-supplier relations in the Japanese auto industry is based on the fact that, unlike in the U.S., buyers often take small, minority equity stakes in partner suppliers (Lincoln & Gerlach 2004). These stakes are argued to act as hostages, thereby reducing the buyer's incentive to defect (Williamson 1983; Pisano 1989). Ahmadjian & Oxley (2005) find evidence for this explanation in their data. This explanation is also complementary to our own. Whereas our model emphasizes the role of broad relationship scope in incentivizing mutual cooperation, other mechanisms such as equity stakes could play a role as well. One advantage of our own model here is that it simultaneously explains both buyer and supplier cooperation, whereas the equity stakes argument explains buyer cooperation only.

In summary, we interpret the evidence offered in the literature on Japanese vs. U.S. buyer-supplier relations in automobiles as consistent with our model's main prediction. Moreover, our model offers stronger logic than dependence balancing explanations, and adds valuable precision and power to explanations based on general relational contracts and hostage-taking.

Conclusion

Our paper's main contribution is to offer a new theory that explains the ways and conditions in which broad partnership scope enhances cooperation in interfirm networks where the central firm can take advantage of its partners. Our theory is that when expectations of future interaction are high, broad relationship scope can help to sustain self-enforcing relational contracts that support greater interfirm cooperation by all firms in the network. In contrast, when expectations of future interaction are low (that is, under arm's length contracting) broad relationship scope reduces cooperation by the central firm, and, if negative externalities are strong enough, reduces the value created in the network.

Our theory offers significant advantages over current treatments of relationship scope in the literature. First, our theory does not rely on strong forms of non-calculative trust that are arguably often missing from business relationships. Second, our model supports a stronger logic than the logic underlying theoretical alternatives such as dependence balancing. Third, unlike most of the extant literature on relational contracting, our theory incorporates: (1) the commonly-observed fact that in interfirm relationships, both sides, rather than one side only, face moral hazard, and (2) the importance of the network level of analysis, rather than the dyadic level alone. Such networks are particularly important in modern ecosystems based on platforms, hardware and software.

We offered suggestive empirical evidence, from two different empirical contexts, that is consistent with the key implications of our model. Our franchising example supports the idea that relational contracting enables "incentive subsidization" such that

broad relationship scope increases cooperation by both the central firm and its partners. Our auto supply chain example supports the conclusion that in the presence of negative externalities, broad scope increases interfirm cooperation when expectations of future interaction are higher. We have not offered evidence for our secondary prediction that under arm's length contracting, the effect of broad relationship scope on cooperation by a central firm can switch from positive to negative as the central firm-partner externality becomes negative. However, we believe that this prediction is testable as well. For example, scholars could examine whether an observed change in regulation that protects partners from hold-up leads to an improvement in the effect of broad relationship scope on cooperation in an interfirm network, as our model implies. We look forward to large sample empirical research aimed at testing the predictions generated by our theory.

References

Adner, R. 2017. Ecosystem as structure: An actionable construct for strategy. *Journal of Management*, 43(1): 39-58.

Ahmadjian, C. and J. Oxley. 2006. Using hostages to support exchange: Dependence balancing and partial equity stakes in Japanese automotive supply relationships. *Journal of Law, Economics and Organization*, 22: 213-223.

Admadjian, C. and J. Oxley. 2013. Vertical relationships, hostages, and supplier performance: Evidence from the Japanese automotive industry. *Journal of Law, Economics and Organization*, 29: 485-512.

Anderson, E. and B. Weitz. 1992. The use of pledges to build and sustain commitment in distribution channels. *Journal of Marketing Research*, 29: 18-34.

Asanuma, B. 1989. Manufacturer-supplier relationships in Japan and the concept of relationship-specific skill. *Journal of Japanese and International Economies*, 3: 1-30.

Baker, G., R. Gibbons, and K.J. Murphy. 1994. Subjective performance measures in optimal incentive contracts. *Quarterly Journal of Economics* 109: 1125-1156.

Baker, G., R. Gibbons, and K.J. Murphy. 2002. Relational contracts and the theory of the firm. *Quarterly Journal of Economics* 117: 39-84.

Baker, G., R. Gibbons, and K.J. Murphy. 2011. Relational Adaptation. MIT working paper, accessed at http://web.mit.edu/rgibbons/www/BGM%20Relnl%20Adapt%20Nov%2013.pdf.

Bakos, Y. and E. Bryjolffson. 1993. Information technology, incentives, and the optimal number of suppliers. *Journal of Management Information Technology,* 10: 37-53.

Barron, D., R. Gibbons, R. Gil, and K. J. Murphy. (2017), "Relational Adaptation under Reel Authority," Kellogg Working Paper.

Ben-Shahar, O., and L. Bernstein. 2000. The secrecy interest in contract law, *Yale Law Journal* 109: 1885-1925.

Bernstein, L. 1996. Merchant law in a merchant court, *University of Pennsylvania Law Review* 144: 1765-1820.

Bernstein, L. 2016. Beyond relational contracts: social capital and network governance in procurement contracts. *Journal of Legal Analysis* 7: 561–621

Bhattacharyya, S. and F. Lafontaine. 1995. Double-sided hazard and the nature of share contracts. *RAND Journal of Economics* 4: 761-781.

Board, S. 2011. Relational contracts and the value of loyalty. *American Economic Review*, 101: 3349-67.

Bradach, J. and R. Eccles. 1989. Price, authority and trust: From ideal types to plural forms. *Annual Review of Sociology* 15: 97-188

Brandenburger, A. and H. Stuart. 1996. Value-based business strategy. *Journal of Economics and Management Strategy*, 5: 5-24.

Brickley, J.A. 1999. Incentive conflicts and contractual restraints: Evidence from franchising. *Journal of Law and Economics*, 42: 745-774.

Brickley, J.A. and F.H. Dark. 1987. The choice of organizational form: The case of franchising. *Journal of Financial Economics* 18: 401-420.

Brickley, J.A., F.H. Dark and M.S. Weisbach. 1991. An agency perspective on franchising. *Financial Management* 20: 27-35.

Calzolari, G., and G. Spagnolo. 2017. Relational Contracts, Procurement Competition, and Supplier Collusion. University of Bologna Working Paper.

Calzolari, G., L. Felly, J. Koenen, G. Spagnolo, and K. Stahl. 2017. Innovation, Competition and Trust: Evidence from German Car Manufacturers. University of Bologna Working Paper.

Chatain, O. 2011. Value creation, competition and performance in buyer-supplier relationships. *Strategic Management Journal*, 32: 76-102.

Dore, R. 1983. Goodwill and the spirit of market capitalism. *British Journal of Sociology*, 34: 459-482.

Dyer, J. and N. Hatch. 2006. Relation-specific capabilities and barriers to knowledge transfers: Creating advantage through network relationships. *Strategic Management Journal*, 27: 701-719

Dyer, J. 1996. Does governance matter? Keiretsu alliances and asset specificity as sources of Japanese competitive advantage. *Strategic Management Journal*, 7: 649-666.

Dyer, J. and K. Nobeoka. 2000. Creating and managing and high-performance knowledge sharing network: The Toyota case. *Strategic Management Journal* 21: 345-367.

Dyer, J. and H. Singh. 1998. The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *Academy of Management Review* 23: 660-679.

Forbes, S., and M. Lederman. 2009. Adaptation and vertical integration in the airline industry. *American Economic Review* 99: 1831-49.

Gawer, A. and Cusumano, M. 2002. *Platform leadership: How Intel, Microsoft, and Cisco Drive Industry Innovation*. Boston, MA: Harvard Business School Press.

Gibbons, R. 2005. Incentives between (and within) firms. *Management Science* 51: 2-17.

Gibbons, R. and R. Henderson. 2012. Relational contracts and organizational capabilities. *Organization Science*, 23: 1350-1364.

Gil, R., and J. Marion. 2013. Self-enforcing Agreements and Relational Contracts: Evidence from California Highway Procurement. *Journal of Law, Economics and Organization* 29: 239-77.

Gil, R. and G. Zanarone. 2017. Formal and informal contracting: Theory and evidence. *Annual Review of Law and Social Science*, 13: 141-159.

Granovetter, M. 1985. Economic action and social structure: The problem of embeddedness. *American Journal of Sociology*, 91: 482-510.

Grossman, S. and O. Hart 1986. The costs and benefits of ownership: A theory of vertical and lateral integration. *Journal of Political Economy* 94: 691-719.

Gulati, R. 1995. Social structure and alliance formation patterns: A longitudinal analysis. *Administrative Science Quarterly*, 40: 619-652.

Gulati, R.1998. Alliances and networks. *Strategic Management Journal*, 19: 293-317

Gulati, R. and H. Singh. 1998. The architecture of cooperation: Managing coordination costs and appropriation concerns in strategic alliances. *Administrative Science Quarterly*, 43(4): 781-814.

Gulati, R. and J. Nickerson. 2008. Interorganizational trust, governance choice and exchange performance. *Organization Science* 5: 688-708.

Hadfield, G. 1991. Credible spatial pre-emption through franchising. *RAND Journal of Economics* 22: 531-543.

Hadfield G., and I. Bozovic. 2016. Scaffolding: Using formal contracts to support informal relations in support of innovation. *Wisconsin Law Review* 5: 981–1032.

Harmon, D., P. Kim and K. Mayer. 2015. Breaking the letter vs. the spirit of the law: How the interpretation of contract violations effects trust and the management of relationships. *Strategic Management Journal*, 36: 497-517.

Heide, J. and G. John. 1988. The role of dependence balancing in safeguarding transaction-specific assets in conventional channels. *Journal of Marketing*, 52: 20-35

Helper, S., J.P. MacDuffie and C. Sabel. 2000. Pragmatic collaborations: Advancing knowledge while controlling opportunism. *Industrial and Corporate Change*, 9: 433-488.

Helper, S. and R. Henderson. 2014. Management practices, relational contracts, and the decline of General Motors. *Journal of Economic Perspectives*, 28: 49-72.

Helper, S., J. Nicholson, R. Noonan, and J. Callen. 2015. The economic benefits of reducing supplier working capital costs. *US Department of Commerce Economics and Statistics Administration.*

Halonen, M. 2002. Reputation and the allocation of ownership. *Economic Journal* 112: 539-558.

Hart, O., and J. Moore, (2008), "Contracts as Reference Points," *Quarterly Journal of Economics* 123: 1-48.

Holmstrom, B., and P. Milgrom. 1991. Multitask principal-agent analyses: incentive contracts, asset ownership, and job design. *Journal of Law, Economics and Organization* 7: 24–52.

Kalnins, A. 2004. An empirical analysis of territorial encroachment within franchised and company-owned branded chains. *Management Science* 23: 476-489.

Katila, R., J. Rosenberger, and K. Eisenhardt. 2008. Swimming with sharks: Technology ventures, defense mechanisms and corporate relationships. *Administrative Science Quarterly*, 53: 295-332.

Kenworthy, L., S. Macaulay and J. Rogers. 1996. "The more things change…": Business litigation and governance in the American automobile industry. *Law and Social Inquiry*, 21: 631-678.

Kerr, S., 1975. On the folly of rewarding A, while hoping for B. *Academy of Management Journal* 18: 769-783.

Kim, P., Dirks, K., and C. Cooper. 2009. The repair of trust: A dynamic bilateral perspective and multilateral conceptualization. *Academy of Management Review*, 34: 401-422.

Klein, B. 1995. The economics of franchise contracts. *Journal of Corporate Finance* 2: 9-37.

Klein, B., R. Crawford, and A. Alchian. 1978. Vertical integration, appropriable rents, and the competitive contracting process. *Journal of Law and Economics* 21: 297-326.

Klein, B. and K.M. Murphy. 1988. Vertical restraints as contract enforcement mechanisms. *Journal of Law and Economics* 31: 265-297.

Kosdrosky, T. 2004. Suppliers more willing to sue automakers, analysts say. *Crain's Detroit Business*, January 19, 2004.

Kramer, R. and R. Lewicki. 2010. Repair and enhancing trust: Approaches to reducing organizational trust deficits. *Academy of Management Annals*, 4: 245-277.

Lafontaine, F. 1992. Agency theory and franchising: Some empirical results. *RAND Journal of Economics* 23(2): 263-283.

Lafontaine, F. and M. Slade. 2001. Incentive Contracting and the Franchise Decision. In K. Chatterjee and W. Samuelson, eds., *Game Theory and Business Applications*. Boston: Kluwer Academic Press.

Larson, A. 1992. Network dyads in entrepreneurial settings: A study of governance in exchange relationships. *Administrative Science Quarterly*, 37: 76-104.

Levin, J. 2003. Relational incentive contracts. *American Economic Review* 93: 835-857.

Lewicki, R., D. McAllister and R. Bies 1998. Trust and distrust: New relationships and realities. *Academy of Management Review*, 23: 438-458.

Lincoln, J. and M. Gerlach 2004. *Japan's Network Economy: Structure, Persistence and Change*. Cambridge: Cambridge University Press.

Lumineau, F. and J. Oxley. 2012. Let's work it out (or we'll see you in court): Litigation and private dispute resolution in vertical exchange relationships. *Organization Science*, 23: 820-834.

MacDuffie, J.P. and S. Helper. 1997. The road to "root cause": Shop-floor problem solving at three auto assembly plants. *Management Science*, 43: 479-502.

MacLeod, B. 2007. Reputations, relationships, and contract enforcement. *Journal of Economic Literature* 45: 595-628.

MacLeod, B. and J. Malcomson. 1989. Implicit contracts, incentive incompatibility and involuntary unemployment. *Econometrica* 57: 447-481.

Macneil, I. 1978. Contracts: adjustments of long-term economic relations under classical, neoclassical, and relational contract law. *Northwestern University Law Review* 72: 854–906.

Malcomson, J. 2013, "Relational Incentive Contracts," In Gibbons, R., and J. Roberts (editors), *The Handbook of Organizational Economics*, Princeton: Princeton University Press.

Moeen, M., D. Somaya, and J.T. Mahoney. 2013. Supply portfolio concentration in outsourced knowledge-based services. *Organization Science* 24: 262-279.

Noteboom, B. 2002. *Trust: Forms, Foundations, Functions, Failures and Figures.* New York: Elgar.

Novak, S. and S. Stern. 2009. Complementarity among vertical integration decisions: Evidence from automobile product development. *Management Science*, 55: 311-332.

Obloj, T. and P. Zemsky. 2015. Value creation and value capture under moral hazard: Exploring the microfoundations of buyer-supplier relationships. *Strategic Management Journal*, 36: 1146-1163.

Pisano, G. 1989. Using equity participation to support exchange: Evidence from the biotechnology industry. *Journal of Law, Economics and Organization*, 5: 109-127.

Poppo, L., and T. Zenger. 2002. Do formal contracts and relational governance function as substitutes or complements? *Strategic Management Journal* 23: 707-725.

Poppo, L., K. Zhou and J. Li. 2016. When can you trust "trust"? Calculative trust, relational trust and, and supplier performance. *Strategic Management Journal*, 37: 724-741.

Poppo, L. K, Zhou and S. Ryu. 2008. Alternative origins to interorganizational trust: An interdependence perspective on the shadow of the past and the shadow of the future. *Organization Science*, 19: 39-55.

Ring, P. and A.Van de Ven.1992. Structuring cooperative relationships between organizations. *Strategic Management Journal*, 13: 483-498.

Sako, M. 1992. *Prices, Quality and Trust.* Cambridge, UK: Cambridge University Press.

Schepker, D., W_Y. Oh, A. Martynov, and L. Poppo. 2014. The many futures of contracts: Moving beyond structure and safeguarding to coordination and adaptation. *Journal of Management*, 40(1): 193-225.

Schwartz, A. 1992. Relational contracts in the courts: an analysis of incomplete agreements and judicial strategies. *Journal of Legal Studies* 21: 271–318.

Smitka, M.J. 1991. *Competitive Ties: Subcontracting in the Japanese Automotive Industry.* New York: Columbia University Press.

Takeishi, A. 2002. Knowledge partitioning in the interfirm division of labor: The case of automotive product development. *Organization Science,* 13: 321-338.

Uzzi, B. 1997. Social structure and competition in interfirm networks: The paradox of embeddedness. *Administrative Science Quarterly*, 42: 35-67.

Wen, W. and F. Zhu. 2018. Threat of Platform-Owner Entry and Complementor Responses: Evidence from the Mobile App Market. NET Institute Working Paper No. 16-10. Available at SSRN: https://ssrn.com/abstract=2848533

Williamson, O.E. 1983. Credible commitments: Using hostages to support exchange. *American Economic Review*, 73: 519-541.

Williamson, OE. 1985. *The Economic Institutions of Capitalism.* New York, NY: The Free Press.

Williamson, O.E. 1996. *The Mechanisms of Governance.* New York: Oxford University Press.

Womack, J., D. Jones and D. Roos. 1990. *The Machine that Changed the World*. New York: Harper Perennial.

Zaheer, A. and N. Venkataraman. 1995. Relational governance as an interorganizational strategy: An empirical test of the role of trust in economic exchange. *Strategic Management Journal*, 16: 373-392.

Zanarone, G. 2013. Contract adaptation under legal constraints. *Journal of Law, Economics and Organization* 29: 799-834.

Zollo, M., J. Reuer and H. Singh. 2002. Interogranizational routines and performance in strategic alliances. *Organization Science*, 13: 701-713.

Zhang, F. 2006. Competition, cooperation and information sharing in a two-echelon assembly system. *Manufacturing & Service Operations Management*, 8: 273-291.

Table 1: Examples of Externality Sources in Interfirm Networks

Model's Key Elements	Franchising Networks	Supply Chains	Videogame Platforms	Airline Alliances
p-p externality p-c externality	Store maintenance	Quality control on key component	Upgrade of popular game	Service on connection flight; Prompt rescheduling under GDP
c-p externality (positive)	National advertising	Training/advice to suppliers	Platform improvement (e.g., multiplayer)	Service on flagship flight
c-p externality (negative)	Encroachment; Raising price/standards; Strategic non-renewal	Frequent changes in specifications	Competing in-house games; Platform upgrade/advertising favouring in-house games	Integration into profitable regional routes; Self-serving flight rescheduling

Table 2: Model Predictions of the Effects of Broad Relationship Scope

Central firm – Partner Negative externality	*Expectation of future interaction*	
	Low	High
Strong	Partner's cooperation ↑ Central firm's cooperation ↓ Network surplus ↓	Partner's cooperation ↑ Central firm's cooperation ↑ Network surplus ↑
Weak	Partner's cooperation ↑ Central firm's cooperation ↑ Network surplus ↑	Partner's cooperation ↑ Central firm's cooperation ↑ Network surplus ↑

Appendix 1: Mathematical model

Environment

The model's environment consists of a central firm, a network of $\boldsymbol{N}$ potential partners, and $\boldsymbol{N+1}$ assets. The central firm owns one of the assets, called "central asset," whereas ownership of the remaining $\boldsymbol{N}$ "local" assets may be endogenously allocated among the partners through the choice of network scope (see below). The value of each asset, to be defined in a moment, depends on the central firm's action, $\boldsymbol{a_c} \in \mathbb{R}^+$, and on a set of $\boldsymbol{N}$ actions (each exerted on a single asset) taken by the partners. The cost incurred by the central firm to take action $\boldsymbol{a_c}$ is $\boldsymbol{k(a_c)}$, and the cost incurred by a partner to take action $\boldsymbol{a_i} \in \mathbb{R}^+$ is $\boldsymbol{c(a_i)}$. We assume the cost functions are continuous, increasing and convex, and satisfy $\boldsymbol{k(0) = c(0) = 0}$, and $\boldsymbol{\lim_{a_c \to \infty} k'(a_c) = \lim_{a_i \to \infty} c'(a_i) = \infty}$. To simplify our analysis, and without much loss in generality, we also assume that the partners and local assets are identical, and that $\boldsymbol{N = 2}$.

There are both "central firm-partner" and "partner-partner" externalities, such that the assets' values are given by:

$v_c(a_c, a_1, a_2)$ for the central asset, and

$v_l(a_c, a_i, a_j) - L(a_c)$ for local asset i.

We assume that $v_c(a_c, a_1, a_2)$ and $v_l(a_c, a_i, a_j)$ are increasing in all arguments and concave, that $L(a_c)$ is increasing and convex, and that $v_c(0, a_1, a_2) = v_l(a_c, 0, a_j) = 0$. The loss term $L(a_c)$ captures the potential reduction in the value of local assets that may be triggered by certain decisions of the central firm. To allow for a broad range of externalities, we also assume that $\frac{\partial v_c(a_c,a_1,a_2)}{\partial a_c \partial a_i} \geq 0$, $\frac{\partial v_l(a_c,a_1,a_2)}{\partial a_c \partial a_i} \geq 0$, and $\frac{\partial v_l(a_c,a_1,a_2)}{\partial a_i \partial a_j} \geq 0$, for all $i, j \in N$ and $i \neq j$. Finally, to ensure uniqueness of equilibrium actions (see below), we assume that local actions are not essential for the central asset to produce value: $\frac{\partial v_c(a_c,0,0)}{\partial a_c} > 0$.

Following a well-established literature (e.g., Williamson 1985; Grossman & Hart 1986; Holmstrom & Milgrom 1991; Gibbons 2005), we say that ownership of an asset conveys both a claim on its value and the right to take actions over it. Given this definition, the *scope* of partnerships within the network can be defined as $g \in \{0,1\}$, where $g = 1$ (broad scope) denotes the case where one partner (say, partner 1) owns both assets and hence takes both local actions, a_1 and a_2; and $g = 0$ (narrow scope) denotes the case where partner 1 owns asset 1 and takes

local action a_1, while partner 2 owns asset 2 and takes local action a_2. We also assume there is two-sided moral hazard, in the sense that all actions, asset values and costs are observable but non-verifiable, implying that the only variable over which the firms can formally contract upon is the scope, g.

The timeline of play within each period is as follows. At stage 1, the central firm and the partners formally agree on the network's scope, g. At stage 2, all firms simultaneously choose their actions. At stage 3, each firm receives its payoff as a function of the chosen actions and scope.

We define the first best actions, $[a_c^{FB}, a_1^{FB}, a_2^{FB}]$, as those that maximize the total surplus $S(a_c, a_1, a_2)$, where:

$S(a_c, a_1, a_2) \equiv v_c(a_c, a_1, a_2) - L(a_c) - k(a_c) + \sum_{i \in N}\left[v_l\left(a_c, a_i, a_j\right) - c(a_i)\right]$.

Therefore:

$$[a_c^{FB}, a_1^{FB}, a_2^{FB}] = argmax_{a_c, a_1, a_2}\{S(a_c, a_1, a_2)\}. \quad (1)$$

Consequently, the maximum surplus that can be achieved by firm C and its network of partners is $S^{FB} \equiv S(a_c^{FB}, a_1^{FB}, a_2^{FB})$.

Optimal scope under spot contracting

Suppose the firms interact only once—that is, they are in a spot market, arm's-length kind of relationship. At stage 2, given the chosen scope g, equilibrium actions are given by:

$$a_c^{SP}(g) \equiv argmax\left\{v_c\left(a_c, a_1^{SP}(g), a_2^{SP}(g)\right) - k(a_c)\right\}$$
$$a_1^{SP}(g) \equiv argmax\left\{v_l\left(a_c^{SP}(g), a_1, a_2^{SP}(g)\right) + g v_l\left(a_c^{SP}(g), a_2^{SP}(g), a_1\right) - c(a_1)\right\} \quad (2)$$
$$a_2^{SP}(g) \equiv argmax\left\{v\left(a_c^{SP}(g), a_2, a_1^{SP}(g)\right) + g v_l\left(a_c^{SP}(g), a_1^{SP}(g), a_2\right) - c(a_2).\right\}$$

The firms will choose scope at stage 1 to maximize total surplus, given the anticipated responses defined above—that is, optimal scope under spot contracting is:

$g^{SP} \equiv argmax\left\{S\left(a_c^{SP}(g), a_1^{SP}(g), a_2^{SP}(g)\right)\right\}$.

It is convenient to define each firm's payoff under the optimal spot scope, as follows:

$\pi_c^{SP} \equiv v_c\left(a_c^{SP}(g^{SP}), a_1^{SP}(g^{SP}), a_2^{SP}(g^{SP})\right) - k\left(a_c^{SP}(g^{SP})\right)$ for the central firm,

$\pi_1^{SP} \equiv v_l\left(a_c^{SP}(g^{SP}), a_1^{SP}(g^{SP}), a_2^{SP}(g^{SP})\right) + g^{SP} v_l\left(a_c^{SP}(g^{SP}), a_2^{SP}(g^{SP}), a_1^{SP}(g^{SP})\right) - (1 + g^{SP})L\left(a_c^{SP}(g^{SP})\right) - c\left(a_1^{SP}(g^{SP})\right) - g^{SP} c\left(a_2^{SP}(g^{SP})\right)$ for partner 1,

$\pi_2^{SP} \equiv (1 - g^{SP})\left[v_l\left(a_c^{SP}(g^{SP}), a_2^{SP}(g^{SP}), a_1^{SP}(g^{SP})\right) - L\left(a_c^{SP}(g^{SP})\right) - c\left(a_2^{SP}(g^{SP})\right)\right]$ for partner 2, and

$S^{SP} \equiv S\left(a_c^{SP}(g^{SP}), a_1^{SP}(g^{SP}), a_2^{SP}(g^{SP})\right) = \pi_c^{SP} + \pi_1^{SP} + \pi_2^{SP}$ as the total surplus.

It follows from the first order conditions of program (2) that given the parner-partner externalities and the complementarities between central and local actions, switching from narrow scope ($g = 0$) to broad scope ($g = 1$) increases all parties' equilibrium actions: $a_c^{SP}(1) \geq a_c^{SP}(0)$, $a_1^{SP}(1) > a_1^{SP}(0)$, and $a_2^{SP}(1) > a_2^{SP}(0)$.

However, whether broad scope enhances cooperation (i.e., moves the spot equilibrium actions closer to the first best), and by which firms, is a priori unclear and depends on the types of network under study. To see this point, consider the following stark examples:

Example 1: $\frac{\partial v_c(a_c,a_1,a_2)}{\partial a_c \partial a_i} > 0$ *for all i, and* $L(a_c) = 0$.

In this case, the central firm's action is a productive input complementary to the partners' actions. Clearly, the central firm's and partners' actions are lower than first best under both narrow and broad scope. However, by increasing all the actions, broad scope enhances cooperation by both the central firm and the local firm, and is therefore the optimal spot governance structure.

Example 2: $\frac{\partial v_c(a_c,a_1,a_2)}{\partial a_c \partial a_i} > 0$ *for all i,* $\frac{\partial v_l(a_c,a_1,a_2)}{\partial a_c} \approx 0$*, and* $L(a_c)$ *very large.*

In this case, the central firm's action primarily consists of holding up or expropriating the partners, and the central firm's returns on holdup increase in the valuable inputs provided by the partners. If the negative externality $L(a_c)$ is large enough, the central firm's action under narrow scope largely exceeds its first best level. Moreover, complementarity between the central firm's and the partners' actions implies that by increasing the latter, broad scope also increases the former, thereby exacerbating holdup. Therefore, broad scope *reduces* cooperation by the central firm more than it increases cooperation by the partners, and therefore it is *not* the optimal spot governance structure.

Optimal scope under relational contracting

The above analysis shows that the levels of cooperation that can be achieved under spot contracting are generally below the first best. Recall, however, that while the firms' actions are not formally contractible, they are observable by the firms. In this section, we allow the firms to interact repeatedly (i.e., for an infinite sequence of time periods), and show how under repeated interaction, they may informally contract on more cooperative actions than those achieved under arm's-length contracting. Using the jargon of economists, we call these informal agreements "relational contracts".

Our key finding in this section is that the effect of network scope on cooperation under relational contracting may sharply differ from those under arm's-length contracting.

A relational contract is a complete plan for the relationship between the central firm and the N partners, which specifies: (1) the actions to be taken; (2) a set of surplus-splitting fixed payments to be made upfront ($s_k^h(g)$ denoting the bonus paid by firm h to firm k under scope g, with $h, k \in \{central\ firm, partner\ 1, partner\ 2\}$); (3) a set of discretionary bonuses to be paid when firms take the scheduled actions ($b_k^h(g)$ denoting the bonus paid by firm h to firm $k$under scope g; and (4) the firms' behavior if a deviation occurs. Using well-known results from Levin (2003), we can focus without loss of generality on stationary relational contracts where equilibrium actions and payments are the same in every period. Moreover, following Baker et al. (1994, 2002), we assume that following a deviation, all firms revert forever after to optimal spot contracting.

Because actions (and the bonuses contingent on such actions) are not court-enforceable, the relational contract must be self-enforcing—that is, it must constitute a subgame perfect equilibrium of the infinitely repeated game. A self-enforcing relational contract specifying actions a_c, a_1, and a_2 under scope g must satisfy the following conditions.

Participation constraints

Let the firms' payoffs on the equilibrium path (that is, under the informally agreed actions), gross of all side payments, be:

$\pi_c(a_c, a_1, a_2) \equiv v_c(a_c, a_1, a_2) - k(a_C)$ for the central firm,

$\pi_1(a_c, a_1, a_2, g) \equiv v(a_c, a_1, a_2) + gv_l(a_c, a_2, a_1) - (1+g)L(a_c) - c(a_1) - gc(a_2)$for partner 1, and

$\pi_2(a_c, a_1, a_2, g) \equiv (1-g)[v_l(a_c, a_1, a_2) - L(a_c) - c(a_2)]$ for partner 2.

Then, the participation constraints for the central firm and the two partners are given, respectively, by:

$$\pi_c(a_c, a_1, a_2) + \sum_{i \in N}\left(s_c^i(g) + b_c^i(g) - s_i^c(g) - b_i^c(g)\right) \geq \pi_c^{SP}, \qquad (3)$$

$$\pi_1(a_c, a_1, a_2, g) + \sum_{h \neq 1}\left(s_1^h(g) + b_1^h(g) - s_h^1(g) - b_h^1(g)\right) \geq \pi_1^{SP}, \text{ and} \qquad (4)$$

$$\pi_2(a_c, a_1, a_2, g) + \sum_{h \neq 2}\left(s_2^h(g) + b_2^h(g) - s_h^2(g) - b_h^2(g)\right) \geq \pi_2^{SP}. \qquad (5)$$

Incentive constraints

Before stating the incentive constraints, we must define each firm's optimal "deviation" from the relational contract, given that the other firms honor the relational contract:

$a_c^{dev} \equiv argmax_{\tilde{a}_c}\{\pi_c(\tilde{a}_c, a_1, a_2)\}$ for the central firm,

$a_1^{dev}(g) \equiv argmax_{\tilde{a}_1}\{\pi_1(a_c, \tilde{a}_1, a_2, g)\}$ for partner 1, and

$a_2^{dev}(g) \equiv argmax_{\tilde{a}_2}\{\pi_2(a_c, a_1, \tilde{a}_2, g)\}$ for partner 2.

It is also useful to define each firm's reneging temptation (that is, its present gain from deviating), given the agreed upon actions, a_c, a_1, a_2, and the scope g:

$R_c(a_c, a_1, a_2) \equiv \pi_c\left(a_c^{dev}, a_1, a_2\right) - \pi_c(a_c, a_1, a_2)$ for the central firm,

$R_1(a_c, a_1, a_2, g) \equiv \pi_1\left(a_c, a_1^{dev}, a_2, g\right) - \pi_1(a_c, a_1, a_2, g)$ for partner 1, and

$R_2(a_c, a_1, a_2, g) \equiv \pi_2\left(a_c, a_1, a_2^{dev}, g\right) - \pi_2(a_c, a_1, a_2, g)$ for partner 2.

The total reneging temptation under scope g is therefore given by:

$R(a_c, a_1, a_2, g) \equiv R_c(a_c, a_1, a_2) + R_1(a_c, a_1, a_2, g) + R_2(a_c, a_1, a_2, g)$.

Two important observations are at order here. First, and by the same logic used to analyze spot contracting in section 2, broad scope reduces the partners' incentive to deviate. Under broad scope, partner 1 owns and controls both stores. Therefore, even if partner 1 decides to deviate and hence to disregard the effect of his actions on the central firm, he still takes into account the effects of those actions on both local asset 1 and local asset 2, thereby choosing an action closer to the first best than the action he would choose if he deviated under narrow scope. This implies that the partners' reneging temptation is lower under broad scope than under narrow scope:

$R_1(a_c, a_1, a_2, 1) < R_1(a_c, a_1, a_2, 0) + R_2(a_c, a_1, a_2, 0)$.

The second observation is that in contrast to the spot contracting case, scope *does not* affect the central firm's deviation because *holding the partners' actions constant at the equilibrium level*, the central firm's payoff does not depend on scope. Therefore, the central firm has the same reneging temptation under broad and narrow scope, irrespective of the types of complementarities and externalities that link the central firm to the partners. These two observations will play an important role in our comparison of broad and narrow scope under relational contracting.

The incentive constraints require that each firm prefer to take the scheduled actions and pay the scheduled bonuses in the current period, and preserve the relationship in the future periods, over choosing the deviation action and defecting on bonuses in the current period, and reverting to spot contracting in the future periods. Let $\delta \in [0,1]$ be the firms' common intertemporal discount factor. Then, the incentive constraints are formally defined as follows:

$\frac{\delta}{1-\delta}\left[\pi_c(a_c, a_1, a_2) + \sum_{i \in N}\left(s_c^i(g) + b_c^i(g) - s_i^c(g) - b_i^c(g)\right) - \pi_c^{SP}\right] \geq R_c(a_c, a_1, a_2)$ for the central firm, (6)

$$\frac{\delta}{1-\delta}\left[\pi_1(a_c, a_1, a_2, g) + \sum_{h\neq 1}\left(s_1^h(g) + b_1^h(g) - s_h^1(g) - b_h^1(g)\right) - \pi_1^{SP}\right] \geq R_1(a_c, a_1, a_2, g)$$

for partner 1, and (7)

$$\frac{\delta}{1-\delta}\left[\pi_2(a_c, a_1, a_2, g) + \sum_{h\neq 2}\left(s_2^h(g) + b_2^h(g) - s_h^2(g) - b_h^2(g)\right) - \pi_2^{SP}\right] \geq$$

$R_2(a_c, a_1, a_2, g)$ for partner 2. (8)

Optimal relational contract

We can now extend Levin's (2003) analysis to show that the relational contract is self-enforcing—that is, constraints (3) through (8) hold—if, and only if the discounted net total surplus it generates exceeds the total reneging temptation, that is:

$$\frac{\delta}{1-\delta}[S(a_c, a_1, a_2) - S^{SP}] \geq R(a_c, a_1, a_2, g). \quad (9)$$

To see why, notice that (9) is the sum of the incentive constraints (conditions (6) through (8)), which is tighter than the sum of the participation constraints, (conditions (3) through (5)), and is therefore necessary for self-enforcement. Clearly, there exist fixed payments and bonuses such that if self-enforcement condition (9) holds, the participation and incentive constraints (conditions (3) through (8)) hold as well. Intuitively, if condition (9) holds, there is enough surplus in the relationship between the central firm and the N partners to offset their aggregate temptation to deviate from the relational contract. The payments can then be used to transfer slack across the participation and incentive constraints as needed. We further elaborate on the intuition underlying this point in the next section.

Given the above analysis, the optimal relational contract under scope g is given by actions $\left[a_c^{RC}(g), a_1^{RC}(g), a_2^{RC}(g)\right]$, such that:

$$a_c^{RC}(g), a_1^{RC}(g), a_2^{RC}(g) \equiv argmax_{a_c, a_1, a_2}\{S(a_c, a_1, a_2)\},$$

subject to the self-enforcement constraint, (9).

Consequently, the optimal scope under relational contracting is given by:

$$g^{RC} \equiv argmax\left\{S\left(a_c^{RC}(g), a_1^{RC}(g), a_2^{RC}(g)\right)\right\}.$$

Note that the total surplus does not depend on scope, whereas the self-enforcement constraint does. Therefore, the role of scope under relational contracting is to reduce the total reneging temptation (that is, the right-hand side of (9)), such that the self-enforcement constrained is relaxed.

Summary: The governance role of scope under spot vs. relational contracting

We have seen in section 2 that under spot contracting it is a priori unclear whether narrow or broad relationship scope is the optimal form of network governance. In particular, we have seen that by internalizing horizontal externalities across the partners, broad scope may improve the partners' cooperation. However, depending on which kinds of decisions and externalities characterize the network, broad scope may leave unaffected, or even reduce, the central firm's cooperation. In a sense, this is not surprising: while broad scope realigns the partners' incentives, it has no direct effect on the central firm's incentives. Therefore, any effect of broad scope on the central firm's action must work indirectly through the partners' actions. When there is no complementarity between central firm's and partners' actions in creating value, or when efficiency requires the central firm to reduce rather than increase its actions due to negative externalities, broad scope will not improve, and may actually reduce, the central firm's cooperation.

Things look very different under relational contracting. In this case, the firms informally agree on the desired actions and the accompanying side payments. Once the actions are agreed upon, each firm separately considers whether to cheat on its partners—that is, whether to take an opportunistic action that maximizes current profits while taking advantage of the fact that the other partners are honoring the informal agreement. As discussed above, this implies that regardless the complementarities and externalities that link actions and assets in the network, broadening scope (that is, assigning both assets to one partner) reduces the partners' reneging temptation *but does not affect* the central firm's reneging temptation. The fact that the reduction in partners' temptation triggered by broad scope does not feed back into the central firm's temptation ensures that broad scope unambiguously reduces the total reneging temptation, and therefore relaxes the self-enforcement constraint and increases surplus. In other words, broad scope is the superior network governance, compared to narrow scope, when relational contracting is feasible. An inspection of (9) suggests that this will be the case when the discount factor, δ, is high enough (that is, when the firms are forward-looking because they have a long expected time horizon) and when the fallback option in case the relational contract terminates, S^{SP}, is small enough (that is, when reversion to spot contracting is sufficiently unattractive).

The two-sided effect of scope on cooperation

By using the optimal program in section 3 we can also show that under relational contracting, broad scope can increase the central firm's cooperation even in those cases (highly negative

vertical externalities) where it would reduce it under spot contracting. To see this point, consider our example 2 from section 2. We have shown that in this case, broadening scope would reduce the central firm's cooperation under spot contracting. Consider now relational contracts. Suppose the network starts with narrow scope, and that in the optimal relational contract under this governance structure, the partners' incentive constraints, (7) and (8), are binding at the first best actions whereas the central firm's incentive constraint, (6), is binding at an action above the first best level. Suppose that switching from narrow to broad scope causes a high enough reduction in the total reneging temptation, such that after this change in governance, the discounted net total surplus generated by the initially agreed actions offsets the total reneging temptation (that is, self-enforcement condition (9) switches from binding to slack). Then, subsidization across incentive constraints implies that even though broad scope has no direct effect on the central firm's incentives, the excess "net relational capital" created by the new governance can be used to raise the central firm's cooperation. More precisely, the firms can agree on reducing the partner's stream of cooperation rents (via changes in the bonuses or fixed payments) by the slack that broad scope has injected in his incentive constraint; transfer those rents to the central firm (again, via changes in the bonuses or fixed payments), thereby making the latter's incentive constraint slack; and ask the central firm in exchange, to move his action down and closer to the first best until the incentive constraint binds again.

In other words, and in sharp contrast with the spot contracting case, the central firm will *respond to the partners' formal incentives*, that is, to a change in governance that realigns the partners' incentives without directly affecting those of the central firm. From a managerial standpoint, this is an important result: a network does not only need to understand whether broadening scope will increase its overall performance, but also which firms in the network will or will not respond to the change in scope. Our analysis suggests that responses may be very different depending on whether the firms operate in a spot or relational contracting environment.

Appendix 2: Statistical Analysis of Franchising Agreements

In this appendix we summarize a set of regression results relating the degree to which a franchise system features broad scope relationships ("multiunit propensity") to the level of cooperation by both franchisors and franchisees in those relationships. A fuller treatment is available from the authors upon request. Our data are drawn form a sample of 114 Uniform Franchise Offering Circulars (UFOC's), one per franchise system (franchisor). Sixty-two percent of our observations are quick service restaurant chains, 18% are automobile maintenance services, and the remaining 20% are other retail business, most of which involve home maintenance or décor.

Our main dependent variables are proxies for the degrees of cooperation exhibited by franchisees and their franchisor over time. The proxies we develop are based on the outcomes of litigation between franchisees and franchisors. Our assumption is that a party failed to cooperate ("breached") if it was the loser in a lawsuit. As of 2000, the FTC has required franchisors to include detailed descriptions in their UFOC's of all litigation to which they were party during the prior 10 years. For legal matters that had been concluded (i.e., were no longer pending) these descriptions include litigation outcomes. We used these outcomes to construct measures of franchisor and franchisee breach as recorded in the UFOC from 2001 (in a few cases, we used UFOC's from 2002, 2003 or 2004 instead due to availability). The categories are as follows: (1) court judgment against the franchisor; (2) court dismissed complaint brought by franchisor; (3) arbitration outcome in favor of franchisee; (4) settlement in favor of franchisee; (5) court judgment against the franchisee; (6) court dismissed complaint brought by franchisee; (7) arbitration outcome in favor of franchisor; (8) settlement in favor of franchisor; (9) settlement in which both concede and no transfer of money or other assets occurs.

In most cases, an outcome in favor of one party in the dispute involved a financial payment to that party from the other party, and/or debt forgiveness. In some cases, it involved a party agreeing to take an action that it had refused to take prior to the litigation (e.g., purchasing inputs from a supplier specified in the contract, ceasing to operate a competing business in violation of a non-compete clause, etc.). Most cases began in court or in arbitration, and ended in a financial settlement (categories 4 and 8), though some ended in a judgment. We coded those outcomes that favored the franchisee (categories 1-4) and those in category 9 as instances in which the franchisor did not cooperate (acted opportunistically or "defected"). We measured franchisor breach by summing the number of these outcomes that occurred in the 10-year period

covered by the relevant UFOC. We coded those outcomes that favored the franchisor (categories 5-8) and category 9 as instances in which the franchisee breached. We measured franchisee breach by summing the number of these outcomes that occurred in the 10-year period covered by the relevant UFOC. We excluded litigation that involved a dispute over an initial sale of a franchise, because we wished to focus on cooperation in ongoing relationships. We also excluded litigation involving a sub-franchisee, because determining fault among the three parties (franchisee, franchisor and sub-franchisee) was more difficult. Because the defection variable is a count measure with several observations of zero, we used tobit estimation. We measured our main independent variable, the propensity of a franchisor to engage in multiunit franchising, in two alternate ways: (1) number of units in a system owned by a multiunit owner/total number of franchised units (MULTIUNIT PROPENSITY1), and (2) number of multiunit owners/total number of unique franchisees (MULTIUNIT PROPENSITY2). Each of these propensity measures was calculated as of the year of the UFOC in our dataset. Table A2.1 presents our regression estimates, while Table A2.2 describes our control variables. The coefficients on MULTIUNIT PROPENSITY1 and MULTIUNIT PROPENSITY2 are negative and statistically significant at the 95% level, as predicted for our theoretical model (asterisks are omitted per *SMJ* policy).

Table A2.1: Regression Estimates

DV:	Model 1 Franchisor Defection (Tobit)	Model 2 Franchisee Defection (Tobit)	Model 3 Franchisor Defection (Tobit)	Model 4 Franchisee Defection (Tobit)
MULTIUNIT PROPENSITY1	-4.08 (2.28)	-5.47 (2.62)		
MULTIUNIT PROPENSITY2			-3.47 (2.20)	-5.47 (2.62)
FRANCHISED UNITS	.005 (.000)	.002 (.000)	.005 (.000)	.002 (.000)
BRAND VALUE	-2.1e-9 (8.7-9)	1.2e-9 (8.4e-9)	-2.1e-8 (8.8e-9)	1.2e-9 (8.4e-9)
YEARS FRANCHISING	.092 (.048)	.102 (.047)	.096 (.049)	.102 (.047)
TERMINATION STATES	-.224 (1.94)	.031 (1.92)	-.280 (1.96)	.031 (1.92)
OWNERSHIP CHANGE	-.937 (1.34)	1.82 (1.30)	-.934 (1.36)	1.82 (1.30)
QSR	-.240 (1.46)	-.511 (1.33)	2.05 (1.43)	-.511 (1.33)
AUTO	.730 (1.78)	-1.77 (1.73)	.531 (1.79)	-1.77 (1.73)
ASSOCIATION	-3.69** (1.49)	-1.38 (1.40)	-3.62** (1.51)	-1.38 (1.40)
COUNCIL	-1.85 (1.26)	-2.15** (1.23)	-2.14** (1.27)	-2.15** (1.23)
Constant	-2.54 (1.72)	-.099 (1.72)	-2.45 (1.78)	-.099 (1.72)
Pseudo R^2	.115	.065	.113	.065
Prob.>$\chi 2$	.000	.002	.000	.002
N	114	114	114	114

Table A2.2: Definitions of Control Variables

Control Variable	Definition
FRANCHISED UNITS	Number of franchised units in the franchise system.
BRAND VALUE	Discounted sum of the three years of franchisor advertising spending preceding the UFOC date, as reported in *AD $ Summary*.
YEARS FRANCHISING	Number of years for which the franchise system was engaged in franchising.
TERMINATION STATES	The fraction of a franchise system's franchised units that are located in U.S. states with laws limiting franchise termination.
OWNERSHIP CHANGE	Takes the value of 1 if the system changed ownership in the five years preceding the year of the UFOC, and zero otherwise.
QSR	Takes the value of 1 if the franchise system participated in the quick-service restaurant industry, and zero otherwise.
AUTO	Takes the value of 1 if the franchise system participated in the auto maintenance restaurant industry, and zero otherwise.
ASSOCIATION	Takes the value of 1 if the franchise system featured an independent franchisee association, and zero otherwise.
COUNCIL	Takes the value of 1 if the franchise system featured a franchisor-sponsored franchisee council, and zero otherwise.