COMPETITION, GOVERNANCE, AND RELATIONSHIP-SPECIFIC INVESTMENTS: THEORY AND IMPLICATIONS FOR STRATEGY

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This paper uses biform games to examine the endogenous decision to invest in relationship-specific assets. It addresses the questions of how competition affects suppliers’ decisions to produce a general-purpose product or a relationship-specific product for a buyer and under what circumstances a governance arrangement designed to share investment costs between the transacting parties increases the investment in relationship-specific assets. We offer a balanced perspective that emphasizes both the superior transaction value of relationship-specific products and their high transaction costs while considering the competition effects generated by alternative investment plans. The model and its extensions generate new insights into investment decisions regarding relationship-specific assets. Copyright © 2013 John Wiley & Sons, Ltd.

INTRODUCTION

Relationship-specific investments create assets that are customized for a particular user or transaction, rendering the value of their second-best use lower than their value in the primary transaction. Prior research has extensively examined how asset specificity induces concerns of opportunism that the investing party may not ex post sufficiently capture the additional value generated by the relationship-specific investments and recoup its ex ante investment, as its transaction partner may threaten to discontinue trading and thereby appropriate a large part of the value created (Klein et al., 1978; Williamson, 1975, 1979, 1983, 1985, 1996). As a result, firms use various governance forms, such as long-term contracts, exclusive territory terms, and ownership holdings, to better align their transacting partners’ incentives with their own; the absence of these governance forms may lead to underinvestment in relationship-specific assets.

Despite the deep understanding we have gained, primarily from the perspective of minimizing transaction costs, regarding how governance forms induce efficient relationship-specific investments, our understanding of the endogenous decision to invest in relationship-specific assets does not extend far beyond this point, as many prior studies have stopped short of noting other important external and internal factors that may also affect specific investments. This paper aims to advance our understanding of the effects of competitive intensity on relationship-specific investments in supplier-buyer relationships. We develop a formal model to highlight the following fundamental theoretical tensions.

First, relationship-specific investments generate “appropriable quasi-rents,” which not only induce higher transaction costs of haggling and holdup (for a review, see Gibbons, 2005) but also constitute a higher transaction value that exceeds what

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Each party to the transaction could generate on its own (Zajac and Olsen, 1993). The consideration of both factors helps us further understand certain strategies employed by firms; for example, we find that, under certain circumstances, firms may be willing to increase the level of asset specificity in the pursuit of greater net present value (NPV) despite higher transaction costs (which only determine the NPV jointly with revenues and risks). In fact, the canonical approach in Williamson (1975, 1985, 1996) of choosing the governance form that minimizes the sum of transformation costs (production costs) and transaction costs also maximizes the NPV on the basis of the premise that governance choices affect neither revenues nor risks. However, we alter this premise and consider variable transactional values in addition to variable transaction costs associated with specific investments.

Furthermore, competition among suppliers introduces additional countervailing forces that affect relationship-specific investments. On the one hand, competition among suppliers worsens the bargaining position of the supplier investing in relationship-specific assets vis-à-vis the buyer for whom the product is customized, thereby exacerbating hold-up risks and further dampening the supplier’s willingness to invest. On the other hand, competition also reduces the suppliers’ surplus from producing general-purpose substitutes, thereby making the alternative decision of producing high-value customized products more lucrative and encouraging relationship-specific investments. We show that the manner in which competition affects investment decisions depends on the following factors: (1) the extra value of the relationship-specific product relative to its general-purpose substitute; (2) the (sunk) fixed investments required to build the specific asset; (3) the outside market value of the general-purpose substitute; (4) the bargaining skills of suppliers and buyers, independent of competition; and (5) the intensity and structure of the competition among suppliers.

We use a biform game, which is composed of a strategic stage followed by a cooperative game. Cooperative games are useful in analyzing situations in which firms must cooperate (in the sense of agreeing to transact with each other) to create value and in understanding how competition for such value-creating transactions affects the firms’ ability to appropriate a share of the value that is created. Biform games extend cooperative games by adding an initial, strategic stage in which firms attempt to influence their “competitive landscape,” i.e., the second, cooperative stage in which players’ payoffs are determined (Brandenburger and Stuart, 1996, 2007). The biform game is an effective and useful tool for shedding light on questions related to value creation and value appropriation under competition because it can be used to accurately capture both the positive and negative aspects of competition (Gans, MacDonald, and Ryall, 2008; MacDonald and Ryall, 2004; Ryall and Sorensen, 2007). Therefore, the use of biform games to formally analyze value-based research questions is becoming an increasingly popular approach in the strategy literature, pioneered by studies such as Lippman and Rumelt (2003), MacDonald and Ryall (2004), Adner and Zemsky (2006), Ryall and Sorensen (2007), and Chatain and Zemsky (2007, 2011).

To examine the effect of competition on relationship-specific investments, we first assume in our baseline model that no ex ante contractual or other governance arrangements are made to govern the bilateral relationship between the buyer and either of the two potential suppliers in our biform game. However, this assumption is not intended to deny the existence of the various organizational arrangements that govern bilateral relationships, as significant theoretical progress has been achieved in addressing these arrangements over the past few decades. Instead, by holding governance arrangements constant in the baseline model, we can more clearly reveal how competition per se shifts the tradeoffs faced by the supplier investing in the relationship-specific assets. We then extend the model to examine the extent to which a governance arrangement affects the firms’ relationship-specific investments in the presence of competition.

Relevant phenomena

The levels of product customization and idiosyncratic investments appear to have changed with the level of market competition in several industries. For example, during the early stages of its history, the U.S. automobile industry experienced a significant trend toward employing more standardized designs and architectures. Argyres and Bigelow (2010) demonstrated that this trend was particularly prominent during the industry’s shake-out stage (i.e., from 1920 to 1931), which is
characterized by substantial entries to and exits from the marketplace amidst fierce competition with a focus on cost reduction (Argyres and Bigelow, 2007). The emergence of a dominant design may explain much of this change (Argyres and Bigelow, 2010), but intensified market competition among the automobile manufacturers, as evidenced by a spike in the marketplace entry and exit rates of these manufacturers, may also have played an important role in pushing the automobile manufacturers away from manufacturing more idiosyncratic products.

However, relationship-specific investments do not always shrink as competition becomes more intense. For example, although the market for international courier and small packages (IC&SP) was highly competitive (Wada and Nickerson, 1999), corporate investment in relationship-specific IT systems remained quite popular. According to Nickerson, Hamilton, and Wada (2001), intense competition in the Japanese market did not prevent many IC&SP couriers from investing in the highly customized IT resources that support many key supply chain activities. Instead, a substantial proportion of all couriers (30.6% in 1998) chose to invest in relationship-specific IT systems at the highest level by serving as document specialists. Intense competition was hypothesized to be the driver of these specific investments, which were made by IC&SP firms to provide superior services to their customers (Wada and Nickerson, 1999).

Among other phenomena, firms may vary their investments in relationship-specific assets in response to their competition, but the underlying mechanisms leading to the different outcomes are not yet clear. Our model delineates a set of boundary conditions that shapes the outcomes. The paper is organized as follows. We first discuss the related literature. Then, we introduce the baseline model, present the main findings, discuss the model extensions, and, finally, conclude our study. We provide all of the proofs for our propositions in an Appendix S1.

RELATED LITERATURE

This paper is related to several distinct topics discussed in published literature. First, it contributes to the literature addressing asset specificity. Relationship-specific investments have the following essential attributes: they must occur prior to the transaction, the advance commitment is irreversible and unsalvable, and the value of their alternative uses is much lower than that of general-purpose investments (Klein et al., 1978; Riordan and Williamson, 1985; Williamson, 1979, 1983). Therefore, a main theme in transaction-cost economics is that because of their lack of outside external value and the nature of sunk costs, relationship-specific assets can become hostage to the noninvesting party, which may, in the ex post bargaining process, threaten to terminate the transaction and to purchase general-purpose substitutes instead (e.g., Argyres and Bigelow 2007; Joskow, 1987; Mahoney, 1992; Nickerson et al., 2001). Although our model adopts these classic assumptions, we also emphasize that relationship-specific assets lead to superior transaction value, which is an equally important quality of asset specificity that has received much less attention than the assets’ high transaction costs has in the existing literature (Dyer, 1996, 1997; Madhok and Tallman, 1998; Zajac and Olsen, 1993). Relationship-specific investments may enhance a firm’s value in many ways. For example, they may enable a firm to produce high-value products and services (Shervani et al., 2007), to reconfigure its resource profiles and enter new markets (Nickerson et al., 2001), to increase the likelihood of winning more valuable contracts from the same transaction partner (Kang et al., 2009), and to create spillover effects among a constellation of activities and multilateral exchanges (Kang et al., 2009; Nickerson, 1997).

Second, this study focuses on the antecedents of the decision to invest in relationship-specific assets. An important conclusion of transaction-cost economics is that proper governance structures can facilitate a firm’s investments in relationship-specific assets (e.g., Novak and Stern, 2008, Riordan and Williamson, 1985). In addition, previous studies that linked transaction-cost economics to other theories have discussed additional factors of influence, such as the demand uncertainty that may lead a firm to use fewer specific assets (Mahoney, 1992), the market position and organizational structure that affect a firm’s investments in idiosyncratic resources (Nickerson et al., 2001), and the industry lifecycle that influences the consequences of matching relationship-specific

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investments to governance forms (Argyres and Bigelow, 2007). To contribute to these lines of thought, we examine how competition with other suppliers affects an incumbent supplier’s specific investments.

Prior research on asset specificity has also demonstrated that various governance forms safeguard the returns of the investing party and therefore should increase that party’s level of investment in the relationship-specific assets (e.g., Klein et al., 1978; Williamson, 1975, 1979, 1983). However, less is known regarding when, and to what extent, these governance agreements effectively boost such investments. As firms face the trade-offs inherent to relationship-specific investments and the options presented by alternative investment plans, we show that the presence of governance contracts may not always guarantee relationship-specific investments; in addition, due to anticipation of various contingencies that may lead to different outcomes, the transacting partners may not always agree to a governance arrangement. We specify the conditions under which the governance arrangement is agreed upon and affects relationship-specific investment.

Finally, this work also contributes to the research on competitive strategy, especially the literature regarding buyer-supplier relationships. Recent studies have determined that client-specific scope economies play an important role in a supplier’s decisions regarding the services offered to its clients (Chatain, 2010; Chatain and Zemsky, 2007). In addition, researchers have shown that the level of a product’s standardization determined the level of closeness in supplier-buyer relationships that is required to enhance the supplier’s performance (Hoetker, Swaminathan, and Mitchell, 2007) and that concerns about future competition shape the supplier’s outsourcing decisions (de Fontenay and Gans, 2008). Our study contributes to this literature by examining how suppliers and buyers interact to bargain over different product profiles. The nature of these interactions eventually determines the supply of highly customized products for the buyer. Moreover, Shervani et al. (2007) found that if a product commanded a large market share, then its retailers felt encouraged to make investments that are idiosyncratic to the product, even in the absence of governance structures that curtail hold-up risks, because of the product’s popularity among consumers. We examine the related question of how competition and market power directly affect the investing party’s bargaining power, which is another mechanism through which market power may alter the incentives driving investments in specific assets.

In general, with respect to the competitive strategy literature, this paper extends recent work on the formal models of buyer-supplier relationships in a promising direction by focusing on whether a focal firm makes specialized investments and how this decision is affected by the intensity of the firm’s competition. Focusing on specialized resources and specialized assets provides a valuable opportunity to clearly expose the interplay between value creation and value appropriation, which is a key theme in the current discussions of competitive strategy in the literature. In addition, our formal models indicate that competition may affect a firm’s performances and the industry’s performances in different ways depending on the impacts of that competition on the incentives for making specialized investments.

THE MODELS

Baseline model

We set up a biform game in the baseline model. The biform game consists of a first stage in which agents take strategic actions to influence their competitive landscape, followed by a competitive stage in which this landscape is represented by a cooperative game whose parameters are determined by agents’ first-stage actions. The cooperative game is fully described by a set of agents and a characteristic function \( v \) that elaborates the economic value that any set of agents can create—via arm’s length transactions— independent of any other agents. Therefore, the characteristic function \( v(G) \) represents the value that a set of agents \( G \) can create.

In accord with the literature, we focus on the “core,” an equilibrium concept specific to coalitional game theory, to examine the players’ second-stage appropriation levels (e.g., Brandenburger and Stuart, 1996, 2007; Chatain and Zemsky, 2007, 2011; MacDonald and Ryall, 2004; Ryall and Sorenson, 2007). The core is the set of divisions of the total value created that ensure that no subgroup can make all of its members better off by leaving the grand coalition. Specifically, the core needs to satisfy the feasibility and the stability constraints (MacDonald and Ryall, 2004): agents
can only appropriate in aggregate what value is created (feasibility), and no subset of agents \((G)\) will agree to engage in the transactions that generate the contemplated amount \((v(N))\) if their aggregate payoffs from doing so are less than \(v(G)\) (stability). This is because, in a free market, the agents can always engage in the transactions that produce \(v(G)\) and then distribute it in a way that makes them all better off (i.e., the alternative values available to every subset of agents via freely available, arm’s length transaction).

The set of core payoff distributions that satisfy the feasibility and stability constraints, when they exist, form an interval for each agent \([\pi_{\text{min}},\pi_{\text{max}}]\). The intervals are more advantageous than point estimates because they highlight the fact that competition alone does not always fully determine a firm’s profit. Other extra-competitive factors may also play an important role, such as bargaining skills and institutional details (which will be captured by the appropriation factor below). These factors are ways in which an agent persuades others to part with value other than the force of their competitive alternatives as described by the characteristic function. Allowing both competitive factors and extra-competitive factors to influence the value captured by firms is crucial to management and strategy research.\(^2\)

In our model, we consider a set of three agents, namely, two suppliers, \(I\) and \(E\), and one buyer \(B\). In the first stage, the supplier \(I\) decides whether to produce 1 unit of general-purpose product \((g)\) or 1 unit of relationship-specific product \((s)\). The production of \(s\) entails investing in relationship-specific assets, at a fixed cost \((F > 0)\) that is not retrievable. That is, the relationship-specific investment \(F\) is a sunk cost and thus is only accounted for in an investing firm’s ex ante expected valuation but not considered in any ex post bargaining outcome. In contrast, any fixed cost incurred while producing \(g\) is fully retrievable and is normalized to be zero. Supplier \(E\) can only supply 1 unit of \(g\). Thus, the set of feasible actions available to the supplier \(I\) in the first stage is

\[
a_I \in \{g, s\} \tag{1}
\]

In the second stage, the characteristic function is determined by the product’s value to the buyer

\[
\gamma [a_I] ([I, B]) \equiv u_B (a_I) - c_I (a_I) \tag{2}
\]

Where \(\gamma [a_I]\) indicates that the characteristic function depends on the supplier \(I\)’s choice in the first stage, \(u_B (a_I)\) is the value the buyer \(B\) receives from the type of product produced by the supplier \(I\) in the first stage, and \(c_I (a_I)\) is the economic cost to the supplier \(I\) of actually producing one unit of product (as distinguished from \(F\), the investment in the capability to produce a relationship-specific product). Because the supplier \(E\) can only produce 1 unit of \(g\), the value created when \(E\) and \(B\) transact is not dependent on \(a_I\), as presented in Equation 3.

\[
\gamma [a_I] ([E, B]) \equiv u_B (g) - c_E (g) \tag{3}
\]

\(c_E (g)\) is the economic cost to the supplier \(E\) of producing 1 unit of \(g\), and we assume that \(c_E (g) = c_I (g)\). Although \(g\) and \(s\) are substitutable to a certain extent, buyer \(B\) derives more satisfaction from \(s\) because it is tailored for the buyer. Without any loss of generality, we assume that buyer \(B\)’s valuations of 1 unit of \(g\) and 1 unit of \(s\), respectively, are

\[
u_B (g) = 1, u_B (s) = \lambda \tag{4}
\]

We constrain our analysis by assuming that \(\lambda - F \geq 1\), which indicates that the net value of the customized product exceeds that of the generic product.\(^3\) This assumption also implies that \(\lambda > 1\). The relationship-specific product \(s\) is only valuable to buyer \(B\), whereas \(g\) can be sold to either buyer \(B\) or elsewhere with little or no alterations at a positive “outside value.” We assume that the outside price of 1 unit of \(s\) is 0 and 1 unit of \(g\) is \(m\)

\(^2\)I thank an anonymous reviewer for pointing out these implications.

\(^3\)In many cases, relationship-specific investments interest scholars because the potential hold-up risks may prevent more value from being created by these investments. Studies of relationship-specific investments become less interesting if the customized product is “inferior” in that its net value is smaller than that of its closest generic substitute (i.e., \(\lambda - F < 1\)).
with $0 \leq m \leq 1$. Thus, the total value created by the grand coalition that includes all three players is

$$v(a_I) \equiv u_B(a_I) - c_I(a_I) + m - c_E(g)$$

(5)

We assume that the marginal costs of producing $g$ and $s$ are both equal to zero.

$$c_I(g) = c_E(g) = c_I(s) = 0$$

This setup results in the following characteristic functions:

$$v[I, E, B] = 1 + m$$

$$v[I, B] = 1$$

$$v[E, B] = 1$$

$$v[I, E] = 2m$$

$$v[I] = m$$

$$v[E] = m$$

$$v[B] = 1 - m$$

(7)

Note that, as the generic product is available on the open market, the buyer always has the option of creating $(1 - m)$ on his or her own without transacting with either supplier. The supplier $I$, however, cannot create any value on his or her own when producing the relationship-specific product. In addition, these results clearly show that each player must face competition from alternative uses of each product in determining how much value they can eventually appropriate.  

Let $\pi_I(a_I), \pi_E(a_I)$ and $\pi_B(a_I)$ indicate the supplier $I$’s, the supplier $E$’s, and the buyer $B$’s appropriated value in the second stage given the supplier $I$’s first-stage choice of product type, respectively. Let $[\pi_I^{\min}(a_I), \pi_I^{\max}(a_I)], [\pi_E^{\min}(a_I), \pi_E^{\max}(a_I)],$ and $[\pi_B^{\min}(a_I), \pi_B^{\max}(a_I)]$ be the suppliers and the buyer’s internal ranges of potential payoffs that are consistent with being in the core.

If $a_I = g$, it is trivial to show that

$$\pi_I^{\min}(g) = \pi_I^{\max}(g) = m,$$

$$\pi_E^{\min}(g) = \pi_E^{\max}(g) = m,$$

and

$$\pi_B^{\min}(g) = \pi_B^{\max}(g) = 1 - m.$$  

(8)

Therefore, both suppliers receive exactly $\pi_I(g) = \pi_E(g) = m$ and the buyer receives exactly $\pi_B(g) = 1 - m$. There is no room for bargaining in this instance. These results are consistent with the implication that both suppliers participate in a competitive market for $g$ whose outside market price $m$ is, by assumption, fully determined for all buyers and suppliers.

Under $a_I = s$, more value is created, and the range of feasible payoffs consistent with being in the cores for the supplier $I$, the supplier $E$, and the buyer $B$ are, respectively,

$$[\pi_I^{\min}(s), \pi_I^{\max}(s)] = [0, \lambda + m - 1],$$

$$[\pi_E^{\min}(s), \pi_E^{\max}(s)] = [m, m],$$

$$[\pi_B^{\min}(s), \pi_B^{\max}(s)] = [1 - m, \lambda]$$

(9)

Supplier $I$ can receive anything from 0 to $\lambda + m - 1$. Because $\lambda - F \geq 1$ by assumption, $\lambda + m - 1 > m$; in other words, by producing the specialized products, $I$ faces a wider core interval on both ends, i.e., $\pi_I^{\min}(s) < \pi_I^{\max}(g)$ and $\pi_I^{\max}(s) > \pi_I^{\max}(g)$. This finding highlights the interesting tradeoffs between value creation and

In effect, the economic-value characteristic functions have normalized the outside values to zero. When $a_I = g$, no economic value is created, which is consistent with all players implicitly competing in a competitive market. When $a_I = s$, a positive economic value of $\lambda + m - 1$ is created, with the division of this economic value determined via bargaining between $B$ and $I$. In this case, $B$’s willingness to pay is $\lambda + m - 1$ and $I$’s willingness to sell is 0. The difference between these is the economic value on the table to be split between the two players, as the players can only realistically bargain over the additional value created in excess of the outside value.

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4 For computational simplicity and without any loss of generality, we assume that the outside price of the customized product is zero; in this way, $m$ becomes a “relative measure” that indicates the marginal difference between the outside values of the different types of products.

5 To highlight the effect of the outside value, we can represent the preceding analysis, which is based upon nominal values, in terms of economic values, which are the nominal values less the values of one’s outside alternatives. Economic-value characteristic functions can be created by subtracting single-agent values from the values of the groups containing them.
value capture that are involved in investment decisions. Relationship-specific investments generate a higher total value, but their low outside value also inflict greater risks upon the investing party $I$ in the value capture process when dividing the value created by the investments, due to hold-up concerns. By contrast, although general investments are free from concerns regarding the value capture process, they tend to create less total value. The buyer $B$ must still receive at least $1 - m$ in value, but may receive up to $\lambda$. It is straightforward to demonstrate that $E$ still receives the competitive market price $\pi_E(s) = m$.

Because $\pi_I^{\text{max}}(s) > \pi_I^{\text{min}}(s)$ and $\pi_B^{\text{max}}(s) > \pi_B^{\text{min}}(s)$, the intervals under $\alpha_I = s$ are nontrivial. Thus, in accord with literature conventions, we follow Brandenburger and Stuart (2007) to introduce an additional parameter, the confidence index, to obtain point estimates. The confidence index is the weight that a player gives to the best possible bargaining outcome when the player forms his or her expectations of the bargaining result; thus, the confidence index measures each player’s subjective assessment of his or her bargaining skills, which can be interpreted as the factors unrelated to the competition that determine the value captured or as “pure bargaining” factors (MacDonald and Ryall, 2004). Let $\alpha_I (0 \leq \alpha_I \leq 1)$, $\alpha_E (0 \leq \alpha_E \leq 1)$, and $\alpha_B (0 \leq \alpha_B \leq 1)$ denote the confidence indices of the supplier $I$, the supplier $E$, and the buyer $B$, respectively. Each player’s level of value appropriation in the core equals the expected surplus from the negotiation (i.e., $\alpha_j \pi_j^{\text{max}} + (1 - \alpha_j) \pi_j^{\text{min}}$, $j \in \{I,E,B\}$), determined using the player’s confidence index as the “weight” for the calculation of expected results. Therefore, the values that $I$, $E$, and $B$ capture that are consistent with being in the core are

$$\pi_I(s) = \alpha_I(\lambda + m - 1), \pi_E(s) = m,$$

and

$$\pi_B(s) = \alpha_B\lambda + (1 - \alpha_B)(1 - m)$$

Equilibrium

The solution concept for a biform game is a Nash equilibrium in the first stage with payoffs determined by the point estimates of the core value in the second stage. Supplier $I$ compares $\pi_I(g)$ and $\pi_I(s)$ to determine whether to produce $g$ or $s$. The equilibrium is summarized in Proposition 1.\(^6\)

**Proposition 1**: At equilibrium, supplier $I$ produces $s$ if $\alpha_I \geq \frac{m + F}{\lambda + m - 1}$ and produces $g$ otherwise.

Although no governance safeguard exists to protect the investing firm $I$ from the hold-up risk associated with producing the relationship-specific product $s$ (i.e., firm $I$ absorbs all of $F$’s investment costs), the investing firm $I$ may still opt for the relationship-specific investment because $I$ faces the following counterbalancing forces in deciding to produce $s$ or $g$. First, the relationship-specific product $s$ generates a superior value to that produced by $g$, and this value is divided between the supplier $I$ and the buyer $B$, thereby giving the supplier $I$ an incentive to produce $s$. This effect is stronger in the parameter space in which the value of $s(\lambda)$ is higher and/or the sunk cost $F$ for producing $s$ is lower, both of which lead to higher extra value created by $s$; the effect is also stronger when the supplier $I$ is more confident about his or her bargaining skills (i.e., $\alpha_I$ is larger), which allows $I$ to capture a larger share of the extra value and thus render that supplier more likely to invest in $s$. Second, the outside market value of the generic product $g$ constitutes the “opportunity costs” of producing $s$, and thus reduces suppliers’ incentives to invest in $s$. The second effect is stronger in the parameter space in which the outside value of $g(m)$ is higher, such that the supplier is more likely to produce $g$.

The performance of the individual firms and the total surplus created by the industry are central issues in the competitive strategy literature. We observe that, at equilibrium, when $\alpha_I \geq \frac{m + F}{\lambda + m - 1}$, the total value created by supplier $I$ and buyer $B$ reaches its maximum; otherwise, the total value created by the industry is suboptimal, for the following reasons. The production and investment decisions generate a total industry surplus (i.e., the total value created by all of the players). At equilibrium, the total surplus of the industry may or may not have reached its potential maximum. Because we have assumed $\lambda - F \geq 1,^7$ producing

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\(^6\)For simplicity and without loss of generality, we assume that when a supplier is indifferent between producing $s$ and $g$, he/she chooses to produce $s$.

\(^7\)If $\lambda - F < 1$, it is straightforward to verify that the supplier $I$ will produce $g$ at equilibrium. Doing so yields the optimal industry profit because the assumption ensures that the net value
s leads to the maximum total surplus for the industry, and the production decision is called “socially efficient.” However, in the parameter space characterized by \(a_I < \frac{m+E}{s+m-1}\), supplier \(I\) produces \(g\) instead of \(s\); in such cases, the industry creates a suboptimal total value. Although the decision of \(I\) to produce \(g\) is profit maximizing for the investing firm per se, this decision foregoes the “gains from trade” (i.e., the additional value that the industry could have generated but failed to create) because of the “negative externalities,” that is, because the investing party bears all of the costs of producing a customized product that would create some benefits for the buyer for free (Tirole, 1988). The analysis of the suboptimal total surplus indicates that the surplus creates a situation in which the governance structures intended to encourage relationship-specific investments will help improve the total industry surplus by increasing the value that the investing firms capture. If the firm’s production decision is consistent with the socially efficient outcome, then the presence of governance forms cannot help improve the performance of either the firm or the industry as a whole.

Finally, note that the firm’s bargaining skills affect the amount of value it can capture only if some residual value exists after accounting for the competition factors. For example, as suppliers of \(g\) compete in a perfectly competitive market, competition quickly drives the value that each supplier can capture down to the level of the “market price” \((m)\) and yield zero economic returns, thereby leaving no extra value to bargain over.

**Model Extension 1: increasing competitive intensity**

We now extend the baseline model to increase the competitive intensity of the competition between the suppliers. The value created by \(\{I, B\}\) is the same as in the baseline model (under both \(I\)’s choice of \(g\) and \(s\)). We assume that the product that supplier \(E\) produces can be substitutable to \(s\) to a certain extent. Specifically, we introduce a competitive intensity parameter \(\delta \in [0,1]\) such that

\[
v[a_I](\{E,B\}) \equiv u_B(g) + \delta (u_B(a_I) - u_B(g))
\]

When \(\delta = 0\), the value function is the same as Equation 3. As \(\delta \to 1\), competitive intensity increases, as the buyer’s valuation of the competitor \(E\)’s product becomes closer to that of product \(s\) from the supplier \(I\). Given \(\delta\), when \(a_I = g\), the value of both suppliers’ products to the buyer \(B\) is \(u_B(g)\); when \(a_I = s\), the value of supplier \(E\)’s product is somewhere between \(u_B(g)\) and \(u_B(s)\). Therefore, \(\delta\) indicates the substitutability between competitive products; for example, it could be a measure of the imitability of supplier \(I\)’s new, specialized products. We resume the assumption that the outside value of \(E\)’s product is \(m\).\(^8\)

It is straightforward to verify that the characteristic functions remain the same as Equation 7 with the exception that \(v(s)(\{E,B\}) = 1 - \delta + \delta \lambda\) because of the new assumption introduced here. When \(a_I = g\), the maximum and minimum values that each player can appropriate remain the same as in Equation 9. When \(a_I = s\), the range of feasible payoffs consistent with being in the cores for all players are

\[
[\pi_I^\text{min}(s), \pi_I^\text{max}(s)] = [0, (1 - \delta) \lambda + \delta + m - 1],
\]

\[
[\pi_E^\text{min}(s), \pi_E^\text{max}(s)] = [m, m], \text{ and}
\]

\[
[\pi_B^\text{min}(s), \pi_B^\text{max}(s)] = [1 - m, \lambda]
\]

Compared with the range of core payoffs of the baseline model in Equation 10, the maximum appropriable value for the supplier \(I\) consistent with being in the core decreases (whereas the minimum value remains 0), which is consistent with the expectation that a greater threat of substitutability of \(s\) poses stronger competitive pressure on the supplier \(I\); thus, \(I\) may be able to capture less value in this situation.

Moreover, it is interesting to note that the supplier \(E\) is still unable to capture more than the competitive market price of \(m\) even though his/her product is valued more by the buyer \(B\) in this setup. This occurs because supplier \(E\) still has zero

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\(^8\)Note that the intensified competition reduces the attractiveness of producing \(s\) for the supplier \(I\), as the competitor \(E\)’s product becomes more similar in value to \(s\) but has a high outside value of \(m\) instead of 0.
added value—the value that would be lost to the world if the firm ceased to exist (Brandenburger and Stuart, 2007)—despite the new assumption of product substitutability. Interestingly, the value of competition of the supplier $E$ in this example is to reduce the added value of the supplier $I$, thereby improving the bargaining position of the buyer. It resonates with the real-life examples discussed in Brandenburger and Nalebuff (1995), which illustrated how firms can be “paid to play” in a game to change the game’s structure, particularly when they reduce the added value of other players (Brandenburger and Nalebuff, 1995: 61–63).

The value that each player captures that is consistent with being in the core is

$$\pi_I (s) = \alpha_I ((1 - \delta) + \delta + m - 1), \pi_E (s) = m,$$

and

$$\pi_B (s) = \alpha_B \delta + (1 - \alpha_B) (1 - m) \quad (13)$$

Based on these payoffs, the supplier $I$ chooses its product type, and the equilibrium is summarized in Proposition 2.

**Proposition 2:** At equilibrium, supplier $I$ produces $s$ if $\alpha_I \geq \frac{m + F}{(1 - \delta) + \delta + m - 1}$ and $(1 - \delta)(\lambda - 1) \geq F$, and produces $g$ otherwise.

Compared with Proposition 1, the parameter space in which the supplier $I$ chooses to produce $g$ in Proposition 2 has been reshaped by the competitive intensity parameter of $\delta$. As $\delta$ increases, the supplier $I$ is more likely to produce $g$ instead of $s$; that is, competition in the product market decreases firms’ strategic investment in relationship-specific assets. In theory, increased competition in the supplier segment reduces the value of both the options of producing the general product $g$ and producing the customized product $s$. On the one hand, it has the expected effect of increasing the buyer’s value appropriation of alternative products, thereby reducing the supplier’s bargaining position over $s$, and as a result, making investments in the relationship-specific assets less attractive. On the other hand, as the supplier’s next-best alternative to investing in the relationship-specific assets is producing general product $g$, more intense competition over $g$ should also reduce the value of this alternative as well. We have set up Model Extension 1 such that the market for the general product $g$ is already competitive with zero economic profit even before we manipulate competition intensity, which may explain why competition lowers the value of producing $s$ but not that of $g$ and thus appears to make it only less likely for relationship-specific investments to occur.

Finally, as intense competition makes it more attractive for the supplier $I$ to produce $g$ instead of $s$, the total industry surplus is lower; this loss of value is partially absorbed by the buyer $B$, as the value appropriation of the buyer $B$ is lower when $I$ produces $g$ than it is when $I$ produces $s$. Although the conventional wisdom states that a buyer should benefit from the competition among its suppliers, completely losing the high-value $s$ makes the buyer’s strengthened bargaining position over $s$ irrelevant and thus reduces the buyer’s returns. Therefore, when competition is intense, the buyer $B$ has an incentive to protect the supplier $I$’s incentives to invest in $s$ production. For example, $B$ can make a credible commitment to compensate the supplier for building relationship-specific assets through various governance instruments. This insight generates several new implications for our understanding of interfirm relationships. For example, because many types of governance structures are effective tools for encouraging relationship-specific investments, intensified competition among suppliers may enhance the buyer’s incentives to use these governance arrangements not only to safeguard its own interests but also to protect its supplier’s incentives to produce high-value relationship-specific products. In other words, competition can strengthen the well-known relationship between governance forms and asset specificity. We will return to this point later.

**Model Extension 2: strategic interactions between two suppliers in a simultaneous game**

We now introduce Model Extension 2, in which competition is not captured as a parameter $\delta$ but rather modeled as a strategic choice in the interaction between the two suppliers. In Model Extension 2, we assume that the buyer $B$ demands a total of 2 units of any type of product. Each supplier, $I$ and $E$, has 2 units of capacity, and each supplier can decide to offer a mixed portfolio of products (1 unit of $g$ and 1 unit of $s$), only the low-value products (2 units of $g$), or only the

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high-value products (2 units of s). That is,

\[ a_j \in \{gs, gg, ss\}, \text{ where } j \in \{I, E\} \]  

(14)

Thus, we make both competitive intensity and relationship-specific investments endogenous. We assume that, for each supplier, the fixed investment needed to build the capacity to produce 1 unit of s is \( F\), and the total fixed investments needed to supply 2 units of s amount to \( 2F\). In the first stage, the suppliers I and E determine their product profiles simultaneously. We assume all the other assumptions of the baseline model. We need to develop the characteristic functions under nine possible combinations of product profiles, and under each combination, we need to specify the value created by seven possible subsets of players. The characteristic functions for these possible combinations are summarized in Table 1.

On the basis of the characteristic functions, we summarize the range of value appropriation and the point estimates that are consistent with being in the core for all three players in Table 2. A few interesting observations merit discussion. First, as long as the relationship-specific product s is undersupplied relative to the buyer’s total demand (i.e., less than 2 units of s are produced in total), producing an additional unit of s has two implications on the focal supplier: it raises the maximum value that the supplier could capture, but reduces the minimum value of appropriation as well. This example again illustrates the nature of relationship-specific investments, as they generate a higher total value and added value for the supplier, raising the ceiling of value appropriation, but their low outside value introduces greater hold-up risks, especially in the presence of competition, which drops the floor of value appropriation. Producing an extra unit of s in this situation makes the buyer B strictly better off. Second, when the total supply of the relationship-specific product s can meet the maximum demand of the buyer (i.e., at least 2 units of s are supplied in the market), any additional unit of s in excess of the buyer’s maximum demand supplied to the market becomes a social waste as it has no outside value, and further production of s lowers the maximum value appropriation for both the focal firm and the competitor up to the point when neither supplier captures value at all (which occurs when each produces 2 units of s).

The point estimate of value appropriation minus the total fixed cost needed for producing the relationship-specific product s (if the focal supplier produces any s) yields the expected payoffs for each player in each outcome of the game. The equilibrium of the game is summarized as follows.

**Proposition 3:** In Model Extension 2, at equilibrium,\(^{10,11}\)

1. When \( \min \{\alpha_I, \alpha_E\} \geq \frac{m+F}{\lambda+m-1} \), the equilibria of the game are \{gg, ss\}, \{gs, gs\}, and \{ss, gg\}. That is, the supplier I produces 2 units of s and the supplier \( E \) produces 2 units of g.
2. When \( \alpha_I \geq \frac{m+F}{\lambda+m-1} \), \( \alpha_E < \frac{m+F}{\lambda+m-1} \), the equilibrium of the game is \{ss, gg\}. That is, the supplier I produces 2 units of s and the supplier \( E \) produces 2 units of g.
3. When \( \alpha_I < \frac{m+F}{\lambda+m-1} \), \( \alpha_E \geq \frac{m+F}{\lambda+m-1} \), the equilibrium of the game is \{gg, ss\}. That is, the supplier I produces 2 units of g and the supplier \( E \) produces 2 units of s.
4. When \( \max \{\alpha_I, \alpha_E\} < \frac{m+F}{\lambda+m-1} \), the equilibrium of the game is \{gg, gg\}. That is, each player only produces 2 units of g.

In the equilibrium, under the condition of \( \min \{\alpha_I, \alpha_E\} \geq \frac{m+F}{\lambda+m-1} \) (i.e., each supplier is sufficiently confident in his or her bargaining skills, given the other parameters), 2 units of s and 2 units of g are produced in total. However, different combinations of product profiles that yield 2 units of each product in aggregate are not equally attractive to both suppliers. Specifically, the highest value appropriated by the focal supplier is achieved when he/she only produces the high-value product (i.e., 2 units of s) while the other supplier produces the low-value product (i.e., 2 units of g). The next
Table 1. The characteristic functions in Model Extension 2

<table>
<thead>
<tr>
<th>Value creation</th>
<th>Subset of players</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>{I, E, B}</td>
</tr>
<tr>
<td>Product profiles</td>
<td>((gg, gg))</td>
</tr>
<tr>
<td></td>
<td>((gg, gs))</td>
</tr>
<tr>
<td></td>
<td>((gg, ss))</td>
</tr>
<tr>
<td></td>
<td>((gs, gg))</td>
</tr>
<tr>
<td></td>
<td>((gs, gs))</td>
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<tr>
<td></td>
<td>((gs, ss))</td>
</tr>
<tr>
<td></td>
<td>((ss, gg))</td>
</tr>
<tr>
<td></td>
<td>((ss, gs))</td>
</tr>
<tr>
<td></td>
<td>((ss, ss))</td>
</tr>
</tbody>
</table>

\(^{a}\) All possible combinations of product profiles are represented by \((X, Y)\) in the second column. \(X\) indicates the supplier \(I\)'s product portfolio and \(X\in\{gg, gs, ss\}\); \(Y\) indicates the supplier \(E\)'s product portfolio and \(Y\in\{gg, gs, ss\}\).

highest value is appropriated by the focal supplier when both suppliers offer differentiated products (i.e., each supplier produces 1 unit of \(s\) and 1 unit of \(g\)), and the least value is appropriated by the focal supplier when he/she only produces the low-value products (i.e., 2 units of \(g\)) while his/her competitor produces the high-value products (i.e., 2 units of \(s\)). This raises the practical possibility that a chance to preempt a competitor in choosing the type of production may assist an incumbent firm in shaping the competitive landscape for its own benefit, a point which we will address in the following model extension.

Examining the other conditions of Proposition 3, we note that, if holding all the other parameters constant, when one supplier is sufficiently confident about his or her bargaining skills but the other is not (i.e., \(\min\{\alpha I, \alpha E\} < \frac{m + F}{\lambda + m - 1}\)), the equilibrium of the game is \{gg, gg\}. When \(\alpha I < \frac{m + F}{\lambda + m - 1}\) and \(\alpha E < \frac{m + F}{\lambda + m - 1}\), the equilibrium of the game is \{ss, gg\}. When \(\alpha I < \frac{m + F}{\lambda + m - 1}\) and \(\alpha E \geq \frac{m + F}{\lambda + m - 1}\), the equilibrium of the game is \{gg, ss\}. When \(\min\{\alpha I, \alpha E\} > \frac{m + F}{\lambda + m - 1}\), the equilibrium of the game is \{gg, gg\}.

Compared with Proposition 3, the equilibrium in this model differs in that, under Condition (1) (i.e., \(\min\{\alpha I, \alpha E\} \geq \frac{m + F}{\lambda + m - 1}\)), the outcomes in which the late-mover \(E\) produces any unit of \(s\) are eliminated; instead, the initial mover \(I\) achieves his highest possible payoffs by producing 2 units of \(s\), and its equilibrium payoffs are never inferior to those of \(E\). Therefore, a chance for the supplier \(I\) to preempt the competitor \(E\) by building relationship-specific assets can affect the late-moving competitor’s choice of production and force it to enter into a less lucrative market for \(g\) that is not in direct competition with \(I\), and thus secure \(I\)'s position in the more lucrative market for \(s\). Consequently, a chance to invest in relationship-specific assets before rival firms may serve as a

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12 Note that the union of the conditions listed as (1), (2), (3), and (4) in Proposition 4 covers the whole parameter space.
**Table 2. The feasible ranges of value appropriation in the core in Model Extension 2**

<table>
<thead>
<tr>
<th>Core value</th>
<th>$\pi_{\text{max}}$</th>
<th>$\pi_{\text{min}}$</th>
<th>$\pi_{I}$</th>
<th>$\pi_{\text{max}}$</th>
<th>$\pi_{\text{min}}$</th>
<th>$\pi_{E}$</th>
<th>$\pi_{\text{max}}$</th>
<th>$\pi_{\text{min}}$</th>
<th>$\pi_{B}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product profiles(^a)</td>
<td>((gg, gg))</td>
<td>(2m)</td>
<td>(2m)</td>
<td>(2m)</td>
<td>(2m)</td>
<td>(2m)</td>
<td>(2 - 2m)</td>
<td>(2 - 2m)</td>
<td>(2 - 2m)</td>
</tr>
<tr>
<td>((gg, gs))</td>
<td>(2m)</td>
<td>(2m)</td>
<td>(2m)</td>
<td>(\lambda + 2m - 1)</td>
<td>(m)</td>
<td>(\lambda + 1 - m)</td>
<td>(2\lambda)</td>
<td>(2\lambda)</td>
<td>(2\lambda)</td>
</tr>
<tr>
<td>((gg, ss))</td>
<td>(2m)</td>
<td>(2m)</td>
<td>(2m)</td>
<td>(2\lambda + m + 1)</td>
<td>(2m)</td>
<td>(\lambda + 1 - m)</td>
<td>(2\lambda)</td>
<td>(2\lambda)</td>
<td>(2\lambda)</td>
</tr>
<tr>
<td>((gs, gg))</td>
<td>(\lambda + 2m - 1)</td>
<td>(m)</td>
<td>(\alpha \lambda (\lambda + m - 1) + m)</td>
<td>(m)</td>
<td>(\alpha \lambda (\lambda + m - 1) + m)</td>
<td>(\lambda + 1 - m)</td>
<td>(2\lambda)</td>
<td>(2\lambda)</td>
<td>(2\lambda)</td>
</tr>
<tr>
<td>((gs, gs))</td>
<td>(\lambda + 2m - 1)</td>
<td>(m)</td>
<td>(\alpha \lambda (\lambda + m - 1) + m)</td>
<td>(m)</td>
<td>(\alpha \lambda (\lambda + m - 1) + m)</td>
<td>(\lambda + 1 - m)</td>
<td>(2\lambda)</td>
<td>(2\lambda)</td>
<td>(2\lambda)</td>
</tr>
<tr>
<td>((gs, ss))</td>
<td>(m)</td>
<td>(m)</td>
<td>(m)</td>
<td>(m)</td>
<td>(m)</td>
<td>(2\lambda)</td>
<td>(2\lambda)</td>
<td>(2\lambda)</td>
<td>(2\lambda)</td>
</tr>
<tr>
<td>((ss, gg))</td>
<td>(2\lambda + m - 1)</td>
<td>(0)</td>
<td>(2\alpha \lambda (\lambda + m - 1))</td>
<td>(0)</td>
<td>(\alpha \lambda (\lambda + m - 1))</td>
<td>(0)</td>
<td>(2\lambda)</td>
<td>(2\lambda)</td>
<td>(2\lambda)</td>
</tr>
<tr>
<td>((ss, gs))</td>
<td>(\lambda + m - 1)</td>
<td>(0)</td>
<td>(\alpha \lambda (\lambda + m - 1))</td>
<td>(0)</td>
<td>(\alpha \lambda (\lambda + m - 1))</td>
<td>(0)</td>
<td>(2\lambda)</td>
<td>(2\lambda)</td>
<td>(2\lambda)</td>
</tr>
<tr>
<td>((ss, ss))</td>
<td>(0)</td>
<td>(0)</td>
<td>(0)</td>
<td>(0)</td>
<td>(0)</td>
<td>(0)</td>
<td>(2\lambda)</td>
<td>(2\lambda)</td>
<td>(2\lambda)</td>
</tr>
</tbody>
</table>

\(^a\) All possible combinations of product profiles are represented by \((X, Y)\) in the second column. \(X\) indicates the supplier \(I\)'s product portfolio and \(X \in \{gg, gs, ss\}\); \(Y\) indicates the supplier \(E\)'s product portfolio and \(Y \in \{gg, gs, ss\}\).
the buyer B’s payoffs decrease by a magnitude of $F/2$. If the governance arrangement is agreed to and the supplier I produces $g$, then the payoffs to both parties are identical as those in the absence of the governance agreement, as the agreement that governs how the firms share the costs of producing $s$ will be irrelevant when only $g$ is produced. Given the core payoffs yielded in the third stage of the game, in the second stage, the supplier I decides to produce either $g$ or $s$ depending on whether the governance agreement is accepted. In the first stage, given the supplier I’s choice of production and the accompanying payoffs to both parties, the supplier I and the buyer B simultaneously decide whether they agree on the governance arrangement. We first present equilibria in the following proposition before providing detailed discussion.

**Proposition 5:** In Model Extension 4, at equilibrium,\(^{13,14}\)

1. The equilibrium of the game is \(\{(A, s, g), A\}\) if \(\frac{m+F}{\lambda+m-1} \leq \alpha_I < \frac{m+F}{\lambda+m-1} \text{ and } \alpha_B \geq \frac{F}{\lambda+m-1}\);
2. The equilibria of the game are \(\{(A, s, g), NA\}\) and \(\{(NA, s, g), NA\}\) if \(\frac{m+F}{\lambda+m-1} \leq \alpha_I < \frac{m+F}{\lambda+m-1}\) and \(\alpha_B < \frac{F}{\lambda+m-1}\);
3. The equilibria of the game are \(\{(A, s, s), NA\}\) and \(\{(NA, s, s), NA\}\) if \(\alpha_I \geq \frac{m+F}{\lambda+m-1}\);
4. The game has the following 4 equilibria: \(\{(A, g, g), A\}, \{(NA, g, g), NA\}, \{(NA, g, g), A\}, \text{ and } \{(A, g, g), NA\}\) if \(\alpha_I < \frac{m+F}{\lambda+m-1}\).

To better understand the results, we first compare the threshold conditions that lead supplier I to produce $s$ rather than $g$ under the two contingencies in the second stage, and then discuss the equilibrium results. When the governance agreement is established, I produces $s$ if \(\alpha_I \geq \frac{m+F}{\lambda+m-1}\) and produces $g$ otherwise. When no governance agreement is accepted at the first stage, I produces $s$ if \(\alpha_I \geq \frac{m+F}{\lambda+m-1}\) and produces $g$ otherwise. The threshold level of \(\alpha_I\) is lower with the presence of the governance agreement than without the agreement. Thus, \textit{ceteris paribus}, introducing a governance structure facilitates the supplier’s decision to invest in relationship-specific assets. This finding is consistent with the expectations of prior studies.

Moreover, the threshold level is lower by a magnitude of \(\Delta_1 = \frac{F}{\lambda+m-1}\). In this case, \(\Delta_1\) measures the magnitude of the benefits that the governance agreement confers upon the investing party I, as \(\Delta_1\) is positively related to how much more likely I will produce $s$ in the presence of the governance agreement than without the governance agreement. The value of \(\Delta_1\) varies with the key parameters that shape the values of $g$ and $s$ in several interesting ways. First, \(\Delta_1\) is directly related to $F$, which indicates that the governance structure encourages I to invest in $s$ at a greater level of significance when the sunk cost of $s$ is larger. This finding confirms our expectations, as the governance arrangement mainly benefits the supplier by reducing the supplier’s share of the sunk cost in the relationship-specific investment; hence, the magnitude of this benefit should also be larger as the sunk cost increases. In addition, \(\Delta_1\) is inversely related to $\lambda$, which indicates that the positive effect of the governance structure on the relationship-specific investment is weaker if the customized product yields more value for the buyer. This effect occurs for the following reasons. As the total value of $s$ becomes greater, the value captured by the supplier of $s$ also increases, regardless of whether governance arrangements are present. Therefore, if the total value of $s$ increases, the supplier will be more likely to produce $s$ instead of $g$ even if no governance is established; that is, the governance structure becomes less useful in terms of helping I switch its production plans. Finally, \(\Delta_1\) is inversely related to $m$, which indicates that the positive effect of the governance agreement on the relationship-specific investment is weaker if the outside value of the substitute $g$ is higher. This occurs because the value the suppliers expect to capture from producing $g$ renders the production of $s$ less attractive; therefore, all else equal, a more attractive substitute hinders the governance agreement’s capacity to entice the focal supplier into producing $s$ as opposed to $g$.

We now discuss each equilibrium and its implications. First, under the conditions of \(\frac{m+F}{\lambda+m-1} \leq \alpha_I < \frac{m+F}{\lambda+m-1} \text{ and } \alpha_B \geq \frac{F}{\lambda+m-1}\) (i.e., Condition (1) in Proposition 5), the equilibrium is \(\{(A, s, g), A\}\),
which means that the supplier \( I \) will produce \( s \) in the presence of the governance agreement but will produce \( g \) otherwise, and both parties agree to set up the governance structure. In this case, the availability of the governance arrangement induces the supplier \( I \) to produce the relationship-specific product that would otherwise be foregone. This result is likely the closest demonstration of the predictions of prior research, which state that interfirm governance increases the probability of relationship-specific investments.

Notably, if \( \frac{m+F/2}{\lambda+m-1} \leq \alpha_I < \frac{m+F}{\lambda+m-1} \) and \( \alpha_B < \frac{F/2}{\lambda+m-1} \) (i.e., Condition (2) in Proposition 5), then the equilibrium state is that the supplier \( I \) is still willing to produce \( s \) in the presence of the governance agreement and produce \( g \) otherwise, but the buyer \( B \) disagrees to the governance arrangement; therefore, no governance structure is established, and the supplier \( I \) is indifferent between agreeing and disagreeing on the governance arrangement and is driven to produce the lower-value \( g \) at equilibrium. Compared with the condition in (1) of Proposition 5, the key condition for divergence is \( \alpha_B < \frac{F/2}{\lambda+m-1} \). This condition indicates that buyer \( B \) is more likely to disagree to the arrangement if the sunk cost to be shared is sufficiently large, and/or if the value the buyer expects to capture from producing \( s \) is sufficiently small, as can occur when the buyer \( B \) lacks confidence in his/her bargaining skills (i.e., \( \alpha_I \) is smaller), the value of \( s \) is sufficiently low (i.e., \( \lambda \) is smaller), or the sunk costs of \( s \) production are sufficiently high (i.e., \( F \) is larger). Second, the supplier expects to capture greater value from producing the substitute product \( g \) because of a larger outside market value of \( m \). In this case, the total value of the industry may be improved if we allow the supplier \( I \) and the buyer \( B \) to design a different governance arrangement that transfers more value to the supplier of \( s \) (e.g., making the buyer pay more than half of the sunk cost), thus perhaps sufficiently increasing the attractiveness of producing \( s \) relative to \( g \).

Finally, if \( \alpha_I \geq \frac{m+F}{\lambda+m-1} \) (i.e., Condition (3) in Proposition 5), then the equilibria \( \{(A, s, s), NA\} \) and \( \{(NA, s, s), NA\} \) indicate that the supplier \( I \) always produces \( s \) regardless of any governance agreement, as the supplier \( I \) expects to capture sufficient value from producing \( s \) even if \( I \) has to absorb the entire sunk cost of \( s \). Anticipating the supplier \( I \)’s actions, the buyer \( B \) certainly disagrees to the governance arrangement, as he/she has no need to compensate for the investment that the supplier \( I \) would make anyway. Consistent with the boundary condition, this result is more likely to occur if the supplier \( I \) expects to capture a sufficiently large value from producing \( s \) (i.e., if that supplier’s bargaining skills (\( \alpha_I \)) are high, the value of the relationship-specific product (\( \lambda \)) is high, or the sunk costs (\( F \)) of \( s \) production are low) or if the supplier \( I \) expects to capture insufficient value from producing the substitute \( g \) (i.e., a smaller outside value \( m \)). In this case, the governance arrangement will not encourage the relationship-specific investment.  

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15 However, this result does not mean that governance mechanisms are useless. If the value and the sunk costs of the relationship-specific investment in \( s \) increase incrementally in
CONCLUSION

In this study, we model upstream suppliers’ endogenous investments in relationship-specific assets. In addition, we examine how the investment decisions vary in the presence of supplier competition and in the presence of a governance arrangement designed to help the suppliers recoup part of the sunk costs needed for building relationship-specific assets. We find that the equilibrium critically depends on the additional value created by the relationship-specific product that is customized for the buyer, the sunk cost required to create the customized product, the outside market value of the customized product’s substitute (i.e., the general-purpose product), the players’ bargaining skills, and the intensity and the structure of the competition. We also find that several results from the studies of the governance model are also noteworthy. For instance, the governance arrangement stipulating that the buyer share the relationship-specific product’s sunk cost to increase the incentives of the investing party may not be established because the buyer may not always agree to this arrangement. Moreover, even if the governance arrangement is agreed upon, it may not result in a production plan that differs from what the suppliers would have chosen in the absence of any governance arrangement.

This study presents a more balanced perspective of relationship-specific investments that incorporates both their superior transaction values and their high transaction costs. Scholars who consider why the pursuit of greater transaction value occasionally necessitates higher transaction costs may achieve additional insights beyond the conclusions generated by an analysis of transaction costs alone (Dyer, 1996, 1997; Madhok and Tallman, 1998; Zajac and Olsen, 1993). This perspective, in its acceptance of potentially higher costs, does not contradict the transaction-cost theory of the firm; instead, it enhances our understanding of the implications of transaction value, as the invariance of this concept is an important, albeit implicit, premise of many transaction cost studies.

Moreover, the paper contributes to our knowledge of competitive strategy by examining how market competition directly affects the bargaining power of the suppliers and the buyers when different types of products are produced and by considering the implications for the financial returns to individual players as well as the whole industry under different competition conditions. Several interesting results demonstrate that market competition among suppliers may not always benefit buyers, nor does it necessarily increase the total value created in the industry; rather, the key issue in this analysis is how competition affects the type of products supplied (i.e., a general-purpose product or a relationship-specific product) and involves the interplay between value creation and value appropriation, the issue that fundamentally underlies the current discussion of competitive strategy. For example, supplying a specialized product increases the potential total value created for all transacting parties as a whole but induces greater risks for each party regarding the proportion of the enlarged “pie” that each can eventually capture. In this setting, the negative externalities of relationship-specific investments drive the industry to reach a suboptimal level of value created, providing an opportunity for firms to use governance structures to complement their competitive strategy and achieve higher profit.

Furthermore, the new findings contribute to the existing knowledge of governance structures in interfirm relationships. They help us to accurately specify the conditions under which governance agreements are likely to be attained and if governance agreements are likely to influence investment decisions. Beyond the results indicating that governance structures increase relationship-specific investments, additional findings highlight the other, less understood factors essential to determining the effectiveness of governance arrangements. In addition, because our results point to competition as a scope condition, competition among suppliers may become a new moderator that strengthens the well-known correlation between relationship-specific investments and effective governance structures.

In addition to these results, we believe that this study provides a useful starting point for considering how the features of a competitive environment might affect investment decisions. There are several avenues for future studies. For example, although we modeled a world in which the suppliers possess certain knowledge of their buyers’ valuations of both types of products, in many situations, the buyers’ valuations of
relationship-specific investments involve considerable uncertainty. Thus, an assumption of stochastic demand in which the buyer’s valuation is only known to the public ex ante (Williamson, 1983) might generate new insights. In addition, researchers may wish to consider different types of governance arrangements beyond the one that stipulates an even split between the buyer and the seller of the relationship-specific investment costs. As the discussions of Model Extensions 4 and 5 suggest, the equilibrium result may vary significantly under different types of governance arrangements. Finally, from a dynamic perspective, an investment in the production of more customized products may alter the intensity of the competition in the longer term. Indeed, the level of competition may also be endogenous, a possibility that may yield insights that cannot be captured by a strictly static viewpoint.

ACKNOWLEDGEMENTS

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REFERENCES


**SUPPORTING INFORMATION**

Additional supporting information may be found in the online version of this article:

Appendix S1. Proofs.