Pricing Formats for Branded Components: An Investigation in Business-to-Business Markets

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ABSTRACT

The use of "Branded Components" is an increasingly popular strategy employed by industrial Original Equipment Manufacturers (OEMs) to differentiate their products from their competitors'. Contracts for branded components between OEMs and their component vendors are relational exchanges where both parties contractually agree that the OEM would use the vendor's brand name in joint promotions or display on the OEM's end-product and/or sales brochures/materials for the duration of the contract. In this research, we use the governance logic of transaction cost economics (TCE) to show that safeguarding and adaptation concerns are simultaneously operative in the governance choices made by contracting parties in these kinds of relational exchanges. Specifically, we ask: Under what conditions are prices (or pricing formulae) for branded components agreed upon (fixed) *ex ante* versus negotiated (flexible) *ex post*? We argue that this choice of pricing formats – fixed versus flexible prices *ex ante* – is determined by whether the core differentiation offered by the focal component is due to either the pre-contractual strength of the vendor's brand or the post-contractual customization activities of the vendor. The pre-contractual brand strength of the vendor represents the vendor's rents independent of its relationship with the OEM; hence, we argue that vendors possessing these rents will use relatively fixed price formats to safeguard these "extra-relational" assets from being appropriated in these relational exchanges. In contrast, differentiation emanating from post-contractual customization activities will be supported by relatively flexible price formats to permit adaptation to product design and specifications. Data from 70 branded component contracts is supportive of these hypotheses. Furthermore, we find that fixed price formats are also used when the market strength of the OEMs on their downstream customer side is high. In effect, these pricing contracts are consistent with "pre-nuptial" agreements where both parties seek to protect their own extra-relational assets but are willing to negotiate over within-relational assets/activities. At a broader level, our research uses the lens of TCE to show how firm-specific resources in the Resources-Based View (RBV) tradition impact the design of governance arrangements and how strategic marketing choices, like the use of branded components, need to be supported by a discriminating choice of pricing rules even in relational exchanges.

INTRODUCTION

The design of inter-firm relationships has increasingly become a strategic decision variable and has been a subject of deliberate design analysis (Heide 1994). Considerable attention has been given in the marketing literature on the role of inter-firm relationships and governance in creating and claiming value (e.g., Heide and John 1990; Jap 1999; Palmatier et al 2006) within dyadic relationships. Of late, two prominent strands of research have focused attention on studying inter-firm relationships not in isolation but in a broad strategic context in which these relationships are embedded in. The first strand – the network perspective – has argued that to understand inter-firm ties better, greater attention needs to be paid to the broader network of relationships a firm is engaged in (e.g., Wathne and Heide 2004; Uzzi 1997). The second strand – the strategic calculus perspective – has argued that if firms possess unique capabilities and skills that they bring to dyadic inter-firm ties, these endowments should uniquely impact the design and structure of these firms' inter-organizational relationships (e.g., Ghosh and John 2005; Madhok 2002; Nickerson et al 2001; Williamson 1999). Compared to the traditional "isolationist" focus on inter-firm ties, systematic empirical work in both these streams is barely in its infancy.

In this paper we apply the strategizing calculus to an increasingly prominent and important strategic marketing decision made by original equipment manufacturers (OEMs) in industrial markets – the use of branded components. Branded components are a form of strategic cooperation used by OEMs to differentiate their product offerings from their competitors' by leveraging the potency of the component brand (Venkatesh et al 2006). In contracts for branded components between OEMs and their component vendors, both parties contractually agree to not only to physically incorporate the component (or a line of related components) into the OEM's

end-product but also to co-market the supplier's brand name with the OEM's brand name in joint marketing and promotional materials (Ghosh and John 2009) over the duration of the contract. Table 1 provides a few illustrations of such branded component contracts in various industrial product and service markets.

Despite its managerial significance, most academic work in this context has focused on untangling the demand-side, consumer perceptions of the use of co-branding (e.g., Desai and Keller 2002; Park, Jun, and Shocker 1996) with little attention being devoted to understanding how firms manage and organize their contractual relationships for branded components.[1] Using the strategizing calculus lens to investigate the supply-side contracting aspects for branded components will advance our understanding of inter-firm ties in two key ways. First, as seeking differentiation gains is the *sine qua non* for using branded components, OEMs often use prominent vendors, with pre-existing brand endowments, resources, and capabilities, as their branded partners. Likewise, the OEMs themselves may possess considerable presence in their own customer markets. How would the presence of these pre-existing endowments that both parties bring to the relationship modulate the contract design between the two parties? Second, branded component contracts in complex industrial markets are, by definition, long-term relationships where both parties might be required to undertake considerable product adjustment and development activities within the relationship. How does this need for adaptation within close relational exchanges modulate the contract design between the two parties?

We study these two key questions in the context of the price determination process used in such branded component contracts. Specifically we ask: Under what conditions are prices (or pricing formulae) for branded components agreed upon *ex ante* (i.e. fixed) in the contracting stage versus negotiated *ex post* (i.e. flexible) during the contract execution stage? We use the

[1] Henceforth these contractual relationships will be referred to as branded component contracts.

comparative analysis approach of Transaction Cost Economics (TCE) and incomplete contracting frameworks to argue that the chosen pricing format should reflect not only the specific within-relationship transactional attributes (Masten 1988; Rindfleisch and Heide 1997; Tirole 2009) but also the individual parties' motivation regarding their pre-existing endowments (Helper and Levine 1992). Specifically, we contend that even within these long-term relational (i.e. not spot-market) exchanges, contracting parties use a calculative approach and the chosen price determination process – fixed versus flexible prices – reflects their need to safeguard their pre-existing endowment from being appropriated and to adapt to changing technical requirements of the task. If the core differentiation offered by the focal branded component is due to the pre-existing endowment of the vendor, vendors possessing higher levels of these rents, that are *independent* of its relationship with the OEM, will use relatively fixed price formats to safeguard these "extra-relational" assets from being appropriated. A similar argument obtains for OEMs possessing high rent generating capacity in their customer markets. Such OEMs would also seek the relative safety of fixed price formats. In contrast, if within relationship technical modifications and product development activities are critical to the differentiation, these will be supported by relatively flexible price formats to permit adaptation to product design and specifications. We test these hypotheses using primary data obtained on 70 branded component contracts in three industry sectors (heavy machinery, electrical and electronics equipment, and automotive).

In the next section we provide a brief overview of branded component contracts. We then provide a framework for our governance choices and develop our refutable predictions. This is followed by presenting our empirical context and our results. We conclude with implications for theory and practice.

AN OVERVIEW ON BRANDED COMPONENT CONTRACTS

We define branded component contracts as *formally* written, legal obligations to use the supplier's brand on the OEM's end product and/or on marketing materials in conjunction with the OEM brand name. Under this broad umbrella, one can observe variations in execution of this contract form. For instance, some agreements might require parties to affix the brand names and logos to the equipment itself. In contrast, some agreements might call for both brand names to be used in marketing communications and sales brochures. The contracts may specify the size and location of the logos, budgets and media plans, and the obligations of each party. They also may specify a revenue or gain-sharing formulae. What is beyond dispute is that both brand names are conspicuously communicated to the end user.

We specifically focus on branded component contracts which involve the procurement of an engineered component (or line of related components) that is physically incorporated into the OEM's product and integral to its proper functioning. These contracts are usually multi-year arrangements that typically involve significant research, design, and development activities that *vary* in their level of specificity to the exchange partner and which may be undertaken by one or both parties during the contract's execution phase. In our investigation, we exclude contracts governing the supply of commodities such as steel ingots, copper wire, etc., as well as contracts for intangible property such as a trademarked character or logo because these do not involve engineering investments in the execution phase. We also exclude intra-firm agreements and joint ventures because the contracting problem is fundamentally different when the two parties are owned by a single legal entity.

Table 2 provides some differences in the contractual sub-clauses and informal norms between branded component contracts and white-box (i.e. unbranded) component contracts in

our dataset. The differences are quite illustrative. The contracting horizon (duration) is significantly longer for branded contracts than white box contracts whereas the number of suppliers used by the OEM for a functionally similar component is significantly lower for branded component arrangements. The written clauses specifying the processes used to determine price and technical design issues are also significantly more open-ended in branded contracts than in white-box contracts. Finally, the behavioral norms are more adaptive and cooperative in branded contracts as compared to white box contracts.

In sum, the greater coordination and adaptation, longer contract durations, and more open-ended contractual sub-clauses and cooperative behavioral expectations seem to suggest that branded component contracts foster closer relationships between the contracting parties and have all the hallmarks of relational exchanges/contracts that create such an overarching environment. Our investigation of the factors impacting the price determination process within such relational exchanges hence, has a subtle yet important difference with traditional studies on relational exchanges/contracting. Specifically, rather than study the canonical governance archetypes, make versus buy or the determinants of more versus less relational exchanges, we seek to understand the discriminating choice of pricing formats *within* relational exchanges and show that even such relationships can be understood using a calculative approach.

FLEXIBILITY IN THE PRICE DETERMINATION PROCESS

The most critical role that price plays in buyer-supplier contracts is to divide the surplus of trade between the two parties. Specifically, at the stage when price is determined in a contract, each party expects to claim their value – through prices or a structured price tier – in such a way that they are at least as well off as their next best alternative (Oyer 2004; Masten 2007). Our focus in branded-component contracts is *not* on the level of price chosen in a particular contract

but on the *contractual process used to determine the final price*. Understanding the price determination process is important because an array of price determination rules (e.g., fixed price formats, posted prices, sealed and open bid auctions, negotiated prices, etc.) can be observed in business-to-business markets. Indeed, despite being considered as the most essential "terms of trade" to be negotiated in an exchange, the "precise price" is surprisingly absent in many contracts (e.g., cost plus pricing mechanisms).

Ever since Coase (1937), TCE has recognized that the use of the price mechanisms is not a costless venture and pricing complex trade arrangements, like the procurement of complex branded components, involves significant amount of time and effort on the part of the transactors. Agreeing on a mutually acceptable price or price structure *ex ante* requires detailed descriptions on products improvements and information on future market situations and technical developments. Such information is however costly to obtain especially in circumstances when contracts cover long-term horizons where outcomes of joint efforts and market conditions are difficult to anticipate. Under these circumstances, contracts are crafted ex ante not necessarily to define the precise terms of the trade but to establish procedures by which the exchange is governed and disputes resolved in an economizing fashion (Crocker and Masten 1991; Goldberg and Erickson 1987). Contracts, as such, then serve the purpose of creating shared rules, procedures, responsibilities, expectations and norms (Macneil 1980; Goldberg and Erickson 1987; Lusch and Brown 1996) that enable parties, often with conflicting trading interests, to organize their exchange efficiently.

The fundamental trade-off in organizing governance mechanisms such as the price determination process is to strike a balance between encouraging value-increasing adjustments and discouraging value-dissipating opportunism (Crocker and Masten 1991). The judicious

choice of a pricing structure in complex business to business contracts can be best viewed in the hazard equilibration model (Masten 1988, 2007; Williamson 1985). In the context of contract price, "equilibrating hazards" means that contractors structure their price to minimize the possibility of costly renegotiation in such a way that their incentive to renege on contractual commitments is equalized on the margin. Figure 1A illustrates this situation. The horizontal axis represents the range of net value *v* of the end-product that is to be produced through joint efforts. Equivalently, the axis also represents the price range that is agreeable to both parties. The distances c_B and c_S are the private costs of initiating a renegotiation by the buyer and supplier respectively. These costs are assumed to be independent from the outcome of the renegotiation and correspond to the effort, time, or other resources expended directly on the renegotiation and/or indirectly through strategic bargaining scheme. Goldberg (1985) vividly calls these activities post-agreement jockeying. In Figure 1A, the probability density distribution of v – f(v) – is symmetric[2]. With the additional assumption that both parties are risk-neutral and have the same bargaining power, to minimize renegotiation costs, the negotiated price – if both parties agree to fix one – is the expected value of v, or p^e.

A party will renege on his promises when the realized outcome substantially deviates from p^e; in particular, a transactor would engage in post-agreement jockeying if the expected gain in the surplus of trade is larger than his costs of initiating a renegotiation. On the one hand, when the ex post value of the joint-project falls below ($p^e - c_B$), the buyer would become dissatisfied with his share of surplus and engage in uncooperative activities to effect a renegotiation. On the other hand, when the realized value of the project becomes higher than ($p^e - c_S$), the supplier would act opportunistically, intending to redistribute the surplus by forcing a renegotiation. Combining these two scenarios, the contract would be self-enforcing without the

[2] Skewed probability density functions would not affect the qualitative results of our arguments.

interjection of a third party such as the court only when the realized value of the end-product falls in the range $[p^e - c_B, p^e + c_S]$ (Klein 1996; Masten 1988, 2007).

We now relate the basic hazard equilibration model to a branded component contract by illustrating the following two cases. First, suppose the differentiation of the end-product mainly comes from pre-contractual brand strength of the supplier. Since the brand equity of the component and thus the value of the differentiation are pre-existing to the agreement, both parties would expect a small variance in the value to be created within the post-agreement relationship. In terms of the hazard equilibration model, this means the probability density distribution of v concentrates around its mean p^e and has very thin tails. f(v) in Figure 1B represents this case. A similarly argument can also be applied to the situation in which the differentiation of the end-product comes primarily from the OEM's downstream market strength. Given the private costs of initiating a renegotiation being c_B and c_S, the probability of either the OEM or the supplier rejecting his contractual commitment – as shown by the total area of the dark regions in Figure B – is very small. Under this condition, both parties expect the contract to be self-enforcing by settling the price at p^e. Since the fixed price contractually determines the distribution of trade surplus between the supplier and the OEM, it also acts as a safeguard that would prevent pre-existing marketing assets from post-agreement appropriation. In this case, both the supplier and the OEM would choose a fixed price contract.

Now suppose the differentiation of the end-product mainly comes from ex post customization efforts. This can happen when the customization effort to integrate the component into the end-product is costly to specify because of its complexity or the involved technology is rapidly evolving. In other words, the value of the joint effort would be very difficult to determine ex ante. Graphically, the probability density distribution of v – denoted by g(v) in

Figure 1B – has a large variance. With the same private costs to initiate a renegotiation c_B and c_S, the probability of either party's reneging on his commitment, which is represented by the lightly shaded regions, is very high[3]. The contracting parties would see their fixed price agreement as not being self-enforceable and thus a renegotiation is highly probable. Observe that this result holds *even after* the trade hazard is equilibriated at the margin by having the negotiated price stipulated at p^e. To economizing on transaction costs, viz., pre-agreement search and negotiation costs and post-agreement costs associated with jockeying and renegotiation, the contracting parties would postpone their price decision to the contract execution stage when market information and the status on customization effort become readily available. In this case, flexible pricing structures with ex post negotiated adjustments would be more desirable.

Based on this underlying logic, the decision associated with creating pricing provisions can be organized along a continuum of flexibility/incompleteness. At one end of the spectrum, *prices are pre-determined and rigid* over the duration of the contract. Prices become flexible as one moves away from this end; however, as Crocker and Masten (1991) aver, this flexibility in prices is achieved through two fundamentally different adjustment processes – *price redetermination* and *price renegotiation*. The location of a particular pricing format along the continuum represents the degree to which the prices are made explicit at the onset of the contract execution stage. This location is a result of the trade-off between maintaining flexibility for adaption and preventing opportunistic appropriation of pre-contractual marketing assets; thereby the location "*defines the degree to which prices are know with certainty at the onset.*" . Consider each in turn.

[3] The contract is likely to be more incomplete that under the previous case because it would leave more contingencies unspecified in the contract. An opportunistic party would find it easier to bring about a renegotiation. This means that the private cost of initiating a renegotiation would be less than c_B or c_S depicted in the graph Then the total area of rejection is larger and our argument in the main text is even stronger.

Fixed, pre-determined prices: This constitutes one end of the continuum with prices that are pre-specified and with no allowances made for adjusting this initial price. For example, a fixed price contract for branded micro-processors with explicit design and performance specifications usually provide explicit terms to describe the item to be delivered, quantities ordered and a stated price per unit. Fixed-price formats are valuable when critical aspects of information related to the trade are measurable and either available or easily communicable to the counter-parties ex ante. Fixed-price formats are also easily enforceable; hence, they provide superior safeguard against ex post opportunistic and moral hazard behaviors and prevent wasteful renegotiations (Bajari and Tadelis (2001). However, rigid, fixed price contracts also hinder ex post adaptations especially in conditions where it is costly to describe specifications and procurement requirements ex ante. For instance, using a comprehensive data set of private building contracts, Bajari, McMillan, and Tadelis (2002) show that parties eschew fixed price contracts (auctions) when more ex post adjustments are expected.

Price Redetermination: Prices that are more flexible than fixed-price formats can be obtained using a price redetermination process where the adjustments in prices are undertaken per some formulae that is agreed upon ex ante. For instance, many component contracts that stretch in duration over multiple years have price escalator clauses that attempt to relate contract prices to some exogenous market conditions or indicators – for example, the price of the underlying commodity or Producer Price Index (see Goldberg and Erickson 1987 for some illustrations of such price escalator clauses). Another form of price-escalator clause is the use of pre-agreed performance-based metric where the unit price (margin) for the components gets adjusted based on exceeding certain sales or revenue-based metric. The value of re-determining price is that it permits adjustment based upon realized market information ex post; further being formulaic and

based upon exogenous indicators, within a permissible range this process also provides safeguards against opportunistic haggling. The key however is that these adjustments are not based on "actual happenings" within the relationship. Hence, if a branded component vendor seeks major specification changes ex post that would require costly effort, price redetermination processes will not be able to adapt efficiently to such unforeseen circumstances.

Price Renegotiation: An even more flexible format is to keep the precise terms that distribute the value created in the relationship (i.e. the final price charged) open for determination during the contract execution stage. Price is open-ended, flexible and left unstipulated during the contract writing stage (and negotiated during the contract execution stage). The value of this format is that it permits trading parties to negotiate prices as events unfold in the contract execution stage; hence encouraging value-enhancing adaptations and improved coordination and implementation efforts. It is also valuable in conditions where it is difficult to specify contractual requirements up-front; under such complex transactions use of inflexible contracting terms stifle adaptations (Bajari and Tadelis 2001; Goldberg 1977). Such adjustments also permit adaptations to complex requirements in long-term arrangements where parties make partner-specific investments (Crocker and Masten 1988). Bajari, Tadelis and McMillan (2008) show the value of such customized contracts that track "information within the relationship" in facilitating value-enhancing adjustments. The downside of such flexibility is that such contract terms provide weak safeguards and permit opportunistic haggling and appropriation of exposed assets.

We now turn to using this rationale for developing our refutable hypotheses in the context of pricing branded components.

CONTEXT AND HYPOTHESES

Recall that in our context, OEMs contract with independent suppliers for an engineered component (or line of related components) that is physically incorporated into the OEM's product and integral to its proper functioning. When it is hard to assess the true value of an exchange, flexible pricing formats facilitate value-enhancing adjustments whereas tighter contracts would constraint future adjustments. On the other hand, when pre-existing value-enhancing equity are known and can be priced out, more fixed forms of price agreement help to offer safeguards to such assets by preventing wasteful renegotiations (Crocker and Masten 1991; Klein, Crawford, and Alchian 1978; Klein 1996). The simultaneous existence of the adaptation and safeguarding motives begs the question: Under what specific conditions do these motives become more salient and what is their impact on the choice of pricing formats? We posit the following refutable hypotheses to explain the variations in price formats.

Pre-existing strength of the component brand: The pre-existing brand strength of the component brand refers to the pre-existing capabilities and resources of the vendor that have rent generating potential. The rent-generating potential of these resources is a scarce, non-imitable resource that can offer a point of differentiation to the OEM's end-product (Aaker 2004). For instance, Ghosh and John (2009) show that one component of the total differentiation provided by a component vendor to the OEM's end-product is one due to pre-existing brand strength and capabilities of the component brand manufacturer (e.g., Intel) in the end-customer markets. In turn, OEMs of end-products are willing to incorporate products from such component vendors that possess high level of these resources and would be willing to pay a price premium (Venkatesh and Mahajan 1996). Indeed component vendors undertake immense effort in measuring and documenting the value generating potential of these resources.

The crucial aspect of these forms of resources is that their rent-generating capability exists *independent* of the relationship with the focal OEM. However, when such vendors get involved in cooperative, but incomplete, relational exchanges with OEMs these rents get exposed to opportunistic renegotiation by the counterparty. Helper and Levine (1992) model this scenario and show that parties possessing high levels of such monopoly rents would then be willing to forego the gains from flexibility and adaptation to safeguard these rents.

Along similar lines, we argue that relatively more fixed price formats would be the desired contract choice in these settings for two reasons. First, it enables the component vendor to prevent potential appropriation of its own firm-specific assets. Second, the value-generating potential of these resources, being independent of the relationship, are likely to be easier to demonstrate and measure, making more complete contracting more feasible. In terms of our hazard equilibration model, easily measurable pre-existing strengths and capabilities of contracting parities would give rise to highly predictable outcomes of the parties' joint effort. This is represented by the density function f(v) in Figure 1B. Under this scenario, contracting parties would more likely to settling on more rigid pricing formats to minimize their pre-existing differentiation capabilities of the supplier being exposed to hazards of renegotiation while maximizing the probability of self-enforcement at the same time. Hence, we hypothesize:

Hypothesis 1: *The higher the pre-existing differentiation afforded by the vendor brand, the more rigid the pricing format for the component, ceteris paribus.*

OEM's market strength in end-customer markets: A similar safeguarding argument can be made for pre-existing brand equity that the OEM possesses in its end-customer market. Again, these value-generating assets are at stake in relational exchanges and OEMs would be cognizant of erecting barriers to prevent appropriation. Indeed Ghosh and John (2005) find an interesting

pattern of the link between these pre-existing resources and the willingness to undertake value-generating activities *in* the relationship. They find that OEMs possessing high levels of downstream market strength had lower levels of non-measurable, quality-enhancing outcomes within the relationship even when they used more flexible contracts. Presumably, the adaptation needs for enhancing such non-measurable and non-enforceable quality ex post were met with resistance by these OEMs wary of protecting their customer-side assets. This trade-off between efficiency and strategic considerations was *not* observed for the relatively measurable and quantifiable cost-reduction outcomes. With similar arguments we hypothesize that an OEM will protect its pre-existing endowment in branded component contracts by using relatively more rigid pricing formats. Hence:

Hypothesis 2: *The higher the level of the OEM's market strength on its customer side, the more rigid the pricing format for the component, ceteris paribus.*

Within-contract customization activities

Components procured under branded component contracts often involve (1) complex interface between the component item and the OEM system and (2) evolving technologies both of which need close coordination between the parties in their ex post development and implementation activities (Ghosh and John 2009). When the interface between the branded component and other components in the end product is complex, the task of integrating the various parts between the supplier and the OEM may involve frequent adjustments to design and specifications during the execution stage. These adjustments during the execution stage would be difficult to anticipate since what exactly to adjust at a particular time needs to incorporate newer developments through coordinated mutual responses. These developments and responses will only become clear from both parties' customization effort in the integration process. In terms of

our hazard equilibration model in Figure 1B, contracting parties would find it more difficult to foresee the final outcome of the product that involves complex interface, as represented by the density function g(v). Because of the large variance of the value to be created by ex post customization efforts, even if the contracting parties fix a price that is at the expected value of g(v), there is a significant chance that the final outcome would fall into one of the rejection regions (e.g., Masten 1988; Crocker and Masten 1991; Klein 1996). The party who is then adversely affected would evoke post-contractual jockeying, hoping to *renegotiate* the agreed price. Inevitably, these undesired actions would hinder the flexibility to adjust to newer engineering designs. Knowing this, farsighted transactors would then agree on more flexible forms of pricing in the contracting stage to economize these transaction costs. Therefore, we have the following refutable hypothesis:

Hypothesis 3a: *The higher the level of complexity between the branded component and other components in the OEM product, the more flexible the pricing format for the component, ceteris paribus.*

Similarly to the analysis on complex interface, the component supplier and the OEM would be difficult to compose a complete description on product improvements in a formal contract when the involved technology is highly unpredictable. Technological uncertainty creates difficult-to-predict state contingencies, causing assessing the relative contribution to the final product from each party and thus fixing a price *ex ante* prohibiting. At the same time, uncertainty makes mutual adjustment *procedures* that are design to deploy adaptive measures to and incorporation of latest innovations more appealing (e.g., Noordewier, John, and Nevin 1990). Again, we can use Figure 1B to illustrate this scenario. As represented by the density function g(v), high technological uncertainty implies the variance of the final outcome of product features would so large that a pre-fixed price is likely to fall outside of the self-enforcing price range. To

save duplicated price negotiation efforts on one hand and to encourage value-enhancing adaptations on the other, trading parties would use flexible pricing formats that the value created from latest technologies can be incorporated into the post-contractually negotiated price. As a result, we expect that branded component contract relationships with higher level of technological unpredictability to be supported by more flexible pricing formats:

Hypothesis 3b: *The higher the level of unpredictability of the technological development involved the component item, the more flexible the pricing format for the component, ceteris paribus.*

Figure 2 provides a schematic on our governance rationale.

RESEARCH CONTEXT

Our model requires micro-level contract data that are unlikely to be found in archival sources. Thus, we employ a mail questionnaire administered to a carefully selected set of key informants from firms in three industry sectors. We selected non-electrical machinery (SIC 35), electrical and electronic machinery (SIC 36), and transportation equipment (SIC 37) firms because our initial field interviews and secondary research had suggested that branded component contracts were observed in these settings. 35% of all the contracts secured by us were branded component contracts. In these selected industries, OEM end-products incorporate numerous engineered components that require the contracting parties to engage in significant levels of design and engineering activities, and to seek revisions during the contract execution stage. Written contracts, hence, show significant variations in their level of completeness as we see in Table 2. Further component suppliers as well as OEMs possess unique, specialized skills that help them differentiate their offerings from their competitors'; hence, both parties arrive at the relationship possessing varying levels of rent-generating assets. Finally, these sectors also incorporate products with diverse technologies that make it infeasible for OEMs to backward

integrate completely into component design and production; hence, contracting with independent suppliers for components is the default option in most cases.

Data Collection

We first conducted a series of comprehensive open-ended field interviews at a dozen OEM sites to establish the substantive relevance of our concepts. Based on these interviews and on previous empirical research, we generated a survey instrument that was then pre-tested at 18 other sites to verify wording, response formats, etc. We purchased a commercial list of names and addresses of purchasing managers and directors at manufacturing firms in these SIC codes and drew a random sample of 1016 names from this list. Each individual on the list was called in order to identify and qualify them as a key informant. This process required an average of five calls per firm and sometimes resulted in another person being nominated by our initial contact. Once we qualified them as informants, we asked them to identify their firm's most important end product line. They were asked to identify a contract that was organized within the last 12 months, under which their firm procured an engineered component(s) from an independent supplier. This component had to be physically embedded into the previously identified end product. All subsequent questions made reference to this contract.

Our qualification and screening efforts yielded 521 key informants who were then mailed the questionnaire. Follow-up phone calls and reminder cards yielded 193 completed questionnaires, from which we eliminated 2 questionnaires for missing data. Our final sample consisted of 191 ties. 70 of these 191 ties were branded component contracts, the remaining 121 were white-box contracts. We assessed informant knowledge and involvement using two self-report items. Their mean responses were significantly above the mid-point of the 7-point scale for each item. Similarly, we compared early respondents against later respondents to assess

whether non-response biases existed. No significant differences were found, thus lending support to our conclusion that there are no significant non-response bias issues in these data. Our unit of analysis is the identified branded component contract between each OEM and its identified supplier for a single component or a set of closely related components procured under that contract. [4]

Measures

In Tables 3 we show the measures used in our study. Most of these measures are identical to the ones used in Ghosh and John (2009). We briefly describe the measures below.

Price Flexibility. Our measure is similar to the one used in Crocker and Reynolds (1993). A grounded measure of this variable was developed as follows. Each informant was asked to describe the price terms of their contract into one of the four categories (see Table 3). These categories represent increasing level of incompleteness, ex ante in the price paid for the procured component. Category 1 (firm, fixed prices) is the most complete because no allowance is made for adjusting the initial price. Category 2 uses pre-determined formulae to adjust the initial prices based on some exogenous indicators like PPI or commodity price indices. Pre-determined gain sharing formulaic adjustments would also fall into Category 2. Category 3 incorporates even more incompleteness because the adjustments to the initial price are negotiated per the specifics of the context on hand and not pre-determined based on a formulae. Finally, category 4 is the most incomplete because neither the initial anchor point nor the adjustment formulae are fixed. This includes the cases in which price is not explicitly included in the initial contract. Rather,

[4] "Closely related components" refer to slight specification differences in components that OEMs might need to incorporate into different versions of their systems that they sell downstream. For instance, an OEM selling CNC machines/systems might seek two different versions of an ASIC (Application Specific Integrated Circuits) chip for different downstream applications.

each transaction price is negotiated and determined at the time of shipment of the components. This category is akin to cost-plus pricing arrangements.

Differentiation capability. The extent to which a component from this supplier improves customers' perceptions of the OEM's product is measured with a 4-item scale (DIFF). These items are identical to the Differentiation measure in Ghosh and John (2009). Each item employs a 7-point Likert style format.

Vendor's specific investments. This measure (SUPPINV) captures the physical and human asset investments made by the supplier to customize the component to the OEM's needs. The 6 item, 7-point Likert style scale is borrowed from Ghosh and John (2005).

OEM's specific investments. Specific investments made by the OEM that parallel those made by the supplier could create a relational safeguard and thus affect the choice of the contract form. To control for this possibility, we use the 6-item scale (OEMINV) in Ghosh and John (2005).

OEM's customer-side market strength. This 5 item, semantic differential scale measures the OEM's competitive strength in its downstream customer market for the most important product line using the focal branded component. The items refer to the end-customer's preferences for this product line, its margins compared with competing products, etc.

Norm of Coordination. This 3 item, likert scale refers to the extent to which both parties undertake joint effort to resolve problems and issues that arise during the execution phase of the relationship.

Norm of Flexibility. This 6 item, likert scale refers to the extent to which both parties are flexible and willing to make adjustments to unforeseen circumstances as they arise.

Vendor Size. This variable measures the total annual sales volume for the vendor firm and is a proxy for its size.

Years of working together. This measure refers to the number of years an OEM has had a procurement arrangement with the said vendor (and not necessarily for the focal component only). This measure taps into the history of the relationship.

Dollar value of contract. This measure refers to the total size of the contract for the focal branded component in dollar terms.

Measure Validity

Our measure validation process follows Anderson and Gerbing (1988). We computed item–to–total correlations for each multi-item scale, and dropped items with estimates below .30. Then, using LISREL 8.0, we estimated congeneric (single-factor) models for each set of items, and used the Werts et al. (1978) formula to compute the scale reliability estimates. We conclude that our multi-item scales exhibit a satisfactory level of internal consistency and unidimensionality. We conclude that the traits are sufficiently discriminated from each other. Given the adequacy of our measures, we turn to the tests of the hypotheses.

RESULTS

The DIFF measure captures the extant (i.e. realized) differentiation enabled by incorporating the vendor's component into the OEM's end-product. Note that hypothesis H1 proposes that vendors will be motivated to safeguard the value they derive from their pre-existing brand strengths and capabilities they bring to the relationship at the contracting stage. This pre-existing differentiating ability of the vendor will have to be parsed out from our measure of realized differentiation which also includes gains that are derived from the joint investments and activities of both parties during the ex post contract execution stage (i.e. ex post differentiation). To do this, we use the approach used by Simon and Sullivan (1993) to separate out intangible brand equity from total firm value. In particular, consistent with their approach,

we assume that for any branded component contract in our sample, the relationship between pre-existing, ex post, and realized differentiation can be specified by a simple additive rule given by:

(1) *Realized Differentiation = Preexisting differentiation + Ex post differentiation +* ν

where, ν is the error term with distribution N(0, σ^2). To get the measure of pre existing differentiation, we first regress total realized differentiation (DIFF) on a set of variables that enable contracting parties to generate differentiation gains during the contract execution stage. Past research (e.g., Jap, 1999; Menard 2004; Nickerson, Hamilton, and Wada, 2001) has suggested that dyad-specific activities like coordinated effort, specialized investments, and relational norms of flexibility can enable the relationship to generate valuable differentiation gains. As per this specification, we estimate the following equation using OLS.

(2) *Realized Differentiation =* β_0 *+* β_1**Vendor's Specific Investments +* β_2**OEM's Specific Investments +* β_3**Coordination Norms +* β_4**Flexibility Norms +* β_5**Supplier Size +* ε

The expected value obtained from equation 2 proxies that part of realized differentiation that is generated through within-contract activities by the two parties in the contract execution stage. In turn, the residual – $\hat{\varepsilon}$ – from this regression is a "purified" measure of differentiation gains that is <u>not</u> correlated with vendor investments and activities undertaken during the contract execution phase. Consistent with the logic used in Simon and Sullivan (1993), we denote this estimated measure to capture the pre-existing endowment that the vendor brings into the relationship at the contract writing stage. This residual measure, $\hat{\varepsilon}$, is independent of the dyad-specific activities of the two parties and we denote it as the "Pre-existing differentiation" provided by the vendor brand. With this measure in hand, we then use the following specification to test our hypotheses regarding the flexibility in pricing formats:

(3) $Price\ Flexibility = \gamma_0 + \gamma_1 * \hat{\varepsilon} + \gamma_2 *\ OEM\ Market\ Strength + \gamma_3 * Technical\ Complexity + \gamma_4 * Technological\ Uncertainty + \gamma_5 * logYears + \gamma_6 * Dollar\ Value + \gamma_7 * Importance\ of\ Component + \delta$

Table 4 shows the estimation results for equation 2. We find that specific investments undertaken by the vendor ($\beta = 0.306$, $p < 0.05$), level of coordination between the contracting parties ($\beta = 0.173$, $p < 0.05$), and the level of adaptation (flexibility) in their relationship ($\beta = 0.322$, $p < 0.05$) are all significant drivers of differentiation. These dyadic-specific activities and norms explain 40% of variations in total realized differentiation. These results provide robust evidence to the basic governance rationale that specialized investments and partner-specific norms of flexibility and coordination do indeed create value *within* the relationship.

Table 5 provides the results for equation 3. As our price flexibility measure is ordinal in nature, we use ordered probit as our estimation technique. The base model provides results for the control variables only. The length of the past experience in working together, dollar value of the contract and importance of the component has no impact on the pricing mechanism.

In the main model, we introduce the four key variables that test our refutable hypotheses. Consistent with H1, we find that as the pre-existing differentiation provided by the vendor increases, the pricing format becomes more rigid ($\beta = -0.22$, $p < 0.05$). Similarly, consistent with H2, as the market strength of the OEM in it's own customer markets increases, the pricing formats become more rigid ($\beta = -0.15$, $p < 0.05$). These two results lend a new twist to TCE by showing that even in close relational exchanges like branded component contracts, parties seek to protect "extra-relational" assets and endowments like brand equity from risks of appropriation by choosing more fixed price formats ex ante. Our data also provides good support for H3. We find that as technical complexity increases, the pricing format becomes more flexible ($\beta = 0.21$, p

< 0.05). This result suggests that parties choose governance ties to provide adaptation and facilitate adjustments to unforeseen design and product specification problems. Our data however do not statistically support for H4. Technological uncertainty has positive but insignificant impact on the pricing format chosen in the relationship ($\beta = 0.13$, $p > 0.10$). Overall, the results provide strong evidence to our thesis that the pricing rule chosen will simultaneously provide safeguards for pre-existing assets as well as facilitate adaptation to encourage value-enhancing activities.

In the additional model shown in Table 5, we added four other within-relationship activities that parties usually undertake in such close relationships. The hypothesized results remain robust. However we find that the effect of importance of component becomes marginally significant ($\beta = -0.14$, $p < 0.10$) suggesting that more critical components are supported by fixed price formats. We also find that specialized investments undertaken by the vendor ($\beta = 0.23$, $p < 0.05$) and the level of coordination between the two parties ($\beta = 0.11$, $p < 0.05$) make the pricing formats more flexible. This provides additional support to the argument that in close, long-term relational exchanges, parties seek more adaptive governance formats, in spite of specialized investments that generate quasi-rents being at stake, to facilitate rent-enhancing adjustments.

DISCUSSION

When Marketing Strategy meets Institutional Design?

Research on strategic marketing decisions and inter-firm relationships have, by and large, followed independent paths. Theory researchers (e.g., Wernerfelt 2005; Williamson 1999) have increasingly called for a joint analysis of the resource-based capabilities perspective with the comparative analysis approach of governance theories like TCA. Drawing on this emerging strategizing calculus perspective, we elucidate how product market structures (Helper and Levine

1992) and firm-specific motivations are pertinent to the design of contracts that support valuable strategic marketing decisions like the use of branded components. Below, we offer the theoretical and managerial implications of our research.

Theoretical Implications

Our work contributes to research in three ways. First, we find that both OEMs and component suppliers with pre-existing rent-generating endowments seek the safeguards of explicit and firm prices to protect their unique, pre-existing endowments from being appropriated in costly negotiations. The novelty of our results is that these extra-relational endowments/assets that are purportedly at risk in these relational exchanges (and hence need to be safeguarded) are *not* the classic transaction-specific assets that create appropriable quasi-rents. Rather, these endowments are pre-existing properties of the individual parties, not the dyad, at the contracting stage and exist independently of their relationship with the focal counter-party; hence, the rents that these assets generate are not party-specific and can be obtained in alternative relationships. Our results provide a direct testimony to a two-sided version of the Helper and Levine (1992) model which shows why firms earning economic rents might willingly forego seemingly efficient governance. We find that in close, relational exchanges, all economic rents – regardless if they are generated from transaction- specific *or* generic assets – might be subject to haggling. Expecting this, farsighted economic agents do seek and install protective measures (e.g., fixed prices) to safeguard these assets. Our work hence extends the scope of governance analysis in inter-firm ties. Indeed they suggest that even for the same relational attributes (e.g., specific investments etc.), firms that engage other parties in cooperative, value-enhancing ventures will seek differential safeguards.

Second, our results show a complex pattern of interplay in the role of safeguarding and adaptation in these relationships. Both parties seek the safeguards of more rigid, hard contracts (i.e. fixed prices) to protect their own assets. Simultaneously, they also seek flexible contracts to facilitate rent-generating adaptations borne out of ex post customization within the relationship. Adaptation is most needed when a component involves complex integration or evolving technology. Our data confirm that firms adopt flexible pricing formats when technological complexity is high, even after *specific* investments are controlled for. Together with our evidence on pre-existing assets, this suggests that contracting parties structure their governance mechanisms by aligning transaction attributes in a multi-dimensional manner (Williamson 1985). Indeed, one contrast in our results is that within these branded component contracts, firms seek flexible governance for dyadic-specific investments but non-flexible governance for pre-existing endowments. One reason could be that since branded component relationships create a mutual hostage situation, parties have the incentive to engage in value-enhancing activities ex post to minimize mal-adaptation losses. This motive contrasts with their desire to prevent the counter-party from appropriating rents arisen from pre-existing resources. The data strongly suggests a calculative approach to governance design even within closely coordinated ties.

Third, the literature on pricing in relational exchanges has emphasized the using of fixed prices or pricing formulae to protect *ex post* specific investments to minimize renegotiation cost. We argue and show that *ex ante* search cost matter too. When it is prohibitively expensive to price the outcome of a cooperative endeavor because of technological complexity, parties would find it more efficient *not* to "name their prices" during the contracting stage but rather to negotiate ex post when the value of joint effort becomes more ascertainable. This new result provides an example in which contracting parties postpone their pricing decision in environments

with imperfect – but not necessarily asymmetric – information to economizing *both* search and negotiation costs (Bajari, McMillan and Tadelis 2008; Bajari and Tadelis 2001).

Managerial Implications

First, our research shows how a strategic marketing decision (i.e. the use of branded component contracts) can be better understood by using the governance lens of TCE. Branded components are an increasingly popular strategy utilized by firms to leverage "potent" component brands (Venkatesh et al 2006). Understanding whether and how the firm can best derive value from this relationship is critical to its success. In particular, we consider whether value is derived from pre-existing firm level resources or anticipated customization activities conducted during the contract execution stage of the relationship. Using micro (contract) level details, we show how parties entering into branded component contracts need to discriminatingly align their choice of pricing rules with the "core" source of differentiation in the relationship. If the differentiation is derived from complex and evolving technologies that lead to highly customized components, such kind of value generation need to be supported by more flexible pricing formats. In contrast, if the realized value is basically derived from the pre-existing capabilities and brand resources of the vendor, the vendor should seek more fixed pricing rules. The same holds for OEMs possessing strong brand equity in their customer markets. By investigating the supply-side implications of branded component contracts, our study provides a nice complement to existing research that basically focuses on demand-side issues

Second, it seems that fixing a price or pricing formula might ease the uncertainty in how to divide the value to be created in a business-to-business transaction. However, when ascertaining the true value of joint efforts during the contracting stage is costly, fixing a price "optimally" – even at the expected value of the future outcomes – would have unintended

consequences. This happens when the possible outcomes of, for example, customization efforts could be realized across a wide range of value with similar probabilities. The agreed price or its associated formula is likely to fall outside of the self-enforcing price range in the execution stage. Under this condition, the realized value becomes so adverse to one of the parties – either too high for the buyer or too low for the seller – that he would engage in post-contractual jockeying, hoping to redistribute the trade surplus. Costly actions such as renegotiation, judiciary intervention, or third-party arbitration would follow. Our research suggests the choice of pricing formats should entail a joint assessment of search and negotiation costs for a specific transaction context.

Third, it must be emphasized that resources, capabilities, and investments are commonly included as factors influencing how a firm coordinates with other collaborators. This research, however, explicitly considers how firm-level resources (i.e., brand strength, market strength) that are not accounted for within the relationship are influential to the pricing provisions governing the agreement. Practitioners often charged with contracting among upstream suppliers for a particular innovation or idea must be cognizant of the implications for firm-specific resources outside of those proposed within the relationship. Our study suggests brand strength, market strength, among other firm-level resources have critical significance for the firm's governance.

While protecting extra-relational resources is essential to safeguard against unscrupulous behaviors, managers should also consider how increasingly rigid pricing provisions may limit product development opportunities ex post. Relationships among firms with high levels of dedicated assets and comparatively higher levels of ex post differentiation are commonly structured to facilitate this adaptation (Gulati, Lawrence and Puranam 2005). If a firm chooses to operate under more rigid contracting provisions activities during the contract execution stage

may be more limited as a result. In sum, understanding whether the value from the relationship arises from ex ante versus ex post differentiation remains the critical indicator of the preferable pricing mechanism.

Limitations

Our study clearly has some limitations. First, our analysis is based on contract-level data with many of our key variables being perceptual measures of our manager informants. Even though we did take proper precautions while collecting data, some perceptual biases (e.g., recall bias) are likely to exist. Second, and more importantly, our estimate of the pre-existing brand resource of the vendor is based on a simple, additive specification. Non-linear or multiplicative specifications could provide different results. Third, even though we test the descriptive aspects of our theory, we do not provide normative analyses. We hope that future studies can rectify these issues.

TABLE 1: BRANDED AND WHITE BOX COMPONENTS IN BUSINESS-TO-BUSINESS MARKETS

OEM Brand & Product	Component Vendor Brand & Product	Sales pitch employed in OEM product manuals/brochures and/or advertisements in magazines/trade journals
Nissan multi-fuel industrial engines	**Zenith** electronic fuel management system	Frankly, the performance will amaze you … specially designed to switch "on-the-fly" from propane to gasoline and back seamlessly and without loss of power.
IBM services	**SIEBEL** e-business software	IBM's infrastructure and industry expertise. Siebel System's sophisticated e-business software. Combined, they enable personalized relationships via phone, web, and e-mail. No more customer #345H…only happier Bobs and higher sales.
Andersen Consulting (now Accenture)	**Fasturn** e-business solutions	… to customize a Web-enabled marketplace for retailers and manufacturers …combines Fasturn's e-business solutions with Andersen Consulting's retail industry knowledge and experience … to deliver high-value results
Mathcad from Mathsoft	**Microsoft Excel**	Patented electronic math technology lets engineers work with math notations … seamlessly integrate a variety of third party data sources based on Excel…
Fujitsu Electronics	**Comodo** (Internet Security Specialists)	… collaborated on the development, marketing and distribution of products containing the SIDEN Trust Chip- a market leading security chip offering unrivalled cost-effectiveness. Comodo's expertise in cryptography and integrated circuits has enabled considerable functionality to be incorporated … whilst the cost of the chip has been dramatically reduced.
Dell PowerEdge Servers	**Intel Xeon** Processors	… optimized to provide maximum flexibility, value, and price/performance…
Baker Hughes Autotrak Rotary Steerable Oil Drilling machines	**Christiansen** PDC drill bits	Drill bits are specially designed for these machines to deliver breakthrough performance
Freightliner Custom Chassis Corporation	**Delco Remy** OR **Leece Neville** alternators	(Components) have been chosen to optimize your flexibility…

TABLE 2: COMPARISON ON CONTRACTUAL AND NON-CONTRACTUAL FEATURES

Features	Branded Component Contracts (n = 70)	White Box Contracts (n = 121)
Contract Duration (years)	2.78**	1.45
Number of suppliers used for functionally similar component	1.80**	3.75
Contract clause: Price Flexibility	2.40**	1.70
Contract clause: Design Flexibility	2.55**	1.60
Informal norm of Joint Action	4.50**	3.20
Informal norm of Flexibility	4.85*	4.01
Informal norm of information exchange	4.52	4.41

Comparison using independent samples t-test. *: $p < 0.1$; **:$p < 0.05$: two−tailed tests.

TABLE 3: OPERATIONAL MEASURES OF CONSTRUCTS

Descriptive and Confirmatory Fit Statistics	Item Description and Response Format
BRAND	Does your *formal contract* with the vendor specify the use of this vendor's brand name in joint promotions or displays on your end-product (or sales brochures) so that it is easily visible to the customers?
Differentiation	1. The item procured under the relationship** with this vendor has enhanced customer perceptions of our end-product performance. 2. The relationship with this vendor for this item has enabled us to differentiate our end-product vis-à-vis our competitors'. 3. The image of our end-product in our customer's eyes has received a boost due to the item supplied in this relationship. 4. This relationship has allowed us to better capture design and engineering synergies between their item and our end-product.
Technological Complexity	This component item has a simple/complex interface with other components in the end-product
Technological Uncertainty	Technological developments related to this item are very predictable/unpredictable
Vendor's Specific Investments	1. This supplier has made significant investment in specialized tools and equipment dedicated to the relationship with us. 2. This supplier has spent significant resources designing the specifications for their item(s) to ensure that it fits well with our production capabilities. 3. The procedures and routines developed by the supplier for their item(s) are tailored to our particular product. 4. We have some unusual technological norms and standards which have required extensive adaptation on the part of this supplier. 5. Most of the training that the supplier's people have undertaken related to our requirement for this item(s) cannot be easily adapted for use with another customer. 6. Training our personnel has involved substantial commitment of time and money on the part of the supplier.
OEM's Specific Investments	1. We have made significant investment in tools and equipment dedicated to the relationship with this supplier. 2. We have spent significant resources designing the specifications for this item(s) to ensure that it fits well with the supplier's production capabilities. 3. The procedures and routines we have developed to obtain this item(s) are tailored to this particular item from this supplier. 4. This supplier has some unusual technological norms and standards which have required extensive adaptation on our part. 5. Most of the training that our people have under-taken related to this supplier's item(s) would be of little value in dealing with another supplier. 6. Training this supplier's people has involved substantial commitment of time and money.
Norm of Flexibility	1. Both parties are expected to be flexible in response to requests made by the other. 2. It is expected that parties will make adjustments in the ongoing relationship to cope with changing circumstances. 3. When an unexpected situation arises, parties would rather work out a new deal than holding each other to the original terms. 4. The parties are open to the idea of making changes, even after having made an agreement. 5. Parties are expected to make adjustments in their manufacturing

	6.	Changes in the terms of the contract are not ruled out, if considered necessary.
Extent of Coordination	1.	Problems that arise in this relationship are expected to be resolved jointly.
	2.	Both parties are expected to make effort towards improvements that benefit the relationship as a whole rather than the individual party.
	3.	Parties are expected to undertake extensive joint effort in activities like component testing and prototyping, forecasting demand, and long-term planning.
OEM's Downstream Market Strength [b]	1.	Customers are not willing/very willing to pay a premium for our end-product
	2.	This end-product is not/very profitable for us.
	3.	We earn lower/higher margins on this end-product than our competition
	4.	Customers value our end-product less/more than competing products.
Contractual Price Flexibility		How would you describe the pricing arrangement for the item(s) under this contract? (Choose One) • Fixed prices over the length of the contract • Specified prices but with adjustment formulas (e.g., inflation, PPI) • Specified prices but with negotiated adjustments • Prices not specified ahead of time of shipment

Unless otherwise indicated, the anchors for the scale points are 1 = strongly disagree and 7 = strongly agree.

**: OEM respondents had identified an independent vendor from whom their firm procured a component(s) that was (were) physically incorporated into one of their most important product line. Throughout the survey, respondents were reminded that this particular contractual exchange or "relationship" for the procurement of the component (or a set of related components) was to be their sole focus in providing their assessment.

a: 7–point semantic differential scale

b: The anchors for this scale are 1 = Entirely decided by our firm and 7 = Entirely decided by this supplier.

TABLE 4: ACCOUNTING FOR POST-CONTRACTUAL DIFFERENTIATION

Variables	OLS
Vendor Sp. Investments	0.306 (0.14)**
OEM Sp. Investments	0.202 (0.16)
Extent of Coordination	0.173 (0.08)**
Extent of Flexibility	0.322 (0.15) **
Vendor Size	0.081 (0.12)
R2; F(5,64)	0.40; 10.21***

TABLE 5: DETERMINANTS OF PRICE ADJUSTMENT MECHANISM

Variables	Ordered Probit Base Model	Ordered Probit Main Model	Ordered Probit Additional Model
Natural Log (Years of working together)	0.01 (0.21)	0.03 (0.16)	0.10 (0.15)
Dollar Value of Contract	0.01 (0.09)	0.05 (0.10)	0.04 (0.08)
Importance of Component	-0.02 (0.10)	-0.04 (0.09)	-0.14 (0.08)*
Preexisting Differentiation		-0.22 (0.09)**	-0.16 (0.07)**
OEM Market Strength		-0.15 (0.07)**	-0.16 (0.07)**
Technical Complexity		0.21 (0.07)**	0.17 (0.06)**
Technological Uncertainty		0.13 (0.08)	0.11 (0.08)
Specific Investments by Vendor			0.23 (0.08)**
Specific Investments by OEM			0.05 (0.10)
Extent of Coordination			0.11 (0.05)**
Extent of Flexibility			-0.08 (0.09)
Threshold - $\lambda 1$	2.37	1.49	0.90
Threshold – $\lambda 2$	2.38	2.36	2.17
Threshold – $\lambda 3$	2.39	3.25	3.19
Pseudo R2	0.00	0.34	0.42

Figure 1A

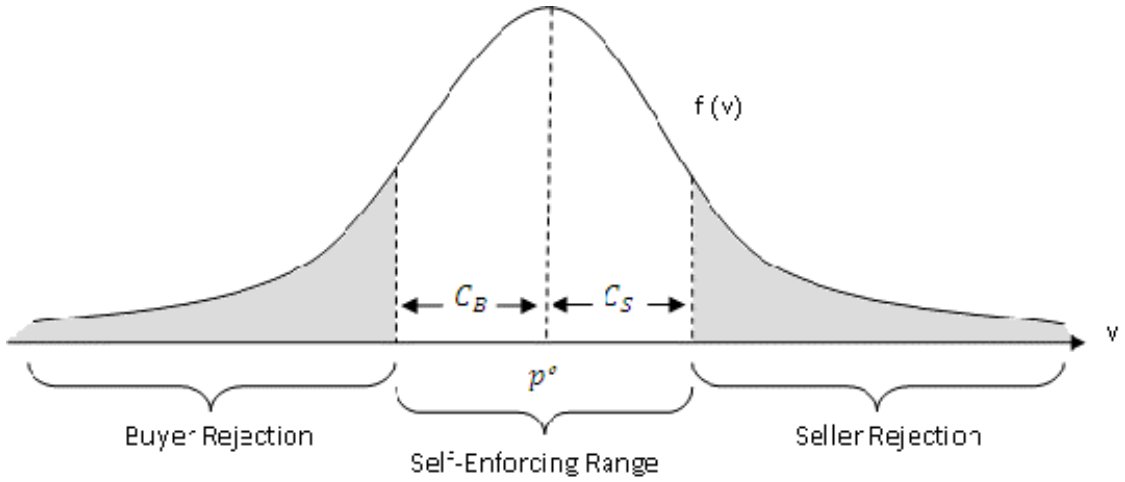


Figure 1B

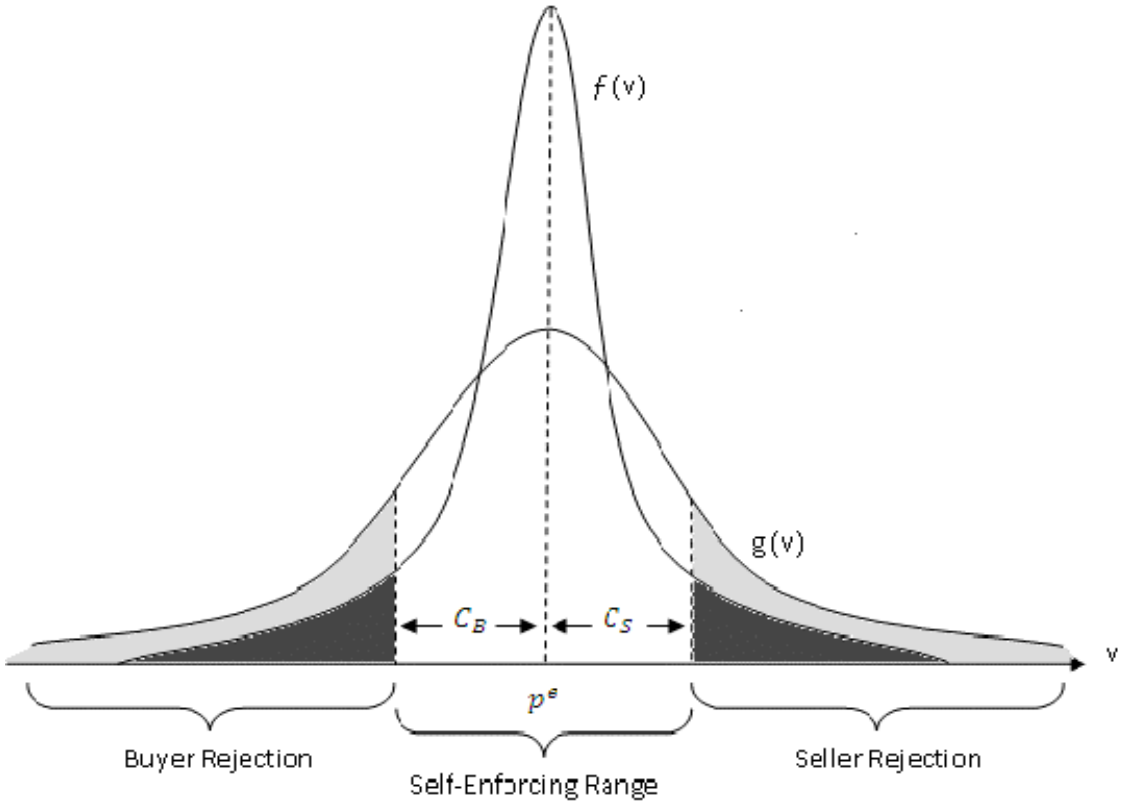
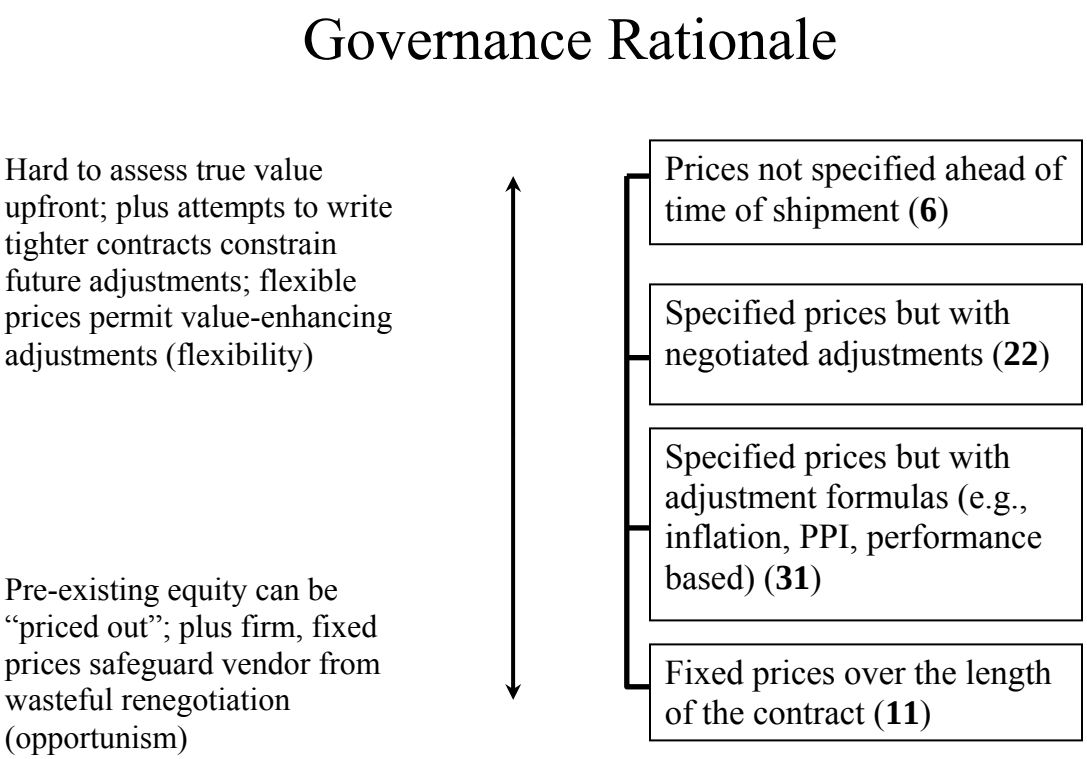


FIGURE 2: FRAMEWORK



Numbers in bold refer to the number of contracts in our data that belong to each category.

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