AN EMPIRICAL INVESTIGATION OF BRANDED COMPONENT CONTRACTS IN INDUSTRIAL MARKETS

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ABSTRACT

Despite the strategic significance of a branded component strategy in both consumer and industrial settings, extant empirical research has focused on developing behavioral theories about consumer perceptions of such co-marketing alliances. There is no systematic empirical investigation about *actual* component branding decisions made by firms or their *normative consequences*. We offer the first empirical evidence about the behavior of firms in choosing branded component contracts with their suppliers. We develop a conceptual model that highlights three roles of branded components: branded components as *differentiators*, branded components as *risk mitigators*, and branded components as *efficient governance devices*. Data from 191 industrial original equipment manufacturers (OEMs) contracting with their component vendors are used to study the descriptive and normative effects specified in the theories. We find that OEMs choose such contracts in a discriminating fashion following the theories. Specifically, OEMs are more likely to brand a component when a) the component possesses significant differentiation capabilities, and b) when the component supplier has made significant investments specific to the OEM. Our normative analysis shows a significant adverse impact of making the "wrong choice" on OEM performance. However, we also find an interesting asymmetry in the normative consequences. Specifically, we find that unbranded contracts carry a heavy penalty when they are employed in those circumstances where the theory predicts a branded contract. In contrast, branded contracts carry a much lower penalty, and actually provide small gains, when employed in those circumstances where the theory predicts an unbranded contract. Implications for theory and practice are developed.

Keywords: Brand Management; Business to Business Marketing; Industrial Marketing; Marketing Strategy; Organizational Research; Relationship Marketing

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1. INTRODUCTION

Firms are increasingly reliant on inter-firm ties with their supply chain partners to create and deliver more value to customers. Such organization ties (e.g., contracts, ownership arrangements and relational exchanges) have been shown to not only to mitigate exchange hazards[1] but also to support strategic marketing decisions (e.g., Ghosh and John, 1999; Nickerson, Hamilton, and Wada 2001). One such increasingly popular contract form that directly speaks to strategic marketing decision making is c*omponent branding*[2], whereby one firm (the Original Equipment Manufacturer or OEM) produces a product that incorporates a component purchased from another firm, and in its marketing efforts, employs both its own brand name as well as the component vendor's brand name. Depending on the specific contract, labels for both brands may be affixed to the equipment itself, and/or the brands might be co-featured in marketing communications. Iconic campaigns like "Intel Inside" and the Nutrasweet swirl on diet cola cans have contributed to the popularity of ingredient branding amongst consumer goods marketers, but as Table 1 illustrates, this strategy is employed in a wide variety of industrial settings as well.

Despite its growing popularity, we lack an understanding of the OEM's decision[3] to employ a branded component contract because there has been no systematic investigation of actual firm decisions. The research to date has focused on uncovering the theoretical mechanisms that lead to benefits from the use of branded components. The bulk of the work views component branding as a

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[1] Exchange hazards are the vulnerabilities that face firms because of the conjunction of opportunistic tendencies of human actors and the limits to court-ordered remedies (Williamson, 1996).

[2] We use component branding and ingredient branding interchangeably.

[3] The OEM is the principal actor in shaping the form and structure of these contracts.

type of co-branding effort (e.g., Keller, 2001; Aaker, 2004), and finds that branding a component which possesses the capacity to differentiate the host product improves customer perceptions of product quality. Specifically, branding a component that a) has a strong brand name (Desai and Keller, 2002); b) is a good fit with the OEM brand (Park, Jun and Shocker, 1996); and c) is used to help out a weak OEM brand (Rao, Qu and Ruekert, 1999) have all been shown in laboratory work to improve customer perceptions about the product embodying the component. Its relevance to understanding firms' decisions is seen in Table 1 from examining the content of the OEMs' marketing messages. The enhancement in quality or performance, due to the branded component, is invoked directly to create a unique selling proposition for the OEM's own product.

However, other cases in Table 1 are not so readily interpreted from this lens. Consider those components that have been custom built to the OEM's specifications such the Comodo chips customized for Fujitsu systems or the Christiansen drill bits customized for Baker Hughes drilling machines. By definition, customizing a component to OEM specification creates differences in technology, design and performance across OEMs. Furthermore, these customized components are embedded into multiple OEMs' products under the same component brand name (e.g., Leece Neville alternators are used in multiple brands of heavy duty trucks, industrial generation sets, construction, and mining and materials handling equipment). The core premise of branding is to project a consistent set of perceptions; thus, a branded component strategy for these technologically different components appears to dilute, rather than capitalize on the component's potential differentiation capacity.

Relatedly, many of these component brands are not necessarily more reputed or established, compared to their OEM counterparts (e.g., Nissan and Zenith; Accenture and VECTIV/Fasturn). In fact, in most industrial markets, OEMs are the primary drivers of demand and component suppliers are usually smaller and less well known than the OEMs. As a consequence, highly reputable vendor

Table 1

ILLUSTRATIVE EXAMPLES OF BRANDED COMPONENTS IN BUSINESS-TO-BUSINESS MARKETS

OEM Brand & Product	Component 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 #3453H…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
Accenture	**VECTIV**	Powered by Vectiv's revolutionary site procurement and optimization solutions and backed by our knowledge and expertise … substantially improve decisions and execution capabilities in reaching optimal portfolio of strategic real estate assets.
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.
PACCAR heavy trucks	**CUMMINS** diesel engines	Specially designed … to improve vehicle performance, lower emissions, and a more integrated power train …"
Dell PowerEdge Servers	**Intel Xeon** Processors	… optimized to provide maximum flexibility, value, and price/performance…
HP ProLiant BL30p BladeSystem	**Intel Xeon** Processors	Powered by Intel Xeon Processors, these innovative servers adapt to change in a seamless modular fashion and allow you to integrate your systems …
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…

brands that might enhance quality perceptions of OEM products are not common, yet we observe a growing popularity in the use of branded component contracts by industrial OEMs.

1.1. Purpose of Study

Our primary goal is to understand an OEM's decision to employ a branded component contract. We build our conceptual model by combining the existing work on the role of component brands in enhancing consumer perception with the emerging work on its role as an efficient governance contract. This latter role is developed from the transaction cost analysis (TCA) literature that has begun to examine the possibility that control over brand assets in inter-firm ties need to be allocated with a view to protecting valuable specific investments. As all of these roles of branded contracts are normative, we seek to provide evidence about their descriptive effects as well as their normative effects.

1.2. Contributions of Study

We offer the first empirical evidence about component branding decisions made by OEMs. Questionnaire responses from 191 OEMs are used to estimate a discrete choice model. We find that the two roles of branded contracts (enabling greater differentiation, and protecting suppliers' OEM-specific investments) influence significantly the decision to employ a branded contract. These effects possess large explanatory power even after controlling for numerous context specific variables. At low levels of these two variables (viz., at minus two standard deviations), OEMs are extremely unlikely to use a branded component contract (4%), but at high levels of these two variables (at plus two standard deviations), they are very likely to use it (90%). Turning to the normative effects, we find that firms' decisions follow the predictions of the theories (i.e., improve differentiation and protect partner-specific investments) in a distinct way, viz. a "comparative advantage" pattern. Thus, OEMs that stand to gain more from a branded component contract are more likely to choose branded contracts, and vice versa.

Further insights into normative consequences are obtained from "counterfactual" models that control for the self-selection into strategies (e.g., Maddala, 1983). Specifically we find that an OEM currently using a branded component contract would face significantly more adverse outcomes, both in terms of increased supplier opportunism as well as reduced profitability if it were to switch to an unbranded component contract, and vice versa. However, there is an interesting asymmetry. The adverse outcomes are much greater in the first case (i.e., a firm switching out of its current branded component contract into an unbranded component contract) than in the latter case (i.e., a firm switching out from its current unbranded component contract to a branded component contract).

The paper is organized as follows. We first briefly review the relevant literature and develop our testable hypotheses. Next, we present our empirical study and its results. We conclude with a discussion of our findings and its implications for research and practice.

2. LITERATURE REVIEW

2.1. Consumer Perceptions

From a psychological viewpoint, brands are heuristic cues about vital product information (Cohen and Basu, 1987), which greatly influence subsequent product evaluation and choice processes (Park and Lessig, 1981). These properties of brands transform them into signals of quality (Barzel, 1982; Kirmani and Rao, 2000) and hence are valuable intangible assets to a firm (Aaker, 2004). There is a vast and diverse literature about brands, including one on national brands versus private labels (e.g., Dhar and Hoch, 1997) so we focus narrowly on the work on brand alliances, with an emphasis on branded component contracts.

<u>Differentiation Capability of Branded Components</u>: Brand alliances are inter-firm ties involving two (or more) existing brands that have the goal of enhancing product demand (Keller, 2001). Component brands are one type of co-branded alliance, so the underlying processes apply

similarly. The core idea is that the host product's differentiation is reinforced or amplified by the presence of a component brand. The literature focuses on pinpointing the conditions under which this reinforcement occurs. Park et al (1996) showed that perceptions of high quality about important attributes of a partner brand are transferred to the co-branded product when the brands complement each other. This notion of complementarities is further developed by Venkatesh and Mahajan (1997) into a decision model to compute optimal prices for branded components as well as to select the appropriate component partner.

Reinforcement effects are also at the core of the limited work on ingredient branding (Desai and Keller, 2002; Simonin and Ruth, 1998). In the latter paper, the authors show that greater prior brand strength, better product category fit, and better brand fit all improve the evaluation of a tie between a component firm (microprocessor chips) and an OEM (automobile firm). Since firms will desire on capitalize on this effect in electing to contract for a branded component, we will control for the degree to which a component offers the capability to differentiate the OEM's product in the eyes of the latter's users.

Risk Mitigation Effects of Branded Components: A conceptually distinct, though related motive for co-branding is the reduction of purchase risk faced by consumers of the host product. Rao et al (1999) developed this idea from the stream of work that views brands as economically valuable signals of unobservable quality (Spence, 1973; Wernerfelt, 1988; Erdem 1998). The sunk investments associated with brand building would be lost if a brand owner were to renege on its implicit promises of unobserved quality. Should quality shading occur, consumers can punish a brand owner by refusing to buy the product. Anticipating this loss, a rational firm will find in its best interest to avoid shading quality; thus brands lower consumer's risks of product purchase. Applying this logic to co-branding, Rao et al (1999) show that host firms with modest reputations gain more from borrowing the credible brand of a partner firm to signal its own unobservable quality. For the purpose of our study, we will control for the extent to which the OEM's product Quality is difficult for consumers to detect, as well as the credibility of the OEM brand.

2.2 Efficient Governance

There is an emerging literature on brand contracting issues that is rooted in the efficient governance[4] analysis tradition. Developed by Williamson (1996), this approach has been employed successfully to explain inter-firm contracting features like incentive clauses, exclusive territories, as well as ownership features such as vertical integration and equipment ownership. At its core is the argument that the form and content of inter-firm agreements should be crafted to safeguard hazards posed by specific investments[5] while facilitating uncertainties at the least possible cost.

Like all contracts, brand contracts allocate ownership and decision control to the parties at hand, thus governance principles should apply to these contracts as well. The relevance of these principles to understanding brand issues is illustrated by the work of Gonzalez-Diaz et al (2002) who studied brand ownership issues in agricultural marketing cooperatives, and by the work on brand ownership decisions in franchising by Azevedo et al (2002). In both instances, they show that the allocation of brand ownership can be understood as an efficient governance response to exchange hazards. In our hypothesis development, we develop this view of branded component contracts more fully.

2.3. Normative Theory and Managerial Practice

All the theoretical perspectives reviewed above are normative theories that specify what firm ought to do under particular circumstances. As such, the gaps in our knowledge involve both

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[4] Governance is defined as the "rules of engagement" that apply to the exchange partners, particularly those rules that are specific to the parties as opposed to general legal and social rules of society. They include contractual rules, ownership rules, and social rules or norms.

[5] Specific investments have lower or zero value if they were to be redeployed to alternative ties with other partners. They have a powerful effect on the form of inter-firm ties.

descriptive and normative effects. First, we do not know the degree to which OEMs actually choose branded component contracts in line with these theories. Second, to the extent that they do (or do not), we do not know the actual gains (losses) that accompany such decisions. This reinforces the need to separate the descriptive effects from the normative effects in our study.

3. HYPOTHESES

For each theoretical perspective, we will present only the descriptive implications as formal hypotheses. The normative implications are implicit in the accompanying text, and our empirical analyses will attend to both aspects.

3.1. Differentiation Capabilities Hypotheses

Experimental research in consumer behavior discloses a variety of factors that reinforce end customer perceptions of the jointly branded product. Given our principal interest lies in modeling the decision to employ a branded component contract, we are less concerned about the factors that promote the reinforcement effect *per se* (e.g., whether the two brands fit or whether the two brands possess good reputations individually) than with the subsequent effect on customer perceptions.

Simonin and Ruth (1998), Keller (2001) and Aaker (2004) suggest that components should be branded when they are more capable of increasing customer preferences for the OEM's product, either because they enhance its functional ability or boost the customer image of the end-product. The supplier's brand name signals costly and not readily observable attributes of product quality (Spence, 1973; Barzel, 1982). We define and measure this ability as the *differentiation capacity of the component*. As such, branded components become "complementors" (Venkatesh and Mahajan, 1997) because customers value the end-product when it has a particular vendor's component. Hence we hypothesize:

H1: *The higher the differentiation afforded to the OEM's end product by a supplier's component, the higher the likelihood that OEM will choose a branded component contract.*

3.2. Risk Mitigation Hypotheses

Industrial products rely on complex technology and product quality is costly to ascertain because of experience and credence attributes (Darbi and Karni, 1973). Potential customers face increased risks when dealing with an OEM with a modest reputation and if there is significant heterogeneity between competing goods. What role does a branded component play?

To fix the argument, consider an OEM who does not possess a particularly strong reputation amongst its potential customers. Intendedly rational customers face increased risks from making the wrong choices (Batra and Sinha, 2000) and will reduce their willingness to pay for this OEM's product. Rao et al (1999) apply signaling theory to show that allying the OEM brand with a reputable component brand enhances customers' perceptions of quality. Notice that OEMs with stronger ex ante reputations will not find the alliance as desirable as they are able to effectively signal the quality of their own brand. Hence, we hypothesize:

H2: *The higher the brand reputation of the OEM, the lower the likelihood that the OEM will choose a branded component contract.*

A related hypothesis can be derived from the consumer risk arising from the differences between competing products. Product designs and specifications conforming to comprehensive industry standards are likely to result in look-alike products. Under such circumstances, customers find it relatively easy to evaluate different products and signals are not as useful. In contrast, heterogeneous product design and specifications arise in weak industry standards regimes. Here, OEMs are more likely to develop proprietary interfaces between components leading to larger differences between competing products. Furthermore, proprietary interfaces lead to more tightly coupled components (Wilson, Weiss, and John, 1990), and customers face higher costs in identifying and assessing the attributes of the different components embedded in a product. Branded components serve as signals of unobservable quality here (Erdem, 1998). Hence, we hypothesize:

H3: *The higher the heterogeneity in the OEMs end-product market, the higher the likelihood that the OEM will choose a branded component contract.*

3.3. Efficient Governance Hypotheses

In recent years, component suppliers in industrial settings have been called upon to be engaged much more closely in the design, engineering and manufacturing processes by their OEM customers. These supplier efforts improve the end product's aesthetic appeal and/or functionality, and hence improve end-user demand. To respond to these OEM requests, suppliers frequently invest in physical and human capital that is specific to a particular OEM. Such investments are hazardous to the supplier (investor) because its OEM partner can hold them up to extract their value via opportunistic renegotiations in the ex post contract execution stage. Uncertainties about the course of future events and market conditions amplify the opportunities to engage in such behavior. Anticipating this problem, farsighted suppliers seek safeguards (e.g., contracts, ownership, relational engagements) to protect such investments. However, in our context, these classic safeguards are not practical.

First, given the need to adapt designs to changing OEM needs, contractual safeguards are inevitably incomplete (Heide and John, 1990). Hence, financial safeguards like take-or-pay contract clauses are rendered ineffective because they apply to "as is" existing models/designs and the design/technology could change over the contract horizon. In essence, in fast moving environments, these contractual safeguards become impossibly difficult to write and enforce. Second, ownership (via backward vertical integration), would obviously eliminate the contracting problem (by eliminating the vendor), but this is impractical because industrial products are based on a host of different technologies and OEMs rely on an independent and healthy upstream supplier base to keep up with technological advances. Third, more modest micro-level ownership shifts through patents and intellectual property rights contracts (IPRs) are difficult to write and enforce because these ties involve joint effort which make it difficult to attribute realized outcomes to the efforts of a single party. Worse yet, patent applications disclose trade secrets and expose the supplier to knowledge appropriation and leakage (Pisano, 1990). Finally, relational exchanges that create mutual dependence through symmetric specific investments (Anderson and Weitz, 1992) are impractical because in our context the OEMs are much larger than the typical component supplier, and they also deal with many such suppliers.

An interesting feasible safeguard can be extrapolated from the context analyzed by Heide and John (1988). There, small manufacturers' agents (MA) are at risk for their specific investments, particularly market developments efforts, made on behalf of large principals. Contractual protection (due to the prevailing norm of 30-day at-will cancellation clauses), backward integration by agents, and symmetric investments (due to the sheer size mismatch between relatively small MAs and large manufacturing firms) are all impractical. Yet, we witness durable ties that survive these ostensible hazards because the MAs craft tighter links with their downstream customers commensurate with their upstream investments. Tighter customer links make it harder for the principals to threaten to bypass the MAs and expropriate the value from their investments.

We adapt this logic and contend that component branding is one such safeguard. To fix the argument, we expand on the idea first elaborated by Gonzalez-Diaz et al (2002) that the ownership of a brand in an inter-firm tie has governance effects that parallel ownership of physical assets. Brand copyrights (brand names) confer specific and transferable ownership and property rights to its owner. A branded component contract conveys ownership rights to the supplier, whereas its absence conveys these rights to the OEM. Why should this matter?

According to governance models (Grossman and Hart, 1986; Hart and Moore, 1990) ownership confers more influence over non-contractible matters. Thus, the ownership of a component brand confers greater influence to the supplier over such matters as design and engineering changes, product and manufacturing technologies, quality control procedures, choice of sub-suppliers, etc. As per theory, it is efficient to shift ownership to the party exposed to more hazards from undertaking non-contractible actions and investments because it motivates the party to undertake optimal levels of such efforts. When non-contractible investments are made by the supplier, making the supplier the brand owner of the component is efficient because it provides the supplier a greater stake in the relationship and a more secure claim, which protects these non-contractible actions taken on behalf of the OEM[6]. Hence we hypothesize:

H4*: The higher the OEM-specific investments of the supplier, the higher the likelihood that the OEM will choose a branded component contract.*

The effect of the supplier-specific investments made by the OEM is somewhat different. To the extent that non-contractible matters are the OEM's responsibility, there is no efficiency gain to be realized from ceding ownership to the vendor, despite the possible supplier-specific investments at risk. Presumably, other safeguards are needed.

H5*: The likelihood that the OEM will choose a branded component contract is not influenced by the level of supplier-specific investments made by the OEM..*

Notice the descriptive and normative effects embedded in each of the above hypotheses. The descriptive effects are straightforward, while the normative effects are linked to the efficiency argument underlying governance analysis. In other words, firms not employing the predicted strategy should suffer adverse consequences. We test both aspects in our data.

3.4. Other Effects

In addition to the mechanisms implicated above, a number of other variables matter in the OEM-supplier context. Most of them are motivated by extant work on governance models in industrial markets. Below, we briefly describe the variables and their effects.

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6 Monteverde and Teece (1982) make a similar argument. In their case, relationship-specific assets are supported by moving the ownership of the specialized tools and dies to the investing party.

Importance of Component: Two effects are pertinent here. First, all governance forms have setup costs, and given the costs of communicating brand names jointly, it is likely that this strategy is reserved for more important components. Second, it is impractical to employ these contracts for all the purchased components. Components that are more critical to the functioning of the end product (independent of the quality level) are more likely to be procured under a branded component contract.

Relative Size of Parties: Our efficiency based argument rests on the Coasian assumption that parties will reach an efficient solution regardless of the distribution of bargaining power. However, the more powerful actor may sacrifice prospective gains to maintain its superior bargaining position. As the OEM gets increasingly larger than the vendor, it may be unwilling to let the supplier to brand its component even if it meant sacrificing some value enhancing activities. This is mirrored in the relational engagement literature that studies the creation of mutual dependence between the OEM and a supplier so that implicit promises become self-enforcing. Anderson and Weitz (1992) have documented that symmetric specific investments play this role. Unfortunately, in our context, the OEMs are much larger than the typical component supplier, and they also deal with many such suppliers. As such, a size mismatch is all but certain, which makes it very difficult to craft relational safeguards.

Contract Structure: We need to control for the fact that some suppliers are able to write and enforce contractual protection for their investments. There look at two structural features that capture the ability to enforce contractual protection, viz. single sourcing and in-house production We stress that the mere presence of a contract term (e.g., financial terms like take-or-pay clauses) does not make it easy to enforce. It is these conditions that enable these terms to work.

<u>Single Supplier</u>: A “single source” supplier enjoys a greater ability to write and enforce contract terms than does a fractional supplier. The difficulty of replacing a sole source makes OEMs adhere to contract terms more faithfully. Indeed, adding just a second source changes the dynamics considerably.

<u>In-house production:</u> In-house production by the OEM of a purchased component is similar to

the addition of a second source. This reduces the likelihood of using a branded component contract.

Thickness of the markets: The number of potential suppliers as well as potential OEM buyers of a technologically similar component has a direct bearing on safeguards. Basic governance theory holds that thick markets discipline incumbent parties to an exchange such that more specialized governance forms of any type are less likely to be needed. OEMs located in such conditions are less likely to use branded components contracts, as this would only increase their switching costs of engaging a replacement supplier with no corresponding safeguarding gains.

Relational Contracting: Recall that relational exchanges were difficult on account of the size mismatch of the parties. Nevertheless, OEM-component vendor ties are often long-lived and social controls over exchange hazards may well have emerged over time. There is a structural as well as a behavioral aspect to this issue. Consider them in turn.

Historical Length of Tie: A long history of purchases from a particular supplier (not necessarily for the focal component) should make expectations of continued interactions more credible. In turn, this evokes the "shadow of the future" as a safeguard against opportunistic behavior. We note that it is not the length per se that matters, but the expectations of future interactions.

Norm of Flexibility: There are a large number of relational norms, but prior work appears to highlight the importance of the flexibility displayed by the interacting parties. Holding fast to prior contract terms is a defining feature of discrete engagement whereas relational engagement is defined by mutual flexibility that enables them to work problems out as they arise.

4. METHOD

4.1. Research Context

Our research context consists of OEM-supplier ties from non-electrical machinery (SIC 35), electrical and electronic machinery (SIC 36), and transportation equipment (SIC 37). These settings were chosen for four reasons. First, our field interviews revealed that branded component contracts were quite prevalent in this context (about a third in our sample). Second, these OEMs' end products incorporate numerous components, sub-assemblies etc. that rely on a broad range of technologies. Thus, complete vertical integration is impractical. Third, purchasing ties in these settings have been shown to not only require close logistics coordination between the two parties but also substantial changes to the design, engineering, and specification of the components during the contract execution phase (e.g., Heide and John, 1990). Thus, contracts are essentially incomplete in many respects and hence cannot be sufficient to safeguard investments. Finally, each of these two-digit SIC sectors consist of many different four-digit SIC industries, which assures us variation across the types of components procured and the relationships governing such transactions.

4.2. Data Collection Process and Sampling Frame

We undertook a pilot study consisting of on-site interviews with purchasing managers from firm in each of the three SIC codes. We used these in-depth interviews, in conjunction with previous published research to develop an initial draft of the questionnaire. The questionnaire was then administered to a sample of managers from 18 firms to verify the wording and response formats as well as the clarity of instructions. Inputs from this pilot test were then used to refine the questionnaire and generate the draft of the final survey instrument.

A mailing list of purchasing managers/directors from manufacturing firms in SIC codes 35, 36, and 37 was obtained from American List Council, a national list broker. A random sample of 1016 names was drawn from the list. The individuals were contacted by phone to qualify them as key informants (Campbell, 1955). Multiple telephone calls (five calls on average) using a snowball technique were needed to qualify an informant at each firm. These informants were asked to pick a relationship with an independent supplier as follows. They needed to be very familiar with the identified supplier, regardless of the success of the relationship (Calantone and Montoya-Weiss, 1998). The component from the identified supplier was required to be an item that was physically incorporated into the OEM's end-product. Finally, they were required to identify a supplier who was financially independent of the OEM; viz. there were no equity holdings across the parties.

The unit of analysis is a purchasing contract between the OEM and the identified supplier for supplier for a single component or else a set of closely related components governance by a single contract. We offered to deliver a customized report to each firm that summarized the relationship profiles in the sample as well as compared their own relationship profile against the average profile in our sample using "par" models. We also set up a web-based discussion forum where the participants were allowed to comment on the reports and interact with other participants.

Our qualification process and incentives yielded 521 informants who verbally agreed to participate in our survey and were sent the questionnaire along with a stamped, addressed envelope. The remaining 505 names on the list were invalid because either the individual was no longer employed with the company or the company had moved its premises. Using reminder cards and follow-up phone calls, we received 207 completed questionnaires. Thirteen of these responses were eliminated either because of excessive missing data or because they described a purchasing agreement outside our specific scope (e.g., an OEM-distributor relationship or a supply arrangement with a non-independent supplier). This left us with 192 responses with a 37% response rate. An analysis of the response rates for other inter-organizational studies that used a similar key informant qualification process (e.g., 30% for Heide and John, 1990) reveals that our response rates are comparable. Table 2 provides a profile of the buyer and vendor characteristics in our sample.

To assess the quality of the key informant data, we used two items to measure informant knowledge and involvement: "How knowledgeable are you about your business unit's dealings with this supplier?" and "How involved are you personally in your business unit's dealings with this supplier?" Their responses on a seven–point Likert scale (1 = "Very low", 7 = "Very high") averaged 6.40 (s.d. = 0.68) and 6.37 (s.d. = 0.68) for knowledge and involvement respectively,

Table 2

SAMPLE PROFILE OF OEM PRODUCTS AND VENDOR COMPONENTS

Types of End-products Manufactured by the Buyer (n = 191)	
Machines (agricultural/automotive/construction/dairy/drilling, manufacturing/CNC etc.)	31%
Dies and Tools (sub-assembly/casts/ etc.)	10%
Electric & Pneumatic Machines (motors/pumps/compressors/turbines)	20%
Instruments (navigational systems/medical devices/ process control equipment/ etc.)	21%
Electronic products (computers/ion vaporizers/PCBs/ etc.)	8%
Others (e.g., hydraulic valves)	10%
Types of Components/Items Purchased (n = 191)	
Fabricated Metal Parts (castings, forgings etc)	12%
Finished Components (motors/engines etc.)	35%
Electronic Subassemblies (microprocessors etc.)	17%
Instruments (gages, sensors, spectroscopes, chromatographs etc.)	22%
Others (e.g., optical lenses, compensators etc.)	14%

indicating a high level of expertise in the understanding and functioning of this particular relationship. We dropped one observation for a response below 5 on one scale, yielding a final sample size of 191.

To assess non-response bias, we used the Armstrong and Overton (1977) approach by contrasting early responses against late responses. Late responses were categorized as those which took more than 5 weeks after the original questionnaire packet was mailed out. This categorization was based on the observed pattern of returned responses. We used one-way MANOVA to compare early and late responses on key demographic characteristics like annual dollar volume of purchase, size of the buyer relative to the supplier, number of suppliers used for the focal component, and the proportion of purchase of the item from that particular supplier. Statistical tests (*Wilks' Lambda* (Λ^*) = 0.97; F (4,188) = 1.46) indicate no significant differences between the two groups.

4.3. Measures

Table 3 provides the details of the measures used. Table 4 provides the pair-wise correlation between the measures of the constructs.

Dependent Variables: There are three dependent variables addressing the contract choice and outcomes of interest. Each one is described below.

Branded Component Contract (BRAND): We asked our OEM informant if the particular supplier's brand name is conspicuously displayed on the OEM product (and/or sales brochures) so that it is easily visible to the final customer. The response is coded as "1" if the component brand label was visibly displayed and "0" otherwise.

Vendor Opportunism (OPPORTUNISM): This 6-item scale adapted from John (1984) to reflect deceptive behavior and strategic non-truthful activities on the part of the supplier during contract execution.

OEM Profitability (PROFIT): This single item measures the OEM's evaluation of the profitability of its relationship with this supplier.

Independent Variables: We have a number of independent variables. The conceptually important variables are presented first, followed by the secondary control variables.

Vendor's specific investments (VENDINV): This six-item scale measures the vendor's investments in physical, process, and human assets that are specialized to the OEM. We modified the items used in Anderson (1985) and Heide and John (1990) for this study.

OEM's Specific Investments (OEMINV): The six items for this scale parallel the content of the VENDINV scale and looks at the OEM's investments in physical, process, and human assets that are vendor specific. We modified the items from Anderson (1985) and Heide and John (1990).

Differentiation Afforded by Component (DIFFCOMP): This 4 item scale adapted from Ghosh (1997) measures the extent to which the vendor's component enhances end customers' perception of

Table 3

MEASURES OF CONSTRUCTS

We provide illustrative items for all multi-item scales. Remaining items for each scale are provided in the appendix available on request.

Descriptive and Confirmatory Fit Statistics	Item Description and Response Format
BRAND	Is this vendor's brand name conspicuously displayed on your end-product (or sales brochures) so that it is easily visible to the customers? Yes, No
DIFFCOMP $\chi^2(2) = 5.63$; CFI = 0.99 NFI = 0.99; Reliability = 0.86	1. This relationship enhances customer perceptions of our end-product performance. 2. This relationship enables us to differentiate our end-product vis-à-vis our competitors'.
OEMREP[a] $\chi^2(2) = 7.64$; CFI = 0.98 NFI = 0.95; Reliability = 0.82	1. Customers are not willing/very willing to pay a premium for our end-product. 2. Customers value our end-product less /more than our competitor's products.
OEMHET[a] $\alpha = 0.76$	1. Widely accepted/No industry standards for end-product design and specifications exist. 2. Competitors' end-products are very similar/dissimilar from our end-product.
VENDINV $\chi^2(9) = 24.1$; CFI = 0.97 NFI = 0.97; Reliability = 0.91	1. This vendor has made significant investment in tools and equipment dedicated to their relationship with us. 2. This vendor has spent significant resources designing specifications for this item(s) to ensure that it fits well with our production capabilities.
OEMINV $\chi^2(9) = 17.75$; CFI = 0.99 NFI = 0.98; Reliability = 0.90	1. We have made significant investment in tools and equipment dedicated to the relationship with this supplier. 2. We have spent significant resources designing specifications for this item(s) to ensure that it fits well with the supplier's production capabilities.
IMPORTANT[a]	Item is a very unimportant/very important element of our end-product.
RELSIZE	With respect to your last year's sales volume, how large is your firm relative to this supplier?
SOLESOURCE	Including this supplier, from how many different suppliers does your firm buy this item(s)?
INTERNAL	Does your firm produce any of its requirements of this particular item(s) in-house? (excluding prototypes) YES, NO
NPOTOEM	What is the total number of potential OEM buyers for this type of item(s)?
NPOTVEND	What is the total number of potential vendors for this type of item(s)?
OPPORTUNISM $\chi^2(9) = 12.60$; CFI = 1.00 NFI = 0.96; Reliability = 0.91	1. This vendor has sometimes altered facts slightly in order to get what it wanted. This vendor feels it is OK to do anything within its means that will help further its own interests.
PROFIT[b]	From the perspective of your company, how profitable is your relationship with this vendor?

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

a: 7–point semantic differential scale

b: The anchors for this scale are 1 = very unprofitable and 7 = very profitable.

Table 4

CORRELATION MATRIX

Construct	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 BRAND	1.00													
2 DIFFCOMP	0.30	1.00												
3 OEMREP	0.14	0.02	1.00											
4 OEMHET	0.06	0.19	0.17	1.00										
5 VENDINV	0.32	0.41	0.21	0.22	1.00									
6 OEMINV	–0.10	0.35	–0.18	–0.03	0.29	1.00								
7 IMPORTANT	0.08	0.12	0.12	0.08	0.12	0.14	1.00							
8 RELSIZE	–0.16	0.05	0.27	0.26	0.14	0.04	0.10	1.00						
9 SOLESOURCE	0.13	0.21	0.00	–0.11	0.23	0.20	0.10	0.05	1.00					
10 INTERNAL	–0.14	–0.10	0.18	0.04	0.01	–0.04	0.00	0.18	0.05	1.00				
11 NPOTOEM	0.01	–0.06	–0.13	–0.18	–0.17	–0.07	–0.08	–0.22	0.10	–0.14	1.00			
12 NPOTVEND	–0.13	–0.09	–0.17	–0.13	–0.06	0.03	–0.12	–0.05	0.08	–0.04	0.25	1.00		
13 OPPORTUNISM	0.07	–0.12	–0.14	–0.08	–0.07	0.03	–0.07	–0.12	0.19	0.03	–0.11	–0.03	1.00	
14 PROFITABILITY	0.19	0.24	0.19	–0.09	0.32	0.20	0.07	0.14	0.19	–0.02	–0.07	–0.12	–0.28	1.00

Matrix represents pair-wise correlations. All correlations above 0.14 are significant at the 0.05 level.

the OEM's end-product, and differentiates the end product from competing end products. Note that it does not measure the differentiation between alternative components in the upstream supply market but rather the differentiation that is afforded to the OEM's end product.

OEM's Reputation (OEMREP): This 4 item scale measures the strength of the OEM's reputation amongst its own customers for the focal product. The extent to which customers value this OEM's end-product, are willing to pay a premium for it over competitor's products, and the extent to which the OEM enjoys better margins and competitive advantage vis-à-vis its competitors are all indicants of its reputation.

OEM Heterogeneity (OEMHET): The extent to which industry standards influence the design and inter-operability of end-products, and the extent to which competing OEMs' products differ from each other is the domain of this measure. This is a new scale that has been developed for this study.

Importance of Component (IMPORTANT): A single item measures the impact of this component on the overall performance of the end–product. Notice that it is not the performance of the vendor that is at issue; rather it is the significance and criticality of the component itself.

Relative size of the firms (RELSIZE): This construct measures the extent to which the OEM is larger than the vendor measured as the ratio of their sales volumes for the previous financial year. This item has been adopted from Heide and John (1990).

Single Source (SOLESOURCE): This item measures the use of a single source for the procurement of the focal component. A binary response format was used. The response is coded as "1" if the OEM procures the component from only the focal vendor and "0" otherwise.

In-House Production (INTERNAL): This item asks measures the OEM's in-house production of the focal component procured from the vendor in question (*excluding* prototypes and special models). Again, a binary response format was used which was coded as "1" if the OEM employed an in-house production facility and "0" otherwise.

Potential Number of OEM Buyers (NPOTOEM): This item measures the number of potential buyers for this vendor's component. Notice that potential buyers need not be in the same market as the focal OEM; however the existence of many potential alternate buyers provides opportunities for the component vendor outside the relationship.

Potential Number of Suppliers (NPOTVEND): This item measures number of potential vendors for this component. Again, the existence of many potential alternate vendors provides the OEM feasible options outside the relationship.

Length of Relationship (YEARS): This measure is the elapsed time of the history of purchases from this particular vendor. These purchases need not necessarily be for the focal component.

Norm of Flexibility (FLEXIBLE): This 6-item scale is adapted from Heide (1994) to reflect the degree to which both parties are expected to make adaptations to unforeseen circumstances.

Decision Control (CONTROL): This 4-item scale reflects the degree to which decisions on component engineering & design, manufacturing technology, quality control procedures, and choice of sub-suppliers were undertaken by the vendor.

4.4. Measure Validity

Measure validation follows the steps outlined in Anderson and Gerbing (1988) and Bagozzi and Heatherton (1994). First, we first calculated the item–to–total correlations for each multi-item set, dropping those items with estimates below 0.30. Then, we estimated congeneric measurement models for each set of items using maximum likelihood estimates in LISREL 8.50. Using the Werts et al (1978) formula, we calculated the reliability estimates for each of these scales. These are reported in Table 3. Overall, both the fit indices and the reliability estimates indicate a satisfactory level of internal consistency and unidimensionality.

Next, we assess discriminant validity per Campbell (1955) and estimated a confirmatory factor model using LISREL 8.50 for the 4 multi-item independent variables. Each item was set to load only on its trait, and the traits were allowed to correlate. We also estimated a series of nested models where the pair-wise correlation between traits were set equal to one and examining the difference in chi-square values for the constrained and unconstrained models. The multi-item vendor opportunism scale was excluded from the analysis since the hypothesized relationships with this dependent variable scale could incorrectly appear to violate discriminant validity. All the own-trait loadings as well as the fit indices for each CFA exceeded the benchmarks suggested in the literature. We also obtained significant fit differences between an unconstrained model and a series of constrained model where one inter-trait factor correlation is constrained to be 1.0. These χ^2 tests support the discriminant validity of the scales. Table 5 reports these estimates.

4.5. Nomological Validity

Recall that branded component contracts are an efficient governance response to suppliers' non-contractible investments because it moves ownership of the asset towards the supplier. Crucially, this transfer also moves the influence over decisions related to the asset to the supplier. To investigate this, we constructed a four-item scale, which measured the extent to which issues about component engineering & design, manufacturing technology, quality control procedures, and choice of sub-suppliers was decided by the supplier. We regress this measure of "vendor control" on the two-way interaction of vendor's specific investments and the component branding decision. As per governance theory, suppliers should have more influence over these decisions when their specific investments are supported by branded component contracts. This was indeed the case in our data.

4.6. Hypotheses Tests

Our hypotheses posit that the decision to brand a component is based on the firm's desire to choose that governance form which yields lower governance cost. Both descriptive and normative aspects are involved here. In order to separate these effects, and to account for the endogeneity of choice, we use the selection correction procedure as developed by Heckman (1979) and expanded

Table 5

ESTIMATES OF DISCRIMINANT VALIDITY

Item	FACTOR 1 OEMINV	FACTOR 2 VENDINV	FACTOR 3 DIFFCOMP	FACTOR 4 OEMREP	FACTOR 5 OEMHET
OEMINV1	0.85[a]				
OEMINV2	0.71**				
OEMINV3	0.77**				
OEMINV4	0.81**				
OEMINV5	0.74**				
OEMINV6	0.82**				
VENDINV1		0.87[a]			
VENDINV2		0.77**			
VENDINV3		0.73**			
VENDINV4		0.80**			
VENDINV5		0.75**			
VENDINV6		0.83**			
DIFFCOMP1			0.75[a]		
DIFFCOMP2			0.84**		
DIFFCOMP3			0.76**		
DIFFCOMP4			0.76**		
OEMREP1				0.76[a]	
OEMREP2				0.75**	
OEMREP3				0.73**	
OEMREP4				0.71**	
OEMHET1					0.72[a]
OEMHET2					0.56**

a: fixed parameter; **: $p < 0.05$;

on by Maddala (1983) and Hamilton and Nickerson (2003). There are three steps in the procedure.

Step 1. Descriptive Effects (Contract Choice): Let G_i^* be the unobserved cost (or profit) outcomes associated with the ith contract choice (*i= 0,1).* Let the vector of independent variables be *X*. Then, the unobserved cost outcome from the branded contract option is $G_1^* = \alpha X + e_1$ while the corresponding outcome from the unbranded contract option is $G_0^* = \gamma X + e_0$.

As our normative theories presume that the firm will elect to use the contract that yields the best outcome, we can write the probability of observing an OEM choosing a branded contract as $\Pr\{G_1^* < G_0^*\} = \Pr\{\alpha X + e_1 < \gamma X + e_0\}$. Assuming that the error terms are normally distributed, we can derive the familiar probit model for the observed choices, viz. C_i = 0, 1 corresponding to the unbranded and branded contracts respectively. Specifically, we have:

$$C_i^* = \beta X + \varepsilon_i \tag{1}$$

$C_i = 1$ if $C_i^* > 0$, 0 otherwise.

Notice that β coefficients are actually the differences between α and γ coefficients, and are the relevant estimates of the descriptive hypotheses developed above. Table 6 provides the maximum likelihood estimates of this model.

Turning to the differentiation hypothesis (H1), we see that branded contracts are more likely to be branded when the differentiation afforded by the supplier's component is larger ($\beta = 0.27$, $p < 0.01$). This validates the descriptive implication of the consumer behavior theory that branding a unique component amplifies end customer quality perceptions.

Turning to the first of the two signaling theory hypotheses involving risk mitigation (H2), we find an opposite result. OEMs with weaker reputations were supposed to gain more from allying with a stronger brand, but we find that OEMs with a *stronger* presence in their own downstream market are *more* likely to use a branded component contract ($\beta = 0.17$, $p < 0.10$). The second risk

Table 6

PROBIT MODEL OF THE COMPONENT BRANDING DECISION

Variable List	Estimates (t–value)
Constant	–3.354*** (–2.798)
Importance of the Component to End–product (IMPORTANT)	–0.063 (–0.423)
Differentiation Capability of the End–product (DIFFCOMP)	0.271*** (2.744)
Specific Investments made by Vendor (VENDINV)	0.448*** (3.825)
Specific Investments made by OEM (OEMINV)	–0.134 (–1.125)
OEM's Customer–side Equity (OEMREP)	0.165* (1.515)
Heterogeneity in End–product Market (OEMHET)	–0.089 (–1.011)
Relative Size of the OEM vis–à–vis the Vendor (RELSIZE)	–0.315*** (–2.152)
Is Component Sole–sourced? (SOLESOURCE)	0.267** (1.714)
Does OEM also produce the unit internally? (INTERNAL)	–0.342** (–1.898)
Potential Number of OEM buyers for the component (NPOTOEM)	–0.002 (–0.665)
Potential Number of Vendors for a similar component (NPOTVEND)	–0.022** (–1.934)
Wald χ^2(df)	46.262 (11)***
Pseudo R^2	0.414
n	191

Note: Positive values indicate greater probability of branding the component.
*: $p < 0.1$; **: $p < 0.05$; ***: $p < 0.01$: one–tailed tests.

mitigation hypothesis (H3) also lacks support. Product heterogeneity in the OEM's downstream market had no effect on the branded component contract ($\beta = -0.09$, $p > 0.10$). In sum, we do not find support for the signaling theory argument that components are branded to reduce customer side risks in the OEM's downstream markets.

Turning to the first governance hypothesis (H4), we find that the OEM is more likely to choose a branded component contract with a supplier who is making greater specific investments in that OEM (β=0.45; p <0.01). Consistent with the second governance hypothesis (H5), we find that OEMs who make greater specific investments in their supplier are not influenced in their choice of branded component contracts ($\beta = -0.13$, $p>0.10$). These two results provide good support for the idea that a branded component contract reflects the OEM's desire to allocate property rights in an efficient fashion.

Turning to the various control variables, we find a number of significant results. To conserve space, we do not remark on their implications for the larger question at hand. We find that the component's importance to the functionality of the OEM's product had no significant effect ($\beta = -0.06$, $p > 0.10$). OEMs are less likely to use a branded component contract with a supplier who is much smaller than themselves ($\beta = -0.32$, $p < 0.01$). OEMs that produce some fraction of the component using in-house facilities are less likely to use a branded component contract ($\beta = -0.24$, $p < 0.05$) but they are more likely to use a branded component contract with a sole source supplier ($\beta = 0.27$, $p < 0.05$). Larger number of potential suppliers reduce the likelihood of choosing the branding option ($\beta = -0.02$, $p < 0.05$), but potential number of OEM buyers for a given supplier's component has no effect. Overall, the model has good fit with the data (Pseudo $R^2 = 0.41$) and is able to explain the OEM's decision in a satisfactory fashion.

Table 7 illustrates the managerial significance of our core effects. We calculated the probabilities that the OEM will brand components at different levels of the two conceptually important variables, DIFFCOMP and VENDINV[7]. For each of these variables, let "low" and "high" refer to values two standard deviations below and above their respective means. All other

[7] Specifically, the probability that a component *k* will be branded is the cumulative normal distribution given by $\tilde{F}(3.354 + 0.271*DIFFCOMP_k + 0.448*VENDINV_k + 0.165*OEMREP - 0.315*RELSIZE_k + 0.217*SOLESOURCE_k - 0.242*INTERNAL_k - 0.022*NPOTVEND_k)$.

variables were set at their sample means. As VENDINV increases from low to high, the probability of branded contracts increases from 0.04 to 0.22 for low level of DIFFCOMP and from 0.14 to 0.90 for high levels of DIFFCOMP. Thus, it is virtually certain that a branded component contract will be chosen when an OEM purchases a component that affords a high level of differentiation from a supplier who is undertaking a high level of OEM-specific investment. In contrast, it is virtually certain that the unbranded contract is used in the opposite circumstance.

Table 7

ESTIMATED PROBABILITIES OF BRANDING A COMPONENT

	Low VENDINV	High VENDINV
Low DIFFCOMP	0.04	0.22
High DIFFCOMP	0.14	0.90

In sum, we find support for our novel governance hypotheses about OEM component branding decisions, while controlling for other expected influences like the differentiation capability of the component as well as other structural aspects of the interaction. Notably, we find no support for risk mitigation.

Step 2. Normative Effects: Recall that we posit our OEMs would choose contracts which yield the lowest cost (or highest value). Vendor opportunism (OPPORTUNISM) captures the costs of contract execution, while OEM profitability (PROFIT) captures the OEM's evaluation of its inter-firm tie with this supplier. Let P_i be the performance outcome associated with each contract mode *i*. As parties self-select the contract mode to optimize performance, for each contract regime, we can write P_i as a function of the independent variables, X_i as follows:

$$P_{1i} = X_i \beta_1 - \sigma_1 \frac{\phi(X_i \beta)}{\Phi(X_i \beta)} + \eta_{1i} \qquad (2)$$

$$P_{0i} = X_i\,\beta_0 + \sigma_0 \frac{\phi(X_i\,\beta)}{1-\Phi(X_i\,\beta)} + \eta_{0i} \qquad (3)$$

where, P_0 and P_1 correspond to the performance measure in the unbranded and branded contract regimes respectively. Notice that the coefficients are different for each equation. The last variable in each equation is the inverse Mills ratio which corrects for endogeneity in choice (Maddala, 1983). These terms ($\frac{\phi(X_i\,\beta)}{\Phi(X_i\,\beta)}$, $\frac{\phi(X_i\,\beta)}{1-\Phi(X_i\,\beta)}$) are calculated from the probit equation in Step 1. $\phi(\cdot)$ is the probability density function and $\Phi(\cdot)$ is the cumulative density function of the standard normal distribution; β is the coefficient vector estimated from the probit model; σ_1 and σ_0 are the coefficients of the two variables; η_{1i} and η_{0i} are the error terms with E(η_{1i}) = E(η_{0i}) = 0.

Table 8 shows the estimates of the four performance models, two each for the two measures of performance. The coefficients of the Mills Ratios variables (i.e., σ_1, σ_2) capture the normative effects (Maddala, 1983). Specifically, from equations (2) and (3), the expected performance for firms using a branded versus unbranded contract respectively can be written as:

$$E\left[P_{1i}/C_i = 1\right] = X_i\,\hat{\beta}_1 - \hat{\sigma}_1 \frac{\phi(X_i\,\beta)}{\Phi(X_i\,\beta)} \qquad (4)$$

$$E\left[P_{0i}/C_i = 0\right] = X_i\,\hat{\beta}_0 + \hat{\sigma}_0 \frac{\phi(X_i\,\beta)}{\left[1-\Phi(X_i\,\beta)\right]} \qquad (5)$$

First consider OPPORTUNISM as the performance indicator (lower is better for this measure). Any firm that is *randomly* assigned to a branded contract (*C_1*) would face vendor opportunism level $X_i\beta_1$. However, any firm that *self-selects* itself into a branded contract would face vendor opportunism levels predicted by equation (4). Table 8 shows that our estimate of the coefficient of the inverse Mills Ratio for the branded contract mode is positive (i.e., $\hat{\sigma}_1$ > 0).

Table 8

SECOND STAGE ESTIMATION OF RELATIONAL PERFORMANCE EQUATIONS

Variable List	**OPPORTUNISM**		**PROFITABILITY**	
	BRAND (n = 70)	**NO BRAND (n = 121)**	**BRAND (n = 70)**	**NO BRAND (n = 121)**
Constant	4.375*** (4.125)	2.567*** (3.231)	1.354*** (3.127)	0.967** (2.445)
IMPORTANT	–0.035 (–0.756)	–0.022 (–0.617)	0.007 (0.217)	0.054 (1.065)
DIFFCOMP	0.107 (1.014)	0.167** (1.986)	0.172*** (3.035)	0.142** (2.427)
VENDINV	–0.189** (–2.134)	–0.022 (–0.644)	0.168** (2.125)	0.048 (1.223)
OEMINV	0.116* (1.835)	0.119* (1.944)	0.056 (1.037)	0.129* (1.903)
OEMREP	0.078 (1.277)	0.039 (0.967)	0.122* (1.875)	0.039 (0.861)
OEMHET	0.011 (0.231)	0.090 (1.523)	–0.037 (–0.562)	0.081 (1.321)
RELSIZE	0.131* (1.840)	0.176** (2.441)	0.023 (0.246)	–0.035 (–0.562)
SOLESOURCE	–0.162* (–1.897)	0.042 (0.567)	0.089 (1.587)	0.032 (0.468)
INTERNAL	0.063 (0.932)	0.056 (0.717)	–0.106* (–1.724)	–0.063 (–1.162)
NPOTOEM	0.110* (1.697)	0.104* (1.654)	–0.099* (–1.807)	0.004 (0.245)
NPOTVEND	–0.103* (–1.734)	–0.064 (–1.112)	0.074 (1.306)	0.039 (0.781)
YEARS	0.001 (0.087)	0.005 (0.524)	–0.026 (–0.359)	–0.035 (–0.567)
FLEXIBLE	0.123 (1.367)	0.090 (1.259)	0.153* (1.927)	0.07 (1.094)
Mills Ratio for BRAND	0.165** (2.127)		–0.233*** (–2.034)	
Mills Ratio for NOT BRAND		–0.124* (–1.788)		0.022 (0.531)
R^2	0.173	0.205	0.168	0.154
F–statistic	7.441 (14, 55)	6.337 (14, 106)	8.125 (14, 55)	4.489 (14, 106)

As such, $X_i\,\hat{\beta}_1 - \hat{\sigma}_1 \dfrac{\phi(X_i\,\beta)}{\Phi(X_i\,\beta)} < X_i\,\hat{\beta}_1$, indicating that OEMs self-selecting themselves into the branded contract regime achieved a better outcome (faced lower vendor opportunism) than an identical firm that was randomly assigned into that strategy. This is called *positive selection into strategy C_1* (Hamilton and Nickerson, 2003). Similarly, for the unbranded contract mode, Table 8 shows a negative estimate ($\hat{\sigma}_0 < 0$). As such, $X_i\,\hat{\beta}_0 + \hat{\sigma}_0 \dfrac{\phi(X_i\,\beta)}{\left[1-\Phi(X_i\,\beta)\right]} < X_i\,\hat{\beta}_0$, indicating that OEMs self-selecting themselves into the unbranded contract regime achieved a better outcome (faced lower vendor opportunism) than an identical firm that was randomly assigned into that strategy. Thus, we find a *positive selection into strategy C_0*.

Undertaking a similar analysis for the PROFIT measure (where higher is better), the branded contract mode coefficient in Table 8 is negative ($\hat{\sigma}_1 < 0$) leading to $E\left[P_{1i}/C_i = 1\right] > X_i\,\beta_1$. As before, OEMs choosing the branded contract achieve a better outcome by virtue of their choice; viz. a positive selection into strategy C_1 holds here as well. However, in the unbranded contract mode $\hat{\sigma}_0$ is insignificant. Thus, OEMs choosing the unbranded contract mode achieve no gain by virtue of their choice. There is no positive strategy into C_0 for this dependent variable (PROFIT).

In combination, the positive selections into the two strategies represent a pattern of behavior which can be termed as the pursuit of *comparative advantage*. According to our theory, certain OEMs ought to select the unbranded contract because they stand to gain from doing so, while others ought to select the branded contract because they stand to gain from doing so. In other words, each group has a comparative advantage in electing to employ its appropriate strategy. Indeed, our OEMs' choices mirror this pattern. We believe that this is a clear evidence of the ability of these normative theories to order firm decisions in the real world.

Step 3. Costs of Mistakes: Thus far, we have assessed the degree to which firms follow the normative guidelines of the theory. We turn now to assessing the costs of making mistakes; i.e., failing to choose the normatively correct decision (Masten et al 1991; Masten, 1993). We do this in two ways. First, we calculate the performance gains (or losses) that would have occurred had an *observed* decision of a particular firm been the opposite; viz. that a firm that has elected to use a branded contract was to change to the other contract, and vice versa. This "counterfactual assessment" must account for the fact that our observed choices are not random assignments. Second, we calculate the performance differences that exist when a particular firm, prior to making its decision, compares the two contracting alternatives. This "comparative assessment" differs from the previous case in that it does not require us to account for the observed choices. We turn to these two analyses below.

Counterfactual Assessment: Consider an OEM who has elected to employ a branded contract (C_1). Its performance under the chosen contract can be contrasted with its expected performance, had it chosen the alternative (counterfactual) contract. The former value is obtained from equation (4). To calculate the latter value, we multiply its vector of attributes, X_i, with the corresponding coefficients from the unbranded contract equation. This is given as:

$$E\left[P_{0i}/P_{1i} > P_{0i}\right] = X_i\,\hat{\beta}_0 - \hat{\sigma}_0\,\frac{\phi(X_i\,\beta)}{\Phi(X_i\,\beta)} \tag{6}$$

The other counterfactual can be calculated similarly. Its performance under its selected unbranded contract (C_0) is given by equation (5) while its performance in the alternative (branded) contract is given by:

$$E\left[P_{1i}/P_{1i} < P_{0i}\right] = X_i\,\hat{\beta}_1 + \hat{\sigma}_1\,\frac{\phi(X_i\,\beta)}{\left[1 - \Phi(X_i\,\beta)\right]} \tag{7}$$

Table 9 provides the mean counterfactual estimates for each of our sub-samples for the two measures of performance. The diagonal elements correspond to the predicted performance for the observed choices and the off-diagonals correspond to the predicted values under the alternative (non-chosen) contract. For OPPORTUNISM, we find that if the firms who chose a branded component contract were switched to an unbranded contract their costs of opportunism rise significantly from 1.68 to 3.97 ($p < 0.01$). Similarly, if the firms choosing the unbranded contract were to be switched to the branded contract, opportunism costs rise significantly from 3.22 to 4.61 ($p < 0.05$). For PROFIT, we find that a shift from a chosen branded contract to an unbranded one significantly lowers outcome evaluations from 6.04 to 2.89 ($p < 0.01$). On the other hand, shifting from a chosen unbranded contract to a branded contract does not change outcomes significantly (4.37 to 4.64, $p > 0.10$).

Table 9

COUNTERFACTUAL ESTIMATES

	OPPORTUNISM		**PROFIT**	
	Branded Contract n = 70	*Unbranded Contract* n = 121	*Branded Contract* n = 70	*Unbranded Contract* n = 121
Performance if component were **branded**	1.68	4.61	6.04	4.64
Performance if component were **unbranded**	3.97	3.22	2.89	4.37

Taken together, our results make a very strong case that *contract choices about component branding need to be aligned in a discriminating fashion with the transactional attributes faced by these firms, and mistakes in making this alignment decision adversely affects performance*.

Comparative Assessment: We employ the technique elaborated by Meyer and Nickerson (2002) to calculate the performance of a *randomly* chosen relationship when organized in different ways for each of our two key independent variables of interest (DIFFCOMP and VENDINV). The gain (loss) in performance between the governance alternatives is the ex ante cost of correctly (mistakenly) organizing the transaction. We proceed as follows. First, except for the focal independent variable (e.g., DIFFCOMP), we set all other independent variables to their sample mean values. Next, for each performance variable we use the estimated equations (without the inverse Mills Ratio terms)[8] in Table 8 to calculate the estimated outcome under four cases, viz. branded contracts and unbranded contracts, and low (2 standard deviations below the mean) and high (2 standard deviations above the mean) levels of DIFFCOMP. Table 10A and 10B show the results. Note that the data points in each of the figures are *calculated* values, and *not actual*, observed values.

Table 10

COMPARATIVE ESTIMATES

A: EFFECT OF DIFFCOMP ON PERFORMANCE

	OPPORTUNISM		**PROFIT**	
	Branded Contract	*Unbranded Contract*	*Branded Contract*	*Unbranded Contract*
Low DIFFCOMP	3.28	3.36	5.79	5.75
High DIFFCOMP	3.84	4.24	6.69	6.49

B: EFFECT OF VENDINV ON PERFORMANCE

	OPPORTUNISM		**PROFIT**	
	Branded Contract	*Unbranded Contract*	*Branded Contract*	*Unbranded Contract*
Low VENDINV	2.84	3.10	5.81	5.62
High VENDINV	2.03	3.00	6.53	5.83

The average value of OPPORTUNISM and PROFIT in our sample was 3.13 and 5.55 respectively. Our data reveals an interesting pattern. When DIFFCOMP is low, were the parties to choose a branded contract (when theory recommends against it), OPPORTUNISM is lowered by 2.6%

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[8] As we are concerned about a randomly selected (hypothetical) project, and not an observed project, there is no need to include the inverse Mills Ratio terms.

and PROFIT increase by 1%. On the other hand, when DIFFCOMP is high, were the parties to choose an unbranded contract (when theory recommends against it), OPPORTUNISM is higher by 12.8% and PROFIT is lower by 3.6%. Along similar lines, when VENDINV is low, were the parties to choose a branded contract (when theory recommends an unbranded contract), OPPORTUNISM is lowered by 8.3% and PROFIT increase by 3.4%. In contrast, when VENDINV is high, were parties to choose an unbranded contract (when theory recommends a branded contract), OPPORTUNISM is higher by 31% and PROFIT is lower by 12.6%.

Taken together, these findings can be summarized as follows. Under conditions of hazardous ties (high levels of DIFFCOMP and VENDINV), parties choosing in a *discriminating* fashion, as per theory, do better. On the other hand, under conditions of non-hazardous ties (low level of DIFFCOMP and VENDINV), parties choosing in a discriminating fashion, as per theory, are slightly worse off. In other words, the *dominant* choice is branded contracts in these conditions. Finally, the costs of misaligned governance are much higher for VENDINV than DIFFCOMP.

5. DISCUSSION

Despite its popularity and strategic significance, component branding is an under-researched topic and there is no systematic empirical evidence about it or its normative consequences. We develop and test a model that highlights three roles attributed to such arrangements: branded component as *differentiators*, branded components as *risk mitigators*, and branded components as *efficient governance devices*. Our results provide many interesting insights. We begin by discussing the implications of the descriptive hypotheses and follow up with the discussion of the normative results.

5.1. Conformance of Firm Behavior with Normative Theory

Consistent with experimental studies in consumer behavior, we find that components with a greater capacity to differentiate the OEM’s product are more likely to be used as branded components. Despite the large number of laboratory studies centering on this effect, our study offers the first empirical demonstration that firms indeed act on this principle.

However, we find no support to the presumed role of branded components as risk mitigating devices. Indeed, contrary to expectation, we find that OEMs with a weaker reputation were *less* likely to use this strategy. In order to interpret this result, we need to distinguish between equilibrium and out of equilibrium outcomes from signaling theory. Recall that Rao et al (1999) developed the risk mitigation effect from signaling theory to predict that if a modestly reputable focal brand is allied with a credible co-brand, the focal brand's quality perceptions are enhanced. To demonstrate support, they assign brands to different conditions in a lab study, which in effect is testing an out of equilibrium prediction. Consider, however, that the behavior of firms in our data rests on equilibrium predictions. As it turns out, the equilibrium predictions for risk mitigation via co-branding are not obvious. In particular, how does a reputable component brand gain from willingly co-branding with a weaker OEM, when the benefits are primarily derived by the OEM? In the absence of a formal model to ascertain the equilibrium, we conclude that our result is inconclusive with respect to judging conformance to the theory.

Finally, the role of branded component contracts as efficient governance devices finds support in our data. OEMs are more likely to use these contracts when the supplier makes more specific investments. This adds to the small, but growing literature on brands as governance devices (Azevedo, 2002; Gonzalez-Diaz, 2002) and commensurate with recent developments (e.g., Ghosh and John, 1999; Nickerson et al 2001), illustrates how efficiency based governance frameworks can be used to address strategic marketing choices.

Overall, we find that the conformance of the behavior of firms to the theory follows a pattern of *comparative advantage*. In accordance with the theory, firms seemed to make their strategic choices with respect to branding a component with a focus on enhancing their gains.

However, as we see below, our normative analysis suggests that firms could gain to some degree by deviating from theory in particularistic scenarios.

5.2. Normative Consequences

The normative consequences of our conceptual model were disclosed through the selection-corrected counterfactual and comparative assessments. In these analyses we not only calculated the performance of making the right choices but also used "what if" scenarios to estimate the performance of making the wrong choice – in effect we explored the "costs of making mistakes".

Counterfactual Assessment: This assessment seeks to address the question: What would be the consequences for an OEM with a *given* vector of attributes of switching from the existing contract choice to its alternative? Our results suggest that given the conditions they are in (a) firms indeed perform better by strategically choosing contractual arrangement (branded or unbranded component) in a discriminating fashion, and (b) had the firms mistakenly chosen the other alternative, they would suffer adverse consequences. However there is an interesting asymmetry in the results. We find that if an OEM "mistakenly" switches to an unbranded component contract, it suffers large losses, both in terms of supplier opportunism and own profitability. On the other hand, if the OEM "mistakenly" switches to a branded component contract, it only suffers a loss on the metric of supplier opportunism. Indeed, such an OEM actually has a small gain in profitability from switching to a branded contract. One consequence of this finding is that, if OEMs can control for potential supplier opportunism in other ways, *they are better off choosing a branded component strategy regardless of their situation*.

Comparative Assessment: This assessment seeks to address a similar, but distinct question: What would be the consequences of the branded versus unbranded contract for a randomly chosen OEM? Our results again show an interesting pattern. Recall that when the theory suggests no gain from branding the component (e.g., a non-hazardous exchange for components with low differentiation capabilities), we find that the wrong choice (branded contracts) provides better benefits on both performance dimensions (even though these gains are small). In contrast, when the theory suggests a gain from branding (e.g., a hazardous exchange for components with high differentiation capability), we find that the branded contract provides much better benefits on both performance dimensions than the unbranded contract (the wrong choice). Thus, *the firm is always better off choosing a branded contract regardless of its situation*. Of course, this overstates the case as we are assuming that there are no other costs of writing and implementing the decision.

In sum, unless there are compelling circumstances that suggest otherwise, it is useful to explore the use of a branded component contract *regardless of the exchange circumstances, or the inherited contract form*. Likewise, switching away from an existing branded contract requires substantial evidence, as the penalties for mistakes are much larger here.

5.3. Limitations

Obviously, our results are context dependent; hence extrapolations to behavior in other contexts must be done cautiously. One boundary condition is that our sample is drawn from industries that engage their suppliers over relatively long spells. It is not clear that the cooperation needed to implement an ingredient branding approach is practical with shorter ties. Another boundary condition is that we examined components that are necessary for the functionality of the product, unlike myriad instances of co-branding without a tangible ingredient or component between firms generally operating in different markets. The exchange hazards elaborated in our work are likely to be much less relevant for the case of co-branded products that are jointly marketed solely to capitalize on brand images. Amongst the principal limitations of the normative effects are the performance measures. Not only are they subjective estimates, but that they are the OEM's judgments only. Joint outcomes of costs or benefits might well reveal different patterns. Hopefully, these limitations will be addressed in future work.

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