WHEN SHOULD ORIGINAL EQUIPMENT MANUFACTURERS USE BRANDED COMPONENT CONTRACTS WITH SUPPLIERS?

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ABSTRACT

We currently possess a limited understanding of an original equipment manufacturer's (OEM) decision to employ a branded component contract with a supplier of a component over the alternative white box contract. In this paper, we use the lens of transaction cost economics to analyze contracts between OEMs and their component vendors, including 70 branded component and 121 white box contracts. We show that OEMs choose these contracts in a discriminating fashion. Specifically, they are more likely to choose a branded component contract when a) its component supplier has made significant component customization investments and b) the supplier's brand name adds significant differentiation to the end product. The normative aspects of the theory are also supported in these data. First, OEMs conform to the principle of comparative advantage in choosing these supplier contracts. Firms that stand to gain more from a particular contract form are more likely to choose that form, and vice-versa. Second, we show that there are significant asymmetric costs of choosing the "wrong" contract form. OEMs that choose white box contracts when the theory argues for a branded component contract face significantly more adverse outcomes than do OEMs who choose branded component contracts when the theory predicts white box contracts. Implications for theory and practice are developed.

INTRODUCTION

Products from original equipment manufacturers (OEMs) are usually comprised of a substantial number of technologically separable components, which are often procured from independent suppliers. An increasingly popular contract form used by OEMs to engage suppliers is the so-called *branded component contract*.[1] The distinguishing feature of these contracts is the presence of the OEM's brand and the supplier's brand on the end product and/or on marketing materials.[2] Early prominent examples of such contracts include G. D. Searle's "Nutrasweet" brand on diet soda cans and Intel's "Intel Inside" logo on personal computers. The use of these contracts has increased greatly in recent years.

In spite of the popularity of these branded contracts, there are several gaps in our understanding. We lack data about the use of these contracts in the field because the published work consists of laboratory investigations that have unpacked gains derived from combining a host brand and a constituent brand that possesses a significant differentiation capability [3]. However, there are certain stylized facts that are not readily interpretable from this differentiation rationale for these contracts. Consider, for instance, the branded component contract examples described in Table 1 where the same brand name is affixed to different versions of a component incorporated into different OEMs' end products. For instance, Leece Neville branded alternators with significant design and performance differences are sold to OEMs of different end products including heavy-duty trucks, power-generation sets, construction, mining, and materials handling equipment.[4] The differences between the versions would appear to undercut the *sine qua non* of employing the same brand name; viz., signaling consistent quality and performance. Nevertheless, we see in Table 1 that such components are nevertheless procured under branded component contracts.

Similarly, the differentiation rationale does not readily explain other examples in Table 1 where the OEM's brand is already much more prominent than their supplier counterparts. For instance, Nissan has much greater visibility than does Zenith among industrial engine buyers and Accenture is a better known brand than Fasturn amongst clients in the information technology industry. As such, it is not clear how differentiation gains can accrue to an OEM that chooses to combine a relatively unknown supplier brand with its own, more reputed brand. Might this not expose the better known brand to the risk of dilution?

Goals and Contributions

Our paper seeks to address two key issues arising from our under-developed understanding of branded component contracts. First, what factors prompt an OEM in the real world to choose a branded component contract over a white box[5] contract? Second, what consequences flow from making an "incorrect" contract choice?

We work out of the transaction cost analysis (TCA) tradition to develop our model of an OEM's choice of contract form with a component supplier. We specify the conditions under which a branded contract form possesses a comparative governance advantage over the white box form. Using primary data gathered from 191 OEM-supplier ties, we conduct empirical tests of our predictions, and find that suppliers' investments and their differentiation capabilities evoke the use of branded contracts. OEMs follow a comparative advantage rule in making their decisions. Specifically, OEMs that stand to gain more from a branded contract (because of vendor customization investments and differentiation capabilities) are more likely to choose such contracts, and vice versa.

We also examine the normative outcomes of these decisions, and draw the following conclusions. There are significant governance costs from providing insufficient safeguards for vendor customization investments as well as from foregoing differentiation gains, but these costs are surprisingly asymmetric. OEMs that do not choose branded contracts when the theory argues for this contract form face significantly more adverse outcomes than do OEMs that choose branded contracts when the theory argues against this contract form. Finally, the governance costs that arise from providing insufficient safeguards for vendor customization investments are larger than those that arise from foregoing differentiation gains.

The remainder of the paper is organized as follows. We present our conceptual framework immediately below. Following that, we present our empirical study. We conclude with a discussion of our findings and its implications for research and practice.

THEORY

Consider the contracts written between an OEM and an independent supplier for a component (or line of related components) that is to be physically incorporated into the OEM's end-product and which is integral to its proper functioning. Significant research, design, and engineering activities, which vary in their level of specificity[6] to the exchange partner, are undertaken by both parties in these supply relationships. We exclude the procurement of commodity items (e.g., steel ingots, copper wire, etc.) or intangible items (e.g., a trademarked character, patents, etc.) because they lack these engineering investments. We also exclude supply arrangements where the OEM is backward integrated into component production as well as joint ventures because the two brand names would be controlled or owned by a single entity. Finally, we focus on ties where the OEM initiates the relationship. Within this class of relationships, we can distinguish white box contracts from branded component contracts as follows.

A white box contract is an arms-length arrangement that carries with it no obligation to utilize any brand belonging to the first party in conjunction with the second party's brand. Once the OEM has procured the component, the vendor's identity effectively disappears from the end-user's view. All those ties where the supplier does not employ a brand name, or else chooses not to communicate its brand directly (or indirectly) to end customers obviously fall within this category. It also includes ties where the supplier brand may be physically affixed to the component itself, but it is not visible to the user until the end product is disassembled. Finally, white box contracts include those ties where the supplier actively communicates its brand to end users, but without *any* contractual agreement or coordination with the OEM. In effect, the product design, development and marketing decisions of the two parties are undertaken unilaterally, and little time and effort is spent on coordinating their activities.

In contrast, branded component contracts obligate each party to employ its own brand in conjunction with the other party's brand. Although legal ownership of the constituent brands remains with the original owners, the co-mingling of the assets requires joint decision-making with close coordination of activities like developing the component and its interface with the end product, crafting detailed rules about the size and locations of logo placements, developing media plans and sharing financial obligations. Such coordination engenders longer-term planning horizons and higher expectations of bilateral cooperation, flexibility and continuity compared to that in white box contracts. In the execution phase, each party expends considerable effort to monitor the counter party's activities. At the same time, each party, by virtue of owning its brand, retains effective veto power over these joint decisions.

Taken together, these features mirror the "joint action" ties described by Heide and John (1990) whose defining characteristics are that the two parties expend resources *ex ante* to craft complex arrangements, and then expend resources *ex post* to enforce agreements, coordinate activities, and adapt to unforeseen situations. Clearly, the governance costs of such contracts are much higher than those of simpler, arms-length white box contracts, which lead us naturally to ask the following question. When would parties fashion this costlier governance form? Transaction cost analysis holds that contracts are chosen to mitigate trading hazards.

Mitigating Hazards

As remarked earlier, we are interested in those ties where independent suppliers undertake design and engineering activities for their component that will improve the functionality and end-user appeal of the client's end product. These responsibilities require the vendor to invest significant resources that are often specialized to the client at hand, including the development of specialized engineering technologies, manufacturing processes and routines, specialized tools and equipment, and training employees. These investments generate value, but their low salvage value across alternative clients make them hazardous to the investing party (the vendor) because the counter-party (the OEM) could opportunistically renegotiate terms during the execution stage. Uncertainties about technology requirements and changes in economic circumstances amplify these renegotiation opportunities. Anticipating this problem, farsighted suppliers will seek protective safeguards before investing in specialized assets and farsighted OEMs will offer safeguards. Absent sufficient safeguards, investment levels would drop and adaptation is more difficult. The classic safeguards for this problem considered in TCA are a) more complete, complex contracts, and b) relational contracts.

<u>Complete contracts</u>: Complete contracts foresee contingencies and fold required safeguards into the formal contract itself. As a practical matter, contracts are invariably incomplete in these engineering-intensive settings given the coarseness of plans typically embodied in requests-for-proposals. For instance, automotive OEMs strive to reduce their product development cycles by engaging vendors very early in the product development process. Similarly, industrial equipment manufacturers frequently ask their vendors, during the contract execution phase, to incorporate technological advances into their components. The consequence of early involvement and complex engineering revisions is that initial designs envisaged at the contract initiation stage are often very different from the implemented designs. Although an increase in the completeness of the initial

design diminishes the threat of opportunistic renegotiation, they are costlier to craft and also reduce the flexibility needed to make changes. This trade-off leads to procurement contracts being typically incomplete in significant respects (e.g., Crocker and Reynolds 1993).

Relational contracts: Relational contracts refer to agreements where cooperative behavior is sustained by the force of social norms and bilateral punishment. These norms enable contracting parties to write relatively incomplete contracts without fear of opportunistic renegotiation. Relational contracts are particularly valued for their ability to promote adaptation. Anderson and Weitz (1992) show that one way to foster relationalism in supplier ties is to exchange hostages in the form of symmetric specific investments. Here, both parties would face adverse consequences from relationship termination, thus symmetric investments create self-enforcing relational agreements (e.g., Telser 1980).

Symmetric investments are, however, difficult to enact in our setting because design and manufacturing tasks cannot be simply shifted from one party to another without impacting the quality of outcomes. For instance, product design and development in technology-intensive settings is not only an inherently creative task but it also involves technical capabilities and expertise across diverse engineering disciplines (Carson 2007). In many cases, the vendor possesses superior expertise in designing the component, and is thus the logical party to make the investment. Forcing symmetric investments under such circumstances would sacrifice productivity. In sum, the technological differences between the parties in our setting preclude a relational contracting safeguard for vendors' specialized investments.

Given the infeasibility of complex, complete contracts and the difficulties of enacting relational contracting, consider the utility of branded component contracts. OEMs can credibly commit to securing their vendor's specialized investments by co-mingling their brand assets, which injects ownership rights into the relationship. To fix our argument, recall that decisions about the two brands were made by their respective owners independently under a white box contract. In a branded contract, the co-mingling of the individual brands necessitates creates mutual dependence which safeguards the supplier's investments as follows. The visible on-going association between the two brands amounts to a hostage exchange that imposes a potential loss of reputational capital on both parties in the event of a premature termination. This makes the OEM less likely to renegotiate opportunistically in the contract execution stage. The vendor's ownership rights accompanying the use of its brand also boosts its bargaining position at the execution stage, which strengthens their anticipated returns from their exposed investments (Gonzalez-Diaz, Barcala, and Arrunada, 2002). Farsighted vendors will anticipate these safeguarding properties of a branded contract, and thus be willing to make the required levels of investments. The co-mingling of brand assets within branded contracts also improves the speed and quality of adaptations. Note that decision rights over one's assets are the very essence of ownership. As such, less time has to be spent on convincing the other part over redeploying an asset.

The upshot of these arguments is that the safeguarding utility of a branded contract increases with the levels of hazardous investments by a vendor. As such, we expect the likelihood of using a branded contract to be higher in these circumstances.

H1: *The greater the specific investments of the supplier, the higher the likelihood of a branded component contract with that supplier*.

Enabling Differentiation Gains

Earlier, we alluded to the extant work that emphasized the differentiation gains that were enabled by co-mingling a host brand and a component brand. The underlying logic is that each brand conveys product information and credibility, which influences product evaluation and choice, and thus constitutes a valuable intangible asset to its owner (Aaker 2004). Under particular circumstances, co-mingling two brands permits each brand to leverage the reputational capital of the other. For instance, Simonin and Ruth (1998) found that subjects reported more favorable evaluations of an OEM end product when it was co-branded with a component that possessed a) a strong brand image itself, and, b) a good fit with the OEM product category, and, c) a good fit[7] with the OEM brand itself.. Similarly, Desai and Keller (2002) found that subjects reported more favorable perceptions of the host brand when it was co-mingled with a supplier brand that enabled unique points of differentiation to be added. Likewise, Park, Jun, and Shocker (1996) showed that the quality of the constituent brands have a positive influence on the co-branded product when the two brands fit each other.

Overall, these studies suggest that co-mingling two brands which reinforce each other enable differentiation gains. In the real world, one can capitalize on this insight by fashioning branded contracts with those suppliers who possess strong brands can add to the appeal of the OEM's product. We denote this characteristic of a potential supplier as its ex ante differentiation capability, and note that it is unrelated to vendor investments made after contract initiation. It leads to the following expectation.

H2: *The greater the ex ante differentiation capability of the supplier's brand with respect to the OEM's end product, the higher the likelihood of a branded component contract with that supplier*.

Contract Outcomes

Hypotheses 1 and 2 employ TCA logic to predict the presence of branded contracts. As TCA is explicitly based on normative principles of minimizing governance costs, choosing the "correct" alternative should lead to more favorable outcomes and vice versa. Using a white box contract when the vendor's investments are large, or its ex ante differentiation capability is high would be an "incorrect" choice and should lead to more adverse outcomes. Likewise, using a branded contract when the vendor's investments are small, or its ex ante differentiation capability is low would also be an "incorrect" choice and should lead to more adverse outcomes. This leads to the following expectation.

H3: *OEMs who choose an incorrect contract form (branded component or white box contract) suffer poorer outcomes.*

We distinguish two outcomes here. First, there is the issue of *prospective* gains or losses that accrue to a randomly selected firm that is contemplating choosing a contract form, but which has not yet done so. Quite separate, there is the issue of *retrospective* gains or losses faced by a firm that is contemplating switching away from its extant contract choice to the alternative (counterfactual) choice.

EMPIRICAL STUDY

Non-electrical machinery (SIC 35), electrical and electronic machinery (SIC 36) and transportation equipment (SIC 37) was selected as the setting for our empirical work for two principal reasons. First, both forms are empirically present. From our field interviews with over a dozen firms, we were reassured that both branded and white box contracts were feasible options. From our review of the relevant trade journals, we concluded that both forms were likely to be found in sufficient numbers. Indeed, about 35% of our sampled contracts were of the branded form.

Second, these industry settings fit our assumptions of a) the impracticality of complete contracts, b) the difficulties of relational safeguards, and c) the absence of complete backward vertical integration. These end products incorporate numerous engineered components that rely on a broad range of technologies and which require the contracting parties to engage in significant levels of design and engineering activities. As such, written contracts are quite incomplete and cannot be relied upon to safeguard investments. Vendors possess unique, specialized skills in component design and technologies; as such relational safeguards through symmetric investments are difficult to enact. Finally, the diverse technologies make it infeasible for OEMs to backward integrate completely into component design and production.

Data Collection

We describe our data collection in an abbreviated fashion here, and direct the reader to a previous study (Ghosh and John 2005) for more details. Briefly, in 1997, field interviews were undertaken first to establish the substantive relevance of our concepts. Based on these interviews and on previous empirical research we generated a survey instrument, which was then pre-tested at 18 sites to verify wording, response formats etc. We purchased a commercial list of 1,000 names and addresses of purchasing managers and directors From these SIC codes. Each individual was contacted in order to identify and qualify them as a key informant. This process required an average of five calls per firm. Each qualified informant were asked to identify their firm's most important end product line, For this line, they were then asked to identify an independent supplier, from whom their firm procured a component(s) which was physically embedded into their end product. They were also asked to identify a single contract governing the purchase of one or more of these items.

Our unit of analysis is the relationship between an OEM and its independent supplier for a single component or a set of closely related components procured under a single contract.[8]

Our efforts qualified 521 key informants who were then sent the survey 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. 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 lending support to the absence of non-response bias.

Dependent Variable Measures

The measures employed in the study are shown in Table 2. Table 3 shows the descriptive statistics and pair-wise correlations. Below, we describe each of the measures briefly.

Contract Form: We developed a grounded measure of this variable by querying each informant whether their written contract specified the use of the supplier's brand name on the end product and/or on marketing materials in such a fashion that the supplier's brand name was visible to the end customer. To put this into perspective, it does not include those instances where a supplier's brand name is visible only when the end product has been dis-assembled. Our Contract Form (FORM) measure is coded 1 for branded component contracts, and 0 for the white box contracts.

Contract Outcomes*:* We measure governance costs as the costs imposed on the OEM by self-interested strategic behavior and guile on the part of the supplier during contract execution. Recall an opportunistic vendor might exploit incomplete contract terms by providing components with incorrect specifications or inferior quality. It might comply with the letter of the contract, but not seek product improvements aggressively for fear that the revised terms might be less favorable. The right contract form dampens such behavior, while an incorrect contract form provides fewer safeguards. Our Vendor Opportunism (VENDOPPT) measure of this construct consists of a 6-item scale; the 7-point Likert style items are adapted from John (1984).

Independent Variable Measures

Vendor's specific investments: This measure captures the physical and human asset investments made by the vendor in order to customize the component to the OEM's needs. This scale (VENDINV), which consists of 6 items that use a 7-point Likert response format, is identical to Ghosh and John (2005).

Differentiation Capability: The extent to which this supplier's brand name and component functionality improves end user perceptions of the end product is measured with a 4-item

Differentiation (DIFF) measure, adopted from Ghosh and John (2005). Iit uses a 7-point Likert style format.

Other Independent Variables

There are a large number of variables that determine contract form in addition to the two focal variables described above. Many of these have been used in prior work, so we seek to control for such effects to the extent possible. Each of these variables is described briefly.

Specific investments made by the OEM that parallel those made by the vendor could create a relational safeguard, and thus affect the choice of the contract form. To control for this effect, we use a 6-item OEM's Specific Investments (OEMINV) measure adapted from Heide and John (1990).

The next measure is the rated importance of the component to the end product. Recall that these OEMs' end products typically incorporate dozens of engineered components. It is impractical to imagine writing a branded contract for each component without the end product looking like a race car. As such, OEMs can be expected to reserve the costlier branded contract forms for those components that are relatively more significant to the performance of the end product. A single item Importance of Component (IMPORTANT) measure on a 7-point Likert format captures the component's impact on the overall performance of the OEM's end product.

The uncertainty of the evolution of technology is also a major concern to these parties. Higher levels of technological uncertainty require them to make larger or more frequent adaptations to their initial designs. The joint action-like features of the branded contract form make it more suitable than the arms-length white box form for adaptation purposes. As such, we use a 2-item Technological Uncertainty (TECHUNCT) measure on a 7-point Likert format to measure the technological uncertainty facing them.

Although TCE places the emphasis on seeking efficient (i.e., joint-profit increases) contracts, it is not unusual that the more powerful incumbent might sacrifice some joint-profit increases to maintain their share of a smaller total pool of profits. In our setting, recall that OEMs possess relatively greater power than their suppliers, so they might be less willing to use a branded component contract because embedding suppliers in this fashion might lead to their own margins being bargained away. They are more likely to sacrifice the efficiency gains from branded component contracts to protect their own margins. To control for this effect, we develop the Relative Size (RELSIZE) measure as the ratio of the OEM sales volume to the supplier's sales volume.

"Thicker" markets discipline exchange partners more closely, thus making arms-length forms sufficient over a wider range of settings. Thus, a larger number of potential suppliers would make the use of a branded contact form less likely. It should be noted that this would be true regardless of the actual number of incumbent suppliers. To control for this effect, we ask our informants to report the Number of Potential Vendors (NPOTVEND) for this class of components.

The parallel argument on the buyer side is that a larger number of potential buyers for a component reduce the likelihood of requiring the costlier branded contract form. As above, these buyers need not be incumbent buyers, or even in the same end product market.. To control for this effect, we ask our informants to report the Number of Potential OEMs (NPOTOEM) for this class of components.

Finally, we control for unobserved industry differences across the three SIC codes with two dummy variables (SIC35, SIC36). Note, however, that unobserved firm differences beyond the measured variables cannot be controlled for as we have only one observation per firm.

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 0.30. Then, we estimated congeneric (single-factor) models for each set of items[9] and the Werts et al

(1978) formula was used to compute scale reliability. Table 2 reports these reliability estimates as well as the fit indices. We conclude that our multi-item scales exhibit a satisfactory level of internal consistency and unidimensionality.

Next, we assessed discriminant validity with confirmatory factor analysis. Following accepted practice, for each set of closely related constructs, we estimated a base model where each item was allowed to load only on its own unobserved trait, and the different traits were inter-correlated. For each base model, we estimated a constrained model where the inter-trait correlations were restricted to 1.0. These estimates allowed us to test for fir differences between the constrained and base models. These tests revealed significant differences between the models, which permit us to conclude that the traits are sufficiently discriminated from each other. Given the adequacy of our measures, we turn to the tests of the hypotheses.

Contract Form Hypotheses (H1, H2)

Table 4 reports probit models of contract form choices. Model 1 is a baseline specification with only the control variables as predictors, while Model 2 adds the focal variables (vendor investments, and differentiation capability) to the model. Model 2 shows a good fit to the data (Pseudo $R^2 = 0.35$) and an improvement over Model 1, suggesting a significant contribution from the focal variables.

Examining the vendor investment hypothesis first (H1), we find a positive estimate for the relevant coefficient ($\hat{\beta}$ =0.42; p <0.01), which supports our prediction of OEMs fashioning branded contracts as a safeguard for their vendors' hazardous investments. Turning to the differentiation capability hypothesis (H2), we find a positive estimate for the differentiation coefficient ($\hat{\beta}$ = 0.29, $p < 0.05$), which supports our prediction of OEMs fashioning branded contracts to gain from the differentiation capabilities of their vendors. There is however, a potential endogeneity problem wth this test that necessitates some additional analysis.

Endogeneity Correction: Recall that the DIFF measure captured the extant differentiation enabled by incorporating the vendor's component into the OEM's end-product. As such, this includes the differentiation gains from two contracting stages: a) the gains arising from the pre-existing strength of the vendor's brand name, and b) the gains arising from the vendor's investments and activities at the contract execution stage. Given that H2 speaks to the gains from pre-existing brand strength, we control for the potential endogeneity in the DIFF measure as follows.

We regress DIFF on a set of exogenous variables that are correlated with the differentiation gains derived from the contract execution stage. We select these instrumental variables from the accounts provided in Ghosh and John (2005), Jap (1999) and Nickerson et al (2001). In these studies, end product differentiation gains from vertical ties are correlated with coordinated effort, specialized investments, and cooperative (relational) norms. Table 5 reports the two specifications of this regression. The residuals from this regression are a measure of differentiation gains that is *not* correlated with vendor investments and activities undertaken during the contract execution phase.

We replace the original differentiation measure (DIFF) in the probit models with this residual based measure which is denote Vendor Ex Ante Differentiation. Models 3 and 4 in Table 4 are probit models of contract choice that employ the instrumented measure of vendor differentiation. The coefficient estimates of the instrumented differentiation measure ($\hat{\beta}$ =0.20, 0.16; Models 3, 4 respectively) are quite similar to the coefficient estimate in Model 2. In sum, as per H2, OEMs are more likely to fashion a branded component contract with a supplier whose differentiation enabling capabilities is higher.[10],[11]

Other Variables: Several of these other variables show a significant effect on contract form. First, relatively larger sized OEMs are less likely to use branded component contract ($\hat{\beta}$ = –0.28 and –0.26 in Models 3 and 4 respectively), as is true of OEMs with larger numbers of potential vendors ($\hat{\beta}$ =

–0.02 and –0.01 in Models 3 and 4 respectively). Finally OEMs operating in SIC 35 were marginally more likely to use branded component contracts ($\hat{\beta}$ = 0.11 and 0.14 in Models 3 and 4 respectively) than OEMs operating in the base SIC category (37).

Contract Outcomes (H3)

We use a discrete choice switching regression approach described in Maddala (1983) to account for the endogeneity in contract choice, and the results are reported in Table 6. There are three separate sets of analyses addressing contract outcomes.[12] We begin by asking whether OEMs chose those particular contract forms that yielded them better outcomes.

Contract Choice Patterns: The first step of Maddala's (1983) two step procedure consists of estimating the probit models (as in Table 4) with contract form as the dependent variable. In the second step, the outcome measure (VENDOPPT) is regressed against the same independent variables and an additional variable, the inverse Mills ratio (IMR), computed from the first stage model. There are two equations estimated in the second step; one for each of the two observed contract forms. The signs of the IMR coefficients in these two equations in Table 6 uniquely identify three possible choice patterns: a) a general tendency to select the branded contract form (*positive selection into regime*), b) a general tendency to reject the branded contract form (*negative selection into regime*) and c) a discriminating strategy which selects that contract form which yields the firm the better outcome (*comparative advantage selection into regime*). The last strategy is directly supportive of our efficient governance arguments.[13]

Table 6 shows a positive (negative) IMR coefficient in the branded (white box) contract equation. These uniquely identify a comparative advantage selection pattern,wherein OEMs that stood to reduce vendor opportunism more with a branded contract are more likely to select this form, while OEMs that stood to reduce vendor opportunism more with a white box contract are more likely to select this form. In sum, our results indicate that our OEMs conform to the normative advice emanating from efficient governance theory, and implement a comparative advantage selection strategy.[14]

Comparative Assessment: We next turn to the task of calculating the losses associated with not responding properly to changes in each key independent variable. Since contract form selection is endogenous, the impact of the two drivers of interest (vendor investment, vendor ex ante differentiation) cannot be ascertained simply by inspecting the regression coefficients in Table 6. We employ the technique elaborated by Mayer and Nickerson (2005) to compare the expected performance of a hypothetical firm that proposes to contract with its supplier under each of the two alternative forms. We proceed as follows. All the independent variables except for the focal independent variable (i.e., vendor investments or vendor ex ante differentiation) in each equation in Table 6 are set to their observed sample averages.[15] Expected outcomes are then calculated under four possible combinations – the 2 governance choices under low versus high (2 standard deviations below and above the mean respectively) levels of each of the focal independent variable of interest.

The results are plotted in Figures 1 and 2. At high levels of vendor investment, Figure 1 shows that an OEM choosing a white box contract (theory recommends against this) faces a 65% increase in vendor opportunism (3.12 versus 1.73) over the branded contract (the recommended choice). At low levels of vendor investment, Figure 1 shows that an OEM choosing a branded contract (theory recommends against this) faces a 3% decrease in vendor opportunism (2.97 versus 3.06) over the white box contract (the recommended choice). Thus, losses from mistaken choices made in hazardous circumstances are much larger than the corresponding losses from mistaken choices in more benign circumstances. Figure 2 plots the corresponding computations for the vendor ex-ante differentiation variable. The results are strikingly similar.

To sum up, we find that prospective costs of misaligned governance are discernible for both vendor investments and vendor ex-ante differentiation capability. However, the losses from not conforming to the normative recommendation are much larger for more challenging and hazardous exchanges (i.e. high vendor investments or large vendor ex-ante differentiation capability). This asymmetry is not expected from the basic theory and we shall return to it later.

Counterfactual Assessment: Our final analysis seeks to compute the expected losses that would accrue to an firm that has already made an observed (factual) choice if we were to place it in the alternative (counterfactual) regime. This loss is quite different from prospective losses computed in the comparative analyses. Unlike the previous calculation, which compares the costs to a hypothetical firm contemplating the two contract forms, this calculation accounts for the fact that our observations consist of the intentional choices of our sampled firms.

Following Maddala (1983), we compute these counterfactual outcomes and plot them in Figure 3. OEMs that chose a branded contract would face much higher vendor opportunism levels (1.74 to 4.09, $p < 0.01$) if they were to switch to a white box contract. Similarly, OEMs that chose a white box contract would face significantly increased vendor opportunism (3.34 to 4.67, $p < 0.05$) if they were to switch to a branded contract form. Notice, however, that the loss is much greater for firms that originally chose the branded contract (viz. more hazardous conditions).

In sum, these results make a strong case for the H3. Branded contract forms and white box contracts must be aligned in a discriminating fashion with the attributes of the exchange. Mistaken alignment decisions adversely impact performance, and there is a decided asymmetry in these misalignment losses.

Nomological Validity

Recall our core argument that branded contracts safeguard non-contractible vendor investments, and thus motivate the vendor to make better investments decisions. A corollary is that OEMs offering branded contracts should also be willing to concede control over decisions related to component design and development to the vendor. These are complementary contracting aspects because delegating decision control allows the vendor to make best use of his investments. We investigate this by regressing vendor control on the two-way interaction between the vendor's specific investments and the contract choice. We find that vendors have more control over these decisions when their non-contractible investments are supported by branded component contracts ($\hat{\beta} = 0.27$; $p < 0.01$).

DISCUSSION

Extant research offers little evidence about the use of branded contracts by firms, or managerial advice on the relative merits of using such contracts over alternative white box forms. We use the governance lens of TCA to offer insights into the actual choices of firms, as well as to assess their comparative merits. Some implications for theory and practice are discussed below along with a summary of the limitations of the work.

Governance Theory

The current study shows that branded component contracts have utility as governance devices quite apart from their utility as differentiation enabling devices as emphasized in the co-branding literature. We show that after controlling for OEMs' use of branded component contracts with those vendors who possess brands that promise differentiation gains, these contracts are utilized to manage problems that arise during contract execution. They help to secure vendors' investments required to customize the component as per the OEM's specifications. The stronger property rights accruing to the vendor by virtue of its ownership of the component brand lie at the core of this safeguard. Farsighted OEMs that anticipate these problems offer this contract form.

Significantly, our OEMs appear to follow the comparative advantage decision rule implied by the theory in offering this contract form. Specifically, OEMs that stood to benefit more from a branded contract were more likely to choose that form, and vice versa. Our result adds to an emerging literature on brands as governance devices (e.g., Gonzalez-Diaz et al 2002), and complements recent developments that extend the efficient governance logic of TCA to address strategic marketing choices (e.g., Ghosh and John 2005; Nickerson et al 2001).

Our results also provide strong support from the field for experiments that demonstrate the utility of co-branding as a differentiation enabling device. We find that OEMs offer branded contracts to vendors who possess strong differentiation enhancing capabilities. as would be expected from these experiments.

Asymmetric Costs of Misalignment: Our normative analyses shows that branded contract decisions have significant performance implications. However, we find a surprising asymmetry in the costs of misalignment. The costs of mistaken future choices were much larger in exchanges that were more hazardous *per se*. Specifically, the penalties for making wrong choices in response to the trading hazards posed by vendor investments or vendor differentiation capability were much larger at high levels of these variables. Our counterfactual computations also show a similar asymmetry of misalignment costs. OEMs switching from an actual branded contract form to a white box form would suffer more than would OEMs switching from an actual white box contract to a branded contract form.

Interestingly, upon re-examining more closely the limited number of TCA studies addressing contract outcomes, we found a consistent asymmetric pattern. Anderson's (1988) pioneering study of the choice between employee salespeople and independent reps found that the firm's realized cost/revenue ratio was not significantly lower for the wrong choice in low uncertainty (less hazardous) exchanges but was significantly higher for the wrong choice in the high uncertainty (more hazardous) exchanges. Similarly, Noordewier et al (1990) found that percentage late deliveries and percentage wrong deliveries by suppliers did not increase given the wrong choice (relational contracts) in low uncertainty (non-hazardous) exchanges but, was significantly worse given the wrong choice (discrete contracts) in the high uncertainty (hazardous) case. Neither one of these early studies corrected for the endogeneous selection bias issue, so we looked at two more recent efforts where this issue is controlled econometrically, Masten et al's (1991) study of the costs of misalignment for make versus buy decisions in ship-building components found significantly larger penalties for wrong choices (buy) under hazardous exchange conditions compared to wrong choices (make) in non-hazardous exchanges. Finally, Mayer and Nickerson's (1995) study on outsourcing found that profitability of information technology projects was more adversely affected from making the wrong choice (contractors) under hazardous exchange conditions than by the wrong choice (employees) under non-hazardous conditions.

The common thread in all these studies, including the present one, is that that larger penalties result from mistakes in governing more hazardous exchange. Put differently, the hierarchical mode appears to be a more robust mode and would appear to provide some insurance against costly mistakes, assuming modest set up costs. Given that current governance theories implicitly assume symmetric costs of misalignment, these findings call for further work.

Did Markets Fail or were Hierarchies (Coordination) Successful? There is an emerging debate about the origins of the comparative merits of alternative governance forms. Traditionally, it has been assumed that the comparative merits of hierarchies in governing hazardous exchange arise from the failure of the market mode, rather than the superiority of the hierarchical mode. However, most studies in TCA rely on testing hypotheses using reduced-form equations relating observed governance forms against exchange attributes. As Masten et al (1991) show, such tests cannot distinguish between market failure and hierarchical success as the underlying mechanism. Outcomes need to be measured and studied directly as is done in the present study.

Table 6 shows that that as vendor investments increase, vendor opportunism is lowered ($\hat{\beta}$ = –0.29) in the branded contract equation, but is insignificantly impacted under non-branded contracts. Thus, the gains from electing the non-market mode (branded contracts) do not arise from trading hazards adversely impacting outcomes under the market mode (non-branded contracts). Instead, they arise from improved outcomes under the non-market mode. In sum, the hierarchical mode succeeded in our data as opposed to the market mode failing. This adds to the small number of studies on this issue, but with similar results. Again, it points to a reworking of the basic theory.

Implications for Practice

The differentiation gain provided by the component is composed of two parts: (a) ex ante differentiating capabilities of the vendor brand and (b) ex post differentiation resulting from customization activities and investments. The relative importance of these two mechanisms has significantly implications on the marketing and pricing practices of a component firm. Specifically, a supplier possessing largely the first type of differentiating capability (e.g., Bosch's pioneering ABS brakes) can leverage its end customer appeal with potential OEM customers. It might extract its value by selling exclusively to the OEM who makes the best offer (in which case, the OEM gets a unique differentiator). This route is recommended by Aaker (2004) who observes that branded components make sense as a differentiator only if OEM competitors cannot have access to the same brand. Notice that if it sought to extract value by selling to multiple OEMs at a premium price justified by its end customer appeal (in which case, the component is not a differentiator because competing OEMs have access to it), the intra-brand competition between OEMs would drive down this premium.

In contrast, a supplier possessing largely the second type of differentiation, with gains derived from customizing the component to the needs and specifications of each OEM can simultaneously provide a meaningful point of differentiation to multiple, competing OEMs. The governance choices are different for these suppliers because the realized value is a function of the joint contributions of the contracting parties, which are non-contractible and create bargainable pools of profits. Here, devising non-exclusive branded component contracts with multiple OEMs is not only feasible, but we think that it is the preferred approach unlike Aaker's approach which presumes that differentiation gains are feasible only with exclusive OEM ties.

Limitations

Our sample is drawn from industries where suppliers are routinely engaged with the same OEM for relatively long spells. It is not clear that the cooperation required to implement a branded component approach is achievable with shorter-term exchanges. Second, we examined engineered components that are embedded into the end product and which are necessary for its proper functioning. Contrast this with co-branding cases where the constituent products have independent end-user markets in their own right. Here, the joint efforts of the parties serve primarily to capitalize on the pre-existing brand equities established in their individual markets, and attention is focused on the fit of the brands. Further, our components were not commodity products but required some form of research, design, and engineering activities – either general purpose or customized; hence one has to be cautious about generalizing our conclusions.

Third, we used a simple, additive specification to parse out the pre-existing capabilities of the vendor from the realized differentiation measure. Non-linear or multiplicative specifications could well provide different results. Fourth, our measures for the key constructs are obtained from informant reports with their attendant biases. Finally, a principal limitation of the normative results is our performance measure. Not only is it a perceptual measure, it consists solely of the OEM's judgments. Perceptions obtained from vendor-side informants might reveal different patterns. Clearly, systematic research on branded component contracts in other contexts is essential to address these limitations.

REFERENCES

Aaker, David A. (2004), *Brand Portfolio Strategy*. New York: The Free Press.

Anderson, Erin (1988), "Strategic Implications of Darwinian Economics for Selling Efficiency and Choice of Integrated and Independent Sales Forces," *Management Science*, 34 (5), 599-618.

——— and Barton A. Weitz (1992), "The Use of Pledges to Build and Sustain Commitment in Distribution Channels," *Journal of Marketing Research*, 24 (February), 18–34.

Anderson, James C. and David W. Gerbing (1988), "Structural Equation Modeling in Practice: A Review and Recommended Two–Step Procedure," *Psychological Bulletin*, 103 (May), 411–423.

Carson, Stephen J. (2007), "When to Give Up Control of Outsourced New Product Development," *Journal of Marketing*, 71 (January), 49-66.

Crocker, Keith J. and Kenneth J. Reynolds (1993), "The Efficiency of Incomplete Contracts: An Empirical Analysis of Air Force Engine Procurement," *RAND Journal of Economics*, Vol. 24 (Spring), 126-146.

Desai, Kalpesh K. and Kevin L. Keller (2002), "The Effects of Ingredient Branding Strategies on Host Brand Extendibility," *Journal of Marketing*, 66 (January), 73–93.

Ghosh, Mrinal and George John (2005), "Strategic Fit in Industrial Alliances: An Empirical Test of Governance Value Analysis," *Journal of Marketing Research*, 42 (3), 346-357.

Gonzalez–Diaz, Manuel, Marta Fernandez Barcala, and Benito Arrunada (2002), "Performance, Efficiency, and the Logic of Multi–Branding: The Case of Fresh Beef," *International Society of New Institutional Economics Conference*, 2002. Available at http://www.isnie.org

Hamilton, Brent H., and Jackson A. Nickerson (2003), "Correcting for Endogeneity in Strategic Management Research," *Strategic Organization*, 1, 53–80.

Heckman, James J (1979), "Sample Selection Bias as a Specification Error," *Econometrica*, 47, (January), 153–61.

Heide, Jan B. and George John (1988), "The Role of Dependence Balancing in Safeguarding Transaction-Specific Assets in Conventional Channels," *Journal of Marketing*, 52 (January), 20-35.

———— (1990), "Alliances in Industrial Purchasing: The Determinants of Joint Action in Buyer–Supplier Relationships," *Journal of Marketing Research*, 27 (February), 24–36.

Jap, Sandy D. (1999), "Pie-Expansion Efforts: Collaboration Processes in Buyer-Supplier Relationships," *Journal of Marketing Research*, 36 (Nov) 461-475.

John, George (1984), "An Empirical Investigation of Some Antecedents of Opportunism in a Marketing Channel," *Journal of Marketing Research*, 21 (3), 278-289.

Maddala, G. S. (1983), *Limited–Dependent and Qualitative Variables in Econometrics*. Cambridge: Cambridge University Press.

Masten, Scott E. (1993), "Transaction Costs, Mistakes, and Performance: Assessing the Importance of Governance," *Managerial and Decision Economics*, 14, 119–29.

Masten, Scott E., James W. Meehan Jr., and Edward A. Snyder (1991), "The Costs of Organization" *Journal of Law, Economics, and Organization*, 7 (3), 1-25.

Mayer, Kyle J. and Jack A. Nickerson (2005), "Antecedents and Performance Implications of Contracting for Knowledge Workers: Evidence from Information Technology Services," *Organization Science*, 16 (3), 225-242.

Monteverde, Kirk and David J. Teece (1982), "Supplier Switching Costs and Vertical Integration in Automobile Industry," *The Bell Journal of Economics*, Vol. 13, No. 1, 206-213.

Nickerson, Jack A., Barton H. Hamilton, and Tetsuo Wada (2001), "Market Position, Resource Profile, and Governance: Linking Porter and Williamson in the Context of International Courier and Small Package Services in Japan," *Strategic Management Journal*, 22 (3), 251-273.

Noordewier, Thomas G., George John, and John R. Nevin (1990), "Performance Outcomes of Purchasing Arrangements in Industrial Buyer-Vendor Relationships," *Journal of Marketing*, 54 (October), 80-93.

Park, C. Whan, Sung Youl Jun, and Alan D. Shocker (1996), "Composite Branding Alliances: An Investigation of Extension and Feedback Effects," *Journal of Marketing Research*, 33 (November), 453–66.

Rao, Akshay R., Lu Qu, and Robert W. Ruekert (1999), "Signaling Unobservable Product Quality Through a Brand Ally," *Journal of Marketing Research*, 37 (May), 258–68.

Simonin, Bernard L. and Julie A. Ruth (1998), "Is a Company Known by the Company It Keeps? Assessing the Spillover Effects of Brand Alliances on Consumer Brand Attitudes," *Journal of Marketing Research*, 35 (1), 30-42.

Werts, Charles E., D. R. Rock, R. L. Linn, and Karl G. Joreskog (1978), "A General Method of Estimating the Reliability of a Composite," *Educational and Psychological Measurement*, Vol. 38, 933–938.

Whinston, Michael D. (2003), "On the Transaction Cost Determinants of Vertical Integration," *Journal of Law, Economics, and Organization*, 19 (1), 1-23.

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**
	BRANDED COMPONENTS	
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…
	WHITE BOX COMPONENTS	
IBM Tivoli storage area network management system	**Brocade Communications** network switches and software	
Ford Motor mid/heavy trucks	**Detroit Diesel** engines	
Presidio Network enterprise voice and data communication	**New Global Technology** VoIP protocol and service	
Lycoming aircraft engines	**Crane Cam** valve train and camshaft sub-system	

Note: The last column is not applicable for white box components because OEMs do not communicate the vendor's brand name for such components.

Table 2: 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 **DIFF** χ^2 (2) = 5.63; CFI = 0.99 NFI = 0.99; Reliability = 0.84	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.
Vendor's Specific Investments **VENDINV** χ^2 (9) = 24.1; CFI = 0.97 NFI = 0.97; Reliability = 0.91	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 **OEMINV** χ^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 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.
Relative Size of OEM to Vendor **RELSIZE**	With respect to your last year's sales volume, how large is your firm relative to this supplier?
Number of Potential Vendors **NPOTVEND**	What is the total number of potential vendors for this type of item(s)?
Number of Potential OEMs **NPOTOEM**	What is the total number of potential OEM buyers for this type of item(s)?
Technological Uncertainty **TECHUNCT**[a] (2 items) $\alpha = 0.76$	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.

Norm of Flexibility **FLEXIBLE** χ^2 (9) = 30.7; CFI = 0.97 NFI = 0.96; Reliability = 0.92	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 processes to deal with unforeseen events. 6. Changes in the terms of the contract are not ruled out, if considered necessary.
Vendor Opportunism **OPPORTUNISM** χ^2 (9) = 12.60; CFI = 1.00 NFI = 0.96; Reliability = 0.91	1. This supplier has sometimes altered facts slightly in order to get what it wanted. 2. This supplier always carries out its duties without any supervision on our part. (Reverse coded) 3. Sometimes the supplier has presented us facts in such a way that has made them look good. 4. This supplier has sometimes promised to do things without actually doing them later. 5. This supplier feels it is OK to do anything within its means that will help further its own interests. 6. On occasion, the supplier has lied about certain things in order to protect its own interests.
OEM Profitability from Exchange **PROFIT**[b]	While providing a response to the following variable please consider the total dollar value of the components procured under this particular contract: From the perspective of your company, how profitable is your relationship with this vendor?
Norm of Joint Action **JOINT** Reliability = 0.91	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.
Vendor Control over Decisions **CONTROL**[c] χ^2 (2) = 6.91; CFI = 0.98 NFI = 0.98; Reliability = 0.84	1. Ongoing design and engineering changes. 2. Supplier's production processes and manufacturing technology. 3. Selection of supplier's sub-suppliers. 4. Supplier's quality control procedures.

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 = very unprofitable and 7 = very profitable.

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

TABLE 3: CORRELATION MATRIX OF MEASURES

Construct	Mean	S.D	Skew	1	2	3	4	5	6	7	8	9	10
1 BRAND	0.36	0.48	0.57	1.00									
2 DIFF	4.01	1.31	0.18	0.30	1.00								
3 TECHUNCT	2.91	1.32	0.42	0.06	0.18	1.00							
4 VENDINV	3.68	1.07	0.10	0.32	0.41	0.22	1.00						
5 OEMINV	3.52	1.13	0.13	–0.10	0.35	–0.04	0.29	1.00					
6 IMPORTANT	5.02	1.30	–0.26	0.08	0.12	0.08	0.12	0.14	1.00				
7 RELSIZE	0.09	0.87	0.00	–0.16	0.05	0.27	0.14	0.04	0.10	1.00			
8 NPOTOEM	45.05	62.35	2.26	0.01	–0.06	–0.18	–0.17	–0.07	–0.08	–0.22	1.00		
9 NPOTVEND	20.34	53.26	3.32	–0.13	–0.09	–0.13	–0.06	0.03	–0.12	–0.05	0.25	1.00	
10 VENDOPPT	3.13	1.26	0.24	0.07	–0.12	–0.09	–0.07	0.03	–0.07	–0.12	–0.11	–0.03	1.00

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

TABLE 4: PROBIT MODELS OF OEM'S CONTRACT CHOICE

Dependent Variable: Dummy Variable for Branded Contract Form (1); White Box Form (0)					
Independent Variables	**Hyp**	**Coefficient** *Model 1*	**Coefficient** *Model 2*	**Coefficient** *Model 3 (IV1)*	**Coefficient** *Model 4(IV2)*
Model Variables					
Vendor's Specific Investments	+		0.42^{***} (0.14)	0.50^{***} (0.14)	0.55^{***} (0.13)
Differentiation	+		0.29^{**} (0.13)		
Vendor Ex ante Differentiation	+			0.20^{**} (0.10)	0.16^{**} (0.08)
Control Variables					
OEM's Specific Investments	–	–0.07 (0.11)	–0.14 (0.12)	–0.15 (0.11)	–0.06 (0.14)
Relative Size of OEM to Vendor	–	$–0.24^{**}$ (0.09)	$–0.35^{***}$ (0.10)	$–0.28^{***}$ 0.08)	$–0.26^{***}$ (0.09)
Number of Potential Vendors	–	$–0.03^{***}$ (0.01)	$–0.02^{**}$ (0.010)	$–0.02^{**}$ (0.01)	$–0.02^{**}$ (0.01)
Number of Potential OEMs	–	0.01 (0.01)	–0.00 (0.01)	–0.00 (0.01)	–0.00 (0.01)
Importance of Component	+	0.08 (0.09)	–0.06 (0.09)	–0.07 (0.09)	0.04 (0.10)
Technological Uncertainty	+	–0.06 (0.09)	–0.09 (0.08)	–0.09 (0.10)	0.07 (0.08)
SIC35		0.12^{*} (0.07)	0.10^{*} (0.06)	0.11^{*} (0.06)	0.14^{**} (0.06)
SIC36		0.05 (0.06)	0.05 (0.06)	0.05 (0.06)	0.07 (0.06)
Constant		–0.41 (0.53)	$–3.36^{***}$ (0.61)	$–2.58^{***}$ (0.59)	$–3.50^{***}$ (0.68)
Wald χ^2(df)		$23.01\ (8)^{***}$	$39.26\ (10)^{***}$	$42.32\ (10)^{***}$	$35.41\ (10)^{***}$
Pseudo R^2		0.20	0.35	0.39	0.33
n		191	191	191	191

Note: Positive values indicate greater probability of branding the component.
*: p < 0.1; **:p < 0.05; ***: p < 0.01: two–tailed tests. Standard errors in parentheses.

TABLE 5: INSTRUMENTAL VARIABLE MODELS

Dependent Variable: Differentiation (DIFF)	**Model: IV1**	**Model: IV2**
Independent Variables		
Vendor's Specific Investments (VENDINV)	0.28^{***}(0.09)	––
OEM's Specific Investments (OEMINV)	0.15^{**}(0.07)	––
Norm of Joint Action (JOINT)	0.28^{***}(0.07)	0.23^{***}(0.07)
Norm of Flexibility (FLEXIBLE)	0.05 (0.10)	0.13 (0.09)
Contractual Price Flexibility (FLEXPRIC)	0.20^{**} (0.08)	0.22^{**} (0.09)
Constant	$–1.77^{**}$ (0.66)	$–3.26^{***}$(0.70)
R^2; n	0.44; 191	0.21; 191

*: p < 0.1; **:p < 0.05; ***: p < 0.01: two–tailed tests. Standard errors in parentheses.

TABLE 6: GOVERNANCE COSTS OF CONTRACT FORMS

Dependent Variable: Vendor Opportunism

Independent Variable	**Branded Component Contracts (n = 70)** *Coefficient (Standard Error)*	**White Box Contracts (n = 121)** *Coefficient (Standard Error)*
Vendor's Specific Investments	-0.290^{***} (0.083)	0.014 (0.087)
Vendor Ex ante Differentiation	0.105 (0.095)	0.157^{*} (0.088)
OEM's Specific Investments	0.126^{*} (0.072)	0.124^{*} (0.071)
Relative Size of OEM to Vendor	0.131^{*} (0.068)	0.176^{**} (0.081)
Number of Potential Vendors	-0.109^{*} (0.060)	–0.057 (0.063)
Number of Potential OEMs	0.110^{*} (0.059)	0.104^{*} (0.061)
Importance of Component	–0.035 (0.075)	–0.001 (0.078)
Technological Uncertainty	0.011 (0.047)	0.115^{**} (0.052)
SIC35	-0.089^{*} (0.050)	0.000 (0.051)
SIC36	0.002 (0.045)	0.042 (0.048)
Inverse Mills Ratio for BRAND	0.169^{**} (0.076)	
Inverse Mills Ratio for NOBRAND		-0.126^{*} (0.069)
Constant	4.156^{***} (1.114)	2.481^{**} (0.944)
R^2	0.168	0.143
χ^2	47.84	42.66
$p > \chi^2$	0.0001	0.0001
RMSE	0.926	0.905

Note: *: $p < 0.1$; **: $p < 0.05$; ***: $p < 0.01$: two–tailed tests.

FIGURE 1: GOVERNANCE COSTS OF VENDOR INVESTMENTS

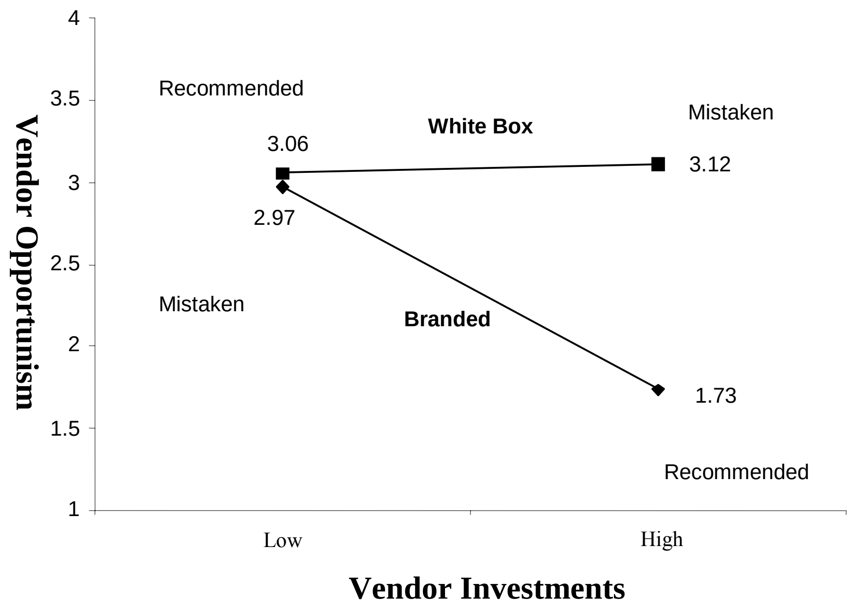


FIGURE 2: GOVERNANCE COSTS OF VENDOR DIFFERENTIATION CAPABILITY

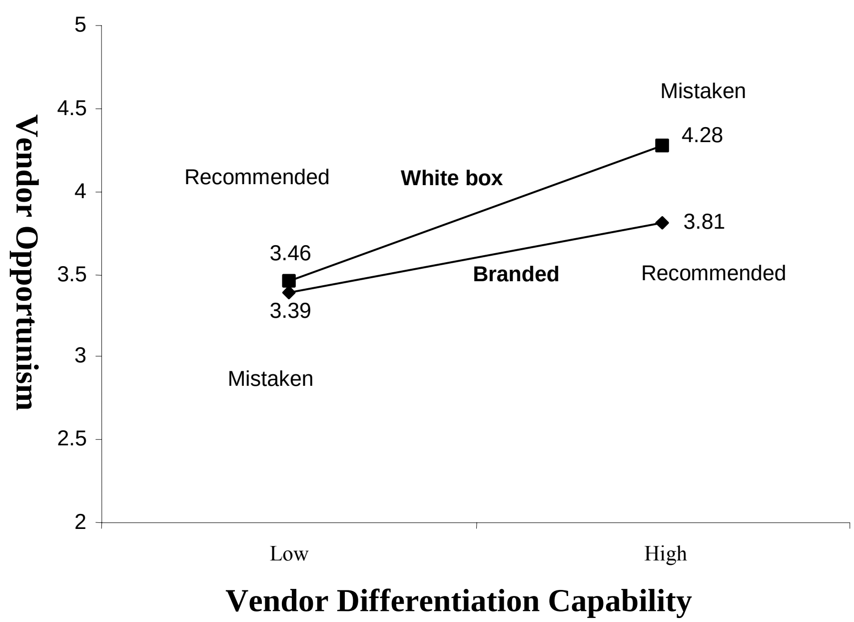
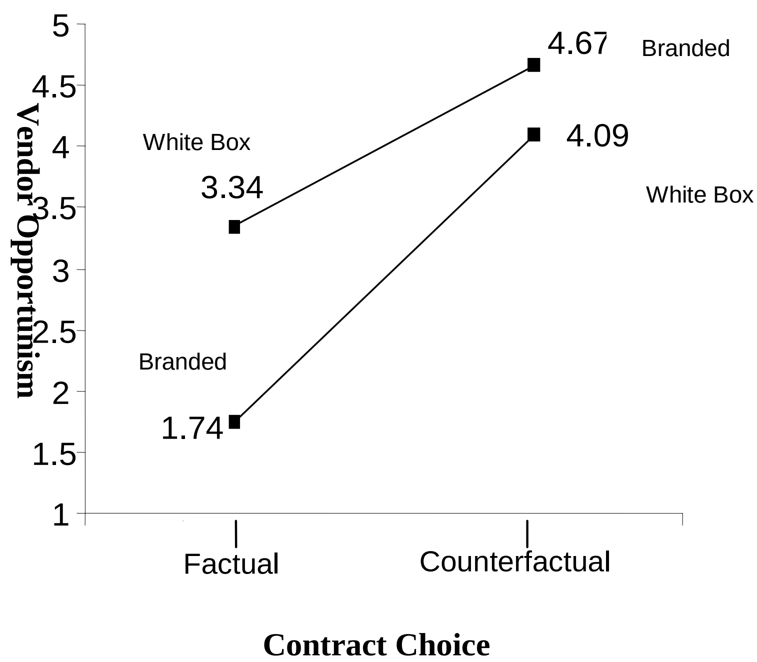


FIGURE 3: GOVERNANCE COSTS COMPARISON OF REGIMES



FOOTNOTES

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[1] We use branded component contract and branded contract interchangeably.

[2] For instance, the parties might agree to affix the brand names and logos to the equipment itself and/or to jointly feature both the brand names in marketing communications and sales brochures.

[3] The key to a successful combination of brands is their mutual "fit".

[4] It should also be noted that these examples contrast sharply with both Nutrasweet and Intel which involved *identical* products sold to different OEMs. Perhaps the prominence of these two cases led the subsequent work to ignore the customization of components that is so prevalent in many instances.

[5] The origins of this term reside in the practice of shipping components in plain white boxes without any conspicuous use of the vendor's brand name. We will use the term white box to refer to unbranded components in this paper. Table 1 offers some examples of such components.

[6] "Specificity" refers to the degree to which the investments in question have reduced value outside their planned use'

[7] "Fit" is a complex construct that centers around the logical connections that can made between the two brands,

[8] "Closely related components" refer to slight specification differences in components that OEMs might need to incorporate in different versions or models 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.

[9] All factor models were estimated in LISREL.

[10] We also investigated the differences in slopes across the SIC sectors for both the focal hypotheses. We find consistent and significant directional support for both set of predictions. These estimates are provided in a web-appendix (or are available from the authors on request).

[11] We also estimated several other specifications of these probit models, including non-linear relationships of our key explanatory variables as well as including two-way interactions such as VENDINV * OEMINV, VENDINV * DIFF, and OEMINV *DIFF. Our predictions are robust to these specifications.

[12] In all subsequent analysis, we use the vendor ex ante differentiation measure obtained as a residual from the instrumental regression Model IV1 in Table 5.

[13] This is the formal equivalent of advising individuals who are skilled at fishing to take up fishing and those who are skilled at hunting to take up hunting.

[14] Similar results were obtained from analyses on OEM profitability from the relationship. Again, OEMs seemed to be choosing contracts in a discriminating fashion to enhance relational profitability. These analyses are provided in a web-appendix.

[15] As we are concerned about a randomly selected (hypothetical) project, and not an observed project, we do not include the inverse Mills Ratio terms.