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Author(s)	Poppo, L; Zhou, KZ; Li, JJ
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When Can You Trust “Trust?”

Calculative Trust, Relational Trust, and Supplier Performance

Laura Poppo^a
School of Business
University of Kansas
Lawrence, KS 66045
Tel: (785)856-3085
lpoppo@ku.edu

Kevin Zheng Zhou
Faculty of Business and Economics
The University of Hong Kong
Pokfulam, Hong Kong
Tel: (852) 3917 - 1006
kevinzhou@business.hku.hk

Julie Juan Li
Department of Marketing
City University of Hong Kong
Kowloon Tong, Hong Kong
Tel: (852) 3442-7865
julieli@cityu.edu.hk

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Keywords: trust; heuristics; transaction cost economics; cooperative strategy; supply chain management

^a Corresponding author.

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ABSTRACT

Little research has empirically assessed two distinct bases for trust: a calculative forward-looking assessment of whether it pays to cooperate versus relational trust, a judgment anchored in past behavior and characterized by a shared identity. Our findings from buyer–supplier relationships demonstrate that calculative trust and relational trust positively influence supplier performance, with calculative trust having a stronger association than relational trust. Yet, important boundary conditions exist. If buyers invest in supplier-specific assets or when supply side market uncertainty is high, relational trust, not calculative trust, is more strongly associated with supplier performance. In contrast, when behavioral uncertainty is high, calculative trust, not relational trust, relates more strongly to supplier performance. These findings suggest that exchange partners should seek to match their use of trust with transactional attributes.

Keywords: trust; heuristics; transaction cost economics; cooperative strategy; supply chain management

As a focal governance supporting interfirm exchanges, trust has distinct forms (Rousseau, Sitkin, Burt, and Camerer, 1998). With *calculative trust*, managers believe the costs and benefits of complying with the business agreement will outweigh those associated with self-interested, opportunistic actions (Parkhe, 1993; Srinivasan and Brush, 2006; Williamson, 1993). In contrast, *relational trust* arises from social relationships when there are strong beliefs about the goodwill, honesty, and good-faith efforts of others, which mitigate risk by aligning core values (Bromiley and Harris, 2006; Ring, 1996; Zaheer and Harris, 2005). However, whereas calculative trust and relational trust co-exist and characterize most business relationships (Lewicki, Tomlinson, and Gillespie, 2006; Rousseau et al., 1998), empirical work treats trust as an aggregate construct (Handley and Angst, 2014; Zaheer and Harris, 2005; but see Saporito, Chen and Sapienza, 2004).

This aggregation is problematic because controversial views exist. One camp argues that when there are opportunities for individual gain, breaches in confidences and expectations occur; because rewards and punishments incentivize transactions and deter opportunistic behavior, calculative trust offers a superior means to ensure cooperation (Williamson, 1996; Parkhe, 1993). In contrast, the other camp proposes that relational trust is more effective because partners behave in accordance with prior expectations and beliefs (e.g., Das and Teng, 2001; Faems, Janssens, and Van Looy, 2008; Ring and Van de Ven, 1994). Moreover, an emerging empirical literature suggests the effectiveness of trust depends on the transactional attributes, yet they do not examine alternative forms of trust (e.g., Goerzen, 2007; Krishnan, Martin, and Noorderhaven, 2006; Poppo, Zhou, and Zenger, 2008b; Zhou et al., 2014). Accordingly, two important questions remain unanswered: (1) how do calculative and relational trust affect exchange performance? And (2) how do transactional attributes moderate the relationships between calculative/relational trust and exchange performance?

To address these questions, we focus on the roles of calculative and relational trust in buyer-supplier exchanges, particularly on how trust affects *supplier performance*, i.e., the buyer's evaluation of the supplier's task performance (e.g. Cannon and Perreault, 1999; Mesquita and Brush, 2008; Zaheer, McEvily and Perrone, 1998). We further examine three well-reasoned transactional attributes which may lead the supplier to renege on its performance agreement: (1) *asset specificity* (i.e., the buyer makes sunk investments in supplier-specific assets); (2) *supply market uncertainty* (i.e., unpredictable changes in the supply market); and (3) *behavioral uncertainty* (i.e., unobservability and incomplete information regarding the supplier's processes and activities) (e.g. Schepker *et al.*, 2014).

Our key reasoning focuses on the different decision rules and logic associated with calculative and relational trust. Calculative trust relies on a *forward-looking* decision rule: a continual reassessment of relative payoffs for whether it pays to cooperate (Saparito *et al.*, 2004). This decision rule requires deliberate processing and accuracy. In contrast, relational trust is anchored in the past, arising from repeated interaction. As a decision rule, it functions as a *heuristic*, a shortcut that avoids conscious deliberation (Uzzi, 1997). Our findings show that if buyers invest in supplier-specific assets or when supply side market uncertainty is high, the heuristic processing associated with relational trust, not calculative trust, is more strongly associated with supplier performance. Yet, when behavioral uncertainty is high, calculative trust, not relational trust, relates more strongly to supplier performance.

Our study contributes to extant trust literature in several ways. First, it is among the few efforts that empirically distinguish between calculative and relational trust, the two prominent types that feature most exchanges. Second, our study develops a contingent view of trust by showing how the effectiveness of calculative and relational trust is differentially affected by

transactional attributes. Third, our study also enrich the supply chain management research by illustrating how buyers could use alternative forms of trust to match with transactional features so as to achieve better supplier performance.

Theoretical Framework

Trust refers to “a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another” (Rousseau et al., 1998: 395). In inter-organizational relationships, trust denotes an exchange partner’s expectation that the other party can be relied on, will behave as predicted, and will act fairly (Zaheer *et al.*, 1998). It fosters perceptions of stability, enhances bilateral coordination, and limits performance losses that would otherwise occur because of self-interest and opportunism. Empirical studies validate this focus: trust and its related normative conventions are associated with lower transaction costs, greater knowledge transfer, and better exchange performance (e.g., Artz and Brush 2000; Gulati and Nickerson, 2008; Li, Poppo, and Zhou, 2010; Poppo and Zenger 2002; Zaheer *et al.*, 1998).

Calculative versus Relational Trust

Trust, however, has different bases. Drawing from Transaction cost economics (TCE), implicit contracting, and game theory (Axelrod, 1984; Williamson, 1996), scholars propose that a structure that aligns incentives with rewards can lead to stable, predictable outcomes. This approach can be applied to trust, “a term with many meanings ... [to] define and delimit the elusive notion of trust (Williamson, 1993: 453). *Calculative trust* informs expectations by deliberately and rationally assessing forward-looking conditions: It requires calculations of benefits and costs, and hinges on the relative values of cheating (e.g., net costs of termination) and cooperation (Bromiley and Harris, 2006; Lewicki *et al.*, 2006). When it is high, parties believe that cooperation and performance goals will be achieved because falling short of them

leads to penalties, including exchange termination (Parkhe, 1993). Thus, sanctions, the expected payoffs of rewards over the penalties, decrease opportunistic behavior, regulate exchanges, and preserve cooperation.

Others argue that a social foundation of trust best describes long-standing, stable business relationships (Granovetter, 1985; Gulati, 1995; Ring and Van de Ven, 1994). Ongoing interaction lets parties accumulate experiences, form expectations of each other, and develop shared values and normative conventions that define how parties will work together (Bercovitz, Jap, and Nickerson, 2006; Macneil, 1980). *Relational trust* arises when social relations evolve to a state in which each partner can expect to act according to the other's preferences and priorities (Lewicki *et al.*, 2006; Saporito *et al.*, 2004). With high relational trust, partners develop a mutual understanding and *shared identity* in which they “‘think like’ the other, ‘feel like’ the other, and ‘respond like’ the other” (Lewicki *et al.*, 1996: 122–123). Such mutuality helps partners make decisions for each other, reduces the risk of opportunistic behavior, increases timely adaptation, and improves joint outcomes.

Whereas ongoing exchanges feature both calculative and relational trust in varying degrees (Rousseau *et al.*, 1998), these types of trust are distinct constructs with different *logics* and *decision rules*. The central logic underlying calculative trust is *incentives*, a rational assessment of well-structured rewards and punishments. Accordingly, calculative trust relies on a *forward-looking* decision rule: a continual reassessment of relative payoffs for whether it pays to cooperate (Saporito *et al.*, 2004). This decision rule requires deliberate processing and accuracy. In contrast, relational trust is anchored in the past, arising from repeated interaction. A *shared identity* is the strongest form of social attachment that may develop as parties consider each other's interests as if they were their own. As a decision rule, relational trust functions as a

heuristic, a shortcut to rational assessment, based on the overall quality of the relationship rather than each single transaction (Rousseau *et al.*, 1998; Uzzi, 1997). It enables the “navigation of increasingly complex interpersonal environments by simplifying the information processing task” (Lewicki and Brinsfield, 2011: 117).

Transactional Attributes and Risk

Three transactional attributes increase the risk that parties will defect from business agreements to achieve gains: asset specificity, market uncertainty, and behavioral uncertainty (Williamson, 1996). *Asset specificity* refers to customized investments specific to the exchange made by one party that cannot be deployed for alternative uses. In this study, we focus on *buyer asset specificity*, which means the buyer has invested in supplier-specific assets and risks sizable sunk costs if the exchange is terminated. Since these assets cannot be redeployed to other transactions, the supplier may hold up the buyer (Williamson, 1996). For example, the supplier may renege on the initial terms to extract a greater share of the buyer’s quasi-rent. It may also not prioritize optimal delivery of products and ship late, not procure the required quality inputs, or submit invoices that misrepresent its operational costs (Wathne and Heide, 2000).

Market uncertainty refers to unpredictable changes in external environments. In this study, we focus on *supply market uncertainty*, which refers to unpredictability in supply prices, vendor support, and the supplier’s manufacturing technologies and product design (Canon and Perreault, 1999). Because uncertainty creates instability that is difficult for managers to understand and respond to, it challenges exchanges by requiring adaptation (Carson, Madhok, and Wu, 2006). *Behavioral uncertainty* refers to the extent to which one party cannot effectively observe or evaluate the activities of the other party (Zhou and Poppo, 2010). When behavioral uncertainty arises, the other party is more likely to misbehave or not disclose information in

order to maximize self-gain (Schepker *et al.*, 2014). In our study, when the buyer cannot readily observe and verify supplier activities, the supplier can hide actions such as undersupplying effort or ignoring critical processes or requirements (Canon and Perreault, 1999).

In next section, we will examine how calculative/relational trust influences exchange performance and how these transactional attributes moderate the effects of trust on performance. Figure 1 summarizes our conceptual model.

Insert Figure 1 about here.

Hypotheses

Direct Effects of Trust

Calculative trust “permits economic actors to deal with each other, but in guarded ways” (Ring, 1996: 152) because exchange partners try hard to meet performance goals only when noncompliance delivers a penalty, the most severe of which is exchange termination (e.g., Parkhe, 1993; Telser, 1980). When partners believe rewards and punishment are well specified for the particular transaction, the benefits derived from executing the specified task outweigh the net costs from not doing so (Williamson, 1993). This motivates each party to fulfill its performance obligations. As a forward-looking logic, calculation implies that buyers and suppliers will assess the rewards and punishment for each new transaction, proceeding only when the transaction projects net gains (Williamson, 1993; Poppo, Zhou, and Ryu, 2008a). As Parkhe (1993) indicates, parties choose to cooperate when they expect payoffs from a series of exchanges; the longer their expectation of time horizon, the greater the perceived benefits from cooperation. Thus, the forward-looking rational assessment of calculative trust incentivizes parties to achieve desired performance.

Hypothesis 1a: Calculative trust is positively associated with supplier performance.

By showing “good faith in the intent and reliability of partner behavior” (Krishnan et al., 2006: 896), relational trust should also foster supplier performance. When relational trust exists, the buyer and its supplier hold common beliefs and commitment to the partnership. These beliefs harmonize interests, curtail potential opportunistic behavior, and motivate exchange parties to comply with and commit to joint goals (Ouchi, 1980; Ring and Van de Ven, 1994). As a heuristic, relational trust also facilitates decision-making. Because relational trust provides partners with the perceptions of stability to their relationships, they do not need to continually monitor the other, collect information, fully examine the current situation, and reassess the relationship (Dyer and Singh, 1998; Lewicki and Brinsfield, 2011). The supplier thus has the autonomy to make decisions on behalf of both parties which fulfill its performance expectations. Therefore, we predict that

Hypothesis 1b: Relational trust is positively associated with supplier performance.

Moderating Effects of Transactional Attributes

Asset Specificity. While the relationship between trust and exchange performance is well documented, under-examined is how asset specificity moderates this relationship when trust is partitioned into its calculative and relational components. We suggest that asset specificity negatively moderates the effect of calculative trust but positively moderates the impact of relational trust on performance. When a buyer has not invested in supplier-specific assets, the buyer can easily switch to an alternative supplier should its performance be low. As a result, if the perceived rewards over punishment are high, suppliers are motivated to achieve explicit performance targets because any misconduct is tied to negative economic consequences while meeting performance goals are rewarded, including renewed business (Parkhe, 1993; Williamson, 1993).

However, when buyer asset specificity is high, it creates a situation of asymmetric dependence – the buyer cannot exit the relationship without considerable out-of-pocket costs. Such sunk costs reduce the effectiveness of calculative trust. Even though rewards and punishments exist, incentives are misaligned: because only the buyer is bound by sunk costs, the supplier knows it can haggle over costs and extract a quasi-rent from the buyer without much punishment. Thus, whereas both parties perceive a well-structured system of rewards and punishments, the supplier may focus on generating returns from the buyer's specialized investment. Because supplier's self-interest of return generation dominates, such misalignment erodes improvements in supplier performance. Therefore, we predict that when assets are specific, calculative trust is less effective at incentivizing supplier performance.

Hypothesis 2a: The positive relationship between calculative trust and supplier performance is weaker when buyer asset specificity is high than when it is low.

When relational trust exists, exchange parties share a common identity and favor a decision to do the *right* thing for the relationship (Lewicki and Brinsfield, 2011). This shared identity alters the meaning and expected behavior arising from a specialized investment: both partners are committed to work together to fully utilize the specialized investment, rather than to take advantage of it. Accordingly, relational trust makes a buyer's investment in supplier-specific assets a credible signal of commitment, not an asymmetry to be exploited (Gambetta, 2009). Furthermore, with relational trust, parties use the 'we' heuristic to make decisions in accordance with collective goals (Uzzi, 1997). For example, as Srinivasan and Brush (2006) show, when the buyer credibly commits to the relationship and the supplier reciprocates this goodwill, supplier performance increases. In contrast, when asset specificity is low, the requirement for transaction-specific adaptations is low and the exchange process is largely standardized (Cannon and

Perreault, 1999). Accordingly, relational trust is less needed to coordinate routine exchanges.

Thus, we predict that

Hypothesis 2b: The positive relationship between relational trust and supplier performance is stronger when buyer asset specificity is high than when it is low.

Market Uncertainty. Prior work presents mixed views on whether market uncertainty strengthens or weakens the effect of trust on performance. Rousseau *et al.* (1998) indicate that because trusting parties can work jointly to deal with uncertainty, trust is most valuable when uncertainty exists; if there is no uncertainty, there is no need for trust to coordinate exchanges (see also Ring and Van de Ven, 1994; Zajac and Olsen, 1993). In contrast, others argue that uncertainty increases the information processing demands required to navigate the future. Because trusting parties are less likely to search adequately for information outside of the relationship, trust is less suitable to effective adaptation to environmental changes (Krishnan *et al.*, 2006; Lewicki and Brinsfield, 2011). We advance a more nuanced proposition that market uncertainty weakens the effect of calculative trust but bolsters the impact of relational trust.

The efficacy of calculative trust hinges on incentive alignment. Under low levels of market uncertainty, well-structured rewards and penalties effectively align incentives: parties will find cooperation more valuable than defection because they can obtain stable information to accurately assess the trade-offs. However, if the supplier's operating environment is highly uncertain, important factors such as pricing, product specifications and technologies are changing constantly (Krishnan *et al.*, 2006). In such conditions, the reward structure is less likely to accurately map how uncertainties affect exchange behavior and outcomes, making parties less assured whether cooperation is still favored. As a result, when market uncertainty is high, calculative trust is less effective in enabling continuous adaptation and motivating performance.

Hypothesis 3a: The positive relationship between calculative trust and supplier performance is weaker when supply market uncertainty is high than when it is low.

In contrast, we argue that relational trust may be more beneficial when supply markets are uncertain. With relational trust, exchange parties expect to continue to work together and adapt jointly to external changes. This commitment is based on previous interactions which give rise to positive expectations of a shared future (Lewicki and Brinsfield, 2011). By providing a bilateral orientation to adaptation, relational trust ensures continuous cooperation despite uncertainty (Lado, Dant, and Tekleab, 2008). Moreover, as a decision heuristic, relational trust favors a “we” orientation toward quick and continuous coordination, a critical practice for adapting successfully to uncertain environments (Li, Poppo, and Zhou, 2010; Luo, 2003). As a result, relational trust enables parties to “act as if the future were more certain” (Zajac and Olsen, 1993: 140; Rousseau et al., 1998). In contrast, relational trust is less needed for supply markets with lower uncertainty, because continuous and efficient adaptation is less necessary.

Hypothesis 3b: The positive relationship between relational trust and supplier performance is stronger when supply market uncertainty is high than when it is low.

Behavioral Uncertainty. We predict that calculative trust can better motivate performance when behavioral uncertainty exists. For calculative trust, unobserved behavior is disciplined through expected payoffs in which rewards depend on expected outcomes. When behavioral uncertainty is high, what is hard to observe is the inputs or *activities*. Yet, with calculative trust, parties can still rely on the final output to evaluate the other. For example, if the buyer detects low quality output, it can punish the supplier by terminating the business agreement, which causes net losses for misbehavior (Parkhe, 1993; Telser, 1980). In addition, forward-looking assessments remind parties to perform well in order to acquire additional business in the future, even though their behavior is difficult to assess (Poppo *et al.*, 2008a).

Thus, by aligning rewards and punishments with outcomes, calculative trust reduces the risk of misconduct and motivates better performance.

Hypothesis 4a: The positive relationship between calculative trust and supplier performance is stronger when behavioral uncertainty is high than when it is low.

We also predict that relational trust should be more valuable when behavioral uncertainty is high. Ouchi (1980) argues that a “clan” culture is most beneficial for tasks defined by behavioral ambiguity -- the harmony of shared interests and goals aligns joint action, and results in effective task performance. Thus, both parties will align their goals and act to achieve the mutual performance objectives despite the inability to observe the other. Relational trust also enables heuristic problem-solving such that the whole relationship rather than each individual transaction is emphasized. This joint orientation is more valuable when behavioral uncertainty exists because it generates positive beliefs and interpretation of each other’s actions (Krishnan *et al.*, 2006). For example, when the buyer holds the supplier in good faith even though accurate information about the supplier’s processes and procedures are lacking, the supplier is willing to share the information of its activities, which helps reduce the behavioral uncertainty. Thus, relational trust is more effective at high levels of behavioral uncertainty.

Hypothesis 4b: The positive relationship between relational trust and supplier performance is stronger when behavioral uncertainty is high than when it is low.

Methodology

Sampling and Data Collection

TCE focuses on the “make-or-buy” decision (Williamson, 1996) and supply chain management emphasizes how buyers manage their suppliers to enhance exchange performance (Cousins *et al.*, 2006; Zhou *et al.*, 2014). Consistent with this tradition, we examined buyer–supplier relationships of manufacturing firms, and collected the data from firms located in two

major areas of China, Beijing and Shanghai. In China, social relationships (e.g., *guanxi*) underlie and coordinate business to business transactions, and as the country transitions to a more market-driven economy, contracts are increasingly used to safeguard investment risks (Zhou and Poppo, 2010). As a result, relational and calculative trust are both common in China, making this context suitable to test our conceptual framework.

We first developed an English version of the questionnaire that independent translators then back-translated into Chinese to ensure conceptual equivalence. To ensure the content and face validity of the measures, we conducted five in-depth interviews with senior purchasing managers and asked each respondent to verify that our measures were relevant and complete. From their responses, we revised a few questionnaire items to enhance their clarity. Then, we conducted a pilot study with 24 purchasing professionals who not only answered all the items but also provided feedback on the design and wording of the questionnaire. We finalized the questionnaire based on the results of the pilot study.

For the final survey, we randomly selected a sample of 600 firms from a list of Chinese manufacturing companies located in the four-digit Chinese Standard Industrial Classification codes 1311–4290. These firms spanned diverse industries (e.g., materials, plastics, electronics, apparel, food). For each firm, a senior purchasing manager was the key informant because our interviews revealed that these managers know most about relationships with suppliers.

We recruited and trained interviewers to conduct the survey onsite; the interviewers visited the managers in their offices, presented the survey, clarified any questions, and collected the survey after completion. This process is a useful way to obtain quality data in emerging economies. The interviewers first contacted managers by telephone to solicit their cooperation. To motivate their participation, the managers were informed of the academic nature of the study

and the confidentiality of their responses, and were offered an incentive in the form of a summary report. 286 managers from different firms agreed to participate, 213 of whom were interviewed onsite. Informants selected one of their firms' major suppliers located in China and answered the survey questions about exchanges with that supplier. After eliminating two surveys with missing data, we obtained 211 complete responses, for an effective response rate of 35.2%.

Most of the firms (60.2%) had 100–1000 employees; 52.1% had more than US\$3 million in annual sales revenue; 16.6% were state-owned; 59.2% were private; and 24.2% were public firms. On average, respondents had worked for 11.3 years in the industry and 6.9 years with their company. A comparison between the responding and nonresponding firms using multivariate analysis of variance indicated no significant differences in terms of key firm characteristics (i.e., industry type, firm ownership, number of employees, and annual sales revenues) (Wilks' $\Lambda = .83$; $F = 1.26$; $p = .49$), which suggested that nonresponse bias was not a concern.

To validate our key informant approach, we used Podsakoff and Organ's (1986) post hoc technique to select 24 firms randomly from participating firms and conducted onsite interviews one year later with two purchasing managers or directors from each firm. Of the two managers, one was the previous participant and the other was a new informant. We obtained responses from 38 managers from 19 firms. The interrater reliability between the two managers' responses ranged from .88 (calculative trust) to .83 (supplier performance) (all $p < .001$). The test–retest reliability of the same managers' responses in these two interviews ranged from .87 (supplier performance) to .72 (asset specificity) (all $p < .001$), demonstrating the consistency of the responses (cf. Li *et al.*, 2008). We also collected additional data from both the buyers and their suppliers and obtained a matched dataset of 28 buyer-supplier dyads. The results indicated high

consistency of buyer and supplier's perceptions of focal constructs (e.g., $r = .82$ for relational trust). These results indicated that our key informant approach was valid.

Measures

The Appendix lists the questionnaire items. We developed the measures of calculative and relational trust based on the conceptual works of Lewicki and Bunker (1996) and Rousseau *et al.* (1998). The measure of *calculative trust* consists of three items. Two items assess the strength of rewards and punishments that sanction cooperative behavior in the interorganizational exchange (see Lewicki and Bunker, 1996: 119-120), and one item captures the degree of exchange continuity. According to the repeated game logic, the expectation of doing business in the long run allows exchange parties to reward or punish prior moves (Axelrod, 1984). For *relational trust*, its highest level is shared identity (Lewicki and Bunker, 1996; see also, Maguire, Phillips, and Hardy, 2001). Our measure has three items: shared identification, shared understanding, and thinking like one another, each of which reflects the degree to which a shared identity exists and enables one party to trust the other to act on its behalf (see Lewicki and Bunker, 1996: 122-3). Our items are highly consistent with Saporito *et al.*'s (2004) measures of self-interest assumption and relational trust in the service (banking) sector.

Our measure of *buyer asset specificity* (Buyer AS) comes from Cannon and Perreault (1999) and captures buyers' specific investments in product features, personnel, inventory and distribution, and capital equipment and tools to accommodate suppliers' needs. We adapted a measure of *market uncertainty* from Cannon and Perreault (1999) to examine the environmental changes in the supply market with respect to pricing, product features and specifications, vendor support services, technology, and product supply. On the basis of Brown, Dev, and Lee (2000),

we developed a measure of *behavioral uncertainty* that assesses how difficult it is to evaluate the other party's activities.

We adapted the measure of *supplier performance* from Cannon and Perreault (1999) and Zaheer *et al.* (1998). It examines supplier performance in the focal exchange relationship with respect to product quality, timeliness of delivery, after-sales support, and total value received.

Controls. We controlled for several sources of heterogeneity. First, we considered *prior experience* because the accumulation of experiences is necessary to support trust (Lewicki and Bunker, 1996). We measured it with the logarithm of the years that the firm had done business with its supplier. We also controlled for two formal governance mechanisms, *explicit contracts* and *monitoring*, with measures adapted from Lusch and Brown (1996) and Dahlstrom and Nygaard (1999), respectively.

Second, we controlled for the effects of *buyer ownership* and *buyer size*. Because prior work suggested that state-owned, private, and public listed firms may behave differently (Peng, 2003), we used two dummy variables: *private* and *state-owned*, with public listed firms as the baseline. We used the logarithm of the employee number to indicate buyer size.

Third, we controlled for *supplier asset specificity* (Supplier AS) and *supplier importance*. Supplier AS was adapted from Cannon and Perreault (1999). Supplier importance was indicated by the percentage of the manufacturer's total annual demand for the component obtained from the supplier.

Fourth, we used two dummy variables to control for differences in the primary industry in which the buyer operated: *mechanics* and *heavy* (e.g., chemicals, materials, automobile), with others (e.g., consumer products such as apparel, furniture, and food) as the baseline. Given the prevalent use of personal social ties (i.e., *guanxi*) to coordinate exchanges in China, we adapted

the measure from Child, Chung, and Davies (2003) to control for *guanxi importance* in the market.

Construct Validity. We followed Anderson and Gerbing (1988) in refining the multiple-item measures and assessing their construct validity. We ran exploratory factor analyses for each multiple-item variable, which resulted in factor solutions as theoretically expected. Reliability analyses also showed that these measures possess satisfactory coefficient reliability. Then, we ran confirmatory factor analysis for a ten-factor model. The Appendix reports the results of this analysis, including the goodness-of-fit index, factor loadings, and composite reliability.

Because the chi-square test is sensitive to sample size, we relied on the comparative fit index (CFI), incremental fit index (IFI), and root mean square error of approximation (RMSEA) to evaluate the model fit (Anderson and Gerbing, 1988). As the Appendix shows, all the fit indexes were above the .90 benchmark (CFI = .90, IFI = .90, and RMSEA = .07); therefore, the model fits the data satisfactorily. Further, the composite reliabilities of all the constructs ranged from .72 to .92, above the .70 benchmark. The average variance extracted for every construct was higher than the .50 cutoff (Fornell and Larcker, 1981). Thus, these measures demonstrate satisfactory convergent validity.

We assessed the discriminant validity of the measures in two ways. First, we ran pairwise chi-square difference tests for all multiple-item scales to determine whether the restricted model (correlation fixed at 1.0) fit the data significantly worse than the freely estimated model did (correlation estimated freely). All the chi-square differences were highly significant (e.g., supplier performance vs. calculative trust: $\Delta\chi^2(1) = 220.24, p < .001$), in support of discriminant validity (Anderson and Gerbing, 1988). We also performed Fornell and Larcker's (1981) more stringent test and found that the average variance extracted for each construct was greater than its

highest shared variance with other constructs (see the Appendix), further supporting discriminant validity. Overall, these results showed that our measures possessed satisfactory reliability and validity. Table 1 presents the means, standard deviations, and correlations for the constructs.

Insert Table 1 about here.

Common Method Assessment. Because information about the dependent and independent variables came from the same respondent, we recognized the potential for common method bias and assessed it in two ways. First, we ran a Harman one-factor test (Podsakoff and Organ, 1986), which loads all the perceptual items into an exploratory factor analysis. Factor 1 accounted for only 26.32% of the variance, indicating that common method bias was unlikely to be a major concern in our data. Second, we used the “MV” marker test, which uses a scale theoretically unrelated to at least one construct in the model as the MV marker to proxy for common method variance (Lindell and Whitney, 2001). We used a four-item scale to measure a manufacturer’s physical resources (Cronbach’s $\alpha = .90$) and adjusted the construct correlations and statistical significance by the lowest positive correlation ($r = .011$) between the MV marker and other variables. None of the significant correlations was insignificant after this adjustment (see Table 1). Therefore, common method bias is unlikely to be a serious concern.

Analyses and Results

In our model, calculative trust (CT) and relational trust (RT) are likely to be endogenous. Transactional attributes may increase the likelihood that parties lie, cheat, misrepresent information, thereby threatening effective cooperation (Williamson, 1996). In response, managers select appropriate governance mechanisms to safeguard transactions. Thus, proper model specification should include transactional attributes as the antecedents of calculative and relational trust: buyer asset specificity (BAS), supplier AS (SAS), market uncertainty (MU), and

behavioral uncertainty (BU). Similarly, prior experience (PE) is necessary to support trust (Gulati, 1995). *Guanxi* (GI) is also important for trust development (Li *et al.*, 2008). To correct for this potential endogeneity, we used a three-stage least square analysis (Hamilton and Nickerson, 2003).

In Stage 1, as specified in Equation 1, we regressed two types of trust against BAS, SAS, MU, BU, PE, and GI to obtain predicted values of relational trust and calculative trust. The results (see Table 2) indicate that calculative trust is significantly related to market uncertainty ($b = -.23, p < .01$), behavioral uncertainty ($b = .20, p < .01$), prior experience ($b = .30, p < .01$), and *guanxi* importance ($b = .24, p < .01$); relational trust is significantly related to buyer asset specificity ($b = .12, p < .05$), supplier asset specificity ($b = .23, p < .01$), market uncertainty ($b = .24, p < .01$), behavioral uncertainty ($b = -.34, p < .01$), prior experience ($b = .25, p < .01$), and *guanxi* importance ($b = .19, p < .01$). These results support the use of the three-stage model to correct for the potential endogeneity of calculative trust and relational trust. We then obtained residuals that are free of influence from asset specificity, market uncertainty, behavioral uncertainty, prior experience, and *guanxi* importance.

$$CT = b_0 + b_1 (BAS) + b_2 (SAS) + b_3 (MU) + b_4 (BU) + b_5 (PE) + b_6 (GI) + e,$$

to obtain $CT_{residual} = CT - CT_{predicted}$.

$$RT = b_0 + b_1 (BAS) + b_2 (SAS) + b_3 (MU) + b_4 (BU) + b_5 (PE) + b_6 (GI) + e,$$

to obtain $RT_{residual} = RT - RT_{predicted}$. (1)

Insert Table 2 about here.

In Stage 2, we used $CT_{residual}$ and $RT_{residual}$ as the indicators of CT and RT, respectively. That is, we regressed performance against $CT_{residual}$ and $RT_{residual}$ and the controls (see M2 in Table 3).

$$\text{Supplier performance} = b_0 + b_1 (CT_{residual}) + b_2 (RT_{residual}) + b_{controls} (\text{Controls}) + e \quad (2)$$

In Stage 3, we added interaction terms to test the moderating effects. To assess the effect of each moderator, we added interactions stepwise as in M3, M4, and M5 and then tested the full model in Equation 3 (M6 in Table 3). Because product terms can incur collinearity, we mean-centered the variables before we constructed the interaction terms (Aiken and West, 1991). We checked for multicollinearity by assessing the variance inflation factors associated with each of the predictors in our models. The highest value of these factors is 2.03, well below the 10.0 benchmark, thus indicating multicollinearity was not an issue. Table 3 reports the regression results of the controls-only model (i.e., M1), as well as the second- and third-stage models.

$$\begin{aligned} \text{Performance} = & b_0 + b_1 (\text{CT}_{\text{residual}}) + b_2 (\text{RT}_{\text{residual}}) + b_{\text{controls}} \text{Controls} \\ & + c_1 (\text{CT}_{\text{residual}} \times \text{BAS}) + c_2 (\text{RT}_{\text{residual}} \times \text{BAS}) + c_3 (\text{CT}_{\text{residual}} \times \text{MU}) \\ & + c_4 (\text{RT}_{\text{residual}} \times \text{MU}) + c_5 (\text{CT}_{\text{residual}} \times \text{BU}) + c_6 (\text{RT}_{\text{residual}} \times \text{BU}) + e. \quad (3) \end{aligned}$$

Insert Table 3 about here.

As Table 3, Model 2 shows, both calculative ($b = .35, p < .01$) and relational ($b = .12, p < .05$) trust related positively to supplier performance, in support of H1a and H1b. Calculative trust is more strongly associated with performance than relational trust is.

We used the full model (M6 in Table 3) to test the interaction hypotheses. Hypothesis 2 assesses the moderating role of buyer asset specificity. The interaction effect of calculative trust \times buyer asset specificity is negative ($b = -.15, p < .01$), and that of relational trust \times buyer asset specificity is positive ($b = .12, p < .05$). These findings support H2a and H2b.

Hypothesis 3 examines the moderating effect of market uncertainty. The interaction effect of calculative trust \times market uncertainty is negative ($b = -.13, p < .05$), and that of relational trust \times market uncertainty is positive ($b = .14, p < .05$), in support of H3a and H3b.

Hypothesis 4 examines the moderating effect of behavioral uncertainty. The interaction effect of calculative trust \times behavioral uncertainty is positive ($b = .14, p < .05$), and that of relational trust \times behavioral uncertainty is insignificant ($b = .04, p > .10$). These findings support H4a, but not H4b.

To gain more insight into the interaction effects, we followed Aiken and West's (1991) procedure and conducted simple slope tests for significant interactive terms. For Hypothesis 2, we split the buyer asset specificity variable into two groups—low (one standard deviation below the mean) and high (one standard deviation above the mean)—and estimated the effect of calculative/relational trust on performance for both levels. We find that calculative trust is strongly related to performance when buyer asset specificity is low (simple slope $b = .66, p < .01$), but not when it is high ($b = .11, p > .10$). Relational trust is not significantly related to supplier performance ($b = -.03, p > .10$) when buyer asset specificity is low, but is positively related to performance when it is high ($b = .27, p < .01$). These results suggest that calculative trust works better when buyer asset specificity is low, whereas relational trust is more effective when it is high.

For Hypothesis 3, calculative trust is strongly related to performance when market uncertainty is low ($b = .53, p < .01$). This effect is weaker when it is high ($b = .22, p < .05$). The effect of relational trust is positive when market uncertainty is high ($b = .23, p < .01$), but is insignificant when market uncertainty is low ($b = -.01, p > .10$). These findings indicate that calculative trust is more effective when market uncertainty is low, whereas relational trust works better when it is high.

For Hypothesis 4, calculative trust relates more strongly to performance when behavioral uncertainty is high ($b = .56, p < .01$) than when it is low ($b = .14, p < .10$). Because the

interaction between relational trust and behavioral uncertainty is insignificant, we did not conduct the simple slope test.

Other effects. As Table 3 shows, prior experience and explicit contracts are positively related to supplier performance, which implies that both prior social relationships and explicit contracts foster better supplier performance. In contrast, monitoring is negatively related to supplier performance, indicating that it may reduce the autonomy of partners and lower their motivation to perform well. Supplier importance is also positively associated with performance, which suggests that more orders from the same supplier help improve its task performance.

Neither buyer nor supplier AS improves performance. The governance mechanism (e.g., relational trust) appears to influence the value-creation potential of AS. Market uncertainty positively affects supplier performance, but behavioral uncertainty negatively affects it. Market uncertainty appears to offer suppliers an opportunity to work hard and adapt to changes in ways that improve their performance; because our sample represents the major suppliers for each buyer, suppliers may see successful adaptation as a way to promote recognition and thus their reputation. Alternatively, when the buyer cannot observe the supplier's activities, suppliers seem to have less motivation to contribute because they cannot be evaluated and rewarded clearly.

Discussion

Research Implications

Interfirm business transactions rarely depend on only one source of trust (Das and Teng, 2001; Lewicki and Bunker, 1996; Rousseau *et al.*, 1998), yet research seldom examines different bases of trust. Our study is among the few that distinguishes between calculative trust and relational trust. Consistent with logic for how the metering of rewards and punishments induces cooperation (Williamson, 1993), we show that calculative trust is positively associated with

supplier performance. Our results also confirm that relational trust relates positively to supplier performance: through the mechanisms of commitment and heuristic processing, relational trust enables the supplier to make decisions on behalf of the relationship that improve performance. Interestingly, calculative trust appears to have a stronger effect than relational trust (its standardized estimate is almost two times larger than that for relational trust, see Table 3), showing the value of developing strong rewards and sanctions. This finding contrasts with Saparito *et al.* (2004), who found that relational trust, but not self-interest (i.e., calculative logic), reduced the likelihood of the customer switching in the banking industry. Possibly, relational trust is more relevant in service sectors, which involve intensive interpersonal interactions, whereas for buyer-supplier exchanges in manufacturing sectors, calculative trust is more effective at disciplining and directing the supplier's operational decisions.

More importantly, our study helps develop a contingent view of trust by showing how the roles of calculative versus relational trust are differentially moderated by three transactional attributes (cf. Krishnan *et al.*, 2006; Poppo *et al.*, 2008b). We find that calculative trust has a weaker relationship with supplier performance when the buyer has invested a great deal in supplier-specific assets or the supply market is highly uncertain; yet it is more effective in times of behavioral uncertainty. We reason that because the buyer cannot easily reverse its sunk investment, calculative incentives, including punishment and repeat business, are less effectual: the supplier can hedge on performance without sanctions. Also, market uncertainty challenges the accuracy of a strong calculus because information is incomplete and changing; as a result, calculative trust relates less strongly to supplier performance. However, for unobservable supplier activities, well-structured incentives discipline supplier performance. This assessment based on outcomes highlights the repercussions of shoddy performance. Our interviews with a

global supply manager at Logitech highlight this calculative logic: Logitech's managers told their Chinese suppliers that if they found a copy of Logitech's newest product model on the street, they would curtail the business relationship forever.

In contrast, we find that relational trust has a stronger effect on performance in the presence of specialized assets or market uncertainty. Relational trust appears to alter the meaning of specialization from self-interest to commitment, and alter subsequent actions from renegeing to realizing transactional value. When market uncertainty is high, the commitment and shared identity of relational trust increase the buyer's willingness to support flexible and continuous adaptation of the exchange to the supplier's changing environment, leading to better supplier performance. Surprisingly, we fail to find the support for our hypothesis that relational trust relates more positively to supplier performance when behavioral uncertainty is high. According to Ouchi (1980), because shared identity aligns goals and because heuristic processing generates positive beliefs about each other's actions, relational trust should be most effective when behavioral uncertainty arises (see also Rousseau *et al.*, 1998). However, Granovetter (1985) cautions about the limits of relational trust and the inherent risk of embedded relationships: those who are closest to us are in the best position to deceive us. In balance, the potential positive and negative effects cancel out each other, resulting in a nonsignificant net effect.

Overall, our contingency findings challenge the assumption that trust helps reduce the risk arising from transactional attributes (e.g., Ring and Van de Ven, 1994; Rousseau *et al.*, 1998). They also extend previous conflicting empirical studies (e.g., Poppo *et al.*, 2008a; Zajac and Olsen, 1993 vs. Goerzen, 2007; Krishnan *et al.*, 2006) by showing the need to match transactional attributes with the types of trust. In addition, by taking the buyer's perspective, our results suggest instances in which the buyer may need to rely more or less on its trusting

perceptions given the transactional risk. This approach shows the value of not assuming a symmetric view of dyadic trusting beliefs (DeJong and Dirks, 2012; Graebener, 2009; Zaheer and Zaheer, 2006).

Managerial Implications

For practitioners, our findings suggest a contingent use of trust. First, relational trust, but not calculative trust, is more valuable when the buyer has invested significant supplier-specific assets. Managers who rely solely on calculative trust to align incentives are likely to experience less-than-satisfactory performance when buyer asset specificity is high. Rather, they should make specialized investments only when a shared identity exists. Because forming a shared identity likely takes considerable social interaction, managers need to be sensitive to time demands; not every supplier might warrant a relational bond. Second, managers should match their use of trust with different types of uncertainty. When the supply market is highly uncertain, the buyer needs to develop relational trust, but not rely on calculative trust, to foster supplier performance. With relational trust, exchange partners will work together and take joint actions to deal with the market uncertainty in a timely manner. When the buyer cannot easily observe the behavior of the supplier, they need calculative trust, but not relational trust, to gauge the final output of the supplier by highlighting how output will be rewarded or punished.

Limitations and Further Research

Our findings have several limitations. First, our cross-sectional design limits our ability to infer cause-effect relationships and to examine the processes for developing each form of trust. Prior work suggests that in newly formed exchanges, calculation should be the primary source for confident expectations (Rousseau *et al.*, 1998). Over time, the distinct individual orientation of calculative trust may be supported, but not supplanted, by a more collective orientation such

that both parties share a common identity (Lewicki *et al.*, 2006; Saporito *et al.*, 2004). A longitudinal study is needed to understand the evolution and dynamic roles of calculative and relational trust.

Second, our use of key informants may lead to common method bias. We addressed this issue with additional data collection and post hoc analysis; our focus on interaction effects further reduces this concern because respondents are unlikely to have a mental “interaction-based theory” that creates systematic bias in their responses (Aiken and West, 1991). Still, our key informant reflects a buyer perspective, which may be different from a supplier perspective, leading to asymmetric trust perceptions (Zaheer and Zaheer, 2006). We encourage researchers to collect data from dyadic and different sources to overcome this concern.

Third, while the early work focused on whether contracts and trust were substitutes or complements (Gulati, 1995; Poppo and Zenger, 2002), recent advances examine how and when trust may simultaneously substitute for and complement different forms of formal governance (Gulati and Nickerson, 2008; Zhou and Xu, 2012). Future research could examine whether calculative and relational trust play differential roles in complementing or substituting for formal governance.

Fourth, our sample of buyer-supplier exchanges exhibits relatively less interaction and interdependence than do many other types of inter-organizational exchanges (Faems *et al.*, 2008), including those that involve power asymmetry (Graebner, 2009) and explorative and exploitative outcomes (Parmigiani and Rivera-Santos, 2011). Future work should replicate our study in other contexts such as strategic alliances or joint ventures.

Conclusion

Despite the prominent role of trust in interfirm exchanges, prior studies have rarely empirically considered alternative bases for trust. Our study distinguishes between calculative trust and relational trust, and further develop a contingent view: calculative trust is more effective for behavioral sources of risk (e.g., unobservability), whereas relational trust works better for sunk costs (i.e., asset specificity) and exogenous risk (e.g., supply side uncertainty). Therefore, managers must carefully match their use of alternative forms of trust with different types of transactional attributes.

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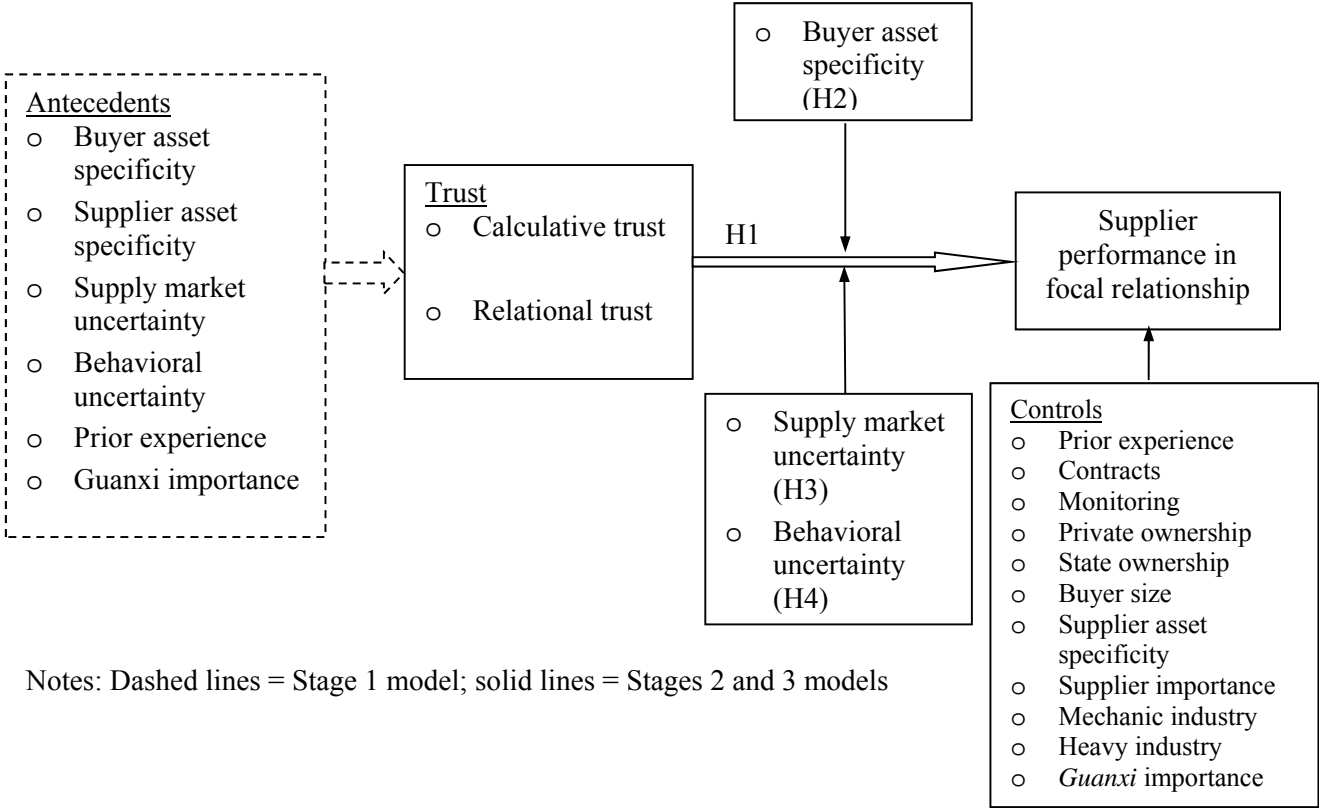
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Figure 1 The Conceptual Model



Notes: Dashed lines = Stage 1 model; solid lines = Stages 2 and 3 models

Table 1 Basic Descriptive Statistics of the Constructs

Construct	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Supplier performance		0.44	0.27	-0.10	0.02	-0.37	0.30	0.37	-0.35	0.11	-0.06	0.13	-0.02	0.27	-0.17	0.06	-0.04
2. Calculative trust	0.45		0.33	-0.05	0.15	-0.19	0.30	0.32	-0.41	0.05	-0.04	0.04	0.03	0.17	-0.17	0.07	0.16
3. Relational trust	0.28	0.34		0.26	0.28	-0.27	0.31	0.15	-0.09	-0.10	0.09	0.15	0.34	0.41	-0.10	-0.04	0.07
4. Buyer AS	-0.09	-0.04	0.27		0.35	0.15	-0.04	-0.09	0.32	-0.15	0.04	0.02	0.39	0.00	0.02	0.00	-0.04
5. Supply market uncertainty	0.03	0.16	0.29	0.36		0.21	-0.08	0.09	0.25	-0.07	-0.05	0.07	0.36	-0.05	-0.09	-0.05	0.10
6. Behavioral uncertainty	-0.36	-0.18	-0.26	0.16	0.22		-0.31	-0.08	0.45	-0.04	-0.04	-0.16	0.15	-0.27	0.12	-0.06	0.28
7. Prior experience	0.31	0.31	0.32	-0.03	-0.07	-0.30		0.08	-0.36	-0.13	0.18	0.23	0.09	0.37	-0.05	0.00	-0.14
8. Contracts	0.38	0.33	0.16	-0.08	0.10	-0.07	0.09		-0.18	-0.07	-0.12	0.08	-0.03	0.00	-0.12	0.09	-0.06
9. Monitoring	-0.34	-0.40	-0.08	0.33	0.26	0.46	-0.35	-0.17		-0.16	0.02	-0.10	0.26	-0.04	0.08	-0.12	0.09
10. Private firm	0.12	0.06	-0.09	-0.14	-0.06	-0.03	-0.12	-0.06	-0.15		-0.55	-0.34	-0.13	-0.02	-0.11	0.10	0.05
11. State-owned firm	-0.05	-0.03	0.10	0.05	-0.04	-0.03	0.19	-0.11	0.03	-0.54		0.26	0.04	0.13	0.12	-0.10	-0.07
12. Buyer size	0.14	0.05	0.16	0.03	0.08	-0.15	0.24	0.09	-0.09	-0.33	0.27		0.01	0.08	-0.01	-0.04	-0.16
13. Supplier AS	-0.01	0.04	0.35	0.45	0.37	0.16	0.10	-0.02	0.27	-0.12	0.05	0.02		0.10	-0.05	-0.04	-0.03
14. Supplier importance	0.28	0.18	0.42	0.01	-0.04	-0.26	0.38	0.01	-0.03	-0.01	0.14	0.09	0.11		-0.16	0.06	-0.01
15. Mechanics	-0.16	-0.16	-0.09	0.03	-0.08	0.13	-0.04	-0.11	0.09	-0.10	0.13	0.00	-0.04	-0.15		-0.35	0.11
16. Heavy	0.07	0.08	-0.03	0.01	-0.04	-0.05	0.01	0.10	-0.11	0.11	-0.09	-0.03	-0.03	0.07	-0.34		-0.07
17. Guanxi importance	-0.03	0.17	0.08	-0.03	0.11	0.29	-0.13	-0.05	0.10	0.06	-0.06	-0.15	-0.02	0.00	0.12	-0.06	
18. MV marker (physical)	0.12	0.05	0.08	0.08	0.01	0.10	0.15	-0.03	0.13	-0.18	0.08	0.15	0.16	0.07	0.10	-0.09	-0.07
Mean	4.90	5.35	4.47	3.24	3.93	3.92	1.42	4.92	3.16	0.59	0.17	5.15	3.75	46.14	0.27	0.23	5.12
SD	1.06	1.07	1.37	1.36	1.06	1.37	0.60	1.23	1.35	0.49	0.37	1.02	1.29	29.03	0.45	0.42	1.18
Min	1.00	3.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	3.91	1.00	1.00	0.00	0.00	1.33
Max	7.00	7.00	7.00	6.50	6.40	7.00	3.69	7.00	6.33	1.00	1.00	8.99	6.50	100	1.00	1.00	7.00

Notes: 1. N = 211; $p < .05$ (two-tailed) for $|r| > 0.13$.

2. Below the diagonal is the zero-order correlation; above the diagonal is the correlation adjusted for potential common method variance with the MV marker technique.

Table 2 Standardized Estimates of Stage 1 Regression Analyses

Independent Variables	Calculative Trust	Relational Trust
	b	b
Buyer asset specificity	-0.08	0.12*
Supplier asset specificity	0.01	0.23**
Supply market uncertainty	-0.23**	0.24**
Behavioral uncertainty	0.20**	-0.34**
Prior experience	0.30**	0.25**
Guanxi importance	0.24**	0.19**
Adjusted R ²	0.19	0.34
Highest VIF	1.71	1.71
Model F	9.08	23.37
DF	6,204	6,204

** $p < .01$, * $p < .05$, † $p < .10$ (two-tailed).

Table 3 Standardized Estimates of Regression Analyses

Independent Variables	Supplier Performance					
	M1	M2	M3	M4	M5	M6
<i>Control Variables</i>						
Prior experience	0.10 [†]	0.13*	0.13*	0.13*	0.11 [†]	0.11 [†]
Contracts	0.31**	0.20**	0.22**	0.20**	0.18**	0.20**
Monitoring	-0.35**	-0.16*	-0.15*	-0.17*	-0.16*	-0.17*
Private firm	0.13 [†]	0.12 [†]	0.10	0.11 [†]	0.11 [†]	0.09
State-owned firm	0.00	0.00	-0.02	-0.01	-0.03	-0.05
Buyer size	0.09	0.08	0.08	0.08	0.09	0.09
Supplier AS	0.07	0.04	0.04	0.02	0.04	0.02
Supplier Importance	0.22**	0.14*	0.13*	0.14*	0.13*	0.12*
Mechanic	-0.07	-0.02	-0.02	-0.01	0.01	0.01
Heavy	-0.05	-0.04	-0.04	-0.05	-0.03	-0.05
Guanxi importance	0.04	0.06	0.07	0.07	0.06	0.07
<i>Direct Effects</i>						
Buyer asset specificity (AS)		-0.03	0.00	-0.02	-0.04	0.00
Supply market uncertainty (MU)		0.11 [†]	0.12*	0.15*	0.10 [†]	0.14*
Behavioral uncertainty (BU)		-0.23**	-0.25**	-0.22**	-0.23**	-0.24**
Calculative trust (CT)	H1a:	0.35**	0.34**	0.34**	0.34**	0.31**
Relational trust (RT)	H1b:	0.12*	0.13*	0.13*	0.14*	0.11 [†]
<i>Interactions</i>						
CT × Buyer AS	H2a:		-0.16**			-0.15**
RT × Buyer AS	H2b:		0.11*			0.12*
CT × Supply market uncertainty	H3a:			-0.14*		-0.13*
RT × Supply market uncertainty	H3b:			0.12*		0.14*
CT × Behavioral uncertainty	H4a:				0.13*	0.14*
RT × Behavioral uncertainty	H4b:				0.02	0.04
Adjusted R ²	0.35	0.48	0.51	0.50	0.50	0.53
R ² Change		0.13**	0.03**	0.02*	0.02*	0.05**
Highest VIF	1.61	1.92	1.94	1.94	2.00	2.03
Model F	11.52	13.45	13.93	13.20	12.70	12.34
DF	11,199	16,194	18,192	18,192	18,192	22,188

** $p < .01$, * $p < .05$, [†] $p < .10$ (two-tailed).

The Appendix: Measurement Items and Validity Assessment (Main Model)

	Factor Loading
Calculative trust: CR = .82, AVE = .61, HSV = .29	
1. Considering rewards and punishments, both parties behave honestly in dealing with each other.	.84
2. The behavior of both parties is trustworthy because the costs and punishments of misconduct are very high.	.79
3. We expect the relationship with this supplier to continue for a long time.	.70
Relational trust: CR = .89, AVE = .73, HSV = .27	
1. Both parties would let the other make decisions because we both think like one another.	.80
2. Both parties can effectively act for the other because both share the same understanding of what matters.	.87
3. Both parties are confident that their interests will be fully protected, because both share a common identity.	.89
Supplier performance: CR = .92, AVE = .74, HSV = .29	
Please rate this supplier's performance on the following aspect (1 = needs great improvement, 7 = excellent)	
1. Product quality.	.86
2. Timeliness of delivery.	.84
3. Sales, service, and/or technical support.	.88
4. Total value received	.85
Buyer asset specificity: Please indicate the extent to which your firm has made investments or changes <i>specifically to accommodate</i> this supplier (1 = none, 7 = a great deal): CR = .90, AVE = .70, HSV = .24	
1. product's features.	.77
2. personnel.	.87
3. inventory and distribution.	.86
4. capital equipment and tools.	.83
Supply market uncertainty: CR = .85, AVE = .54, HSV = .19	
For this supply market, the following factors are changing (1 = very infrequently, 7 = very frequently)	
1. Pricing	.46
2. Product feature and specifications	.78
3. Vendor support services	.84
4. Technology used by suppliers	.87
5. Product supply	.66
Behavioral uncertainty: CR = .72, AVE = .57, HSV = .32	
1. It is difficult to evaluate if this supplier follows our recommended operating procedures.	.86
2. We don't have accurate reports about this supplier's activities.	.84
Supplier asset specificity: Please indicate the extent to which the supplier has made investments or changes <i>specifically to accommodate</i> your request (1 = none, 7 = a great deal): CR = .88, AVE = .64, HSV = .24	
1. product's features.	.71
2. personnel.	.87
3. inventory and distribution.	.79
4. capital equipment and tools.	.83
Monitoring: CR = .92, AVE = .80, HSV = .32	
1. We spend a lot of time to control quality and quantities of deliveries from this supplier.	.90
2. We watch this supplier closely to make sure on-time delivery occurs.	.93
3. We monitor the operational procedures of this supplier.	.86
Explicit contracts: CR = .91, AVE = .71, HSV = .16	
In dealing with this supplier, to what degree do you rely on the written contracts (as opposed the shared understanding) to specify (1 = very low; 7 = very high):	
1. the role of each party	.78
2. the responsibility of each party	.92
3. how each party is to perform	.92
4. what will happen in the case of events occurring unplanned	.73
Guanxi importance: CR = .86, AVE = .66, HSV = .10	
1. In this market, business depends on good connections with friends and family.	.84
2. In this market, Guanxi is still very important.	.75
3. In this market, Guanxi is a requirement for success.	.85
Model Fit: $\chi^2(515) = 1105, p < .01$; CFI = .90, IFI = .90; RMSEA = .07	

Notes: CR = composite reliability; AVE = average variance extracted; HSV = highest shared variance with other constructs. If unspecified, the scales are anchored as 1 = strongly disagree, 7 = strongly agree.