Strategic performance effects of misaligned formal contracting: the mediating role of relational contracting

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Please see http://www.runmycode.org/companion/view/1108 for all the data and the code used to estimate the models.

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Highlights:

- Firms experience significant losses due to misaligned formal contracting.
- Misalignment matters more for end-product enhancements than for cost reductions.
- Relational contracting mediates the negative performance effects of misaligned formal contracting.

ABSTRACT

Studies show that failing to align formal contracts with transaction attributes reduces relationship performance. However, few studies consider either how the effects of misalignment differ across outcome types or the mechanisms through which misalignment affects performance. This study examines the effects of misaligned formal contracting on two types of outcomes, i.e., end-product enhancements and cost reductions, and on one mechanism through which misalignment affects performance, i.e., relational contracting. Using survey data from 305 buyer-supplier relationships in the Scandinavian wood industry, the findings suggest that (1) misalignment has a significantly stronger negative effect on end-product enhancements than on cost reductions, and (2) relational contracts mediate the effect of misaligned formal contracting on performance. Firms in the sample experience significant misalignment-related losses of 10.3% and 5.3% in end-product enhancements and cost reductions, respectively. The findings suggest that misalignment is particularly harmful to performance outcomes that rely on relational contracting, such as end-product enhancements.

KEYWORDS

Formal contracting, relational contracting, relational norms, misalignment, transaction cost economics, end-product enhancement outcomes, cost reduction outcomes, inter-organizational relationships

INTRODUCTION

One of the most important decisions facing business-to-business (B2B) marketing managers is the use of formal contracts to govern transactional hazards in customer relationships. Such contracts are implemented to realize strategic performance outcomes, such as cost reductions and improved products and services (Ghosh & John, 1999; 2005). Moreover, transaction cost economics (TCE) is a dominant perspective in B2B relationship management. TCE's primary recommendation is summarized in the discriminating alignment hypothesis: firms should "align transactions, which differ in their attributes, with governance structures, which differ in their costs and competencies, in a discriminating (mainly transaction cost economizing) way" (Williamson, 1991, p. 79). For B2B marketers and purchasers, this principle encourages high performance through consciously engineering formal contracts to account for transactional attributes, such as transaction-specific investments and uncertainty.

The TCE literature terms the failure to align governance forms with transaction attributes as *misalignment* or *misaligned governance* (e.g., Mooi & Gilliland, 2013). We use the term misalignment[1] more narrowly and refer to *misaligned formal contracting*, which means that the parties have chosen a level of formal contracting that deviates from the appropriate or expected level of formal contracting under given transaction attributes. Prior research strongly supports the hypothesis that misaligned formal contracting erodes performance (see Web-appendix A). However, two key areas remain unexplored.

First, although several studies of the relationship between contracting and performance consider multiple types of performance outcomes, few test for effect differences[2]. Ghosh and John (2005) is the only study that tests for performance differences by comparing cost

[1] The most common term in the TCE literature is "misalignment" (e.g., Mooi & Ghosh, 2010). Some authors, however, use "alignment", "fit", and "misfit". "Misfit" and "misalignment" are synonyms and antonyms of "fit" and "alignment", respectively. We use "misalignment" and "misaligned formal contracting" interchangeably.

[2] To our knowledge, only four studies formally test for effect differences. Ghosh and John (2005) study the difference between cost reduction and end-product enhancement outcomes. Bercovitz, Jap, and Nickerson (2006) examine the differences between current and expected future performance. Mesquita and Brush (2008) consider the differences between production and negotiation efficiencies. Finally, Mooi and Ghosh (2010) examine the differences between *ex ante* contract negotiation costs and *ex post* transactional problems.

reductions and end-product enhancements (i.e., improved end-product utility). These two outcome types have different strategic implications: whereas cost reductions are important in cost leadership strategies, end-product enhancements are essential in differentiation strategies. Hence, we label these relationship performance outcomes *strategic performance outcomes*. Moreover, these two outcome types differ regarding how easily they can be written into contracts *ex ante* and the ease with which they can be enforced in court *ex post* (Ghosh & John, 2005). The contracting choices made by buyers and sellers thus have different effects on cost reductions compared with end-product enhancements. Ghosh and John (2005) find that contract flexibility (i.e., the extent to which the contract leaves certain aspects open for later negotiation) has different effects on cost reductions and end-product enhancements depending on the level of the buyer‟s asset specificity and the buyer‟s position in the end-product market.

In this study, we analyze the effects of misaligned formal contracting on cost reductions and end-product enhancements. In contrast to Ghosh and John (2005), we study misalignment between transaction attributes and the *level of formal contracting,* which is the detail with which explicit contract terms specify the agreement and formalize the parties‟ roles and contingency plans (Lusch & Brown, 1996; Macneil, 1980). A detailed contract can be either rigid or flexible. The core functions of formal contracting are as follows: (1) to facilitate court enforcement, i.e., a more detailed contract specifies a broader area of the parties‟ relationship (Klein Woolthuis, Hillebrand, & Nooteboom, 2005) and (2) to act as a coordination device (e.g., Wuyts, 2007). Hence, the level of detail is often viewed as one of the most important aspects of formal contracting (Argyres & Mayer, 2007).

An often overlooked function of detailed formal contracting is to facilitate the self-enforcement of relational contracts (Klein, 1996). By contrast, contract flexibility (rigidity) presupposes or implies that a relational contract already exists (does not exist) (Carson, Madhok, & Wu, 2006). In relational contracting, the parties implicitly or informally agree on

the terms of exchange and self-enforce the contractual agreement rather than relying on enforcement through the judicial system (Gilson, Sabel, & Scott, 2010). Based on TCE, we argue that misaligned formal contracting undermines relational contracts and that more extensive use of relational contracting is required to realize end-product enhancements than to realize cost reductions. Thus, misalignment should have a stronger negative effect on end-product enhancement than on cost reduction. By examining these effects empirically, we deepen our understanding of the role of formal contracting in realizing these two outcomes and shed light on important tradeoffs that firms should consider when designing contracts.

Second, few empirical studies use mediation tests to examine the mechanisms through which misalignment affects performance. Testing mediation hypotheses may provide additional support for TCE and its core arguments, thereby increasing our understanding of how misalignment affects performance. Although Jap and Ganesan (2000) test for mediation, their proposed mediator, supplier commitment, does not mediate the effect of misalignment. Therefore, other mediators should be considered. Considering the importance of relational contracting to relationship performance (e.g., Bercovitz et al., 2006; Jap & Ganesan, 2000), we expect it to act as a key mediator.

In summary, we hypothesize that the negative effects of misalignment are stronger on end-product enhancements than on cost reductions, and that relational contracting mediates these effects. Importantly, comparing two different outcomes is a form of moderator analysis in which the outcome type is a moderator describing the characteristics of the outcome. Outcome types should thus offer insight into the mechanisms through which misalignment affects performance (Ghosh & John, 2005). Hence, testing for effect difference complements mediation tests when assessing a proposed mechanism, and consistency between the results of testing the two hypotheses lends additional confidence to the results.

In this study, we provide theoretical argumentation for these two hypotheses and

report the results from testing them on a sample of 305 buyer-supplier relationships in the Scandinavian wood industry. The analysis accounts for the endogeneity of both formal and relational contracting, and we discuss the implications of our findings. The Web-appendices report more detail regarding the data and methods presented in the paper.

THEORY AND HYPOTHESES

The discriminant alignment hypothesis and its implications: The discriminant alignment hypothesis suggests that firms should align formal contracts with transaction attributes. Williamson (e.g., 1985) describes three transaction attributes – asset specificity, uncertainty, and frequency – and he identifies asset specificity as "the big locomotive to which TCE owes much of its predictive content" (1985, p. 56). In addition, the empirical literature suggests that performance ambiguity and complexity should be included as transaction attributes (e.g., Mooi & Ghosh, 2010). These attributes create exchange hazards that may create temptations for opportunistic behavior.

To „align formal contracts with transaction attributes" means two things. First, when a relationship is characterized by hazards such as asset specificity, firms should safeguard these investments by means of formal contracts. Second, when there are no hazards, firms should not use formal contracts. Empirical research typically finds a strong positive association between asset specificity and formal contracting, which suggests that firms tend to align asset specificity with more detailed formal contracts (e.g., Mooi & Ghosh, 2010). Because firms *should* align governance structures with transaction attributes, firms that fail to do so will experience weaker performance (Masten, Meehan, & Snyder, 1991; Williamson, 1985).

Misalignment and the fit-as-matching perspective: A large number of published studies examine the performance implications of misaligned governance, of which several have been published in marketing journals (Brettel, Engelen, & Müller, 2010; Cannon, Achrol, & Gundlach, 2000; Ghosh & John, 2009; 2005; Ghosh, Dutta, & Stremersch, 2006; Jap &

Ganesan, 2000; Mooi & Ghosh, 2010). The vast majority of empirical TCE studies support the idea that misalignment results in performance reductions, regardless of the context.

Within the TCE literature, two major perspectives regarding misaligned governance dominate: fit-as-moderation and fit-as-matching. The *fit-as-moderation perspective* conceptualizes misaligned governance as interaction terms between governance and transaction attributes. Because individual interaction terms in isolation do not offer any theoretical meaning, the fit-as-moderation perspective does not distinguish between the existence and the effect of misalignment (Venkatraman, 1989).

In this study, we rely on the *fit-as-matching perspective*. This perspective conceptualizes misaligned governance as *a variable in itself,* representing a theoretical match between one variable and one or several other variables (Venkatraman, 1989). For each transaction, there is an optimal or appropriate level of formal contracting, given transaction attributes. Both positive and negative deviations m_i from this level affect performance negatively. Therefore, the absolute value of m_i, $|m_i|$, defines misalignment as the distance from the optimal decision (Venkatraman, 1989). Hence, we define *misalignment* or *misaligned formal contracting* as the deviation between the chosen level of formal contracting and the appropriate or expected level of formal contracting under a given set of transaction attributes. Hence, a misaligned formal contract has either too much or too little detail.

How do we know if the contract contains too much or too little detail? The most common analytical approach to the fit-as-matching perspective is "residual analysis" (Venkatraman, 1989, p. 431). Residual analysis has been used in studies of both continuous and discrete governance variables in marketing (Mooi & Ghosh, 2010) and related fields (e.g., Bercovitz et al., 2006; Nickerson & Silverman, 2003). Residual analysis is a two-stage procedure in which the first stage involves regressing the governance variable onto transaction attributes. The second stage involves regressing performance onto misalignment

that is measured as the absolute value of the residual $|\hat{\varepsilon}_i|$ from the first-stage regression.

The residual analysis rests on three assumptions: (1) competition tends to weed out inefficient alignments, and the first-stage estimates can be assumed to reflect efficient behavior; (2) firms sometimes make poor contract choices, and the absolute value of the first-stage residual $|\hat{\varepsilon}_i|$ can be assumed to reflect mistaken contract choices and thereby captures $|m_i|$; and (3) evolutionary forces do not immediately weed out mistakes despite competition, and a significant portion of the population is likely to be misaligned (Web-appendix B offers further details about these assumptions and why they should hold in our context).

An advantage of residual analysis is that we can construct a misalignment variable that corresponds to how TCE describes poor alignments. Instead of judging multiple interaction terms and their significance levels, we identify variation in the governance choice variable due to mistakes and develop a single global index of misalignment. We can thus examine both its antecedents and performance consequences (e.g., Nickerson & Silverman, 2003).

Strategic performance outcomes and relational contracting: As noted in the introduction, cost reductions and end-product enhancements differ in several ways. *Cost reductions* are the buyer‟s net gains from lower production and administration costs that are realized through cooperation with the supplier, such as improved logistics and/or better fit between the supplier‟s components and the buyer‟s production processes (Ghosh & John, 2005). Such outcomes are simple to specify in a contract *ex ante* because they can be quantified. Similarly, they are quite easy to measure, verify, and attribute to the efforts and specific investments made by each of the parties *ex post* (Ghosh & John, 2005).

By contrast, *end-product enhancements* are the net gains from the improved utility of the end-products realized through cooperation with the supplier, such as better differentiation of the buyer‟s end products and improved customer perceptions (Ghosh & John, 2005). End-product enhancements often require complex problem solving through joint search processes

across different parts of the value chain. Because search processes are time-consuming, parties often suggest and implement actions to improve the end products *ex post*, making it difficult to specify such outcomes contractually *ex ante.* It is also difficult to relate the parties‟ individual actions to end-customer perceptions and sales margins, which makes it difficult to measure, verify, and attribute end-product enhancements *ex post* to the efforts and specific investments made by each party *ex ante*. In addition, end-product markets are often exposed to exogenous market changes, making it difficult to rely on the direct effects of contractually specified incentives to improve end-products (Ghosh & John, 2005).

In summary, because end-product enhancements require the parties to undertake *ex post* adaptations to a greater extent than for cost reductions, end-product enhancements are more difficult to specify in contracts *ex ante* and to enforce in court *ex post*.

Relational contracting is typically studied as *relational norms,* which means that the parties share mutual expectations and informal rules that motivate certain behaviors, including solidarity, flexibility, and information exchanges (Heide & John, 1992; Macneil, 1980). Previous studies typically find that such relational contracts positively affect relationship performance (e.g., Bercovitz et al., 2006; Jap & Ganesan, 2000). However, because end-product enhancements are more difficult to specify *ex ante* and enforce in court *ex post*, realizing end-product enhancements relies on the use of self-enforced relational contracts to a greater extent than realizing cost reductions.

Relational contracting and misalignment: As discussed above, detailed formal contracting facilitates (1) *court enforcement* of the promises specified in the contract; (2) *coordination*; and (importantly) (3) *self-enforcement* of *relational contracts*. More detailed contracts can lead to improved self-enforcement of relational contracts for two reasons. First, formal contracts reduce the incentives for opportunism by facilitating court enforcement of the contractible dimensions of the exchange, which will further increase the expected future

value of the relationship and motivate the parties to honor implicit promises (Klein, 1996).

Second, formal contracts shift rents between the parties and create hostages, such as in shifting decision control (Baker, Gibbons, & Murphy, 2011). Hostages created by a contract can be used to equalize the parties‟ relative costs of opportunism. This concept has been referred to as dependence balancing (Heide & John, 1988) or hazard equilibration (Masten, 1988). The notion is to minimize the temptation to act opportunistically by equilibrating the potential costs that the parties can inflict upon one another (Williamson, 1983). In summary, formal contracts can bolster and ensure the credibility of relational contracts.

Nonetheless, although formal contracting can support relational contracting, it also has the potential to undermine self-enforcement of relational contracts. The concept of misalignment captures this double-edged nature of formal contracts. First, if a contract has *too little detail*, we have a negative misalignment. Detailed formal contracts specifying roles and contingency plans shift rents, obligations, and authority between the parties, which enables safeguarding, coordination, and monitoring for the party at risk (Heide & John, 1988). Thus, a negative misalignment implies that the relationship is under-safeguarded, under-coordinated, and under-monitored (Mooi & Ghosh, 2010). This type of misalignment increases the temptation to act opportunistically by means of (1) forced renegotiations, (2) refusals to adapt, and (3) performance evasion (Wathne & Heide, 2000).

Second, if a contract has *too much detail*, we have a positive misalignment. Because formal contracts are incomplete, the authority granted to the parties by the contract can itself be exploited for opportunistic purposes (Klein, 1996). The parties may, for example, (1) force renegotiation by falsely claiming dissatisfaction, suing for trivial deviations, or implying that the other party has breached the contract; (2) work to rule; or (3) exploit loopholes and ambiguous terms in the contract (Masten, 1988; Wathne & Heide, 2000) . In other words, in trying to renegotiate the agreement, one party may make claims based on a literalist

understanding of specific terms in the formal contract. However, such behavior is often contrary to the original contractual understanding (Baker, Gibbons, & Murphy, 2002; Klein, 2000). Thus, when transactional hazards are low, an overly detailed formal contract represents a hazard in itself by making the relationship over-safeguarded, over-coordinated, and over-monitored (Mooi & Ghosh, 2010), leading to a greater temptation to act opportunistically.

Therefore, regardless of whether the formal contract is more or less detailed than the appropriate level required by given transaction attributes, misalignment implies a failure to equilibrate hazards and increases the incentives to act opportunistically. The contract does not "equate on the margin the expected costs of opportunistic behavior" (Masten, 1988, p. 191) and therefore undermines the credibility of the relational contract.

Hypotheses: In the discussion above, we argue as follows: (1) relational contracting positively affects performance, (2) relational contracting is required more to realize end-product enhancements than to realize cost reductions, and (3) misaligned formal contracts should negatively affect relational contracts. Combined, these three arguments suggest that relational contracting acts as a mediating mechanism in understanding how misalignment affects performance and that misalignment should be more detrimental for end-product enhancements than for cost reductions. Therefore, we hypothesize as follows:

H1: *Misalignment has a stronger negative effect on end-product enhancements than on cost reductions.*

If H1 is supported, it will also provide indirect evidence of the mediating role of relational contracting. However, we also explicitly test if relational contracting mediates the effect of misalignment on performance and thus hypothesize the following:

H2: *Relational contracting mediates the negative effect of misalignment on relationship performance.*

METHODS

Research context: We study Scandinavian firms purchasing wood-based raw materials and/or components. The Scandinavian wood industry is useful as a context for our study for two reasons. First, the wood industry is characterized by substantial variance in transaction attributes. On the one hand, wood is heavy and bulky, making transportation costly and thereby motivating firms to invest in high-quality logistics systems. Wood may also require careful handling with respect to moisture and storage and is heterogeneous, which motivates efforts to optimize splitting, sorting, processing, and use. These efforts may require both relationship-specific investments and adaptations over time. A variety of firms purchase wood products, including processing firms (sawmills and planing mills), resellers (retailers and wholesalers), and assemblers (construction firms, joineries, and furniture factories). Hence, suppliers often adapt their products and services to their customers" unique needs. On the other hand, many products in this industry are highly standardized, which may lead to low degrees of relationship-specific investments. Assuming that firms want to align governance structures with transaction attributes, we should observe substantial variation in the use of formal contracts – from simple to highly detailed contracts.

Second, the industry is fragmented and competitive because of limited scale advantages, small firms, and standardized technologies. The competition should weed out many inefficient alignments, which leads us to believe that the assumptions underlying the residual analysis will hold in this setting.

Research design and data gathering: We rely on a single key informant in each buying organization; each informant was responsible for purchasing and had more than two years of purchasing experience. We contacted 2,365 (out of approximately 2,644) business units by telephone. We reached 651 people willing to participate from whom we received 305 complete responses. Web-appendix C provides a detailed description of the research design and data gathering.

Measures, measure development, and validation: Our empirical models contain (a) endogenous variables, (b) instrumental variables (IVs) for formal contracting, (c) IVs for relational contracting, and (d) control variables. We use existing measures whenever possible and ensured context-relevant item wording by conducting nine in-depth interviews with potential informants. We validate the measures using confirmatory factor analysis and find that the measures demonstrate satisfactory reliability, unidimensionality, internal and external consistency, and convergent validity. Discriminant validity is also satisfactory.

We assess non-response bias by comparing early and late responders, and find no problem. We assess common method bias by including an extra factor in our first-order confirmatory factor analysis. We allow this factor to affect all perceptual scale items, but it explains only 3.2% of the variance in items, which indicates that common method variance is not a major problem. Web-appendix D provides detailed descriptions of all the measures, correlations, descriptive statistics, and measure validation.

Empirical models: The empirical analysis should account for the self-selection and endogeneity of formal contracting and relational contracting because it ensures unbiased parameter estimates for misalignment and relational contracting. Furthermore, we must measure and estimate the effect of misalignment properly. To address these issues, we develop a three-step procedure that we explain below. Step 1 estimates the drivers of formal contracting and generates the misalignment measure. Step 2 tests H1 by estimating the effects of misalignment on the two performance variables while accounting for the self-selection of formal contracting. Step 3 tests H2, the mediation hypothesis, while accounting for the endogeneity of the mediator (i.e., relational contracting).

Step 1, generating the misalignment measure: We generate the misalignment measure by regressing formal contracting FC_i onto the explanatory variables using heteroskedasticity-robust ordinary least squares (OLS):

$$FC_i = \gamma_{FC0} + \mathbf{IVFC_i}\boldsymbol{\gamma}_{\mathbf{FC1}} + \mathbf{IVRC_i}\boldsymbol{\gamma}_{\mathbf{FC2}} + \mathbf{CV_i}\boldsymbol{\gamma}_{\mathbf{FC3}} + \varepsilon_i \quad (1)$$

where $\mathbf{IVFC_i}$ is a vector of IVs for formal contracting that includes the following variables: relationship complexity, annual purchasing value, and headquarters influence over purchasing. $\mathbf{IVRC_i}$ is a vector of IVs for relational contracting and contains the two variables: the degree of internal procurement and knowledge similarity. $\mathbf{CV_i}$ is a vector of transaction attributes and control variables that will be used in all equations and includes the following variables: buyer- and supplier-asset specificity and their interactions and quadratics, environmental uncertainty, performance ambiguity, buyer-firm size, buyer and supplier experience in sales and marketing, and sub-industry dummies. ε_i is the error term. The γs are parameters.

For each observation in the sample, we predict the first-stage residual $\hat{\varepsilon}_i$ and take the absolute value to create our measure of misalignment: $MISALIGNMENT_i = |\hat{\varepsilon}_i|$.

Step 2, testing H1: When estimating the effects of $MISALIGNMENT_i$ on the performance variables, we must account for self-selection. Actors make formal contracting decisions by observing components of the gains from formal contracting. However, some of these components are likely to be unobserved in our dataset and, by definition, they will be captured by the first-stage residual $\hat{\varepsilon}_i$. $MISALIGNMENT_i$ is therefore not a pure measure of inappropriate governance alignments; it may also reflect unobserved components of the effect of formal contracting.

From the literature on the correlated random coefficient model and control function estimators for this model, we know that self-selection and unobserved comparative advantages can be accounted for by allowing the endogenous variable to interact with a first-stage residual (e.g., De Blander, 2010; Garen, 1984; Heckman, 1979). Indeed, previous studies that take a fit-as-matching perspective have often included an interaction term between the choice variable and the first-stage residual, in addition to the misalignment

variable (see e.g., Castañer, Mulotte, Garrette, & Dussauge, 2014; Leiblein, Reuer, & Dalsace, 2002; Parmigiani & Holloway, 2011). Hence, we estimate the following equations:

$$CR_i = \gamma_{CR0} + \theta_{CR} MISALIGNMENT_i + \mathbf{IVRC_i}\boldsymbol{\gamma}_{\mathbf{CR2}} + \mathbf{CV_i}\boldsymbol{\gamma}_{\mathbf{CR3}} + \rho_{CR1}\hat{\varepsilon}_i + \beta_{CRi} FC_i + u_{CRi} \quad 2a$$

$$EE_i = \gamma_{EE0} + \theta_{EE} MISALIGNMENT_i + \mathbf{IVRC_i}\boldsymbol{\gamma}_{\mathbf{EE2}} + \mathbf{CV_i}\boldsymbol{\gamma}_{\mathbf{EE3}} + \rho_{EE1}\hat{\varepsilon}_i + \beta_{EEi} FC_i + u_{EEi} \quad 3a$$

where CR_i and EE_i are cost reductions and end-product enhancements, respectively. $\hat{\varepsilon}_i$ controls for the endogeneity of formal contracting. To identify the average effects of formal contracting, we exclude $\mathbf{IVFC_i}$ from entering Equations 2a and 3a. θ_{CR} and θ_{EE} represent the effects of misalignment on cost reductions and end-product enhancements, respectively. The γ s and ρ s are parameters; u_{CRi} and u_{EEi} are error terms; and β_{CRi} and β_{EEi} are the heterogeneous relationship-specific effects of formal contracting. β_{CRi} and β_{EEi} are given by:

$$\beta_{CRi} = \beta_{CR} + \rho_{CR2}\hat{\varepsilon}_i + \beta_{CRsq} FC_i \quad 2b$$

$$\beta_{EEi} = \beta_{EE} + \rho_{EE2}\hat{\varepsilon}_i + \beta_{EEsq} FC_i \quad 3b$$

where β_{CR} and β_{EE} are the main effects of formal contracting on the two performance variables. Including $\hat{\varepsilon}_i$ in Equations 2b and 3b allows for an interaction term between formal contracting and the first-stage residual in the effect on performance. Thus, ρ_{CR2} and ρ_{EE2} are the parameters for the interaction term between and $\hat{\varepsilon}_i$ and formal contracting. This interaction term controls for the way in which the effect of formal contracting may depend on unobserved comparative advantages and how contracting choices due to self-selection correlate with these unobserved factors.

We test H1 by assessing the significance of the difference between θ_{CR} and θ_{EE}:

$$\Delta\theta = \theta_{EE} - \theta_{CR}. \quad 4$$

Step 3, testing H2: Estimating the mediated effects of misalignment on the two performance

outcomes first involves estimating the effect θ_{RC} of misalignment on relational contracting. We do so by using a similar estimator as Equation 2a/b. Next, we estimate the effects of relational contracting, δ_{CR} and δ_{EE}, on the two performance variables while accounting for the endogeneity of relational contracting. We do so by using a simple control function estimator. Finally, we estimate the significance of the product terms $\theta_{RC}\delta_{CR}$ and $\theta_{RC}\delta_{EE}$. Please see Web-appendix E for further details on Step 3.

Model evaluation and estimation: We empirically evaluate whether the IVs satisfy the exogeneity and relevance conditions and find that the IVs satisfy the exogeneity condition but they have somewhat weak relevance. The IVs for relational norms are particularly weak.

Two issues are of concern when estimating the models. First, several of the equations include generated regressors (e.g., the misalignment variable is generated based on prior regressions). Unless corrected for, generated regressors lead to incorrect standard errors for the parameter estimates (Wooldridge, 2010). Second, mediated effects tend to be asymmetrically distributed rather than normally distributed in finite samples. Because of this asymmetry, tests relying on the assumptions of normality provide underpowered tests of mediation (Hayes, 2013). Both problems can be addressed using the bootstrap method, and we use bias-corrected bootstrap confidence intervals for hypothesis testing.

Web-appendix E provides a detailed description of model evaluation and estimation.

RESULTS

Before testing the hypotheses, we regress formal contracting upon several transaction attributes and control variables. Notably, we find that buyer and supplier asset specificity, relationship complexity, and annual purchasing value all have significant effects. These results are consistent with both TCE theory and previous empirical findings (see Web-appendix F for more details and results), and we can assume that the absolute value of the residuals from this regression represent misaligned formal contracting.

Figure 1 illustrates the main results and shows that misalignment negatively affects both cost reductions and end-product enhancements. The difference between the two effects is significant at the 5% level and supports H1 (-0.41, bootstrap standard errors (BSE) = 0.21, 95% bias-corrected bootstrap confidence interval (BCBCI):[-0.92; -0.07]).

---- Insert Figure 1 about here ----

Turning to H2, misalignment has a significant negative effect on relational contracting, and relational contracting has significant positive effects on both cost reductions and end-product enhancements. The mediated effects of misalignment through relational norms are negative and significant at the 1% level for both cost reductions (-0.36, BSE= 0.15, 99% BCBCI: [-0.88; -0.11]) and end-product enhancements (-0.48, BSE = 0.19, 99% BCCBCI: [-1.10; -0.16]), which supports H2.

We further explore the findings by estimating the expected outcome for each firm in the sample if it had avoided misalignment and chosen the recommended level of formal contracting, and we calculate the total loss as a percentage over the entire sample. We find that misalignment results in a total loss for the firms in the sample of 10.3% in terms of end-product enhancements and 5.3% in terms of cost reductions. The 95% BCBCI indicates that the losses are significant: [-17%; -6%] and [-11%; -1%], respectively.

Web-appendix F provides a detailed reporting of the analyses and also reports robustness checks and post-hoc analyses. The robustness checks show that (a) the models are robust to a number of changes in the models, which indicates that the weak IVs are not problematic, and (b) misalignment has no significant direct effects on performance when controlling for relational contracting, which suggests full mediation. The post-hoc analyses show that (a) the two mediated effects are significantly different from one another ($p<0.05$), but not under all model specifications, and (b) purchasing manager sales and marketing experience is negatively related to the level of misalignment ($p<0.01$). The latter finding is

consistent with the assumptions underlying the residual analysis and support the notion that the absolute value of the first-stage residual captures misalignment.

DISCUSSION

Findings and theoretical contribution: This study provides a deeper understanding of TCE by supporting the hypothesis that misaligned formal contracting has a significantly greater negative effect on end-product enhancements than on cost reductions and that relational contracting mediates these effects.

Only one previous study compares the effect of misaligned governance with respect to these two performance outcomes (Ghosh & John, 2005). Expanding on the insight from Ghosh and John (2005), our results suggest how cost reductions and end-product enhancements can be achieved and traded off against one another during the contracting process by specifying contracts that are more or less detailed. The findings suggest that end-product enhancements are highly sensitive to misalignment between formal contracting and transaction attributes. The effect of misalignment on end-product enhancements is significantly stronger than the effect on cost reductions. Hence, firms aiming at realizing end-product enhancements should pay close attention to misalignment. However, because reducing misalignment will result in significantly smaller effects on cost reductions, efforts to reduce misalignment are not likely to substantially reduce costs. Attempting to reduce the overall level of misalignment at the firm level may even lead to increased costs because reducing misalignment can itself be difficult and costly. A number of studies suggest that contracting and aligning contracts with transaction attributes is an activity that must be learned and that firms can build contracting capabilities (e.g., Argyres & Mayer, 2007; Mayer & Argyres, 2004). Consistent with these studies, our post-hoc analysis shows that experience in sales and marketing relates negatively to misalignment. However, building contracting capabilities by hiring experienced managers, for example, is likely to be costly. Hence, at the

firm level, the decision to reduce misalignment may involve a tradeoff between end-product enhancements and cost reductions: Reducing misalignment increases revenues, but it may simultaneously increase costs.

However, although efforts to reduce misalignment may lead to only small relationship-level cost reductions and higher costs at the firm-level, the resulting end-product enhancements may lead to longer-term performance benefits. The difficulties and costs involved in reducing misalignment and thereby in supporting relational contracts and end-product enhancements, also represent barriers to imitation. Indeed, recent research suggests that relational contracts can be a source of persistent performance differences precisely because they are difficult to imitate or replicate (Gibbons & Henderson, 2012). In support of this argument, prior research finds that gains from revenue-expanding differentiation strategies by means of end-product enhancements tend to be greater than those from low-cost strategies (e.g., Rust, Moorman, & Dickson, 2002; Ulaga & Eggert, 2006).

We further contribute to the understanding of the misalignment-performance relationship by empirically confirming the mediation effects through relational contracting. To our knowledge, only one previous study engages in a similar mediation test (Jap & Ganesan, 2000), but the proposed mediator in that study, supplier commitment, does not mediate the misalignment-performance relationship. We propose an alternative mediator, relational contracting, and find that it mediates the performance effects of misalignment.

Our findings contribute to both marketing research and TCE research more broadly. Prior quantitative field studies find that formal contracting either has a positive (e.g., Poppo & Zenger, 2002) or nonsignificant (e.g., Lusch & Brown, 1996) effect on relational contracting, whereas experimental research (e.g., Bohnet, Frey, & Huck, 2001) tends to suggest negative effects (except Lazzarini, Miller, & Zenger, 2004). Our findings are more nuanced and correspond to economic theory by suggesting that the effects can be both positive and

negative (e.g., Klein, 1996; Masten, 1988). We find that each relationship has an optimal level of formal contracting that depends on the attributes of the transaction. Increasing the level of contract detail to the optimal level has positive effects, whereas using overly detailed contracts (relative to this optimal level) has negative effects. Hence, aligning formal contracts with transaction attributes supports the credibility of relational contracts, which, in turn, has implications for performance.

Taken together, these findings suggest that formal contracting can be a double-edged sword. As a result, firms should play close attention to both the content and length of their contracts because formal contracting can both support and undermine relational contracting.

Managerial implications: The results suggest that managers should be concerned with aligning formal contracts to transaction attributes because misalignment leads to significant losses in terms of end-product enhancements (10.3% loss) and cost reductions (5.3% loss).

Previous research based on game-theoretical modeling claims that "a formal governance structure should be chosen not only for its own impact but also for how it affects the feasible set of relational contracts" (Gibbons, 2005, p. 237). Our results empirically support this argument. Managers may be tempted to write contracts that specify a wide range of contingencies and outcomes to provide direct *ex ante* incentives for certain behaviors. However, they should avoid writing overly detailed (or overly simplistic) contracts and recognize that contracts that are too detailed (or too simplistic) compared to the recommended level are likely to undermine relational contracts; in this manner, they can also undermine outcomes requiring relational contracting and *ex post* adaptation, such as end-product enhancements.

This study further suggests that the fit-as-matching perspective provides managers with a viable means of achieving desired outcomes. The fit-as-matching perspective suggests that the first step is to estimate the optimal governance choice in each unique situation and

then observe the effects of deviating from this optimal choice. Many companies use databases to manage their contracts and analyze supplier performance and customer profitability. Such data can be used to perform similar statistical analyses as in this study to facilitate learning and develop best practices. The analyses can be part of improvement programs, benchmarking studies, or even built into contract management software programs.

Limitations and further research: Improving and extending this study may provide directions for future research. Although we assess several assumptions underlying the analytical approach, we cannot entirely rule out alternative explanations. In Web-appendix G, we discuss threats to the validity of our findings and suggest that they are small.

There are ample opportunities for future research to consider other types of performance outcomes, other dimensions of relational and formal contracting, and other transaction attributes. For example, innovation outcomes rely to a great extent on relational contracting (Gilson, Sabel, & Scott, 2009). However, collaborative innovation is often subject to particular hazards, such as high technological uncertainty and complexity, high performance ambiguity, lack of previous experience with the partner, and knowledge leakage hazards. As Gilson et al. (2009) argue, collaborative innovation will often require the parties to resolve disputes and engage in joint planning and intensive learning about one another‟s motivations and capabilities. Relational contracts facilitating such behavior will thus be particularly useful and perhaps more useful than the norms studied here. Likewise, although contracts specifying roles and contingency plans are important in collaborative innovation projects, other dimensions may be even more important, such as the specification of property and decision rights, and the specification of the partners‟ rights and obligations to conduct reviews and exchange information (e.g., Carson & John, 2013; Gilson et al., 2009). A critical consideration in such cases is how firms should align these formal contract dimensions with transaction attributes to support relational contracts that, in turn, facilitate innovation.

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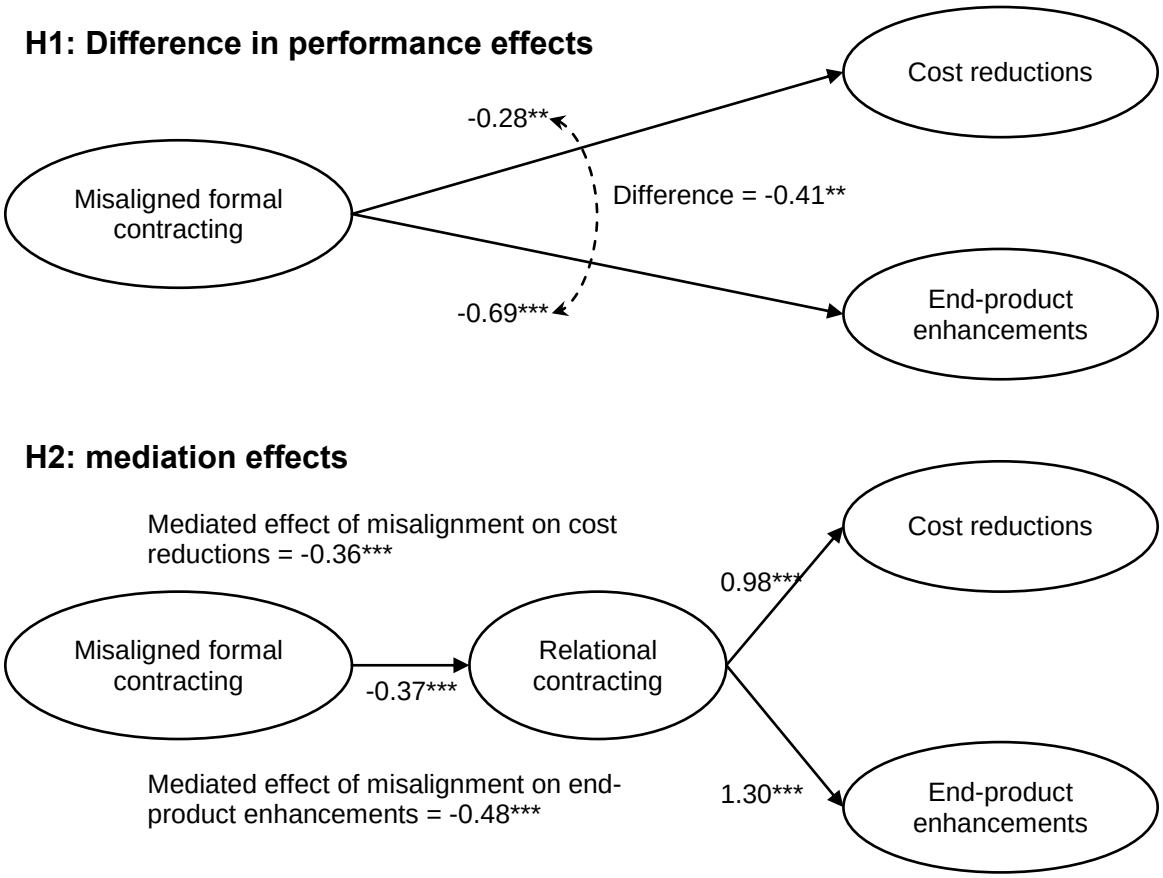
Figure 1: Results from hypothesis testing[a]



[a] We only illustrate the hypothesized effect. Please see web-appendix F for a more detailed description, including effects of control variables. We report unstandardized parameter estimates. Hypothesis tests are based on asymmetric bias-corrected bootstrap confidence intervals. *: p-value < 0.1, **: p-value < 0.05: **, and ***: p-value <0.01.

Web-appendices

Contents

Tables:

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Web-appendix A: Overview of earlier contract performance studies

The introduction of the paper refers to previous research on the contract-performance relationship. Table WA1 presents the papers that are based on the logic of the discriminating alignment hypothesis. A number of other papers have also been published on the contract-performance relationship, but we present only a few them here (number 18. – 23.) because they do not explicitly test implications of the discriminating alignment hypothesis.

Table WA1: Overview of earlier contract performance studies [(a)]

Classification based on whether the studies examine the effects of…	# Authors	Contract form			Performance effects				Support discriminating alignment hypothesis?
		Formal contracting	Contract flexibility	Relational contracting	Multiple performance variables	Formally test for differences in performance effects	Compare cost reductions and end-product enhancements	Examines mechanisms through which misalignment affects performance	
… formal contracting (i.e., low vs. high level of detail)	1. Mooi & Gilliland (2013)	●							Yes
	2. Carson & John (2013)	●							Yes
	3. Mooi & Ghosh (2010)	●			●	●			Yes
	4. Ghosh & John (2009)	●							Yes
	5. Anderson & Dekker (2005)	●			●				Yes
… contract flexibility (e.g., fixed price vs. cost plus contracts)	6. Mani, Barua, & Whinston (2012)		●		●				Yes
	7. Susarla & Barua (2011)		●						Yes
	8. Carson, Madhok, & Wu (2006)		●						Yes
	9. Ghosh & John (2005)		●		●	●	●		Yes
… relational contracting	10. Poppo, Zhou, & Zenger (2008)			●					Yes
	11. Bercovitz, Jap, & Nickerson (2006)			●	●	●			Yes
… both formal and relational contracting	12. Hoetker & Mellewigt (2009)	●		●					Partly
	13. Susarla, Barua, & Whinston (2009)		●	●	●				Yes
	14. Mesquita & Brush (2008)	●		●	●	●			Yes
	15. Poppo & Zenger (2002)	●		●					Yes
	16. Cannon, Achrol, & Gundlach (2000)	●		●					Yes
	17. Jap & Ganesan (2000)	●		●	●			●	Partly
… both formal and relational contracting but without considering alignment with transaction attributes[(b)]	18. Poppo & Zhuo (2014)	●		●					N.A.
	19. Kashyap, Antia, and Frazier (2012)	●		●	●				N.A.
	20. Wuyts & Geyskens (2005)	●		●					N.A.
	21. Ferguson, Paulin, and Bergeron (2005)	●		●					N.A.
	22. Achrol and Gundlach (1999)	●		●					N.A.
	23. Lusch and Brown (1996)	●		●					N.A.
	This study	●		●	●		●	●	**Yes**

[(a)] Grayed-out columns indicate under-researched areas. [(b)] Studies 18 to 23 consider the effects of governance on performance without considering how governance is aligned with transaction attributes. Instead they consider direct effects or interactions between governance mechanisms. N.A.=Not applicable.

Web-appendix B: Assumptions underlying residual analysis

The paper briefly describes three assumptions underlying residual analysis. We here describe these assumptions in more detail and provide evidence that they are viable. In Web-appendix C, we further argue that these assumptions will hold in our research setting, the Scandinavian wood industry.

The first assumption is that competition tends to weed out inefficient alignments (Anderson, 1996), which is a cornerstone assumption of TCE (Williamson, 1985) and supported by several empirical studies (e.g., Nickerson & Silverman, 2003; Susarla & Barua, 2011). This assumption means that the predicted level of formal contracting (based on first-stage parameter estimates that correspond to the logic of TCE) provides an estimate of the optimal and appropriate degree of formal contracting. Anderson (1988, p. 608) calls this prediction "the industry's recommendation".

The second assumption is that firms sometimes make poor contract choices. Azoulay and Shane (2001) suggest that a lack of knowledge leads contractors, for example, to apply erroneous heuristics or to blindly imitate others or follow the advice of others. The research by Mayer and colleagues (e.g., Argyres, Bercovitz, & Mayer, 2007; Mayer & Argyres, 2004) strongly suggests that contracting choices depend on prior knowledge and experience, which implies that firms and individuals with little knowledge and experience are likely to make poor contracting choices. This assumption means that mistakes – and thus misalignment – are not captured by the first-stage prediction but instead by the absolute value of the first-stage residual (Venkatraman, 1989). In other words, the absolute value of the first-stage residual should capture $|m_i|$.

The third assumption is that, despite competition, mistakes are not immediately weeded out by evolutionary forces. Nickerson and Silverman (2003) find that evolution toward more efficient governance alignments takes time because it can be costly and difficult to negotiate governance realignments. This assumption means that a significant portion of the population is likely to be misaligned at any given time.

Web-appendix C: Additional detail concerning research design and data gathering

Research design: Consistent with similar studies of industrial buyer-supplier relationships (Buvik & John, 2000; Wuyts & Geyskens, 2005), we rely on a single key informant in each buying organization (i.e., a business unit that may be part of a larger company/retail chain). Although the choice of a single key informant may lead to respondent bias, previous studies measuring both sides of the dyad indicate that buyer and supplier responses demonstrate significant correlation (e.g., Ghosh & John, 2005; Rokkan, Heide, & Wathne, 2003), particularly with respect to structural issues, such as formalization (John & Reve, 1982).

The key informants were responsible for purchasing and had more than two years of purchasing experience. To avoid systematic bias, we asked the managers to relate their answers to their third most important supplier (Rokkan et al., 2003).

Data gathering: Out of an estimated population of 2,644 business units, we contacted 2,365 business units by telephone. We reached 651 persons willing to participate, and 562 declined. In all, 1,152 business units were either outside the target group or unavailable. We sent the participants an e-mail with a link to the questionnaire. We sent two reminder e-mails and made one reminder phone call, and we re-contacted informants when necessary to provide missing data. We received a total of 305 complete responses.

Web-appendix D: Measure development, measures and measure validation

Measure development: Our empirical models contain (1) endogenous variables, (2) instrumental variables (IVs) for formal contracting, (3) IVs for relational contracting, and (4) control variables. Web-appendix E explains the roles of all the variables using equations.

We used existing measures whenever possible and ensured context-relevant item wording through nine in-depth interviews with potential informants. The interviewees completed the questionnaire and provided comments. All interviews were transcribed, and all issues encountered by the informants were classified and counted. In addition, we consulted industry experts to improve the measures.

Measures: We describe the measures below. All measures are reported in Table WD1. Table WD2 reports correlations and descriptive statistics.

Endogenous variables: We measure *formal contracting* along two dimensions. The first dimension, *role specification*, contains five items measuring the extent to which parties specify their different roles. The second dimension, *contingency planning*, contains three items measuring the extent to which parties specify how they will respond to various contingencies. These items were previously used by Lusch and Brown (1996) and Wuyts and Geyskens (2005).

Relational contracting is typically studied within the empirical research as *relational norms,* which is defined as the extent to which parties share mutual expectations and informal rules that control and coordinate the parties' behavior (Heide & John, 1992; Macneil, 1980). The relational norms construct is typically understood as a higher-order syndrome consisting of several more specific norms. Hence, we measure relational contracting with 11 items reflecting the relational norms of *solidarity*, *flexibility,* and *information exchange*. These items were previously used by Heide and John (1992), among others.

We measure *end-product enhancements* and *cost reductions* by two five-item scales used by Ghosh and John (2005). These scales measure the extent to which cooperation with suppliers has increased end-product utility and reduced costs for buyers. We made one modification to the end-product enhancements scale. Some of our informants did not like formulations such as ―our products and services" because they were not directly engaged in producing physical products but rather in wholesaling, importing, or retailing. For these types of firms, we instead used the formulation ―our product and service offerings", which is

conceptually similar and easily understood by the informants.

IVs for formal contracting: We measure *relationship complexity* by means of three items previously used by Selnes and Sallis (2003) that indicate the extent to which the relationship involves many different units and professions and whether products and services are complex. *Annual purchasing value* is measured in millions of Norwegian kroner, and we apply the natural logarithm. We measure *headquarter influence* through four items indicating the extent to which the headquarters controls the business unit‘s purchasing activities. The scale is new.

IVs for relational norms: *Knowledge similarity* is measured by four items indicating similarity in knowledge, education, and training between the purchasing manager responsible for the relationship and his or her most important contact person in the supplier organization. The scale is new. *Internal procurement* is measured by a 10-point scale (0% to 90%) indicating the share of purchases of the same products from internal suppliers (e.g., subsidiaries). We apply the natural logarithm.

Transaction attributes and control variables: *Buyer asset specificity* is measured by means of six items previously used by Heide and John (1992), Buvik and John (2000), and Rokkan, Heide, and Wathne (2003). The items assess the extent to which the buyer has made relationship-specific investments. *Supplier asset specificity* is measured by the same six items as buyer asset specificity but related to the investments made by the supplier. *Environmental uncertainty* is measured as the perceived volatility of the market environment. The scale consists of four items previously used by Buvik and John (2000) and Selnes and Sallis (2003). We include main terms, squared terms, and quadratic terms to account for potential non-linear relationships. We measure *performance ambiguity* by means of four items previously used by Heide and Miner (1992) and Wuyts and Geyskens (2005). The scale assesses the extent to which it is difficult to observe and evaluate supplier performance. We measure *purchasing manager* and *supplier contact person experience in sales and marketing* using two single-item scales. The informant rated his or her agreement with statements suggesting significant experience in sales and marketing. These items have previously been used by Korhonen-Sande (2010). *Buyer-firm size* is measured as the natural logarithm of the number of employees. The *sub-sector* dummies indicate raw-material processing firms (n=42); joinery factories, furniture factories and carpentries (n=171); construction firms (n=42); and reselling firms (n=50).

Measure validation: We initially conduct a confirmatory factor analysis for each construct. After removing three items, all scales have sufficient internal consistency. Second, we estimate the full measurement model but without second-order constructs. We remove five items due to high cross-loadings, and the first-order measurement model has satisfactory fit values (χ^2(df): 1973.61 (1318), RMSEA: 0.040, SRMR: 0.048, CFI: 0.97, Critical N: 209, and Parsimony-normed fit index: 0.79). Third, we apply the second-order factor structure that constitutes formal contracting as a set of restrictions on the first-order factor model. Applying this factor structure does not reduce the model fit ($\Delta\chi^2$(df)=12.55(16), p=0.71) and increases model parsimony (Parsimony-normed fit index: 0.80). Fourth, we similarly apply the second-order factor structure constituting relational norms. Adding these restrictions significantly decreases model fit ($\Delta\chi^2$(df)=58.16(30), p=0.00) but increases model parsimony (Parsimony-normed fit index: 0.82). Because all other fit indices remain satisfactory (RMSEA: 0.041, SRMR: 0.051, CFI: 0.97, Critical N: 210) and because the loadings, average variance extracted, and composite reliabilities are all high for the second-order constructs, we consider the fit of the second-order model to be acceptable.

The fit statistics and the measurement diagnostics reported in Table WD2 (see Table WD1 for all loadings) demonstrate satisfactory reliability, unidimensionality, internal and external consistency, and convergent validity. Discriminant validity is also satisfactory. First, all constructs share more variance with their own items than they share with other constructs. Second, all correlations are significantly different from unity. We construct composite scores for each latent variable by calculating the loading-weighted mean across all items on the scale.

Non-response bias and common method bias: Non-response bias does not seem to be a problem. Only one item shows a significant difference between early (n=170) and late (n=135) responses. We assess common method bias by including an extra factor in our first-order confirmatory factor analysis. We allow this factor to affect all perceptual scale items but restrict it from correlating with other latent variables (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Including this factor improves the model-to-data fit ($\Delta\chi^2$(df)=171.02(53), p=0.00). However, it explains only 3.2% of the variance of the items, indicating that common method bias is not a major problem.

Table WD1 Measures and their standardized loadings in the confirmatory factor analysis

Most items are measured on one- to seven-point scales initiated by the statement: "Indicate the degree to which the following statements correspond to how you perceive the actual situation."

ENDOGENOUS VARIABLES:

Formal contracting (adapted from Lusch and Brown 1996)

Detailed role specification (λ=0.946)
1. Rules (agreements) and regulations have been developed for most issues in this relationship. (λ=0.723)
2. How to handle day-to-day management of the relationship is expressed in a written agreement. **(eliminated owing to poor internal consistency)*
3. We have a detailed contractual agreement with this supplier. (λ=0.877)
4. Our contract or agreement precisely defines the responsibilities of each party. (λ=0.959)
5. Our contract or agreement precisely states how each party is to perform. (λ=0.918)

Detailed contingency planning (λ=0.904)
1. Our contract or agreement precisely states the legal remedies for failure to perform. (λ=0.935)
2. Our contract or agreement precisely states what will happen in the case of events occurring that were not planned. (λ=0.906)
3. Our contract or agreement precisely states how disagreements will be resolved. (λ=0.893)

Relational contracting (adapted from Heide and John, 1992)

Norm of solidarity (λ=0.975)
1. The parties are committed to improvements that may benefit the relationship as a whole, not only the individual parties. (λ=0.680)
2. Problems that arise in the course of this relationship are treated by the parties as joint rather than individual responsibilities. **(eliminated owing to poor internal consistency)*
3. The parties in this relationship do not mind owing each other favors. (λ=0.615)
4. The relationship between the parties is better described as a cooperative effort rather than an ''arms-length negotiation." (λ=0.823)

Norm of flexibility (λ=0.917)
1. Flexibility in response to requests for changes is a characteristic of this relationship. (λ=0.755)
2. When some unexpected situation arises, the parties would rather work out a new agreement than hold each other to the terms in the original agreement. (λ=0.631)
3. To cope with changing circumstances, the parties expect to be able to make adjustments in the ongoing relationship. (λ=0.850)

Norm of information exchange (λ=0.851)
1. In this relationship, it is expected that any information that might help the other party will be provided to them. (λ=0.835)
2. Exchange of information in this relationship takes place frequently and informally, not only according to a prescribed agreement. (λ=0.732)
3. It is expected that the parties will provide proprietary information if it can help the other party. (λ=0.699)
4. It is expected that we keep each other informed about events or changes that may affect the other party. (λ=0.817)

End-product enhancement outcomes (adapted from Ghosh and John 2005)
1. Cooperation with this supplier has positively contributed to boost our sales.(λ=0.831)
2. *For producers:* Cooperation with this supplier contributes positively to the customers' perception of our end-products and services.
   For resellers: Cooperation with this supplier contributes positively to the customers' perception of our products and service offerings. (λ=0.870)
3. *For producers:* The image of our products and services in our customers' eyes has been significantly strengthened because of cooperation with this supplier.
   For resellers: The image of our products and service offerings in our customers' eyes has been significantly strengthened because of cooperation with this supplier. (λ=0.894)
4. *For producers:* Cooperation with this supplier has enabled us to make our products and services positively different (differentiated) from our competitors.
   For resellers: Cooperation with this supplier has enabled us to make our products and service offerings positively different (differentiated) from our competitors. (λ=0.689)
5. *For producers:* Cooperation with this supplier has positively affected our products regarding product design and technical solutions.
   For resellers: Cooperation with this supplier has positively affected our total product offering regarding product specter and presentation. **(eliminated owing to cross-loadings)*

Cost reduction outcomes (adapted from Ghosh and John 2005)
1. Cooperation with this supplier has enabled us to reduce our costs. (λ=0.574)
2. Our routines and procedures have over time become more effective due to cooperation with this supplier. (λ=0.774)
3. Coordination of activities between the two parties has over time become more effective in this supplier relationship than in other supplier relationships. (λ=0.762)
4. In this supplier relationship, we have been able to realize cost reductions through the implementation of efficient practices.(λ=0.834)
5. Cooperation with this supplier enables us to respond to fluctuations in the market. (λ=0.703)

INSTRUMENTAL VARIABLES FOR FORMAL CONTRACTING:

Relationship complexity (adapted from Selnes and Sallis 2003)
1. The products and services that we exchange are generally very complex (entangled/ complicated). (λ=0.655)
2. There are many operating units involved from both organizations in this relationship. (λ=0.812)
3. There are many contact points between different departments and professions of the two organizations. (0.766)

Annual purchasing value
Natural logarithm of total annual purchases (in million Norwegian kroner) through the relationship.

Headquarter influence over purchasing (new scale)
1. The contractual relationship between our business unit and the supplier is governed by the headquarters in the chain/company. (λ=0.926)

2. The headquarters in the chain/company has responsibility for negotiations about prices and terms of trade regarding this supplier relationship. (λ=0.978)
3. The chain or company headquarters decides where we can cooperate with this supplier. (λ=0.880)
4. If we have disagreements with our supplier, it must be reported to the chain or company headquarters so that they can take care of the issue.* *(eliminated owing to poor internal consistency).*

INSTRUMENTAL VARIABLES FOR RELATIONAL CONTRACTING:

Knowledge similarity (new scale)
1. The contact person and I have similar educational backgrounds. (λ=0.756)
2. The contact person and I have similar formal knowledge. (λ=0.904)
3. The contact person and I have received training in the same things. (λ=0.657)
4. The contact person and I know the same professional terms. **(eliminated owing to high cross-loadings)*

Internal procurement
Natural logarithm of (1 + a 10-point scale (0% to 90%) indicating the share of purchases of the same products from firm-internal supplier (e.g., subsidiaries).

TRANSACTION ATTRIBUTES AND CONTROL VARIABLES:

Buyer asset specificity (adapted from Buvik and John 2000; Heide and John 1992; and Rokkan, Heide, and Wathne 2003)
1. Our firm has made extensive internal adjustments in order to work effectively with **this** supplier. (λ=0.804)
2. Our firm has provided special training to employees working with **this** supplier. (λ =0.691)
3. We have tailored our firm's operations system (including any production system) to the particular products that we buy from **this** supplier. (λ=0.797)
4. Our firm has made a significant investment in equipment and/or plant in order to adapt to the products we receive from **this** supplier. (λ=0.726)
5. Our firm's (incoming) logistics system (for example, routines, equipment, technology for inventory, transportation) has been tailored to meet the requirements of working with **this** supplier. (λ=0.764)
6. Our firm has, to a great extent, adapted our ordering routines and information technology to **this** supplier. (λ=0.649)

Supplier asset specificity (adapted from Buvik and John 2000; and Rokkan, Heide, and Wathne 2003)
1. This supplier has made extensive internal adjustments in order to work effectively with **our firm**. (λ=0.812)
2. This supplier has provided special training to employees working with **our firm**. (λ=0.706)
3. This supplier has adapted their operations system (including any production system) in order to be able to deliver to **our firm**. (λ=0.781)
4. This supplier has made significant investments in equipment and/or plant in order to adapt to the purchasing needs in **our firm**. (λ=0.757)
5. This supplier's logistics system (for example routines, equipment, and technology for inventory, transportation and delivery) has been tailored to meet the requirements for working with **our firm**. (λ=0.775)
6. This supplier has, to a great extent, adapted their ordering and delivery routines to **our firm**. **(eliminated owing to wrong translation into Swedish)*

Environmental uncertainty (adapted from among others Buvik and John 2000; and Selnes and Sallis 2003)
1. The demand for our products varies continually. (λ=0.788)
2. End user needs and preferences change rapidly in our industry. (λ=0.622)
3. The market condition of our supplier is very unstable. (λ=0.495)

Performance ambiguity (adapted from Heide and Miner 1992 and Wuyts and Geyskens 2005)
1. It is inadequate to evaluate this supplier based only on product prices. **(eliminated owing to high cross-loadings)*
2. It is difficult to determine whether agreed upon quality standards and specifications are adhered to.* *(eliminated owing to high cross-loadings)*
3. Conducting performance evaluations of this supplier requires making sure that they follow approved production and quality control procedures. (λ=0.759)
4. Evaluating this supplier requires extensive incoming inspection. (λ=0.764)

Purchasing manager sales and marketing experience (adapted from Korhonen-Sande 2010).
1. I have a lot of experience in sales and/or marketing.

Supplier representative sales and marketing experience (adapted from Korhonen-Sande 2010. The informant was asked to evaluate the most important contact person in the supplier organization)
1. The contact person has a lot of experience in sales and/or marketing.

Buyer firm size
Natural logarithm of number of employees in buyer firm business unit.

Table WD2: Correlation matrix, descriptive statistics, and measurement statistics [a]

		1	1.1	1.2	2	2.1	2.2	2.3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Correlations (based on factor model)																							
1	Formal contracting	**0.925**			*0.060*				*0.062*	*0.062*	*0.060*	*0.048*	*0.054*	*0.064*	*0.060*	*0.055*	*0.059*	*0.071*	*0.068*	*0.060*	*0.060*	*0.055*	
1.1	Detailed role specification																						
1.2	Detailed contingency planning																						
2	Relational contracting	0.279*			**0.916**																		
2.1	Norm of solidarity								*0.060*	*0.050*	*0.065*	*0.057*	*0.062*	*0.063*	*0.061*	*0.061*	*0.055*	*0.072*	*0.070*	*0.061*	*0.060*	*0.060*	
2.2	Norm of flexibility																						
2.3	Norm of information exchange																						
3	End-product enhancement outcomes	0.138*			0.276*				**0.825**	*0.044*	*0.065*	*0.059*	*0.060*	*0.063*	*0.060*	*0.058*	*0.060*	*0.069*	*0.070*	*0.057*	*0.059*	*0.059*	
4	Cost reduction outcomes	0.231*			0.532*				0.599*	**0.735**	*0.061*	*0.060*	*0.062*	*0.063*	*0.061*	*0.052*	*0.049*	*0.070*	*0.072*	*0.061*	*0.059*	*0.062*	
5	Relationship complexity	0.361*			0.257*				0.198*	0.359*	**0.747**	*0.057*	*0.064*	*0.067*	*0.064*	*0.059*	*0.055*	*0.075*	*0.066*	*0.064*	*0.064*	*0.061*	
6	Annual purchasing value	0.462*			0.276*				0.109†	0.181*	0.352*		*0.056*	*0.060*	*0.057*	*0.056*	*0.056*	*0.068*	*0.063*	*0.057*	*0.057*	*0.042*	
7	Headquarter influence over purchasing	0.353*			0.099*				0.149*	0.131*	0.092	0.189*	**0.929**	*0.062*	*0.057*	*0.059*	*0.060*	*0.068*	*0.068*	*0.057*	*0.058*	*0.057*	
8	Knowledge similarity	0.137*			0.239*				0.187*	0.233*	0.191*	0.177*	-0.036	**0.779**	*0.060*	*0.064*	*0.065*	*0.070*	*0.071*	*0.060*	*0.059*	*0.061*	
9	Share of internal procurement	0.125*			-0.041				-0.044	-0.113†	0.070	0.079	0.157*	0.148*		*0.061*	*0.061*	*0.067*	*0.067*	*0.057*	0.057	*0.057*	
10	Buyer asset specificity	0.396*			0.278*				0.322*	0.492*	0.410*	0.285*	0.235*	0.146*	0.002	**0.741**	*0.039*	*0.072*	*0.064*	*0.061*	*0.061*	*0.061*	
11	Supplier asset specificity	0.323*			0.428*				0.268*	0.550*	0.494*	0.313*	0.188*	0.100	0.001	0.679*	**0.767**	*0.071*	*0.063*	*0.061*	*0.061*	*0.056*	
12	Environmental uncertainty	-0.106			0.031				0.172*	0.203*	0.085	0.009	-0.109	0.222*	0.022	0.061	0.099	**0.646**	*0.078*	*0.067*	*0.068*	*0.067*	
13	Performance ambiguity	0.205*			0.152*				0.016	0.043	0.392*	0.271*	0.077	0.156*	0.073	0.356*	0.384*	0.123	**0.762**	*0.066*	*0.067*	*0.065*	
14	Purchasing manager sales and marketing experience	0.115†			0.104†				0.232*	0.085	0.019	0.102†	0.168*	0.189*	0.103†	0.078	-0.019	0.095	-0.102		*0.051*	*0.056*	
15	Supplier representative sales and marketing experience	0.070			0.137*				0.149*	0.204*	0.005	0.111†	0.104†	0.218*	0.066	0.033	0.038	0.006	-0.057	0.320		*0.057*	
16	Buyer-firm size	0.323*			0.174*				-0.127*	-0.015	0.219*	0.510*	0.130*	0.062	-0.014	0.076	0.287*	-0.024	0.177*	-0.174*	0.023		
Correlations (based on scores)																							
17	Misalignment	0.077			-0.009				-0.100†	-0.099†	-0.022	0.024	0.025	-0.038	0.091	-0.076	-0.016	-0.095†	-0.012	-0.076	-0.031	-0.080	
Descriptive statistics																							
	Mean	3.671	4.091	3.230	4.890	4.909	4.894	4.863	3.873	3.839	2.524	0.860	1.881	3.240	0.251	2.539	2.651	3.750	3.041	4.095	4.987	3.421	1.078
	Standard deviation	1.798	1.887	1.907	1.099	1.218	1.226	1.281	1.389	1.234	1.217	1.319	1.644	1.290	0.516	1.287	1.338	1.076	1.363	1.600	1.305	1.343	0.816
	Skewness	0.141	-0.116	0.440	-0.534	-0.574	-0.666	-0.465	-0.195	-0.072	0.974	0.316	1.930	0.435	2.170	0.819	0.604	0.021	0.511	-0.044	-0.509	0.555	0.868
	Kurtosis	1.801	1.698	1.979	3.129	3.187	3.173	2.800	2.474	2.446	3.952	3.129	5.460	2.985	6.968	3.047	2.401	2.804	2.627	2.057	2.805	3.217	3.174
	Minimum	1.000	1.000	1.000	1.354	1.321	1.000	1.000	1.000	1.000	1.000	-2.303	1.000	1.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	0.693	0.002
	Maximum	7.000	7.000	7.000	7.000	7.000	7.000	7.000	7.000	7.000	7.000	5.298	7.000	7.000	2.303	7.000	6.382	6.740	7.000	7.000	7.000	7.378	3.563
Measurement diagnostics																							
	Composite reliability	0.922	0.927	0.936	0.939	0.752	0.792	0.855	0.894	0.853	0.790	-	0.950	0.820	-	0.879	0.877	0.675	0.735	-	-	-	-
	Average variance extracted	0.855	0.763	0.831	0.838	0.506	0.563	0.597	0.680	0.540	0.558	-	0.863	0.607	-	0.549	0.589	0.418	0.581	-	-	-	-
	Lowest st. loading	0.904	0.723	0.893	0.851	0.615	0.631	0.699	0.689	0.574	0.655	-	0.880	0.657	-	0.649	0.706	0.495	0.759	-	-	-	-
	Highest st. loading	0.946	0.959	0.935	0.975	0.823	0.850	0.835	0.894	0.834	0.812	-	0.978	0.904	-	0.804	0.812	0.788	0.764	-	-	-	-

[a] Correlations are positioned to the left of the diagonal, and their standard deviations (in italics) are positioned to the right of the diagonal. The diagonal (in bold) contains the square root of average variance extracted for each construct. Correlations that are significantly different from zero are flagged: † $p<0.1$ and * $p<0.05$ (two-tailed). All correlations are significantly different from unity. Correlations are based on output from the confirmatory measurement model. Descriptive statistics are based on scores computed from the actual observations.

Web-appendix E: Additional detail concerning the analyses

Graphical illustration of the empirical models: The empirical modeling in this paper is complicated, but the various steps are necessary from a statistical point of view. To help the reader see the big picture, Figure WE1 complements the equations with a graphical illustration of the models. Figure WE1 illustrates most parameters in the equations (to avoid clutter, it does not illustrate constants and certain parameters that we list below it). We illustrate Step 1 twice, in both parts A and B of Figure WE1, because Step 1 is a necessary step before both Step 2 and Step 3.

Notice from Figure WE1 part A that we illustrate the interaction term between $\hat{\varepsilon}_i$ and formal contracting using an arrow pointing from $\hat{\varepsilon}_i$ to β_{CRi} and β_{EEi}. To avoid clutter, we do not illustrate in Figure WE1 the main effects β_{CR} and β_{EE} or the quadratic effects in β_{CRsq} and β_{EEsq} in Figure WE1.

Detailed explanation of Step 3: The article contains only a brief explanation of the third step in the analysis. A more detailed description is provided below.

Estimating the mediated effects of misalignment on the two performance outcomes first involves estimating the effect of misalignment on relational contracting RC_i using the same estimator as used earlier (i.e., same structure as Equations 2a/b and 3a/b):

$$RC_i = \gamma_{RC0} + \theta_{RC} MISALIGNMENT_i + \mathbf{IVRC_i}\boldsymbol{\gamma}_{\mathbf{RC2}} + \mathbf{CV_i}\boldsymbol{\gamma}_{\mathbf{RC3}} + \rho_{RC1}\hat{\varepsilon}_i + \beta_{RCi} FC_i + u_{RCi} \qquad 5a$$

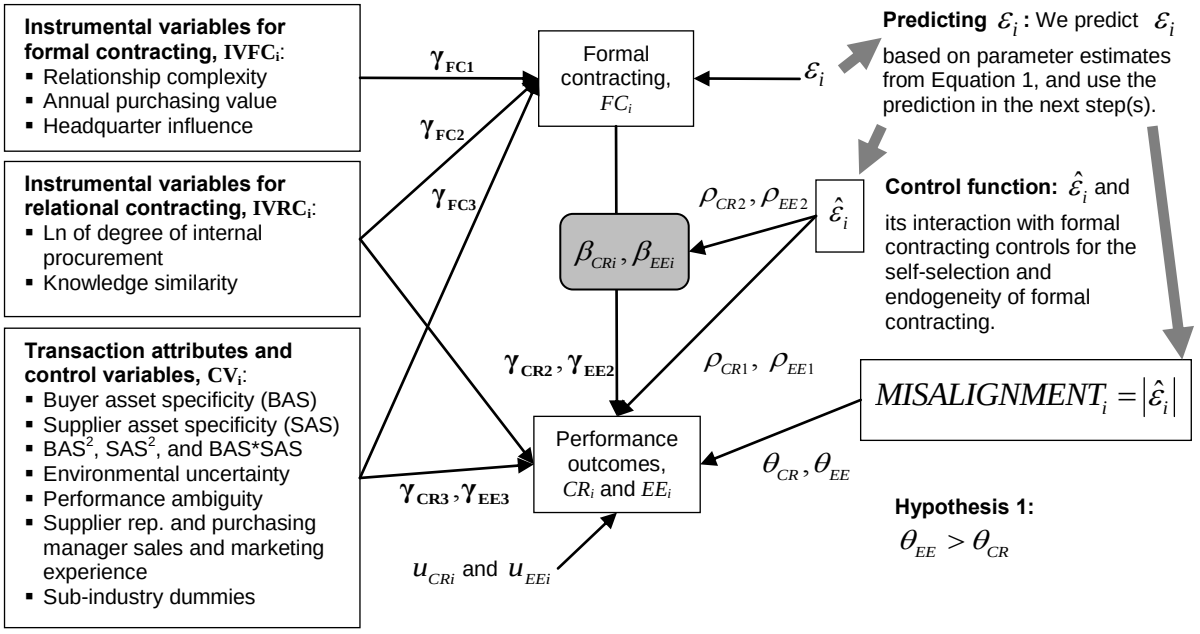
where θ_{RC} is the effect of misalignment; the γ s and ρ_{RC1} are parameters; u_{RCi} is the error term; and β_{RCi} is the heterogeneous relationship-specific effect of formal contracting, which is given by

$$\beta_{RCi} = \beta_{RC} + \rho_{RC2}\hat{\varepsilon}_i + \beta_{RCsq} FC_i \qquad 5b$$

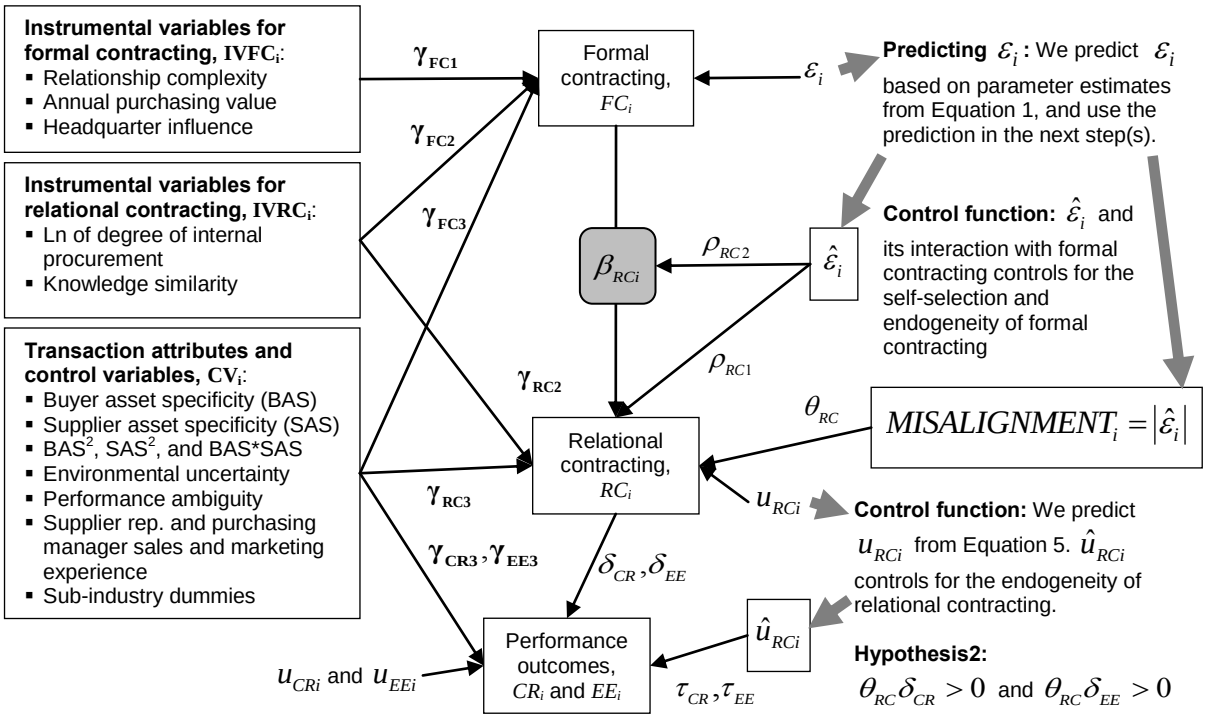
where β_{RC} is the main effect of formal contracting on relational contracting, ρ_{RC2} is the effect of the interaction term between $\hat{\varepsilon}_i$ and formal contracting, and β_{RCsq} is the quadratic effect of

Figure WE1: Graphical illustration of the empirical models

A) Steps 1 and 2: testing H1 and H2



B) Steps 1 and 3: testing H3, mediation hypothesis



Explanations:

- Black arrows: represent parameters. Thick gray arrows: explanation what we did with the residuals.
- Black arrows with two parameters or sets of parameters: target the performance variables and represent one for cost reductions and one for end-product enhancements.
- Shaded boxes: represent the heterogeneous effects of formal contracting. The effect is heterogeneous because FC_i interacts with $\hat{\varepsilon}_i$ and has a quadratic effect. The interaction between FC_i and $\hat{\varepsilon}_i$ controls for the self-selection of formal contracting and reduces bias in the θ's.
- To avoid clutter, we do not illustrate the following elements in the figure: constants and the following parameters: β_{CR} and β_{EE}, β_{CRsq} and β_{EEsq}, and β_{RC} and β_{RCsq}.

formal contracting (note: to avoid clutter, we do not illustrate β_{RC} and β_{RCsq} in Figure WE1).

Next, we estimate the effect of relational contracting on the two performance variables. The main concern in this estimation is to account for the endogeneity of relational contracting. We use a simple control function estimator (Wooldridge, 2010) and include the residual $\hat{u}_{RCi}$ from Equation 5a as a control variable in the performance equations. To identify the effect of relational contracting, we use $\mathbf{IVRC_i}$ and the square of formal contracting as IVs for relational contracting and exclude these IVs from directly affecting performance. To reduce multicollinearity, we further exclude $MISALIGNMENT_i$, $\hat{\varepsilon}_i$, and the interaction between formal contracting and $\hat{\varepsilon}_i$ from directly affecting performance. To the extent that these variables affect relational contracting (i.e., θ_{RC}, ρ_{RC1}, and ρ_{RC2} are significant), they are also effectively IVs for relational contracting. Thus, we estimate the following equations:

$$CR_i = \gamma_{CR0} + \delta_{CR}RC_i + \tau_{CR}\hat{u}_{RCi} + \mathbf{CV_i}\boldsymbol{\gamma}_{\mathbf{CR3}} + \beta_{CR}FC_i + u_{CRi} \quad 6$$

$$EE_i = \gamma_{EE0} + \delta_{EE}RC_i + \tau_{EE}\hat{u}_{RCi} + \mathbf{CV_i}\boldsymbol{\gamma}_{\mathbf{EE3}} + \beta_{EE}FC_i + u_{EEi} \quad 7$$

where the δ's are the effects of relational norms, the γs and τs are parameters, the us are error terms, and the βs are the effects of formal contracting (note: to avoid clutter, we do not illustrate β_{CR} and β_{EE} in Figure WE1). We are interested in the mediated effects of misalignment and test H2 by assessing the significance of the following product terms:

Mediated effect of misalignment on cost reduction outcomes = $\theta_{RC}\delta_{CR}$ 8

Mediated effect of misalignment on end-product enhancement outcomes = $\theta_{RC}\delta_{EE}$ 9

Evaluating IVs: We empirically evaluate whether the IVs satisfy the exogeneity and relevance conditions using the user-written ivreg2-command in Stata 13.1 (Baum, Schaffer, & Stillman, 2007; StataCorp, 2013). We find that the IVs as an entity meet the Sargan (1958) statistic (p-values >0.29 for all dependent variables) and also meet the difference-in-Sargan statistic (p-values >0.13), which indicates that the IVs satisfy the exogeneity condition.

The partial R-square for the IVs for formal contracting is 0.080, and the F-statistic is

8.29, which is slightly lower than Stock and Yogo's (2005) cut-off criteria of 9.08, which indicates that the IVs are slightly weak. The IVs for relational norms are weak, with a partial R-square of 0.061 and an F-statistic of 3.07, which may lead to a finite sample bias in the parameter estimates. To control the robustness of the results for changes in IVs, we present the results from testing alternative models with a subset of IVs in Web-appendix F.

Estimation: Two issues are of concern when estimating the models. First, Equations 2 to 3 and 5 to 7 include generated regressors (i.e., $\hat{\varepsilon}_i$ and $\hat{u}_{RCi}$ are generated based on prior regressions). Unless corrected for, generated regressors lead to incorrect standard errors for the parameter estimates (Wooldridge, 2010). Second, mediated effects tend to be asymmetrically distributed rather than normally distributed in finite samples. Because of this asymmetry, tests relying on the assumptions of normality provide underpowered tests of mediation (Hayes, 2013).

We address both issues by using the bootstrap method. We follow the instructions provided by Cameron and Trivedi (2009, p. 427-29) for two-step estimators and by Hayes (2013) for indirect effects. First, we write a program in Stata 13.1 returning results from estimating Equations 1 to 4. Second, we write a program returning results from estimating Equations 1 and 5 to 9. We bootstrap both programs using 10,000 replications. We estimate asymmetric bias-corrected bootstrap confidence intervals (90%, 95% and 99%) because they account for asymmetries in the distribution of the parameter estimates as well as possible finite-sample bias in the parameter estimates (Cameron & Trivedi, 2009; Hayes, 2013).

Web-appendix F: Detailed reporting of the results

In the following, we first report the results from estimating Equation 1. Next, we highlight a few other results from estimating Equations 2, 3, and 5 to 7 that are not mentioned in the paper itself. Then, we present the robustness checks and finally the post-hoc results. We report the hypothesis tests (i.e., estimating $\Delta\theta$, $\theta_{RC}\delta_{CR}$, and $\theta_{RC}\delta_{EE}$) in the paper and do not report them here. Table WF1 presents the parameter estimates for Equations 1 to 3, and 5 to 7, bootstrap standard errors, and significance levels based on asymmetric bias-corrected confidence intervals.

Equation 1: Consistent with prior research, the main effect of buyer asset specificity is positive and significant ($p<0.05$). Supplier asset specificity has a positive but non-significant main effect. However, buyer and supplier asset specificity interact significantly in affecting formal contracting ($p<0.05$). Because buyer and supplier asset specificity correlate highly ($\hat{r}$ =0.68) and because we include their interaction term, we also control for possible confounding by including their quadratic terms. The quadratic terms are negative and non-significant at the 5% level. Due to the interaction and quadratic terms, we conduct simple slope analyses for the effects of both buyer and supplier asset specificity, and we find that buyer asset specificity has significant positive effects on formal contracting when supplier asset specificity has medium-to-high values and vice versa. These results suggest that high joint-specific investments motivate detailed formal contracting, which is consistent with prior research (e.g., Bercovitz et al., 2006).

Environmental uncertainty and performance ambiguity are not significantly related to formal contracting, which is consistent with the mixed evidence reported in the literature. The IVs are significantly related to formal contracting, as expected.

In summary, the results are consistent with TCE, and we can assume that $|\hat{\varepsilon}_i|$ represents deviations from TCE predictions and therefore misaligned formal contracting.

Other results: Table WF1 displays other notable results as well. First, formal contracting has a positive average effect on relational contracting (Equation 5b) and on both performance variables (Equations 2b and 3b). There is a weak significant quadratic effect of formal contracting on relational contracting and a strong significant quadratic effect on end-product enhancements. There is no quadratic effect on cost reductions. Considering the role of formal contracting in supporting relational contracting, the quadratic effects suggest that formal

Table WF1: All results from estimating Equation 1 – 3 and 5 – 7[a]

Equation #:	Parameters	1	Parameters	2a	Parameters	3a	Parameters	5a	Parameters	6	Parameters	7
Dependent vars.:		**Formal contrac-ting**		**Cost reductions**		**End-product enhance-ments**		**Relational contract-ing**		**Cost reductions**		**End-product enhance-ments**
Explanatory variables:												
Constant	γ_{FC0}	2.048 *** (0.651)	γ_{CR0}	4.280 ** (0.550)	γ_{EE0}	4.475 *** (0.700)	γ_{RC0}	5.000 *** (0.548)	γ_{CR0}	-0.848 (1.328)	γ_{EE0}	-2.541 ** (0.1.723)
Relational contracting									δ_{CR}	0.983 *** (0.293)	δ_{EE}	1.295 *** (0.387)
Endogeneity correction for relational contracting, $\hat{u}_{RCi}$									τ_{CR}	-0.625 *** (0.301)	τ_{EE}	-1.115 *** (0.392)
MISALIGNMENT$_i$ ($\lvert\hat{\varepsilon}_i\rvert$)			θ_{CR}	-0.278 ** (0.156)	θ_{EE}	-0.687 *** (0.218)	θ_{RC}	-0.370 *** (0.162)				
Vector **IVFC$_i$**	$\boldsymbol{\gamma}_{\mathbf{FC1}}$											
Relationship complexity		0.178 ** (0.070)										
Annual purchasing value		0.251 *** (0.096)										
Headquarter influence		0.139 ** (0.064)										
Vector **IVRC$_i$**	$\boldsymbol{\gamma}_{\mathbf{FC2}}$		$\boldsymbol{\gamma}_{\mathbf{CR2}}$		$\boldsymbol{\gamma}_{\mathbf{EE2}}$		$\boldsymbol{\gamma}_{\mathbf{RC2}}$					
Knowledge similarity		0.019 (0.073)		0.091 (0.062)		0.091 (0.080)		0.111 * (0.062)				
Ln of degree of internal procurement		0.181 (0.191)		-0.479 *** (0.163)		-0.432 ** (0.181)		-0.318 ** (0.158)				
Vector **CV$_i$**	$\boldsymbol{\gamma}_{\mathbf{FC3}}$		$\boldsymbol{\gamma}_{\mathbf{CR3}}$		$\boldsymbol{\gamma}_{\mathbf{EE3}}$		$\boldsymbol{\gamma}_{\mathbf{RC3}}$		$\boldsymbol{\gamma}_{\mathbf{CR3}}$		$\boldsymbol{\gamma}_{\mathbf{EE3}}$	
Buyer asset specificity (BAS)		0.245 ** (0.105)		0.083 (0.119)		-0.042 (0.138)		-0.172 * (0.107)		0.297 *** (0.094)		0.217 * (0.128)
Supplier asset specificity (SAS)		0.063 (0.093)		0.274 *** (0.090)		0.185 (0.111)		0.258 ** (0.090)		0.026 (0.119)		-0.135 (0.162)
BAS^2		-0.107 * (0.055)		0.031 (0.054)		0.051 (0.069)		0.118 ** (0.055)		-0.099 ** (0.057)		-0.116 * (0.076)
SAS^2		-0.059 (0.060)		0.094 ** (0.049)		0.021 (0.062)		0.020 (0.053)		0.061 (0.044)		-0.028 (0.061)
BAS*SAS		0.156 ** (0.074)		-0.145 ** (0.079)		-0.076 (0.095)		-0.119 * (0.079)		0.016 (0.071)		0.099 (0.096)
Environmental uncertainty		-0.122 (0.078)		0.207 *** (0.072)		0.214 *** (0.084)		0.028 (0.080)		0.164 *** (0.061)		0.173 * (0.094)
Performance ambiguity		0.033 (0.066)		-0.171 *** (0.062)		-0.100 (0.076)		-0.043 (0.058)		-0.125 ** (0.056)		-0.041 (0.077)
Purchasing manager sales/ marketing experience		-0.011 (0.059)		-0.073 (0.051)		0.010 (0.062)		0.029 (0.051)		-0.091 ** (0.051)		-0.025 (0.071)
Supplier representative sales/ marketing experience		-0.029 (0.068)		0.173 *** (0.061)		0.103 (0.072)		0.073 (0.061)		0.094 (0.060)		-0.005 (0.090)
Buyer-firm size		0.218 ** (0.093)		-0.312 *** (0.088)		-0.342 *** (0.113)		-0.121 * (0.082)		-0.150 ** (0.056)		-0.141 ** (0.072)
Sub-industry dummies [b]:												
Construction dummy		1.088 *** (0.222)		-0.635 *** (0.295)		-0.763 *** (0.345)		-0.763 *** (0.288)		0.231 (0.200)		0.351 * (0.277)
Reselling dummy		1.099 *** (0.284)		-0.417 (0.336)		0.252 (0.411)		-0.787 *** (0.312)		0.414 ** (0.245)		1.372 *** (0.322)
Processing dummy		1.285 *** (0.290)		-0.333 (0.335)		-0.298 (0.451)		-0.360 (0.302)		0.033 (0.208)		0.220 (0.296)
Endogeneity correction for formal contracting, $\hat{\varepsilon}_i$			ρ_{CR1}	-0.427 *** (0.180)	ρ_{EE1}	-0.578 *** (0.234)	ρ_{RC1}	-0.372 *** (0.178)				
Equation #:				**2b**		**3b**		**5b**				
Relationship-specific effects of formal contracting				β_{CRi}		β_{EEi}		β_{RCi}				
Formal contracting, FC_i			β_{CR}	0.467 *** (0.169)	β_{EE}	0.546 *** (0.217)	β_{RC}	0.442 *** (0.170)	β_{CR}	-0.047 (0.053)	β_{EE}	-0.128 ** (0.072)
FC_i^2			β_{CRsq}	-0.015 (0.035)	β_{EEsq}	-0.116 *** (0.049)	β_{RCsq}	-0.056 * (0.037)				
Correction for self-selection, $FC_i\hat{\varepsilon}_i$			ρ_{CR2}	0.062 (0.069)	ρ_{EE2}	0.279 *** (0.101)	ρ_{RC2}	0.177 *** (0.075)				
R-square		0.433		0.402		0.291		0.252		0.474		0.306

[a] Equation 1: heteroscedasticity robust standard errors. Equation 2-3 and 5-7: two-sided significance levels based on asymmetric *bias-corrected* bootstrap confidence intervals: *: p-value<0.1, **: p-value<0.05, ***: p-value<0.01. Bootstrap standard errors in parentheses. [b] The base category includes joinery and furniture factories, and carpentries.

contracts may sometimes be too detailed in an absolute sense and not just in relation to the predicted level.

Second, the interaction term between $\hat{\varepsilon}_i$ and formal contracting shows an interesting pattern: parties with unexpectedly high levels of formal contracting (i.e., high $\hat{\varepsilon}_i$) experience stronger positive effects of formal contracting on both relational norms and end-product enhancements but not to the same extent on cost reductions. These findings suggest that the parties select the level of formal contracting based on their private knowledge of how formal contracting should affect relational contracting. In other words, comparative advantage in terms of relational contracting seems important for formal contracting choices (Garen, 1984), which implies that the parties understand that formal contracting has effects on relational contracting. This finding supports the main ideas underlying this paper, that formal contracting can both support and undermine relational contracts.

Third, the residual from Equation 5 $\hat{u}_{RNi}$ is significantly and negatively related to both performance outcomes. Correcting for the endogeneity of relational contracting is therefore preferred because OLS underestimates the effect of relational norms on performance.

Robustness checks: We conduct four robustness checks. First, the main effect of supplier asset specificity and its quadratic term on formal contracting are not significant, which may be because the buyer reports supplier asset specificity[1]. We therefore estimate all equations once more but without supplier asset specificity or its interaction with buyer asset specificity. However, the results still support all three hypotheses (θ_{CR} = -0.32, p<0.05; θ_{EE} = -0.70, p<0.01; $\Delta\theta$ = -0.38, p<0.05; $\theta_{RC}\delta_{CR}$ = -0.36, p<0.01; $\theta_{RC}\delta_{EE}$ = -0.42, p<0.01).

Second, because the IVs for relational norms are weak, we estimate a model in which we also include $MISALIGNMENT_i$, $\hat{\varepsilon}_i$, and the interaction between formal contracting and $\hat{\varepsilon}_i$ in Equations 6 and 7. However, none of these terms are significant, and the results continue to support H3 ($\theta_{RC}\delta_{CR}$ = -0.38, p<0.01; $\theta_{RC}\delta_{EE}$ = -0.47, p<0.01).

Third, we estimate a model in which we include $MISALIGNMENT_i$ in Equations 6 and 7. Again, the results do not change, and the direct effects of misalignment are not significant ($\theta_{RC}\delta_{CR}$ = -0.35, p<0.01; $\theta_{RC}\delta_{EE}$ = -0.46, p<0.01; θ_{CR} = -0.12, p>0.1; θ_{EE} = -0.15, p>0.1). The nonsignificance of these effects suggests that relational contracting fully mediates the effects

[1] We thank an anonymous reviewer for noting this.

of misalignment.

Fourth, several previous studies examine the use of multiple governance mechanisms and how these interact in affecting performance (e.g., Cannon et al., 2000). Such interactions may potentially change our results. We therefore also estimate a more complicated model (than Equations 6 and 7) that includes interaction terms between formal and relational contracting as well as multiple interaction terms between formal and relational contracting and the residuals from Equations 1 and 5. These estimations suggest a positive interaction term between formal and relational contracting on cost reductions (0.14, $p<0.05$) but not on end-product enhancements (-0.03, $p>0.10$). However, our main results do not change, as we still find significant mediation ($\theta_{RC}\delta_{CR}$ = -0.38, $p<0.01$; $\theta_{RC}\delta_{EE}$ = -0.53, $p<0.01$).

Post hoc test of the difference between the mediated effects: The results imply that the mediated effect of misalignment through relational norms is stronger on end-product enhancements than on cost reductions. We find that the mediated effects are significantly different from one another at the 5% level ($\theta_{RC}\delta_{EE} - \theta_{RC}\delta_{CR}$ = -0.12, $p<0.05$). However, this result is sensitive to model re-specifications. Including one or more of the instrumental variables in Equations 6 and 7 leads to more multi-collinearity, wider confidence intervals, and an insignificant difference between the effects.

Post-hoc evaluation of the misalignment measure: We cannot evaluate the misalignment measure in similar ways as multi-item measures. However, we can evaluate its nomological validity, i.e., whether it behaves as it should in relation to other constructs (Campbell, 1960; Cronbach & Meehl, 1955). In particular, we can examine the antecedents to misalignment. We have data on purchasing manager and supplier representative experience in sales and marketing. Therefore, we test whether purchasing manager and supplier representative sales and marketing experience reduces misalignment.

We first regress $MISALIGNMENT_i$ onto $\mathbf{IVRC_i}$, $\mathbf{CV_i}$, $\hat{\varepsilon}_i$, FC_i and $FC_i\hat{\varepsilon}_i$, except for the two measures of sales and marketing experience (originally part of $\mathbf{CV_i}$). Only $FC_i\hat{\varepsilon}_i$ has a significant effect. Next, we predict the residual from this regression $\hat{e}_i = |\hat{\varepsilon}_i| - |\hat{\varepsilon}_i|$, which forms a measure of misalignment free of variance related to the unobserved comparative advantages captured by $FC_i\hat{\varepsilon}_i$. Finally, we regress $\hat{e}_i$ against the two experience variables. We find that purchasing manager experience reduces misalignment at the 1% level (estimate

= -0.033, p<0.01). However, supplier representative experience has no significant effect even at the 10% level, most likely because of high correlation with purchasing manager experience ($\hat{r}$ =0.32). If we exclude purchasing manager experience, supplier representative experience significantly reduces misalignment at the 5% level (est.=-0.033, p<0.05). These results provide additional confidence that $MISALIGNMENT_i$ captures misalignment.

Note that we obtain substantially the same results if we include sales and marketing experience in the first equation instead of using the two-step procedure (purchasing manager sales and marketing experience: -0.045, p<0.05, and supplier representative sales and marketing experience not significant).

Web-appendix G: Limitations of the analytical approach

The analytical approach rests on the assumptions described in Web-appendix B. A critical question concerns whether these assumptions hold true or not.

One threat to the validity of the misalignment measure is self-selection based on unobserved variables. Unobserved variables that affect the parties‘ motivation to make a certain contracting decision will be reflected in the first-stage residual ε_i and therefore also in the misalignment measure. We account for this possibility by means of a control function approach with an interaction term between ε_i and formal contracting. This approach relies on the validity of the instrumental variables. Although our empirical assessment suggests that these instrumental variables are exogenous, we are still not able to exclude the risk that none of these are exogenous because all exogeneity tests rely on at least one of the instrumental variables being exogenous (i.e., testing for exogeneity when in fact none of the instrumental variables are exogenous may erroneously suggest exogeneity).

Another threat to the validity of the findings is that deviations from the expected level of formal contracting result from unobserved factors that have an inverted U- or V-shape relationship with relational contracting or performance, instead of resulting from mistaken governance choices. Our study shares this threat with all other studies that rely on residual analysis. However, we regard this threat as minor for three reasons. First, we do not know of any obvious unobserved variables that might have both a linear relationship with formal contracting and an inverted U- or V-shaped relationship with relational contracting or performance. Second, if such a variable biases the results, it should have a substantial effect on formal contracting. The inverted U- or V-shaped effect on relational contracting or performance should also be strong. Third, we find that two quite simple measures of sales and marketing experience are negatively related to the misalignment measure, which suggests that at least part of the variance in the misalignment variable is attributable to mistaken governance choices.

In summary, the results of this study rely on the assumption that deviations from the expected level of formal contracting result either from mistaken governance choices or from the actors‘ self-selection based on observing variables that are unobserved to us but that also have linear relationships with the dependent variables. These assumptions are realistic, although we cannot entirely rule out alternative explanations.

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