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Nooteboom, Bart; Berger, Johannes; Noorderhaven, Niels G.

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SOURCES, MEASUREMENT AND EFFECT OF TRUST IN THE GOVERNANCE OF BUYER-SUPPLIER RELATIONS

SOM THEME B: MARKETING AND NETWORKS

*Bart Nooteboom**, *Hans Berger** and *Niels G. Noorderhaven***

** School of Management and Organization, Groningen University*

*** University of Brabant*

P.O. Box 800, 9700 AV Groningen, the Netherlands

tel: +31-503633852; fax: +31-503633850; e-mail: b.nootboom@bdk.rug.nl

Abstract

The purpose of the paper is an empirical test of the role and effects of trust next to other components of governance, in buyer-supplier relations that carry risks of dependence due to specific investments. Several dimensions of trust are identified, and measures for them are designed. They are implemented on a survey of ten customer relations for each of ten suppliers of components to OEM's of electrical/electronic devices. An econometric test is conducted of the effect of the trust related variables on perceived risk for the supplier in the relationship, next to the effects one would expect of specific investments as causes of risk, and forms of governance used to reduce risk. Perceived risk is measured in two dimensions: the probability that problems will arise, and the size of loss that would arise if those problems materialize. Control is exercised for firm related effects: uncertainty avoidance (which may be an autonomous cause of perceptions regarding risk) and firm size (large firms may have a better diversification of risks). Hypotheses concerning the effects are well corroborated.

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Introduction

Several causes are yielding radical product differentiation, in many markets. Technological development yields flexible methods of production and acts as an enabling cause¹. Individualization of consumer behaviour provides a market opportunity. Globalization of markets provides an incentive, to reduce pressures of price competition by product differentiation. But radical product differentiation greatly increases the complexity of both input and output markets, and to be "sustainable" (Zuscovitch, 1994), it requires that firms concentrate on core competencies (Prahalad & Hamel, 1990), and outsource as many activities as possible, even if that entails "transaction specific investments", in the sense treated in transaction cost economics (TCE).

As indicated in TCE, transaction specific investments yield dependencies and risks of "hold-up". This raises complicated issues of "governance" of relations between formally independent but materially dependent firms, in forms of organization "between market and hierarchy" (Williamson, 1985). Traditional TCE, as developed by Williamson, focuses on the role of self-interest, opportunism and contractual instruments of governance, and neglects the role of trust, even in later work (Williamson, 1991). In other research traditions, notably the work of the IMP (Industrial Marketing and Purchasing Group), trust is a central variable (Hakansson, 1982, 1987, 1989; Johanson & Mattson, 1987). But in that perspective, trust appears to be pervasive to the point of neglecting the role of self-interest and opportunism. Our perspective is that trust as well as its limits due to opportunism play a role, and that trust is a dimension of governance next to those derived from TCE: mutual self-interest and dependence, legal ordering, private ordering by guarantees, shared ownership of specific assets, hostages, reputation effects, and the like, as safeguards against risk involved in specific investments (Nooteboom, 1993b).

According to social exchange theory (Blau, 1964), in addition to an

¹ In particular information technology: programmable machines, computer aided design, simulating rather than building prototypes, etc.

economic dimension (extrinsic utility), exchange often has a social dimension (intrinsic utility). Economists tend to think of value in exchange as something that exists independently from the transaction. As formulated by Murakami & Rohlen (1992, 70): "The value of the relationship itself is typically ignored and the impersonality of the transaction is assumed". In intrinsic utility, the exchange process itself matters, in addition to the economic surplus and its division that the exchange yields. People may prefer to transact on the basis of trust and its concomitants of ethics, kinship, friendship or empathy. Social exchange relies more on unspecified, implicit obligations², which depend on shared systems of meaning, belief and ethics.

The economic relevance of trust is that it economizes on the specification and monitoring of contracts and material incentives for cooperation. This makes transactions not only cheaper, and on the basis of social exchange theory perhaps more agreeable, but also makes for greater flexibility. With detailed formal contracts it is more difficult (slow and costly) to modify terms for changed conditions. Apart from its own worth, trust pays. But it also carries a risk of the betrayal of trust.

For a definition of trust and the specification of a framework for its role in governance, we adopt the analysis from Nooteboom (1995).

Trust

Trust may concern a partner's *ability* to perform according to the intentions and expectations of a relation (competence trust), or his *intentions* not to defect willingly (behavioral trust). Here, we focus on the latter type of trust. Of course, risks due to failures of competence are important in subcontracting relations, but they do not form the focus here. The focus is on the relation between behavioral trust and cooperation.

According to Williams (1988), cooperation requires willingness to accept

² The idea that exchange includes non-contractual elements of course goes back (at least) to Durkheim (1893).

dependence, which requires assurance that other, non dependent (or less dependent) parties will not defect in the cooperation. According to Dasgupta (1988), trust is associated with expectations regarding the other's choice of actions that have a bearing on one's own choice of action. Such expectations may have a strong or a weak basis, ranging from assurance from objective facts and logical reason, through belief which is less firmly based on experience and argument, to unsubstantiated faith. Gambetta (1988b: 217) summarized different views on trust as the subjective probability that one assigns to action by another agent (or group of agents) which affects one's own action.

Since our focus is on relations between organizations, the question arises what the relation is between the conduct of individuals and firms: the "micro-micro" problem. As argued by Ring & Van de Ven (1994), they are related by roles that individuals are assigned in organizations. Conduct "qua persona" is restricted and guided by organizational roles. Alignment between the two can be a problem. If cooperation is founded on trust based on personal bonding, problems may arise concerning the exigencies of organizational role. Personal loyalty may deviate from organizational interest, and may even lead to corruption or embezzlement. Too strong personal ties may need to be prevented by turnover of personnel across roles. Conversely, personnel change may lead to a breakdown of relations based on personal trust. Such considerations should be part of governance.

Our approach to the micro-micro problem now is as follows. First of all, if trust is indeed interpreted as a subjective probability assigned to conduct, it can logically apply to a subjective probability held by an individual with respect to the conduct of an organization in terms of decisions taken by that organization. Of course, this subjective probability may at least in part be based on experiences and perceptions of individuals in their organizational roles, and corresponding organizational constraints, at the partner organization. Thus we will handle trust in terms of relational risk with respect to the partner organization, as perceived by an individual who plays a central role in the focal organization (notably a CEO):

proposition 1

It makes sense to treat trust as a perception of an individual with respect to a partner organization

The argument implies that trust is not an objective condition, and varies between individuals, even in otherwise identical conditions.

Dimensions of trust

Williams (1988) proposed a scheme for the determinants of cooperation, as reproduced in figure 1. Williams argued that none of these sources suffices by itself, and that in cooperation some mix will always be operative, while no universally best mix, regardless of specific conditions, can be specified. Often, trust will not suffice as a basis for cooperation. Conversely, material self-interest and coercion are seldom sufficient as a basis for cooperation: one needs trust to the extent that one cannot fully control the partner's conduct by threat and reward (cf. Deutsch, 1962, quoted in Zand, 1972).

figure 1: sources of cooperation

	macro	micro
egotistic	coercion or fear of sanctions from some authority (god, law)	material advantage or "interest"
non-egotistic	ethics: values/norms of proper conduct	bonds of friendship, kinship or empathy

If trust is associated with a subjective probability that a partner will not make misuse of one's dependence, without further qualification, then anything that contributes to such subjective probability would belong to trust. However, trust is generally not associated with motives of self interest. We trust someone if he is likely to cooperate even if he is not coerced to do so and has no direct material interest in doing so. This yields:

proposition 2

Trust represents a source of cooperation next to sources that pertain to self-interest and coercion

Thus, from figure 1, trust is associated with the non-egotistic sources of cooperation; with loyalty to a partner due to ethics or bonds of friendship or kinship rather than coercion or material self-interest. From this we derive:

proposition 3

One dimension of trust is institutionalization, in the form of values and norms that constitute an ethics of transactional relationships

It would not be justified to say that the recognition of such institutions is absent from traditional TCE. For example, Williamson (1991) recognizes the effect of institutions on transaction costs, but under the assumption that they apply equally to all actors in a given context or national culture, they do not serve to distinguish between "structural alternatives" of governance structure within that context. Here, we propose that they do, for two reasons. First, the susceptibility to values and norms is likely to differ between individuals within a national culture, and between organizations, as part of organizational culture, so that their impact may vary within national boundaries (cf. Noorderhaven, 1995). Second, institutions may not be exogenous to a transaction relationship, and may partly develop within it.

The second dimension of trust, in the form of bonds of friendship or kinship, is related to the concept of social exchange, indicated before. Social exchange by its nature is restricted to insiders: people with whom one shares the bonds that form a basis for trust. Trust requires familiarity and mutual understanding, and hence depends on time and context; on habit formation and a positive development of a relation. As indicated by Hirschman (1984): unlike most economic commodities, trust may grow rather than wear out by usage. If trust is associated with a subjective probability that a partner will cooperate, then a zero probability means blind distrust. The problem with that is that because it

prevents us from entering upon cooperation, we miss the opportunity to build trust on the basis of successful cooperation, and zero trust remains zero (cf. Gambetta, 1988b). On the other hand, if on the basis of a non-zero subjective probability of cooperation by the partner one enters cooperation, the probability will be adjusted on the basis of experience. It may grow, but that is not necessarily the case: naivety may be tuned down to realism. If trust is blind, in the form of a unit subjective probability, it is likely to be disappointed sooner or later, because few partners will be able to resist every "golden opportunity" for defection. But positive experiences with a relation, and an expansion of its scope will enhance a favourable perception of probability of cooperation. From this we derive:

proposition 4

A second dimension of trust is associated with what we will call "habitualization": familiarization, habit formation, and bonding, associated with positive experiences.

Hypotheses on trust and governance

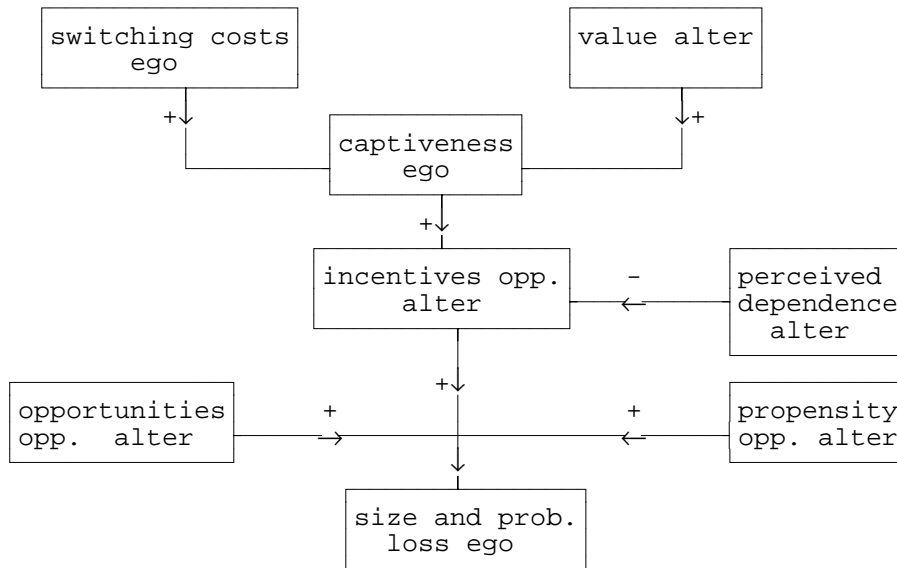
We proposed that trust is one source of cooperation, next to coercion and self-interest. The latter two have been elaborated in an exploration of forms of "governance" in TCE. To embed trust in a wider scheme of governance, Nootboom (1995) proceeds as follows:

*X is willing to engage in cooperation with Y (i.e. enter upon cooperation or continue it), even if this makes X dependent, if X has a more or less well grounded belief, in the form of a subjective probability, that Y will cooperate in the sense of not mis-using such dependence. This belief may be based on (perceived) available **opportunities** for misuse on the part of Y, Y's **incentives** towards misuse, and Y's **propensity** to employ the opportunities. Inclination to use opportunities for defection is related to trust, which has its basis in ethics, kinship, friendship or empathy.*

My definition of (behavioral) trust would now be as follows:

X trusts Y to the extent that X chooses to cooperate with Y on the basis of a subjective probability that Y will choose not to employ opportunities for defection that X considers damaging, even if it is in the interest of Y to do so. The trustworthiness of Y depends on Y's true propensity to employ those opportunities

figure 2: determinants of risk of opportunism



This is elaborated into the scheme in figure 2 for the risk of opportunism of ego in his relation with alter. Here risk of opportunism is identified as the net outcome of causes of dependence, legal and private governance and trust. This risk has two dimensions: the probability that the partner (alter) will behave opportunistically, and the loss one incurs if he does.

In an earlier study (Berger, Noorderhaven & Nooteboom, 1995), we investigated the determinants of only one side of risk: the size of a possible loss. Here we want to investigate the explanation of both sides of risk simultaneously.

The scheme represents the perspective of one agent (ego; in our present study: the supplier). A similar scheme applies to the other partner (alter). In our present study we focus on risk and its determinants *as perceived* by the supplier, in the customer relation considered.

In the scheme we find the role of trust, as discussed, in the (perceived) propensity of an agent to employ opportunities for opportunism. In opportunities for opportunism we recognize the notion of legal ordering from TCE: contractual limitations of the room for opportunistic action. Private ordering also may yield restrictions on such opportunities: losses incurred from the provision of hostages or other guarantees. In the switching costs we recognize elements of governance from TCE such as loss of (one's share in) transaction specific investments, loss of quality of supply due to discontinuity of the relation. For our present purpose, we derive the following hypotheses for empirical testing, in which we separate the effects on size and probability of loss.

hypothesis 1

Value of the partner (VA) has a positive effect on the size of possible loss (rather than any effect on its probability)

hypothesis 2

Switching costs, measured by means of asset specificity (ASE), have a positive effect on the size of possible loss (rather than any effect on its probability)

The greatest part of switching costs, in line with TCE, consists of dedicated assets and transaction specific investments that the supplier has made.

hypothesis 3

Ordering (private and legal), taken as a restriction of opportunities for the partners opportunism (ROA) has a negative effect on the probability of loss (rather than any effect on its size)

This hypothesis can be broken down into the two types of ordering:

hypothesis 3a

Legal ordering (LO) has a negative effect on the probability of loss

hypothesis 3b

Private ordering (PO) has a negative effect on the probability of loss

hypothesis 4

Trust, with its dimensions of habitualization and institutionalization (HI) has a negative effect on the probability of loss (rather than on its size)

The last hypothesis can be broken down into the various dimensions of trust, as discussed before:

hypothesis 4a

Institutionalization (INST) has a negative effect on the probability of loss

hypothesis 4b

Habitualization (HAB) has a negative effect on the probability of loss

Also, there may be a psychological side to trust, in the sense that it is mitigated by self-confidence: a supplier who is confident of his own value will be more trusting than one that is diffident (cf. Deutsch, 1973). An effect of own value may also be interpreted differently. According to figure 2, the partner (Y) has less incentive towards opportunism to the extent that he is himself dependent on X, since then X might retaliate with opportunism. If X is confident about his value to Y, he may rationally expect Y to have less incentive towards opportunism:

hypothesis 5

Own value (VE) has a negative effect on probability of loss (rather than its size).

The literature on repeated games (Axelrod, 1984) demonstrates how the expectation of future cooperation constrains opportunism: short term benefits from opportunistic defection may be less than long term gains of ongoing cooperation. The implication is that a perspective for ongoing, future cooperation has effects on both the value of the partner, and hence on the size of loss, and on the probability of loss:

hypothesis 6

Continuity of the relation (CON), based on past growth (GR) and future perspective (FP) has a positive effect on size of loss, and a negative one on probability of loss.

This can also be broken down into its components

hypothesis 6a

Past growth (GR) has a positive effect on size and a negative effect on probability of loss

hypothesis 6b

Future perspective (FP) has a positive effect on size and a negative effect on probability of loss

These hypotheses do not pertain to trust, as defined before, in that they are part of the egotistic sources of cooperation: they pertain to the rational evaluation of self-interest by the partner. They do not impact, like trust, on the inclination towards opportunism, given the opportunities and incentives for it, but on the incentives, inspired by self-interest.

We may proceed further along this line: ego may have other knowledge of alter's dependence, which may constrain his perceived incentives towards opportunism, as illustrated in figure 2.

hypothesis 7

Other factors that indicate the dependence of alter, and thereby constrain

his inclination towards opportunism (RSA), have a negative effect on probability of loss (rather than its size)

Controls

In view of the structure of our data (ten customer relations for each of ten suppliers), we should expect firm-specific effects. To what extent are perceptions of relational risk determined by characteristics of the perceiver rather than those of the transaction relation? Indeed, the experiment was designed like this to investigate such effects, next to the effects discussed above.

First of all, some people (and some firms) may be more sensitive to risks (exhibit high "uncertainty avoidance") than others, so that *ceteris paribus* they will perceive higher risks; in particular higher probability of loss:

hypothesis 8

High uncertainty avoidance (UAE) has a positive effect on the perceived probability of loss (rather than on size of loss)

A larger firm is likely to be subject to lower transaction costs and relational risk, compared to small firms, due to less bounded rationality and more capacity for search, contract design, monitoring, and litigation, with the support of specialized staff functions, and a wider spread across different products, markets and transaction relations, yielding better opportunities for alternative employment of partially specific assets, lower switching costs and a greater spread of risk (Nootboom, 1993b). As a result it is likely to incur lower risks; in particular a smaller size of loss:

hypothesis 9

Firm size (SE) has a negative effect on the size of loss (rather than on its probability)

However, we cannot be sure that firm characteristics such as uncertainty avoid-

ance and size suffice to account for all firm-specific effects, and firm dummies will be added to test for remaining effects.

Data and measurement

A major question of course is how trust is to be measured. Here we take the approach of constructing measures, by factor-analytic means, from multiple questionnaire items relating to the different dimensions of trust, as discussed before, in a survey of buyer-seller relations.

One part of our analysis is that opportunism and trust are to some extent idiosyncratic: they vary between people and organizations even other conditions are identical. As a result, trust and the choice of governance, and their effects on perceived risk, will vary between people. We want to include this in our study and therefore designed a survey with ten different suppliers in the same industry, with for each of them ten customer relations. This allows us to test for systematic effects of trust, governance, etc. versus firm specific effects. A second reason for this design was to distinguish the study from a previous one (Berger, Noorderhaven & Nooteboom, 1995), on the basis of a survey of 80 suppliers to a single OEM of photocopying machines.

The questionnaire used in the present study was based on that developed in the previous one, with omission of items that had proved to be of little value, and adding some new items. In the present study, one of the researchers was present while the respondent completed the questionnaire, to minimize the risk of misunderstanding of questions. This method also had the advantage that there were no missing data. Apart from variables that by their nature are binary (yes/no) or cardinal (e.g. firm turnover size) all items on the questionnaire were five point scales. They were chosen on the basis of their hypothesized relation to latent variables that resulted from the theoretical analysis.

Table 1: Summary of hypotheses

Hypothesized effects of variables on size and probability of loss

	size of loss (SLE)	probability of loss (PLE)
H1 Value alter (VA) % share turnover (%S) remaining value alter (RVA)	+	0
H2 Switching costs (ASE) dedicated assets physical asset specificity knowledge specificity location specificity	+	0
H3 Restriction opp. alter (ROA) legal ordering private ordering	0	-
H4 Trust (HI) habitualization institutionalization	0	-
H5 Value ego (VE)	0	-
H6 Continuity (CON) growth future perspective	+	-
H7 Restraint alter (RSA)	0	-
H8 Uncertainty avoidance (UAE)	0	+
H9 Firm size (SE)	-	0

For most variables, multiple underlying items were used, but sometimes only a single item. Confirmatory factor analysis was used to test the measurement hypotheses. Cronbach's alpha was used to determine overall construct reliability, with the cut-off point at the usual value of 0.7. Factor loadings were used to assess for each item whether it contributes significantly to the joint factor, with the cut-off point at the usual value of 0.3. When an item had a lower loading, it was dropped, and the analysis was repeated for the remaining

items, until a reliable scale with reliable loadings emerged. The items were then added to yield a measure of the latent variable. The resulting scales, with their alpha values and specification of the underlying items, is given in an appendix. As shown, all multi-item scales have an alpha above .7, except growth (.68).

Size of loss (SLE) is measured as a two-item scale, and probability of loss as only a one-item scale. For value alter (VA) we have two measures: percentage of sales to the focal customer (%S) and a scale of four further items (RVA). Joining them into one scale greatly reduces the alpha value, and is therefore rejected, so that both will be used separately. Asset specificity (ASE) is measured as the aggregate of four constructs, one for each dimension of asset specificity (as specified by Williamson), with a total of 10 items. Restraint of opportunities of opportunism (ROA) is measured as the aggregate of two scales: one for legal ordering (LO) and one for private ordering (PO), with a total of 7 items.

Trust (HI) is measured as an aggregate of two dimensions, called habitualization (HAB) and institutionalization (INST), with a total of 6 items. Value ego (VE) is an aggregate of 6 items. Continuity of the relation (CON) is an aggregate of two scales, past growth of the relation (GR) and future perspective (FP), with a total of 5 items. Restraint alter (RSA) is composed of 5 items, and uncertainty avoidance (UAE) of 7 items. Firm size naturally is a cardinal measure.

The hypotheses are now summarized in table 1.

Tests

First, we test the idea that size of loss (SLE) and probability of loss (PLE) constitute separate dimensions. In factor analytic terms: are they orthogonal? For this we compare the factor analysis on the two items underlying SLE with a factor analysis on the three items of SLE and PLE taken together. The results are reported in table 2.

The table shows that Cronbachs alpha, which was quite high for the SLE construct with its two items (sle1 and sle2), deteriorates drastically when we add

the single item for PLE (from $\alpha = 0.90$ to $\alpha = 0.26$). A factor is then formed, with high loadings from the items of SLE (0.95, 0.86), but a low loading (0.34) from the item of PLE, with a correspondingly low communality (0.12) of that item with the factor. The loading is only just above the cut-off point of 0.3. This is sufficient evidence to conclude that our measurements of SLE and PLE indeed represent separate dimensions, warranting separate regressions to explain each.

table 2: orthogonality SLE and PLE

construct	Cronbach's α	items	factor loading	communality
SLE	0.90	sle1	0.94	0.88
		sle2	0.86	0.74
SLE + PLE	0.26	sle1	0.95	0.90
		sle2	0.86	0.73
		ple	- 0.34	0.12

To test the hypotheses explaining size of loss and probability of loss, we now regress SLE and PLE on the explanatory variables pertaining to:

- captiveness ego: Value alter (%S and VA) and switching costs due to dedicated and specific assets ego (ASE)
- governance: Restriction of room for opportunism alter (ROA) due to legal safeguards (LS) and private ordering (PO)
- incentives alter: Value ego (VE), Continuity of the relation (CON), restraint alter (RSA)
- trust: Habitualization and institutionalization (HI)
- control variables: Uncertainty avoidance ego (UAE), Size ego (SE)

Later we will see what happens when we split up the explanatory variables into their component variables, and we will test for any remaining firm effects. We proceed by means of a backward procedure: all the explanatory variables are included initially, and variables with non-significant effects (effects at a lower

than 90% confidence level) are eliminated. The results are given in table 3.

From a confrontation between the results in table 3 and the hypotheses in table 1, table 3 indicates which hypotheses are confirmed (☉), and which are not (⊗). Most of the hypotheses are confirmed. We will give a systematic discussion later, where we will show that in some cases lack of confirmation yields interesting interpretations.

Table 3: Summary of results: standardized regression coefficients
between brackets: significance level (T)
confirmed hypotheses are indicated with ☉;
lack of confirmation is indicated with ⊗

	size of loss (SLE)	probability of loss (PLE)
H1 Value alter (VA) % share turnover (%S) remaining value alter (RVA)	☉ 0.59 (0.000)*** ⊗ 0.06 (0.45)	☉ 0.02 (0.78) ☉ -0.05 (0.60)
H2 Switching costs (ASE)	⊗ 0.10 (0.31)	☉ 0.11 (0.21)
H3 Restriction opp. alter (ROA)	☉ 0.10 (0.20)	☉ -0.25 (0.000)***
H4 Trust (HI)	☉ -0.06 (0.43)	☉ -0.22 (0.033)**
H5 Value ego (VE)	☉ -0.03 (0.72)	⊗ -0.05 (0.58)
H6 Continuity (CON)	☉ 0.159 (0.000)***	☉ -0.249 (0.019)**
H7 Restraint alter (RSA)	⊗ 0.099 (0.018)**	⊗ 0.01 (0.91)
H8 Uncertainty avoidance (UAE)	☉ 0.07 (0.32)	⊗ -0.201 (0.022)**
H9 Firm size (SE)	⊗ 0.07 (0.39)	☉ 0.08 (0.43)
adjusted R square	0.52	0.32

* indicates a p-value for T between 0.1 and 0.05 (significance > 90%)

** indicates a p-value for T between 0.05 and 0.01

*** indicates a p-value for T smaller than 0.01 (significance > 99%)

In the final step of the backward procedure, only those variables are retained that have a significant effect (at least one *); the values and significance levels of other variables derive from earlier steps.

Table 4: Results with RSA excluded
between brackets: significance level (T)
confirmed hypotheses are indicated with ●;
lack of confirmation is indicated with ⊗

	size of loss (SLE)	probability of loss (PLE)
H1 Value alter (VA) % share turnover (%S) remaining value alter (RVA)	● 0.52 (0.000)*** ⊗ 0.07 (0.42)	● 0.02 (0.78) ● -0.05 (0.60)
H2 Switching costs (ASE)	● 0.17 (0.031)**	● 0.11 (0.21)
H3 Restriction opp. alter (ROA)	● 0.07 (0.36)	● -0.34 (0.000)***
H4 Trust (HI)	● -0.03 (0.75)	● -0.22 (0.033)**
H5 Value ego (VE)	● -0.03 (0.72)	⊗ -0.05 (0.58)
H6 Continuity (CON)	● 0.306 (0.000)***	● -0.249 (0.019)**
H7 Restraint alter (RSA)	excluded	excluded
H8 Uncertainty avoidance (UAE)	● 0.07 (0.32)	⊗ -0.201 (0.022)**
H9 Firm size (SE)	⊗ 0.07 (0.39)	● 0.08 (0.43)
adjusted R square	0.52	0.32

The most striking lack of confirmation concerns the effect of RSA: restraints on the incentive towards opportunism by alter. We had expected a zero effect on SLE and a negative effect on PLE, but we find a zero effect on PLE and a positive effect on SLE. However, inspection of the correlation matrix, supplied

in appendix B, shows that RSA has a strong positive correlation with asset specificity ASE, which suggests that RSA may be taking the place of ASE. The correlation between ASE and RSA has an interesting implication: According to hypothesis 1, asset specificity (ASE) increases the size of loss, but it also contributes to the dependence of the partner, as indicated by the correlation

Table 5: Results with firm dummies

	size of loss (SLE)	probability of loss (PLE)
H1 Value alter (VA) % share turnover (%S)	● 0.53 (0.000)***	excluded
remaining value alter (RVA)	excluded	excluded
H2 Switching costs (ASE)	● 0.26 (0.007)***	excluded
H3 Restriction opp. alter (ROA)	excluded	● -0.34 (0.000)***
H4 Trust (HI)	excluded	● -0.26 (0.024)**
H5 Value ego (VE)	excluded	excluded
H6 Continuity (CON)	● 0.315 (0.000)***	● -0.295 (0.011)**
H7 Restraint alter (RSA)	excluded	excluded
H8 Uncertainty avoidance (UAE)	excluded	⊗ -0.156 (0.089)**
H9 Firm size (SE)	excluded	excluded
Firm dummies	D2 -0.15 (0.09)* D4 -0.13 (0.05)* D5 -0.18 (0.008)*** D6 -0.19 (0.008)*** D10 -0.28 (0.000)***	D1 -0.12 (0.11) D2 0.32 (0.000)*** D6 0.35 (0.000)***
adjusted R square	0.61	0.55

between ASE and RSA, and thereby reduces his inclination towards opportunism, which reduces the probability of loss. If we redo the regressions while excluding RSA as a variable in the regressions for SLE, we obtain the result summarized in table 4. For PLE the results are almost exactly as in table 3. For SLE, ASE now has a significant effect: its coefficient hardly changes, but it is now highly significant. Another result is that the coefficient of CON increases (while maintaining its high level of significance).

We tried to investigate how effects of the variables may be distributed over their component variables: for different types of asset specificity (ASE); different types of ordering (LO and PO in ROA); different aspects of continuity (GR and FP in CON); different dimensions of trust (HAB and INST in HI), in order to test hypotheses 3a and 3b, 4a and 4b, 6a and 6b. But with the enlarged number of explanatory variables we encountered strong multicollinearity. Next, we tested for any remaining firm effects. Our hypothesis was that firm effects are taken care of by the firm-related variables uncertainty avoidance (UAE) and firm size (SE).

To test this, we repeated the regressions with dummies for the ten firms (whose customer relations we are studying). To reduce the chance of multicollinearity, we allowed only for the variables that were significant in the last round (table 4). In other words: the object is to test whether, in comparison with the last results, the addition of firm dummies:

1. yields a significant increase of R square
2. the results on the explanatory variables (table 4) are not disturbed

The results are given in table 5.

Table 5 shows that dummies do get significant effects, and that they significantly raise R square. We must therefore reject our hypothesis that the two firm specific explanatory variables (UAE and SE) suffice to account for firm effects. The number of significant dummies is greater for SLE than for PLE. Note that for PLE one of the firm specific variables (UAE) turned out to have a significant effect, and thus covers at least part of firm variation, while for SLE none of the two firm variables came out significant. However, addition of the dummies did not effect the results concerning the

systematic (non firm specific) effects in table 4. On the contrary: the size and significance of those effects increased, with the exception of the effect of UAE on PLE (which did, however, remain significant). Thus, in the present study the omission of remaining firm effects (which are considerable) does not bias the results on the systematic effects.

Finally, we further tested the stability of the results by taking step-wise regression as an alternative to backward regression. It yielded virtually the same results. The only difference worth mentioning concerns the inclusion of firm dummies in the last round (table 5): fewer firm dummies were included in the end result. In the regression of PLE the dummy for firm 1 was not included; in the regression of SLE the dummies for firms 2 and 4 were not included. For the rest, the pattern of significant and non-significant variables was identical, and differences in regression coefficients and their significance levels were small.

Discussion

The study confirms the idea that relational risk has two dimensions: size of loss and probability of loss, which have substantially different causes.

In particular, the central hypothesis (Hypothesis 4) is confirmed that trust, induced by institutionalization and habitualization (HI), has a negative effect on risk in the form of the perceived probability of loss (PRL). Perceived probability of loss is further reduced, as according to Hypothesis 3, by governance in the form of restriction of room of opportunism (ROA) by means of legal and private ordering. As hypothesized (Hypothesis 6b) it is also less when there is perceived continuity in the relation (CON), on the basis of past growth and future perspective.

These results can be seen as a confirmation of our thesis that both trust and traditional factors from TCE are relevant, and that an extended theory of transactions applies.

Contrary to Hypotheses 5 and 7, restraints on the incentive towards opportunism

of alter, due to the value of ego (VE) and other factors that indicate the dependence of alter (RSA), do not affect the perceived probability of loss. This need not, of course, imply that they should not. Perhaps the suppliers considered in the study are not sufficiently sophisticated to include this indirect evaluation of the dependence of the partner as a condition that reduces their own risk. And this might yield a policy implication: in assessing relational risk, one should not only consider direct effects concerning one's own dependence, but also indirect effects through the partners' dependence as a restraint on their opportunism.

Also, we find that uncertainty avoidance ego (UAE) has a *negative* effect on perceived probability of loss, instead of the positive effect hypothesized (Hypothesis 8). But this contrary effect has a clear interpretation: rather than taking a relatively gloomy look at the perceived risk that remains after measures of governance are taken, as we hypothesized, risk averse firms see to it, more than others, that risk is sufficiently covered. This makes good sense.

Risk in the form of the *size* of loss, if the relation goes wrong, as hypothesized, is positively affected by the value of the partner in terms of percentage of one's turnover that is associated with that partner, but remaining aspects of partner value (RVA) have no significant effect. Thus Hypothesis 1 is partly confirmed. Switching costs due to dedicated and transaction specific investments (ASE) also has the hypothesized positive effect on size of loss (Hypothesis 2), but only after we disallow for an effect of RSA, which is strongly correlated with ASE. Continuity of the relation (CON) has its hypothesized positive effect on size of loss (Hypothesis 6a). Firm size does not have the hypothesized negative effect (Hypothesis 9). We do not consider this as a final verdict. As is often the case, firm size is correlated with many other variables, so that its effect may be masked.

The check on firm specific effects, on the basis of dummies, shows that firm specific effects are important, and that firm variables such as uncertainty avoidance and size do not suffice to cover all firm effects. However, the omission of firm dummies does not, in the present study, yield a bias in the measurement of the systematic effects derived from our extended theory of transactions.

Suggestions for further studies are the following:

- replicate the study on other sets of relations
- incorporate further firm specific variables to better explain firm effects
- expand the measurement of size and probability of risk by adding more items as a basis for their composition
- conduct more refined studies, with some control of multicollinearity, to test and estimate the components of explanatory variables (trust, asset specificity, continuity, ...)

A policy recommendation is to see whether in their relations firms may be advised to employ more sophistication in their assessment of relational risk, in particular by taking into account the restraint that a partner may need and want to exercise in view of his dependence; in particular dependence in view of different dimensions of value that one is offering to the partner.

Appendix A: measurement and scales used

Dependent variables

SLE: Size of loss ego ($\alpha=0.90$)

- Actually, we cannot afford a break with this customer
- If the relation with this customer breaks, it will take us much effort to fill the gap in turnover

PLE: Probability of loss ego

- The risk in this relation is sufficiently covered by contractual and non-contractual means

Explanatory variables: captiveness

VA: Value alter ($\alpha=0.70$)

- Because we supply to this customer we are able to build up technological know-how that is useful also for other customers
- Because we supply to this customer we obtain market knowledge that would otherwise be difficult to access
- Our firm is involved in an early stage in the development of new components for this customer ("early supplier involvement")
- This customer involves us in the testing of components and/or in prototyping

DA: Dedicated assets ($\alpha=0.83$)

- Our firm employs significantly more people than when we would not supply to this customer
- Our firm must have people with specific expertise in house to be able to supply to this customer
- Our firm has had to create extra capacity to supply to this customer
- We had to make investments to satisfy the specific supply conditions of this customer (e.g. for "just-in-time")

PAS: Physical asset specificity ($\alpha=0.70$)

- For our production for this customer highly specific machines, apparatus or instruments are needed
- Most of the machines, apparatus or instruments needed for the production for

this customer can also be used for other customers, if necessary

KAS: Knowledge specificity ($\alpha=0.68$)

- We have had to invest much time in acquiring the procedures desired for this customer (e.g. in the area of logistics and quality control)
- Much specific technological know-how is required to effectively supply to this customer
- Much knowledge of the internal organization of this customer is required for effective cooperation

LS: Location specificity

- The location of our firm plays an important role in the relation with this customer

SWE: switching costs ego = ASE asset specificity ego ($\alpha=0.84$) = dedicated assets + physical asset specificity + knowledge specificity + location specificity

Explanatory variables: governance

LS: Legal safeguards ($\alpha=.79$)

- The contract with this customer is as complete as possible
- The contract forms the core of our relation with this customer
- It is not so important in this relation to have a good contract

PO: Private ordering ($\alpha=.71$)

- The customer shares in the payment for specific machines and apparatus that we must make for the production for him
- The customer shares in the payment for the investments in specific tools and/or measurement apparatus that we must make for the production for him
- Guarantees are given for minimal custom over an agreed period of time
- We give guarantees for supply for an agreed period of time

ROA: Restriction of room for opportunism alter ($\alpha=...$) = legal safeguards + private ordering

Explanatory variables: incentive related

VE: Value ego ($\alpha=0.76$)

- Our supply performance to this customer cannot be assessed on its merit if one looks only at the price

- This customer is aware that our supply performance cannot be assessed on its merit if one looks only at price
- Our supply to this customer is clearly custom made
- We provide an important source of information on new technologies for this customer
- Our firm is involved in an early stage in the development of new components for this customer ("early supplier involvement")
- This customer involves us in the testing of components and/or in prototyping

GR: Growth ($\alpha=0.68$)

- The relation between our firm and this customer has continually improved in the course of time
- Our supply to this customer has increased strongly in the course of time

FP: Future perspective ($\alpha=0.67$)

- In this relation it is assumed that contracts will in general be renewed
- For the foreseeable future we do not expect a break with this customer
- We see the relation with this customer as a long term relation, in which one must invest, and in which both sides are willing to make concessions if it is really needed

CON: Continuity ($\alpha=0.78$) = growth + future perspective

RSA: Restraint alter ($\alpha=0.80$)

- If this customer did not behave fairly with respect to us, he could seriously damage his reputation in the market
- This customer is more dependent on us than we on him
- This customer cannot afford a break with us
- If the relation with our firm breaks, the customer will have trouble finding a comparable supplier
- We know much more about the customer than he about us

Explanatory variables: trust related

HAB: Habitualization ($\alpha=0.75$)

- Because we have been doing business so long with this customer, all kinds of procedures have become self-evident
- Because we have been doing business for so long with this customer, we can understand each other well and quickly

INST: Institutionalization ($\alpha=0.87$)

- In this relation, both sides are expected not to make demands that can seriously damage the interests of the other
- In this relation the strongest side is expected not to pursue its interest at all costs

HI: Habitualization/institutionalization ($\alpha=0.77$) = Habitualization + institutionalization + item:

- In this relation informal agreements have the same significance as formal contracts
- In our contacts with this customer we have never had the feeling of being misled

Control variables

UAE: Uncertainty avoidance ego ($\alpha=0.80$):

- In our relations with customers, our firm always tries to cover everything watertight contractually
- In the contact with customers we stick to the procedures and rules that apply in our firm
- We want to prevent becoming too dependent on one or a few large customers
- In our firm there is a clear preference for risky projects with an opportunity for high profits
- In view of the nature of our industry it is best to proceed cautiously, and not take too large steps
- With us, decisions are taken fast
- With us, administrative procedures play an important role

S: Size = annual turnover supplier

Appendix B: correlation matrix

Correlations:	PDE	VAR61	HI	ROA	FO	ASE
PDE	1.0000	-.3238*	.1367	.3044*	.4042**	.4485**
VAR61	-.3238*	1.0000	-.3002*	-.4138**	-.4658**	-.0487
HI	.1367	-.3002*	1.0000	-.0034	.4837**	.0242
ROA	.3044*	-.4138**	-.0034	1.0000	.3300**	.1734
FO	.4042**	-.4658**	.4837**	.3300**	1.0000	.1694
ASE	.4485**	-.0487	.0242	.1734	.1694	1.0000
VA	.3314**	-.3332**	.1221	.3676**	.3670**	.5600**
PEROMZET	.6372**	-.0627	.0073	.2153	.1314	.4284**
ASA	.3254*	-.0769	.1242	.3117*	.2279	.3721**
VE	.2785*	-.3243*	.2493	.3248*	.3853**	.4326**
UAE	.0193	-.1398	-.1823	-.0578	-.0086	.2073
SIZE	.1065	-.2056	-.0363	.5233**	.3913**	.0204
RSA	.2701*	-.1296	.2461	-.0011	.2409	.5356**

Correlations:	VA	PEROMZET	ASA	VE	UAE	SIZE
PDE	.3314**	.6372**	.3254*	.2785*	.0193	.1065
VAR61	-.3332**	-.0627	-.0769	-.3243*	-.1398	-.2056
HI	.1221	.0073	.1242	.2493	-.1823	-.0363
ROA	.3676**	.2153	.3117*	.3248*	-.0578	.5233**
FO	.3670**	.1314	.2279	.3853**	-.0086	.3913**
ASE	.5600**	.4284**	.3721**	.4326**	.2073	.0204
VA	1.0000	.1490	.3446**	.8455**	.2521	.2425
PEROMZET	.1490	1.0000	.1902	.1456	-.1173	-.0416
ASA	.3446**	.1902	1.0000	.3909**	.1445	.3283*
VE	.8455**	.1456	.3909**	1.0000	.1051	.1837
UAE	.2521	-.1173	.1445	.1051	1.0000	-.0555
SIZE	.2425	-.0416	.3283*	.1837	-.0555	1.0000
RSA	.5528**	.0451	.3858**	.5843**	.1294	-.1875

Correlations:	RSA
PDE	.2701*
VAR61	-.1296
HI	.2461
ROA	-.0011
FO	.2409
ASE	.5356**
VA	.5528**
PEROMZET	.0451
ASA	.3858**
VE	.5843**
UAE	.1294
SIZE	-.1875
RSA	1.0000

N of cases: 97 2-tailed Signif: * - .01 ** - .001

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