WORKING PAPER NO. 69/02

Allocation of Specific Assets, Relationship Duration, and Contractual Safeguarding in Buyer-Seller Relationships

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BERGEN, DECEMBER 2002
ISSN 0803-4028

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Abstract

This study explores the interaction effect of bilateral dependency and relationship duration on contractual safeguarding. In particular, the study compares how the allocation of specific assets, unilateral or mutual, affects contractual safeguarding across buyer-seller relationships with short versus long prior history. Data from a survey of 157 industrial purchasing relationships demonstrates that unilateral investments in specific assets by either the buyer or the supplier are more strongly supported by contractual safeguarding as the length of the relationship is increased. On the other hand, contractual safeguarding of mutually deployed specific assets is significantly relaxed as relationships evolve over time.

Keywords: Transaction costs; Asset specificity; Contractual safeguarding; Relationship duration

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1. Introduction

Transaction cost economics (TCE) (e.g., Williamson, 1985) has become one of the most influential and used theories for analyzing different kinds of inter-firm relationships. A key challenge for all kinds of inter-firm relationships is to design and implement a governance structure that creates sufficient coordination so the desired outcomes can be reached at the lowest possible costs. According to transaction cost economics, the principal governance problem is to implement a governance structure that provides sufficient safeguarding to secure the return of specific investments. It is assumed that the level of asset specificity determines appropriate safeguards, and that the use of safeguards influences transaction costs. Despite the large number of empirical studies that have investigated different areas of inter-firm governance, the effects of the allocation of asset specificity between the actors and relationship duration on the governance structure is scantly explored (Heide and John, 1992).

Transaction cost economics argues that when asset specificity becomes substantial, terms of trade will convert from conventional market exchange into small numbers exchange (Williamson, 1975). The hybrid mode (e.g., contracting) or internal organization (hierarchy) is then assumed to replace market governance to safeguard asset specificity (Williamson, 1985), and handle bilateral dependence (Williamson, 1991a). However, TCE does not explicitly differentiate between situations where only one of the involved actors unilaterally invests in specific assets compared to situations where all actors mutually deploy such investments. Furthermore, TCE assumes that actors at any time may exploit the value of asset specificity by opportunistic actions, thereby neglecting any possible effect of relationship history on governance structure. The purpose of this study is to examine the linkage between the

allocation of asset specificity and the use of contractual safeguarding. We will specifically examine whether this linkage is contingent upon the prior length of the relationship.

If the allocation of asset specificity (unilateral versus mutual) and relationship duration increase or decrease the need for safeguarding, the incurred transaction costs are also likely to be influenced. If for example, two firms due to a long history of prior trading can reduce the level of safeguarding mechanisms, the actors can also save on transaction costs. Furthermore, we may speculate whether actors in such situations are able to rely on contracts (hybrids) even though the level of asset specificity suggests vertical integration. Such research questions have not previously been addressed in theoretical or empirical studies. This study contributes to the literature on inter-firm governance by highlighting the interplay between the allocation of specific assets and relationship duration on the use of safeguarding mechanisms.

The paper is organized as follows: We first present the theoretical background underlying our research. We focus here on the effects of both unilateral and mutual deployment of specific assets, as well as relationship duration on safeguarding. We then report the research methodology, followed by a presentation of the results. Finally, the results are discussed, and implications for theory and practice are outlined.

2. Theory and hypotheses

Investments in specific assets occur frequently in relationships between buyers and suppliers, and a key governance problem is to secure the return on such investments. Asset specificity refers to investments and adaptations deployed by the buyer and/or the supplier, by tailoring specific product design, production processes or human skills to a specific trade partner. Transaction cost economics argues that actors investing in specific assets should implement appropriate mechanisms ex ante to safeguard such assets (Williamson, 1981;

1985). Transaction cost economics hold the transaction as the unit of analysis, and the level of asset specificity, the frequency of transactions, and the uncertainty surrounding transactions determine how to organize and govern inter-firm relationships (Williamson, 1981). TCE follows an efficiency path, and explains the purpose of establishing specific governance structures to safeguard specific assets as economizing on transaction costs (Williamson, 1981).

Furthermore, TCE focuses on how governance structures can adapt to changes over time, such as for example, market development and introduction of new technologies. The alignment between the actors should allow for adjustments over time, and safeguarding practice may deviate from original ex ante agreements as adjustment processes evolve over time (Macneil, 1978). This requires flexible safeguarding mechanisms so the required adaptations can be implemented.

Most inter-firm relationships between two independent actors are based on contracts, and the use of a hierarchical structure can only modestly be used since there is no common ownership or cross equity holdings. The question of appropriate safeguarding is related to how the actors can build safeguarding mechanisms into the contract. However, since these mechanisms need to be flexible in order to handle adjustments, the parties cannot ex ante agree on the complete use of safeguarding mechanisms for the entire duration of the relationship. As long as the contract is incomplete, it is required that the parties over time interact in order to plan on necessary adjustments of safeguarding (Heide, 1994). Such inter-firm planning of appropriate safeguarding serves the role of a proactive device that support inter-firm trades by providing a framework in which adaptations of terms of trade can take place (Heide, 1994). We will in this study denote this as *contractual safeguarding*. This refers to policies and procedures used to organize inter-firm transactions and realignment of terms of trade. The main purpose of such mechanisms is to enforce the commitments of both partners,

and make re-negotiations and adjustments of terms of trade less difficult. Such guidelines for inter-firm interaction should regulate the flows of information and resources between the partners, and thereby contribute to conflict resolution (Stinchcombe, 1985), provide information about costs (Milgrom and Roberts, 1992; Stinchcombe 1985), and aid in planning future production (Frazier, Spekman and O'Neal, 1988; Schonberger and Gilbert, 1983; Spekman, 1988).

We will in this study focus on independent suppliers and buyers without any kind of common ownership or cross equity holdings, relying solely on contractual safeguarding. We will pay attention to investments in specific assets made by both the supplier and the buyer. The primary objective is to examine the effects of unilateral versus mutual deployment of specific assets on contractual safeguarding, and analyze whether these effects are mediated by relationship duration. This is illustrated in Figure 1 below. We are thus concerned about two types of situations: (1) where only one of the actors invests in specific assets, and (2) where both the buyer and the supplier deploy symmetric investments in specific assets. We will investigate whether these two kinds of situations have different effects on contractual safeguarding, and whether these effects are contingent on the length of the relationship between buyer and supplier. Below we discuss in more detail the effects of unilateral and mutual specific assets on contractual safeguarding.

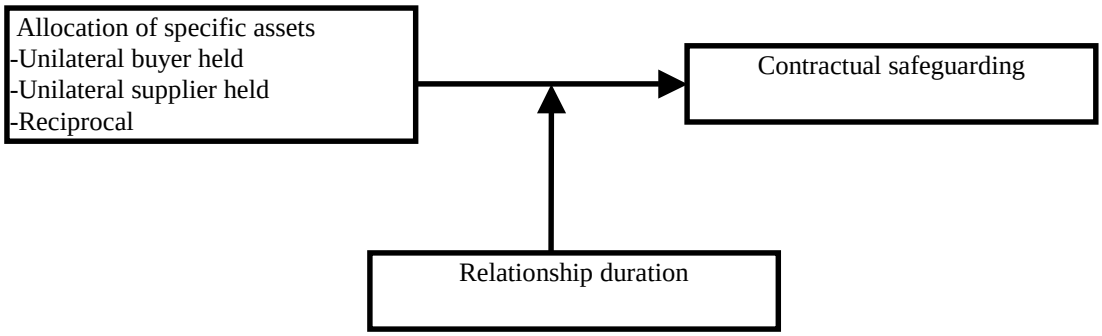

Figure 1
Research model

2.1. The effects of unilateral deployment of specific assets and relationship duration on contractual safeguarding

Unilateral deployment of specific assets concerns the problem of asymmetric dependence as specific assets increase the vulnerability of the investing party (Heide and John, 1988), and the trade partner can expropriate the quasi rents by opportunistic behavior (Williamson, 1981; 1985). However, due to high switching costs, the investing party is unable to make credible threats of switching to another trade partner. This means that unilateral deployment of specific assets is expected to undermine the investing party's ability to implement contractual safeguards ex ante (Heide and John, 1992). From a buyer's point of view, the lack of contractual safeguards combined with substantial supplier held specific assets put him/her in a position to exercise power and control over the supplier when negotiating terms of trade. On the other hand, comprehensive contractual protection of supplier-held specific assets should reduce the buyer's flexibility and make him/her relinquish on-going influence in areas like adjustments of product design, organization of quality control, and production scheduling.

Both from the supplier and buyer's points of view, relinquishment of decision control by implementing contractual safeguarding mechanisms dedicated to protect the trade partner's specific investments may create a problem of reverse opportunism, in the meaning that it improves the bargaining position of the investing party (Heide and John, 1992). Accordingly, we assume that both the buyer and the supplier are unwilling to relinquish independence or decision control by providing specific safeguarding arrangements protecting the trade partner without some insurance that such inter-firm ties serve their own interests. However, as buyer and supplier interact over time, they may experience mutual benefits that may ease the enforcement of contractual protection of unilateral investments in specific assets. We should therefore expect that contractual safeguarding such as for example, credible agreements

regulating verification of costs and market conditions, order scheduling, and production planning, would be implemented over time rather than ex ante. We therefore propose the following two hypotheses:

H_1: Unilateral investments in specific assets by the buyer will increase the level of contractual safeguarding as the duration of the relationship is extended.

H_2: Unilateral investments in specific assets by the supplier will increase the level of contractual safeguarding as the duration of the relationship is extended.

2.2. The effects of reciprocal investments in asset specificity and relationship duration on contractual safeguarding

Mutual deployment of specific assets is expected to have a strong positive effect on the commitment of both parties to the relationship (Anderson and Weitz, 1992). When both parties invest in specific assets, reciprocity is maintained by a hostage exposure (Williamson, 1983), which enforces compliance to the relationship (Klein, 1980). Such commitments create a lock-in condition where the symmetric exposure of assets at risk serves as a mutual safeguard arrangement, and tends to create an atmosphere of forbearance (Williamson, 1991a). This is often framed as self-enforcing agreements based on credible commitments to the relationship (Heide, 1994; Williamson, 1983; 1985). Furthermore, symmetric deployment of specific assets provides a balanced dependence structure that serves to align the interests of both parties and preserve the relationship (Bradach and Eccles, 1989; Macneil, 1980).

However, the relationship between mutual (symmetric) investments in specific assets and contractual safeguarding is not straightforward. The hostage model described above assumes

that the value of each actor's specific investments is well specified and verified (Williamson, 1983). Mutual deployment of specific assets raises the problem of asymmetric information and uncertain evaluation of the value of the sacrificed hostages. We argue that this problem is substantial in relationships with short prior history. Moral hazards caused by problems related to uncertain screening and verification are still present under such circumstances (Williamson, 1983; 1985), and this should motivate the actors to implement contractual safeguards. *"Indeed, it may be difficult for buyers to ascertain whether the investments made in response to first period orders are of the amount or the kind that the producers claim"* (Williamson, 1985, p. 177). Moreover, the implementation of contractual safeguards also represents some relinquishment of control, and successful crafting of safeguarding mechanisms is dependent upon both partners' willingness to relinquish independence and decision control (Heide and John, 1992).

In the early stages of relationships, symmetric exposure of asset specificity should enforce both the motivation (uncertain evaluation) and the ability (balanced dependence structure) of the transacting parties to implement contractual safeguarding. As the relationship evolves over time, credible commitments in conjunction with a balanced dependence structure should relax the need for specific safeguarding devices. We therefore propose the following hypothesis:

H_3: Mutual investments in specific assets will decrease the level of contractual safeguarding as the duration of the relationship is extended.

2.3. Control Variables

We will also include volume of annual purchasing, the frequency of exchange, and buyer's manufacturing technology as control variables in the analysis. We will not develop

hypotheses for these variables, but simply discuss how these variables may affect contractual safeguarding.

Annual purchasing volume. We expect that parties in relationships representing important stakes may find it difficult and costly to adjust terms of trade ex post. The industrial buying behavior literature suggests that greater stakes attract parties from multiple organizational levels and across several departments within each firm, thereby making adjustments to initial agreements more difficult (Johnston and Bonoma, 1981). Furthermore, stake importance is expected to influence inter-firm governance. The size of exchange is frequently used as an indicator reflecting stake importance (e.g., Spekman, 1988).

The frequency of exchange. TCE assumes that frequency influences the efficiency of specialized governance (Williamson, 1985), and hence the level of contractual safeguarding.

Buyer's manufacturing technology refers to the way intra-firm tasks like production and procurement are structured in the buying firm, and reflects the equipping and sequencing of activities in the workflow (Hickson, Pugh, and Pheysey, 1969; Woodward, 1965). As our sample consists of several industrial sub-groups, it is important to control for possible effects of manufacturing technology. Order production is characterized by unpredictable, complex, and flexible interactions between the performing units. Process production has extensive automation of production with rigid schedules and fixed technological structures, and reflects a high degree of workflow rigidity. Hickson, Pugh, and Pheysey (1969) describe production technology with respect to several dimensions: the automation of operation technology, the sequencing of operations, the specificity of evaluations of operations, and operation continuity. These dimensions are assumed to reflect task uncertainty, performance flexibility, and the planning horizon materialized in the buying firm's organizational design. In an inter-organizational setting, the operation technology of the buying firm is assumed to be related to procurement activities, and hence affect technological ties between the supplier and the buyer.

Several inter-organizational studies have examined the effect of the buyer's manufacturing technology on inter-firm organization. Johanson (1982) found that the rigidity of buyer's manufacturing technology increased the formalization of purchase contracts in industrial channel dyads, and Heide (1994) found a significant negative relationship between the rigidity of the buyer's manufacturing technology and flexible adjustment mechanisms. Based on these findings, we expect the rigidity of the buyer's manufacturing technology to be positively related to contractual safeguarding.

3. Research method

3.1. Empirical setting and data collection

The unit of analysis in this study is industrial buyer-seller relationships, and data was collected from manufacturing firms. To capture the domain of the constructs in the hypotheses (Churchill, 1979), an extensive literature review was first carried out. In the next stage, an explorative study was conducted among purchasing professionals in manufacturing firms, consultants, and academics engaged in procurement, logistics, and production planning. An archival study of standard purchasing contracts across four different industries was then undertaken to examine whether our definition of contractual safeguarding corresponded to contractual terms applied in industrial purchasing agreements. Another pilot study among 14 manufacturing firms was later conducted to obtain preliminary tests of scales and to capture relevant issues for prospective measures of asset specificity. These pilot studies provided valuable information that guided further improvements of ambiguous questions, inappropriate vocabulary, and scaling methods (Hunt, Sparkman, and Wilcox, 1982). Finally, a pretest of

the revised questionnaire based on personal interviews was carried out. The pretest revealed no significant problems with any of the remaining measures or scaling formats.

The final questionnaire was mailed to a census of 684 industrial procurement professionals with membership in the National Association of Purchasing and Logistics in a European country. Among these, 114 reported after receiving the questionnaire that they were unable to participate in the study because their firm had left business, or was no longer engaged in manufacturing. Among the remaining 570 informants, 32 % returned the questionnaire after two callbacks. The major part (67 %) of the non-responders reported busy work schedules or lack of time as the main reason for not answering the questionnaire. Non-response bias was measured by comparing early and late responders (Armstrong and Overtone, 1977). No significant differences were found between the two groups with respect to length of the relationship, firm size, purchasing volume, or key informants' knowledge and involvement in the firm. Finally, firm size was compared between the responding firms and a sample of 160 non-responders. No significant difference was detected.

3.2. Measures and validity of measures

Contractual safeguarding (CONTRACT) reflects the planning dimension of bilateral governance (Heide, 1994), and describes to which extent production planning and order scheduling are formalized through fixed policies and procedures. Empirical studies from manufacturing settings by Heide and John (1990), and Noordewier, John and Nevin (1991) provided important inputs for developing this scale. The factor analysis assigned all four items to one factor which showed satisfactory internal consistency with $\alpha = .78$.

Buyer held specific assets (BUYSPEC) and *supplier held specific assets (SUPPLSPEC)* refer to investments and adaptations respectively made by buyer and supplier in physical

assets, production facilities, tools, and knowledge tailored to the relationship. The scaling of these concepts was based on items developed by Heide and John (1990; 1992); Masten, Meehan, and Snyder (1991); and Walker and Poppo (1991). Both scales consist of five items. The factor analysis confirmed a one-factor solution for each scale with reliability measures of $\alpha = .78$ for BUYSPEC and $\alpha = .85$ for SUPPLSPEC.

Relationship duration (LENGTH) was measured as the natural logarithm of the prior length of the relationship (ln-years).

Annual purchasing volume (PURCHASE) was measured as the buyer's annual purchases from the specific supplier.

The frequency of exchange (ORDERS) was measured as the average number of monthly orders between the buyer and supplier.

The buyer's manufacturing technology (BUYTECH) was measured as the degree of workflow rigidity in the buying firm. The variable was based on four different technological dimensions reflecting workflow rigidity (Hickson, Pugh, and Pheysey, 1969): (1) the automation of operation technology, (2) the sequencing of operations, (3) the specificity of evaluations of operations, and (4) operation continuity. The factor analysis assigned all items to one single factor, and the scale showed satisfactory reliability with $\alpha = .76$.

Relationship duration, annual purchasing volume, and the frequency of exchange are all single item measures based on ratio scales (years, monthly number of processed orders, and amount of $), and are not subject to reliability tests.

We used factor analysis to assess discriminant validity for all 14 items composing the scales of buyer held specific assets (BUYSPEC), supplier held specific assets (SUPPLSPEC) and contractual safeguarding (CONTRACT). None of the items showed a lower sampling adequacy (MSA) than 0.80. This indicates that inter-item correlations are explained by common factors (Kaiser, 1974). Common factor analysis with varimax rotation revealed three

factors. The varimax rotated factor loadings are presented in Appendix 2. All construct loadings are above the 0.40 cut-off point often used as a rule of thumb. Furthermore, all cross-construct loadings are smaller than the corresponding construct loadings. In sum, discriminant validity of the scales should be satisfactory.

3.3. Analysis

In order to test our research hypotheses, an OLS-regression model was estimated to analyze the interaction effect of asset specificity and prior length of the relationship on contractual safeguarding. The model was estimated as follows:

$$\begin{aligned} CONTRACT = \; & b_0 + b_1\,BUYSPEC + b_2\,SUPPLSPEC + b_3\,BUYSPEC \times SUPPLSPEC + \\ & b_4 LENGTH + b_5\,BUYSPEC \times LENGTH + b_6\,SUPPLSPEC \times LENGTH + \\ & b_7 BUYSPEC \times SUPPLSPEC \times LENGTH + b_8\,PURCHASE + b_9\,ORDERS + \\ & b_{10} BUYTECH + \varepsilon \end{aligned} \quad (1)$$

where:
CONTRACT = Contractual safeguarding
BUYSPEC = Buyer held specific assets
SUPPLSPEC = Supplier held specific assets
LENGTH = Relationship duration
PURCHASE = Annual purchasing volume
ORDERS = Monthly numbers of orders
BUYTECH = The rigidity of the buyer's manufacturing technology

H_1 can be analyzed in terms of the coefficients of the expression for the derivate of the regression equation (1) in accordance with Schoonhoven (1981):

$$\delta CONTRACT/\delta BUYSPEC = b_1 + b_3\,SUPPLSPEC + b_5\,LENGTH + b_7\,SUPPLSPEC \times LENGTH \quad (2)$$

When we consider the impact of unilateral deployment of buyer held specific assets (i.e. zero level for supplier held specific assets), the expression can be reduced to:

$$\delta CONTRACT/\delta BUYSPEC = b_1 + b_5\,LENGTH \quad (3)$$

In line with H_1, an increased level of unilateral buyer held specific assets should increase the level of contractual safeguarding under conditions of long relationship duration. This corresponds to a positive value of the interaction term BUYSPEC x LENGTH (i. e., $b_5 > 0$). Similarly, H_2 can be analyzed in terms of the coefficients of the expression for the derivate of the regression equation with respect to supplier held specific assets:

$$\delta CONTRACT/\delta SUPPLSPEC = b_2 + b_3\ BUYSPEC + b_6\ LENGTH + b_7\ BUYSPEC \times LENGTH \quad (4)$$

The effect of unilateral supplier held specific assets (i.e. zero level for buyer held specific assets) can be expressed as follows:

$$\delta CONTRACT/\delta SUPPLSPEC = b_2 + b_6\ LENGTH \quad (5)$$

As suggested by H_2, an increased level of unilateral supplier held specific assets should increase contractual safeguarding under conditions of long relationship duration. This corresponds to a positive value of the interaction term SUPPLSPEC x LENGTH (i. e., $b_6 > 0$).

H_3 was tested by the three-way interaction term BUYSPEC x SUPPLSPEC x LENGTH, and shows the effect of mutual and high asset specificity on contractual safeguarding as the length of the relationship increases. In line with H_3, this should be negative (i.e., $b_7 < 0$), indicating that contractual safeguarding decreases as the relationship evolves over time.

We also conducted additional regression analyses for buyer-seller relationships with respectively short (less than 10 years) and long duration (10 years or more). The average length of the relationships in our sample is 11.0 years with 10 years as the median. The results are presented as Model 2 and Model 3 in Table 2.

4. Results

Table 1 presents the estimated coefficients and levels of significance. The overall goodness of fit is acceptable ($F(10, 146) = 6.93$, $p < 0.01$, $R^2_{Adj} = 0.28$), and indicates that the model gives an adequate description of the data.

Table 1
Regression analysis with contractual safeguarding as dependent variable

Independent variables:	Coefficients	t-values
Buyer held specific assets (b_1)	-3.12	-3.04[a]
Supplier held specific assets (b_2)	-1.14	-2.07[b]
Buyer held specific assets x Supplier held specific assets (b_3)	0.71	3.22[a]
Length (b_4)	-2.30	-2.89[a]
Buyer held specific assets x Length (b_5)	1.28	3.24[a]
Supplier held specific assets x Length (b_6)	0.57	2.63[a]
Buyer held specific assets x Supplier held specific assets x Length (b_7)	-0.28	-3.23[a]
Annual purchasing volume (b_8)	0.07	2.02[b]
Monthly number of orders (b_9)	0.02	2.08[b]
Buyer's manufacturing technology (b_{10})	0.12	1.50
Constant (b_0)	7.76	3.77[a]
Model Fit	$F(10, 146) = 6.93^a$ $R^2_{Adj} = 0.28$, n= 157	

a indicates significant at $p < 0.01$, b indicates significant at $p < 0.05$, and c indicates significant at $p < 0.10$

As suggested by H_1, we observe a strong and positive effect of buyer-specific assets on contractual safeguarding for relationships with long prior history. The interaction term (BUYSPEC x LENGTH) is positive and significant ($b_5 = 1.28$, $t = 3.24$, $p < 0.01$). The same pattern is observed by comparing model 2 and model 3 in Table 2. The direction of the effect of unilateral buyer-specific assets changes from a negative ($b_1 = -1.92$, $t = -3.10$, $p < 0.01$) to a positive value ($b_1 = +0.75$, $t = 2.48$, $p < 0.05$) by comparing relationships with respectively short and long prior history.

We also find the same pattern for unilateral supplier-specific assets. As predicted by H_2, the interaction effect of supplier held specific assets and relationship duration is positive (b_6 = +0.57, t = 2.63, p < 0.01). This demonstrates that supplier-specific assets become more positively related to contractual safeguarding as relationships evolve over time. The same results are found by comparing Model 2 and Model 3 in Table 2. The effect of unilateral supplier-specific assets in relationships with short duration is negative (b_2 = -0.86, t = -2.59, p < 0.05), and positive for relationships with long duration (b_2 = +0.67, t = 3.72, p < 0.01).

Table 2
Regression Analysis of relationships with respectively short and long duration with contractual safeguarding as dependent variable

Variables	**Model 2:** Dyads with less than 10 years duration		**Model 3:** Dyads with 10 years or longer duration	
	Coefficients	t-value	Coefficients	t-value
Buyer held specific assets (b_1)	-1.92	-3.10[a]	0.75	2.48[b]
Supplier held specific assets (b_2)	-0.86	-2.59[b]	0.67	3.72[a]
Buyer held specific assets x Supplier held specific assets (b_3)	0.47	3.49[a]	-0.13	2.03[b]
Annual purchasing volume (b_4)	0.10	0.62	0.04	1.33
Monthly number of orders (b_5)	0.015	0.90	0.014	1.69[c]
Buyer's manufacturing technology (b_6)	0.23	1.73[c]	0.06	0.60
Constant (b_0)	5.95	4.52[a]	0.76	0.98
Model Fit	$F(6,56)=5.02^a$, $R^2_{Adj}=0.28$, n=63		$F(6,87)=8.04^a$, $R^2_{Adj}=0.31$, n=94	

a indicates significant at p < 0.01, b indicates significant at p < 0.05, and c indicates significant at p < 0.10

These analyses show that the effect of unilateral deployment of specific assets on contractual safeguarding is non-monotone over the length of the relationship. This effect is more clearly illustrated by plotting the partial derivates of respectively unilateral buyer held specific assets and unilateral supplier held specific assets over the relationship duration range. Recall that relationship duration is expressed as the natural logarithm of the number of years

the relationship had existed. (ln(years)). This is illustrated in Figure 2. When relationship duration is below 2.44 (i.e. 11.0 years), unilateral buyer-specific assets have a negative effect on contractual safeguarding, but the effect is positive for higher values of relationship duration. Similarly, we observe a negative effect of supplier-specific assets on contractual safeguarding when relationship duration is below 2.0 (i.e. 7.30 years), and a positive effect when relationship duration exceeds this value. Great caution should of course be taken when estimating critical values of relationship duration, because the shape of the time effect on bilateral governance is not well elaborated either theoretically or empirically in prior research. Notwithstanding, our data demonstrates strong support for the hypothesized interaction effects.

As predicted by H_3, the three-way interaction term of buyer-specific assets, supplier-specific assets and relationship duration on contractual safeguarding is negative ($b_7 = -0.28$, $t = 3.23$, $p < 0.01$). This finding demonstrates that mutual dependence in relationships with long prior history reduces the level of contractual safeguarding. This result is also found in Model 2 and Model 3 in Table 2. Mutual deployment of specific assets in relationships with long prior history decreases the level of contractual safeguarding ($b_3 = -0.13$, $t = -2.03$, $p < 0.05$).

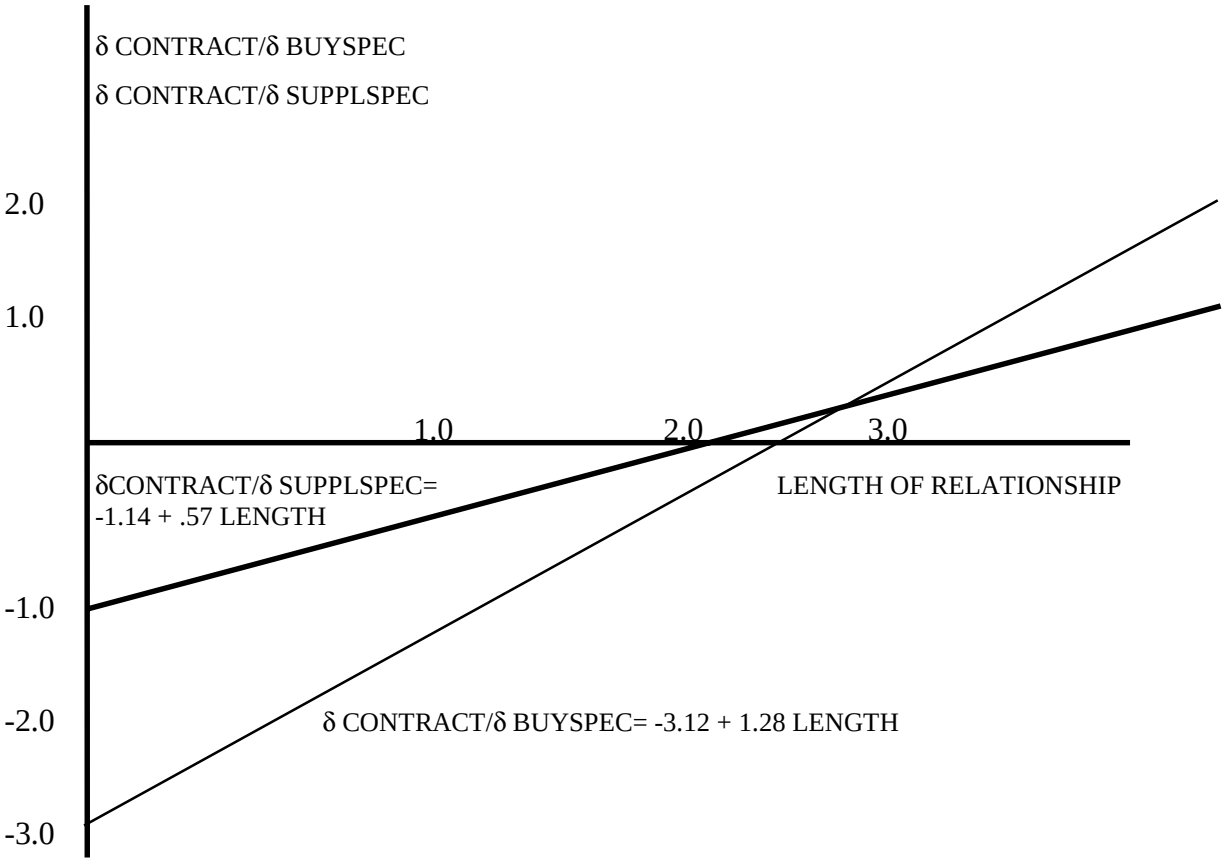

Figure 2
The effect of relationship duration on the linkage between buyer held specific assets (BUYSPEC), supplier held specific assets (SUPPLSPEC) and contractual safeguarding (CONTRACT)

The effects of the three control variables on contractual safeguarding were all as anticipated. Annual purchasing volume is positively related to contractual safeguarding (b_8 = 0.07, t =2.02, $p < 0.05$), indicating that relationships representing high stakes require more comprehensive contracting. Our findings also demonstrated a significant and positive relationship between the number of orders and contractual safeguarding (b_9 = 0.02, t = 2.08, $p < 0.05$). This indicates that the frequency if inter-firm exchange influences the efficiency of specialized governance mechanisms. Finally, we expected high workflow rigidity of buyer's

manufacturing technology to be positively related to contractual safeguarding. The observed relationship is positive, but not significant (b_{10} = 0.12, t =1.50).

Table 3
Correlation matrix and descriptive statistics

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1. Contract safeguarding	1.0	.36	.42	.42	.16	.36	.39	.41	.23	.24	.23
2. Buyer held specific assets		1.0	.57	.91	.009	.82	.44	.83	.24	.08	.13
3. Supplier held specific assets			1.0	.80	.07	.45	.75	.70	.12	.12	.17
4. Buyer held specific assets x Supplier held specific assets				1.0	.08	.74	.60	.90	.23	.09	.14
5. Length					1.0	.58	.67	.42	.21	.11	.17
6. Buyer held specific assets x Length						1.0	.70	.91	.33	.09	.19
7. Supplier held specific assets x Length							1.0	.81	.23	.15	.20
8. Buyer held specific assets x Supplier held specific assets x Length								1.0	.32	.09	.17
9. Annual purchasing volume									1.0	.23	.07
10. Monthly numbers of orders										1.0	.08
11. Buyer's manufacturing technology											1.0
Mean values	4.13	2.46	3.57	9.81	2.27	5.68	8.21	22.87	12.91	10.17	4.29
Standard deviation	1.55	1.25	1.50	8.24	0.88	3.92	5.00	22.72	27.19	15.12	1.35

$r < -0.16$ and $r > 0.16$ is significant at $p < 0.05$ (two-tail test) for n = 157

5. Discussion and implications

5.1. Discussion of the results

The empirical results indicate that relationship duration is an important factor when a party is vulnerable and faces substantial unilateral dependence (Moorman, Zaltman, and Deshpande, 1992). Even if unilateral deployment of specific assets should motivate the investing party to establish contractual safeguards, the condition of asymmetric dependence can restrict the ability to enforce such arrangements (Heide and John, 1992). Our results support this view, and show that unilateral investments in asset specificity by the buyer or supplier make it difficult to implement contractual safeguarding in relationships with short prior history. This pattern is completely turned around when we consider relationships with

longer duration. The results show that both unilateral buyer-held and unilateral supplier-held specific assets increase contractual safeguarding as the relationship evolves over time.

Our empirical findings also show that contractual safeguarding is relaxed as the length of the relationship is extended if both actors mutually deploy specific assets. This result is consistent with previous theoretical and empirical studies. When both parties in a relationship deploy specific investments, reciprocity is maintained by an exposure of hostages (Anderson and Weitz, 1992; Williamson, 1983). This should enforce stronger contractual compliance and create an atmosphere of forbearance (Williamson, 1991a). Furthermore, empirical findings by Gundlach and Cadotte (1994) have demonstrated that increased mutual interdependence in business relationships is associated with the use of more non-coercive strategies, lower residual conflicts, and more favorable evaluations of partner performance. Mutual deployment of specific assets should over time provide better performance, and hence, lead to positive expectations of enlarged future inter-firm trade (Heide and John, 1990).

5.2. Theoretical implications

According to transaction cost economics, problems related to asymmetric information, uncertain evaluation of the accurate value of specific investments, and the future performance of a particular relationship should be most severe in the early stages of a relationship (Williamson, 1985). Our findings support TCE for relationships with symmetric investments in specific assets, as mutual asset specificity seems to enforce contractual safeguarding in relationships with short prior history. However, this governance pattern was absent for relationships with asymmetrical investments in specific assets. Our findings suggest that it is difficult to implement contractual safeguarding ex ante in asymmetrical relationships, but over time such mechanisms can be added to the relationship.

Our sample of buyer-supplier relationships represents hybrids with no common ownership or cross equity holdings, relying solely on contractual safeguarding. If our results are valid in general for such relationships, we may argue that not only the level of asset specificity affects the use of governance mechanisms, but also whether these investments are symmetrical or asymmetrical. Mutual and symmetric investments seem to make it easier to implement contractual safeguarding ex ante, while it is more difficult to implement contractual safeguarding in situations where only one actor makes such investments. This may indicate that contractual governance can handle higher levels of asset specificity if the investments are symmetrical than for unilateral investments, and that the transformation point where hierarchical governance replaces hybrid governance differs for these two kinds of situations. The hybrid governance zone handling intermediate levels of asset specificity can thus be 'shorter' for relationships with unilateral investments than for symmetrical relationships.

Furthermore, the effect of relationship duration is also different for these two kinds of relationships. While contractual safeguarding is enforced over time in relationships with asymmetrical deployment of specific assets, it decreases over time in relationships with mutual and high asset specificity. We may speculate whether other mechanisms than contractual safeguarding can be used to safeguard asset specificity. As suggested by Heide and John (1992), relational norms can provide safeguarding for unilateral deployment of specific assets, and Bradach and Eccles (1989) argue that governance mechanisms are often used in different combinations. The fact that contractual safeguarding over time increases in asymmetrical relationships and decreases in symmetrical relationships may be explained by how contractual safeguarding is combined with other mechanisms, for example relational norms. This study thus indicates that the alignment of bilateral governance is a very complex issue, and we may speculate whether different governance mechanisms partly substitute each

other and partly complement each other in a complex governance pattern (Bradach and Eccles, 1989).

5.3. Managerial implications

This study has demonstrated that unilateral deployment of specific assets makes it difficult to implement contractual safeguarding in the initial stages of buyer-supplier relationships. A managerial challenge is thus to find other ways of safeguarding such assets. Relational norms may play this role (Heide and John, 1992). However, it takes some time for relational norms to develop, and the development of relational norms is likely to be dependent on verification of skills and economic performance (Ring and Van de Ven, 1992; Stern and El-Ansary, 1992). Accordingly, it is important to promote socialization processes in the early stages of buyer-supplier relationships in order to promote goal congruence and credible commitments, thereby providing a foundation for the development of relational norms.

Another way of balancing inter-firm dependence concerns symmetric deployment of specific assets. Even though strategic deployment of specific assets made for the purpose of balancing inter-firm dependence should advance governance efficiency, it might, however, interfere with an efficient allocation of resources and economics of production. For instance, if economics of scope considerations suggest that the supplier should make unilateral investments in specific assets, as this will maximize the collective net gains, a re-allocation of specific assets for the purpose of balancing the dependence structure could reduce relationship performance. This means that both economics of organization and economics of production have to be considered in order to improve the performance of inter-firm cooperation. Several safeguarding mechanisms in addition to contractual devices should therefore be considered. The prospects of future sales, commitments to large volumes, or good profit margins (Rubin,

1990) can mitigate some of the risks and also provide some hazard premiums (Williamson, 1991b).

5.4. Limitations and future research

Much remains to be done to elaborate how the allocation of specific assets and the relationship history interact and affect contractual governance in buyer-seller relationships. However, some of the limitations of this research propose new and interesting research agendas. First, this study is based on a cross-sectional design. The specific sequencing of investments in specific assets may be reflected in the length of the relationship, but unfortunately we were not able to identify any sequencing from our cross-sectional data. Second, long-term relationships may be associated with a gradual build-up of specific assets, and provide an institutionalization of specific governance patterns over time (Noorderhaven, 1995). Such an institutionalization of inter-firm interactions based on organizational learning may explain the observed relaxation of contractual safeguarding in symmetrical relationships with long duration.

Another limitation concerns the motivation for mutual deployment of specific assets. Our research design does not examine whether symmetric deployment of assets over time is based on efficiency considerations, or mainly represents a strategy aimed at balancing inter-firm dependency or sustain credible commitments (Anderson and Weitz, 1992). An interesting research issue is to examine a possible trade-off between economics of organization and economics of production as one route for enhancing our understanding of how the allocation of specific assets is established and develops over time.

Examination of the antecedents and nature of relational norms is an interesting research issue. Exchange norms and personal trust might reflect a substantial portion of calculativeness

(Nooteboom, Berger, and Noorderhaven, 1997; Williamson, 1993), such as for example rational expectation of the benefits from future trade. If the contracting parties are far-sighted and examine the contracting process in its entirety, actors should be expected to sacrifice some contractual safeguarding over time, if the economic prospects offer sufficient high hazard premiums. This will particularly be the case if initial investments in specific assets have a short payback time and provide substantial economic surplus to the investing parties.

This study was based on the buyer's perception of inter-firm dependence and bilateral governance. Several empirical studies have reported satisfactory correspondence between the measures of the same variables across both sides in a buyer-supplier relationship (e.g. Heide and John, 1990; 1992; John and Reve, 1982). Furthermore, Anderson and Weitz (1992) found a strong positive relationship between two trading partners' perceptions of each other's deployment of specific assets and credible commitments. Notwithstanding these findings, the perception of trade partners' deployment of specific assets is a critical issue when we consider mutual deployment of specific assets. Research based on data from both sides of the relationship is desirable to further elaborate on these issues.

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APPENDIX 1

Measures of constructs

Scales	Sample of items. *Response format*: 7-point Likert-type scale with end points inaccurate description and accurate description.
BUYSPEC 5 items $\alpha = 0.78$	BUYSPEC1: Our firm has made significant investments in storage and transportation equipment dedicated to deal effectively with deliveries from this supplier. BUYSPEC2: Our firm has committed a lot of time and resources to developing special equipment and routines for product control of the deliveries from this supplier. BUYSPEC3: We have made significant investments in information technology dedicated to rationalize the interactions with our supplier. BUYSPEC4: Our firm has committed substantial time and resources to the training and development of personnel for our supplier. BUYSPEC5: Our firm has deployed substantial resources to tailoring specific quality assurance programs for this supplier.
SUPPLSPEC 5 items $\alpha = 0.85$	SUPPLSPEC1: Our supplier has carried out considerable product adjustments in order to meet the requirements from our company. SUPPLSPEC2: Our supplier has carried out extensive investments in reorganizing of production to improve the quality of the products delivered to our firm. SUPPLSPEC3: Our supplier has to a great extent invested in production equipment and tools in order to make better adaptation to our firm's requirements. SUPPLSPEC4: Our supplier has committed a lot of time and resources to meet our firm's requirements with regard to routines and equipment for product control. SUPPLSPEC5: Our supplier has carried out extensive investments in storage and transportation equipment in order to handle deliveries to our company.
CONTRACT 5 items $\alpha = 0.78$	CONTRACT1: Our firm and this supplier have mutually binding agreements that regulate all activities related to integration of our production planning. CONTRACT2: Our firms have set firm agreements to integrate the supplier's production planning with our firm's procurement planning. CONTRACT3: Our firm and this supplier have developed rules and procedures for order scheduling and follow-up on orders and deliveries to our firm. CONTRACT4: Exchange of information between our firm and the supplier on price and marketing issues are pre-planned and carried out regularly.
BUYTECH 4 items $\alpha = 0.76$	BUYTECH1: The workflow in our production department is highly preprogrammed. BUYTECH2: Information technology is extensively used for control and scheduling purposes. BUYTECH3: The production technology in our firm consists of rigid sequences of automatic processes. BUYTECH4: It is very costly and resource demanding to redesign our production for new lots of products.

APPENDIX 2

Discriminant validity, three-factor solution with varimax rotation

Items: The corresponding item-description is presented in Appendix 1.	FACTOR 1 Supplier held specific assets	FACTOR 2 Buyer held specific assets	FACTOR 3 Contractual Safeguarding
SUPPLSPEC1	**0.78**	0.14	0.18
SUPPLSPEC2	**0.71**	0.26	0.25
SUPPLSPEC3	**0.68**	0.33	0.13
SUPPLSPEC4	**0.68**	0.18	0.18
SUPPLSPEC5	**0.45**	0.40	0.17
BUYSPEC1	0.03	**0.69**	0.14
BUYSPEC2	0.35	**0.58**	0.23
BUYSPEC3	0.19	**0.58**	0.12
BUYSPEC4	0.23	**0.56**	0.04
BUYSPEC5	0.36	**0.54**	**0.17**
CONTRACT1	0.09	0.06	**0.81**
CONTRACT2	0.16	0.14	**0.79**
CONTRACT3	0.23	0.11	**0.50**
CONTRACT4	0.15	0.23	**0.45**
EIGEN VALUE	5.42	1.66	1.33
Variance Explained: 60.2%			