MANAGEMENT CONTROL OF INTER-FIRM RELATIONS:

THE ROLE OF INFORMATION

Proefschrift voorgedragen
tot het behalen van de graad
van Doctor in de Toegepaste
Economische Wetenschappen
door
Alexandra VAN DEN ABabeele
Advisor: Prof. Dr. Filip Roodhooft

Prof. Dr. Shannon Anderson
Prof. Dr. Henri Dekker
Prof. Dr. Luc Sels
Prof. Dr. Luk Warlop

Daar de proefschriften in de reeks van de Faculteit Economische en Toegepaste Economische Wetenschappen het persoonlijk werk zijn van hun auteurs, zijn alleen deze laatsten daarvoor verantwoordelijk.
I am indebted to many individuals without whom this dissertation would not have been possible.

First and foremost, I wish to express my warmest appreciation to my supervisor Prof. Dr. Filip Roodhooft, for his inspiring and encouraging guidance towards a deeper understanding of research work, his invaluable comments throughout the whole development of this dissertation and his unconditional belief in my work.

I am also very grateful to the four other members of my doctoral committee. Professors Shannon Anderson, Henri Dekker, Luc Sels and Luk Warlop provided intellectual inspiration, shared their technical wisdom, and gave insightful and greatly appreciated criticism.

Thanks also to all my former and current colleagues for providing a nice and creative working atmosphere, and for all the pleasant moments together.

A word of thanks to my friends for their continuous interest in the evolution of this dissertation.

My parents contributed greatly like they have always done. I thank them immensely for always being at my side, listening to me and giving moral support. I thank my two brothers, Luc and Robert, for all their friendship and for the fun we have together.

At last, to Hil Foon for supporting me with your love and understanding, thanks for your good-humored spirit, making me laugh every single day!
## General introduction

1. Review of important theoretical frameworks and concepts in inter-firm relations
   1.1 Inter-firm cost management
   1.2 Inter-firm management control
     1.2.1 Transaction cost economics (TCE)
     1.2.2 Critique on TCE
     1.2.3 Studying the role of (accounting) information in the negotiation process
   1.3 Bringing everything together: the general research framework

2. Research method
   2.1 Experimental research method
   2.2 Survey research method

3. Overview of the three manuscripts

### Manuscript 1: The effect of cost information on buyer-supplier negotiations in different power settings

**Abstract**

1. Introduction
2. Literature review
   2.1 Exchange models for negotiation
   2.2 The negotiation process
   2.3 Total Cost of Ownership and the concept of Value Chain Analysis
   2.4 The relative power structure
   2.5 Interaction effect of power and cost information
3. Research method
   3.1 Experimental design
   3.2 Subjects and procedures
   3.3 The bargaining task
   3.4 Dependent variables
     3.4.1 Negotiation outcomes
     3.4.2 Negotiation behavior
4. Results
   4.1 Experimental checks
   4.2 Negotiation outcomes
   4.3 Negotiation behavior
   4.4 Test of mediation and moderation
5. Discussion and conclusion

### Manuscript 2: How information and controls impact the formation of trust in inter-firm settings

**Abstract**

1. Introduction
2. Literature review and hypotheses
3. Research method
   3.1 Experimental design
     3.1.1 Control system
     3.1.2 Information
   3.2 Subjects and procedures
   3.3 The bargaining tasks
3.4 Dependent variables
3.4.1 Negotiation outcomes
3.4.2 Negotiation behavior

4. Statistical analysis and results
4.1 Early stage of the relation
4.2 Later stage of the relation

5. Conclusion and further research

APPENDICES

Manuscript 3: Information as an inter-firm governance mechanism, and its relation to formal controls, trust and perceived risk

Abstract

1. Introduction

2. Literature review
   2.1 Proactive information collection as an inter-firm governance mechanism
   2.2 Different dimensions of governance mechanisms and their effect on perceived risk
      2.2.1 Perceived risk
      2.2.2 Formal controls
      2.2.3 Trust
      2.2.4 Information
   2.3 Substitutes or complements: a dynamic view

3. Data and method
   3.1 Data collection
   3.2 Variables and measures
      3.2.1 Dependent variables
      3.2.2 Independent variables

4. Results
   4.1 Relation between perceived risk and the different dimensions of the governance mechanisms
   4.2 The joint effects of different governance mechanisms on perceived risk
   4.3 Does trust substitute information and control at later stages of the relation?
      4.3.1 The relation between trust and information
      4.3.2 The relation between trust and controls

5. Discussion and conclusion

APPENDIX

General conclusion

1. Contributions to the literature
2. Managerial implications
3. Limitations and suggestions for further research

List of tables

List of figures

References

Doctoral dissertations from the Faculty of Economics and Applied Economics
The central aim of this PhD project is to provide empirical research on the impact of more refined cost and management accounting information on buyer-supplier relations and outcomes.

Until recently, buyer-supplier relations received little attention of management accounting practitioners and researchers because prices for inputs simply flowed through the firm’s accounts and there was no need or opportunity for exercising “management control” beyond the legal boundaries of the firm. Procurement was simply a matter of negotiating the best price (Anderson, 2006).

However, over the last decades, companies have begun to see the wisdom of collaborating with key suppliers, partly due to the cost pressure caused by decreasing price levels and partly due to firms’ concentration on their core competencies. Firms increasingly outsource activities that do not belong to their core competences (Baiman et al., 2001; van der Meer-Kooistra & Vosselman, 2000). As activities are outsourced, intra-firm relationships are replaced with inter-firm relationships.

This has major implications for the business environment: over the past decades the median Fortune 500 industrial company has shrunk almost 40% and the value of purchased materials and services has grown from 20% to more than 50% of the selling price of finished goods (Rajan, 2006). Given the fact that a typical industrial buyer spends more than half of every sales dollar on purchased products, the potential for purchasing to impact the bottom-line is self-evident: a one percentage-point saving in purchasing costs can improve the margin on sales by half a point (Degraeve & Roodhooft, 1999; Ellram, 2002; Noordewier et al. 1990).

Due to this quantitative significance and due to the recognition of the implications for organizational design and management control within and between organizations, the topic is drawing increasing interest of current management accounting and control research (Anderson, 2006; Anderson & Sedatole, 2003; Dekker, 2003a; Hopwood 1996; Otley 1994).

Management accounting may play a key role in the management of inter-firm relationships. Recognizing this gap in the literature, Tomkins (2001, p.164) calls for an increased focus on the management of inter-firm relationships, by arguing that "the area warrants more empirical research with a greater emphasis upon business processes and the use of accounting in action/negotiation."

This is exactly the aim of this PhD dissertation, which provides three empirical studies on the impact of (management accounting) information on inter-firm relationships.
The first two manuscripts are based on experiments and assess to what extent more refined information (in these studies operationalized as Total Cost of Ownership information) can be useful in inter-firm cost management between buyers and suppliers in different business settings. While the first manuscript focuses on the use of information in different power settings, the second manuscript investigates the influence of information on buyer-supplier negotiations in different inter-firm management control settings. These two manuscripts are studied from a Social Exchange Theory (SET) perspective and use experiments as a research method because this allows us to study the way in which trust is built at the level of the relationship (i.e. the negotiation process) and, more importantly, the role that (accounting) information plays in this process. We choose this perspective and research method because the negotiation process and the role of information have received scant attention in the existing literature on inter-firm relations. One key conclusion that we can draw from these experiment-based manuscripts is that information can serve as an important governance mechanism in inter-firm relations.

Once information has been identified as an important inter-firm governance mechanism (manuscript 1 & 2), manuscript 3 discusses how information relates to other inter-firm governance mechanisms (trust and formal controls) in inter-firm relations. This third manuscript is survey-based, which prevents us from studying the negotiation process, but, which allows us to test some of the findings in the experimental studies with real company data, while taking into account transaction and partner characteristics that have been identified in prior (mainly Transaction Cost Economics (TCE) and Organization Theory-based) frameworks on inter-firm relations (e.g. Anderson & Dekker, 2005; Das & Teng, 2001a; Dekker, 2004; van der Meer-Kooistra & Vosselman, 2000). Manuscript 3 extends these models by explicitly incorporating information as a governance mechanism for inter-firm relationships.

The remainder of this introduction is organized as follows. The next section briefly reviews some of the main theoretical frameworks and concepts that have emerged in the literature on inter-firm relationships and that are used throughout this dissertation. Then, the research method is discussed. Finally, a general overview of the manuscripts is provided.

1. Review of important theoretical frameworks and concepts in inter-firm relations

The aim of this section is to briefly review some important concepts that have emerged in the literature on inter-firm cost management and control and that are used throughout this dissertation.

1.1 Inter-firm cost management

Inter-firm relationships introduce new challenges for management accounting, such as the provision of information for coordinating and optimizing activities across firms in a value chain (Dekker, 2003a; Gulati & Sighn, 1998). One of the requirements for any buyer-supplier relationship development is that information
between the firms is shared (Cachon & Lariviere, 2001; Tomkins, 2001). From the management’s point of view, information on activities and cost structures is important when analyzing and developing a firm's operations. Inter-firm information sharing therefore often includes something about activities and costs (Kulmala, 2004). Shared cost information can be used to carry out a Value Chain Analysis (VCA) in order to reveal the cost-reduction potential of suppliers’ operations and to exploit cost reduction potentials across the boundaries of companies (Cooper & Slagmulder, 1999).

VCA is described as a technique that can play an important role in the management of supply chain relationships. This analysis was developed by Porter (1985), and in the accounting literature further developed by Shank (1989) and Shank & Govindarajan (1992 & 1993). VCA is used to analyze, coordinate and optimize linkages between activities in the value chain, by focusing on the interdependence between these activities (Dekker, 2003a).

Accounting information is an important constituent of VCA. Accounting information needed for a VCA takes into account the linkages in the wider value chain, such as the causes of the purchasing price, the costs of activities related to the product, and the consequences of the product for the buyer's activities (Dekker, 2003a).

Traditional management accounting practices are unable to adequately support a VCA (Hergert & Morris, 1989; Porter, 1985) as they are based on the internally oriented concept of “value added”, which hinders firms in taking advantage of the opportunities to coordinate interdependence in the value chain. The value added perspective focuses on (maximizing) the difference between the firm's purchasing costs and selling price. Traditional management accounting practices typically only track the purchase price associated with a particular product or supplier and they bury the costs of ordering, expediting, receiving, inspecting, and using purchased goods in overhead accounts or general expenses (Carr & Ittner, 1992). By obscuring these additional costs, traditional management accounting systems encourage purchasing managers to focus on price and to select the lowest bidder without taking into account additional costs the supplier may introduce in the value chain of the purchasing organization (Degraeve & Roodhooft, 1999). Traditional management accounting systems ignore thus linkages in the wider value chain (Dekker, 2003a).

In contrast, Total Cost of Ownership (TCO) accounting systems start from a value chain perspective (Shank & Govindarajan, 1992). TCO accounts for costs that are caused by buying from a certain supplier, such as the cost of purchasing (including the costs of ordering, freight, and incoming quality control), the costs of holding (including the costs of storage, insurance, obsolescence and the cost of money), the cost of poor quality (including the costs of rejection, re-receiving, scrap, rework, repackaging, downtime, and warranties) and the costs of delivery failure (including the costs of expediting, premium transportation and downtime) (Carr & Ittner, 1992). The TCO concept attempts thus to quantify all of the costs related to the purchase of a given quantity of products or services from a given supplier (Ellram, 1995a). In this respect, it is important
not to focus solely on production costs (internal suppliers) or price (external suppliers), but also to take into account the more difficult costs to assess qualitative factors (Anderson et al., 2000).

The TCO approach received considerable attention during the last decade (for a review see Wouters et al., 2005). Recent theoretical models from the operations management literature also start to tackle the problem on how buyers should design their procurement process to achieve minimum total cost through an effective balance of procurement costs and operating costs (Cachon & Zhang, 2006).

Recognizing that price represents only a fraction of the cost of doing business with suppliers, a growing number of companies are now measuring both purchasing department and supplier performance based on the TCO.

Many different types of TCO systems have been reported (for a classification see Ellram, 1995b). A recent survey study even suggests that a generic model of Total Cost of Ownership is not appropriate (Ferrin & Plank, 2002). TCO-based models basically consists of summarization and quantification of all or several costs associated with the choice of supplier and subsequently adjusting or penalizing the unit price quoted by the supplier with this figure in some way (De Boer et al., 2001). Some firms have applied a dollar based approach while others have kept it to some form of weighted point method to circumvent quantification problems (Ellram, 1994 & 1995b).

In weighted-point based systems a number of evaluation criteria are selected, and their relative weights are expressed in numerical terms so that a composite performance index or score can be determined and supplier comparisons can be made. Monczka & Trecha (1988) and Smytka & Clemens (1993) combine a total cost approach with rating systems for criteria such as service and delivery performance for which it is more difficult to obtain the cost figures. Holloway et al. (1996) report on Sun Microsystems’ TCO system, which is also based on a weighted point score. The TCO is calculated as follows: $\text{TCO} = \left[ \frac{100 - \text{score}}{100} \right] + 1$. The TCO is interpreted quite literally: if a supplier has a score of 86, corresponding to a TCO of 1.14, the supplier is informed that every dollar Sun spends with the supplier actually costs Sun $1.14.

Although these rating based models take into account other costs than the price and although they facilitate communicating performance to the supplier, they also have some important shortcomings (Roodhooft & Van den Abbeele, 2005): this method (i) appoints weights in an arbitrary way, while it does not account for the real weights of these costs in the total costs, (ii) can lead to incorrect scores because often not all relevant cost information is used and (iii) takes not automatically all constraints (such as production capacity problems) into account. Practitioners’ literature indeed mentions that purchasing professionals evaluate these systems as inaccurate and that they need more sophisticated accounting systems to consistently and accurately spread overhead costs (Milligan, 1999).
Lalonde & Pohlen (1996) assert that combining TCO and Activity Based Costing (ABC) can provide a more accurate image of the activities and resources consumed in dealing with specific suppliers. Many other researchers have also coupled ABC to purchasing decisions and supply chain management (Bennett, 1996; Degraeve & Roodhooft, 2000; Degraeve et al., 2005; Dekker & Van Goor, 2000; Roodhooft & Konings, 1997; Ellram, 1995a). TCO systems nowadays are often ABC supported. Recent literature even defines TCO as an extension of ABC to a boundary-spanning context (Wouters et al., 2005). They assert that TCO can be seen as an application of ABC that quantifies the costs that are involved in acquiring and using purchased goods and services.

In an ABC-based TCO analysis, as in activity-based costing, cost drivers can be at various levels, such as unit level (e.g., purchase price), batch level (e.g., costs of creating a purchase order) and supplier level (e.g., cost of identification and certification of a supplier) (Degraeve & Roodhooft, 2001). A notable difference between TCO and typical ABC applications is that costs need to be captured at a greater level of detail: by supplier and by item purchased (Ellram, 1995a).

Important advantages of an ABC-based TCO approach over other methodologies exists in arriving at objective cost measures in a systematic way and in enabling companies to develop inter-organizational activity based management opportunities (Degraeve et al., 2000). A disadvantage of the approach is that determining the TCO for selecting a supplier for the delivery of a certain item based on ABC information requires an extensive management accounting system that captures the relevant costs of the activities by supplier and item purchased.

In the remainder of this dissertation we take a deterministic approach to TCO. The aim is neither to describe a value chain and ABC analysis or to discuss how the data are collected and what the problems related to this aspect are (cf. Degraeve et al., 2005), nor to identify and categorize important TCO cost drivers (cf. Ferrin & Plank, 2002) or to discuss the drivers for successful adaptation of TCO systems (cf. Wouters et al., 2005). The focus is on the use of TCO data and on how this information influences buyer-supplier negotiations. In this respect, we adopt a view on TCO as it is described by Wouters et al. (2005): they explain that TCO presumes the existence of boundary spanning activities and that the intent of TCO information is to detect trade-offs along the value chain and to improve profitability by modifying how partners do business with each other, such as, which firm undertakes which activities. The operationalization, and the limitations of this operationalization, are discussed in more detail in manuscript one and two.

In sum, best practice by purchasing managers is now informed by a "cost of ownership" approach (Anderson et al., 2000; Seal et al., 2004) that explicitly calculates the complete costs of acquiring a component, where the piece price is only the most visible part of cost, with delivery, product support, quality control, stockholding, inspection, materials handling and all activities that contribute to total cost. The recognition of the importance of these activities enriches the modalities of interaction in the supply chain beyond price and
quantity bargaining with negotiations ranging over quantities, quality, delivery timings, supply continuity, and even product development (Seal et al., 1999).

Although, other inter-firm cost management techniques exist (see for instance Cooper & Slagmulder (2004) and Kulmala (2004) for several case studies on different inter-firm cost management practices), the focus in this dissertation is on TCO and VCA for specific reasons.

First, in the management accounting literature VCA is regarded as a core analytical tool of strategic management accounting. The development of VCA in the literature, however, has primarily been conceptual and anecdotal and since little empirical evidence of its use in practice is available, the relevance of the concept for practice has been criticized (Lord, 1996). In addition, although a VCA conceptually spans the entire value chain, crossing organizational boundaries, its role in inter-firm relationships has received scant attention, with Dekker’s (2003a) extensive case study at Sainsbury as a notable exception. Second, the academic accounting literature recurrently depicts TCO analysis as an important and useful tool for negotiation between buyers and suppliers (Ellram, 1995a & 1995b; Monczka et al., 2002; Roodhooft et al., 2003 & 2005). The idea is that the refined cost and cost driver information resulting from a TCO analysis can be used to optimize and better coordinate the performance of activities across the supply chain. However, empirical evidence for this claim has yet to be provided. The first two manuscripts in this dissertation provide experimental evidence on the use of TCO information as a VCA tool for inter-firm cost management and resulting negotiations between buyers and suppliers. Contrary to what is popularly believed, more refined information (i.e. TCO information) does not always result in better outcomes (cf. manuscript 1). On the other hand, (accounting) information and information exchange have an important impact on the development of the inter-firm relationship and on outcomes such as joint profits and trust (cf. manuscript 2). Finally, these experiments allow us to look at the impact of information on the negotiation process of inter-firm relationships. Two elements that have received scant attention in the extant inter-firm literature (Ring & Van de Ven, 1994) and that will be discussed in more detail in the remainder of this introduction.

1.2 Inter-firm management control

To structure and control inter-firm relations, suitable management control systems and processes need to be established. Important questions are: how to set up inter-firm relations, with which partner, within which contractual framework, how to coordinate the relationship, and which management control mechanisms can be used for supporting, planning, measuring and assessing the activities and results.

1.2.1 Transaction cost economics (TCE)

The most common theoretical framework used in research on inter-firm relationships is transaction cost economics (TCE). TCE takes as its point of departure Coase’s (1937) assumption that managers make their
governance decisions to minimize costs. These costs include the search cost to find a partner and the costs of preparing, executing and monitoring a contract or agreement, including the cost of enforcement and applying sanctions and loss of specific investments if the relation is terminated. Assuming equal production costs, TCE predicts that the governance structure associated with the lowest transaction costs will be chosen to govern the transaction (Williamson, 1985; Williamson, 1991). Transaction costs depend on a combination of certain characteristics of the transaction taking place (i.e. the specificity of assets dedicated to the relationship, the level of environmental uncertainty and the frequency of transacting) and certain characteristics of human nature (i.e. bounded rationality, opportunism and risk neutrality).

While TCE has been widely used to guide inter-firm research, it has been criticized for its singular focus on the notions of opportunism and for its under-emphasis on process (i.e. its static nature) that has resulted in negligence of the social mechanisms of governance (e.g. Dekker, 2004; Ghoshal & Moran, 1996; Gulati, 1995; Madhok, 1996).

In the next paragraphs we explain how several researchers have criticized TCE, combined TCE with other theoretical perspectives and have used a modified form of TCE for studying inter-firm relations and for better understanding the design of management control systems. We then explain how manuscript 3 extends these “modified TCE” models with information as a governance tool.

1.2.2 Critique on TCE

A first important criticism on TCE is related to its emphasis on opportunism and transaction cost minimization (e.g. Dekker, 2004; Lorenzoni & Lipparini, 1999). This has resulted in a focus on one particular purpose of control in inter-firm relations (Gulati & Singh, 1998), which can be described as the management of appropriation concerns (Williamson, 1985). This purpose of control concentrates on the argument that partners in inter-firm relationships need to safeguard their interests against the potentially opportunistic behavior of the other(s). While appropriation concerns can clearly be an important concern, managing transaction risks is only part of the control challenges in inter-firm relationships. A second purpose of control in inter-firm relations can be described as the coordination of interdependent tasks between partners (Gulati & Singh, 1998; Lorenzoni & Lipparini, 1999). To create transactional value, inter-firm partners determine tasks to be performed, pool resources and decide on a division of labor. Organization theory (Thompson, 1967) suggests that the need for coordination varies with to the degree of interdependence and the uncertainty of tasks performed within the inter-firm relationship. Gulati & Singh (1998) stress the importance of using control mechanisms for managing task interdependence because the concerns about anticipated coordination costs are particularly salient in inter-firm relations because these types of relations can entail significant coordination of activities between partners and because they have to be managed without the benefit of formal authority relationships that typically characterize intra-firm relations. Summarizing, appropriation concerns and coordination requirements are powerful concepts in
explaining inter-firm management and control and governance mechanisms are useful in the management of these problems (Dekker, 2004). These two control problems are addressed in manuscript 3.

A second line of criticism on TCE is related to its static nature (Gulati & Singh, 1998) that has resulted in a negligence of the social context within which transactions are embedded (Ghoshal & Moran, 1996). It has been argued that social embeddedness not only influences the design of the control systems, it also influences the relationship and each party’s behavior (Granovetter, 1985; van der Meer-Kooistra & Vosselman, 2000). Several researchers have therefore modified or extended TCE to include some important characteristics of the relationship such as power and trust. Buvik & Reve (2002), for instance, extend the TCE perspective by combining resource-dependence theory (RDT) and TCE, and examine the role of the buyer's bargaining power on the alignment of the contractual safeguarding of relations-specific investments.

But in particular trust has emerged as an important factor in the design and study of control systems (Gietzmann, 1996; Ring & Van de Ven, 1992). Several researchers have used a modified form of TCE, which takes account of the role of trust (e.g. Chiles & McMackin, 1996; Langfield-Smith & Smith, 2003; Madhok, 1995; van der Meer-Kooistra & Vosselman, 2000).

To summarize, the extant literature on inter-firm relations has examined the roles of accounting, control and trust in inter-firm transactional relationships from different perspectives. However, until now the literature has failed to fully explore the way in which trust is built at the level of the relationship (the how of the trust building process), and, more importantly, the role that (accounting) information plays in this process (Vosselman & van der Meer-Kooistra, 2004). Although the links between trust, information and control have been questioned (e.g. Langfield-Smith & Smith, 2003; Dekker, 2004; Tomkins, 2001) there is hardly any research on how formal controls relate to trust building processes, which is typically characterized by information exchange.

1.2.3 Studying the role of (accounting) information in the negotiation process

Given uncertainty and complexity in inter-firm relations, an understanding of the decision process as it gradually shows through actors’ behaviors is essential. Management accounting may play a key role in this process.

Although accounting information is widely acknowledged to provide the basis for many contractual agreements, the impact of accounting information on bargaining behavior has received little attention (Luft et al., 1998). The existing research on accounting negotiation has focused on intra-firm issues such as transfer pricing, budgeting, and collective bargaining (Peffer, 2000). Research on the role of information in inter-firm relationships, however, has remained limited and needs to be addressed (Tomkins, 2001).

Exchange models offer some perspective here. Social exchange theory (SET) has been extensively used by marketing scholars to explain business-to-business relational exchange (for an overview see Lambe et al.,
Research on relational exchange has focused on the process by which relationships are developed (Anderson & Narus, 1984 & 1990). These works rely on social exchange theory (SET) (Homans, 1974; Thibault & Kelley 1959) to explain how firms are able to develop relationship variables such as trust, cooperation, and commitment to an extent where the partners can work together to make relational exchange successful.

Exchange models generally describe bargaining and negotiation as a “process”, characterized by information exchange, joint-problem solving and persuasion (Alexander et al., 1994). In this framework, negotiation outcomes (e.g. level of satisfaction, profits, whether or no agreement is reached) are seen as a complex interaction of three constructs: negotiator characteristics, situational characteristics, and the characteristics of the negotiation process itself (Campbell et al., 1988). In this view, negotiator characteristics and situational characteristics are seen as affecting both process-related behaviors and performance outcomes.

1.3 Bringing everything together: the general research framework

In manuscript 1 and 2 experimental research methods are combined with the foundations of social exchange theory. This allows us to control for negotiator characteristics and to focus on several situational characteristics of interest, in particular accounting information (operationalized by TCO information). In both experiments we test the influence of the availability of detailed accounting information on the negotiation process and the resulting impact on the negotiation outcomes. As can been seen in Figure 1, manuscript 1 focuses on the influence of the relative power structure of a buyer and its interaction with cost information, whereas Manuscript 2 investigates the effect of control systems and cost information on trust.

Manuscript 1 and 2 give insights into how information is employed to (jointly) solve problems, to share information and to be co-operative. This approach allows us to clarify the mechanism by which a partner signals his non-opportunistic behavior to the other partner in the relationship, thus signaling trustworthy behavior. Accounting information proves to be able to serve an important function in relational signaling and thus in building trust. In other words, manuscript 1 & 2 allows us to demonstrate the role of accounting information as a governance mechanism for inter-firm relationships.

Once information has been identified as an important inter-firm governance mechanism (manuscript 1 & 2), manuscript 3 discusses how information relates to other inter-firm governance mechanisms (trust and formal controls) in inter-firm relations and how these three types of governance mechanism reduce perceived risk in inter-firm relations. This third manuscript is survey-based, which allows us to test some of the findings in the experimental studies with real company data, while taking into account transaction and partner characteristics that have been identified in prior (mainly TCE and Organization Theory-based) frameworks (e.g. Anderson & Dekker, 2005; Das & Teng, 2001a; Dekker, 2004; van der Meer-Kooistra & Vosselman,
Manuscript three extends these models by explicitly incorporating information as a governance mechanism for inter-firm relationships.

These elements are brought together in Figure 1. The figure is broken down into two panels in order to clearly visualize the scope of the three studies. The upper panel of the figure indicates what is studied in the first two manuscripts, namely a set of situational characteristics (power, information and inter-firm control systems) and how they influence the negotiation process and outcomes. The lower panel charts the topic of the third manuscript (namely what type of governance mechanisms are used to reduce two specific inter-firm governance problems or risks).

**Figure 1: Research framework**

- **Manuscripts 1 & 2:** Experiments grounded in Social Exchange Theory to *isolate the effect of information* and to study the negotiation process

  - **Negotiator characteristics:** (Age, Education, Experience, …)
    - (CONTROLLED)

  - **Situational characteristics:**
    - **Power** (dependence)
    - **Information** (TCO)
    - **Formal Control System**

    - *(MANIPULATED)*

  - **Process related factors:**
    - Competitive behavior
    - Cooperative behavior

  - **Outcomes:**
    - Profit
    - Trust

- **Manuscript 3:** Survey research extending Transaction Cost Economics and Organization theory based literature by explicitly introducing information as an inter-firm governance mechanism for studying the combined effect of information and other governance mechanisms on inter-firm relations in a more natural setting

  - **Transaction characteristics**
    - Interdependence
    - Task Uncertainty
    - Asset specificity
    - Environmental Uncertainty
    - Frequency

  - **Governance problems**
    - Coordination requirements
    - Appropriation concerns

  - **Governance mechanisms**
    - Information
    - Trust
    - Formal control
The two panels are not independent from each other. In the first two manuscripts the focus is centered on the 
*negotiation process* while the situational characteristics are regarded as “given”: these are experimental 
variables and we disregard what determines them. In this regard, the lower panel should be seen as a “loupe” 
on the situational characteristics box of the upper panel. In the third manuscript, the focus is no longer on the 
negotiation process, but on what type of governance mechanisms are used to counter different types of 
perceived risks, while controlling for several transaction characteristics. The elements in the lower panel 
should thus be regarded as situational characteristics that influence each other (as studied in the third 
manuscript) and that may influence the negotiation process (as studied in the first two manuscripts).

**2. Research method**

This dissertation combines experimental research with survey research. Both research methods are discussed 
in more detail.

**2.1 Experimental research method**

Experimental design is particularly useful for investigating whether and how managerial accounting 
practices affect the behavior and decision process of individuals within the organization (Sprinkle, 2003; 
Waller, 1995). It is often difficult to use archival or field data to assess the effects of an organization's 
managerial accounting system on the behavior of its members (Ittner & Larcker, 2001). First, archival data is 
often unavailable or difficult to obtain. Firms are not always willing (or even able) to provide information on 
their management accounting systems and more specifically on how it is used as a tool for decision making. 
Second, the independent variables under investigation may be contaminated because their effects cannot be 
disentangled from other effects, including self-selection biases and sample-selection biases. Finally, the 
dependent variables and independent variables may contain both random noise and systematic bias 
(measurement error).

Controlled laboratory experiments can help overcome these limitations (Brownell, 1995). First, experiments 
allow us to control and isolate causal factors of interest (Campbell & Stanley, 1963). Experimental design 
can be distinguished from all other types of research in that it involves the manipulation or control of the 
independent variables which enable us to *isolate causal effects of accounting information*, from other factors 
influencing the inter-firm relation. Second, experiments are particularly useful to investigate the impact of 
management accounting and control variables on behavior and the decision making *process* (Sprinkle, 2003; 
Waller, 1995).

The two manuscripts based on experiments allow us to study the way in which trust is built at the level of the 
relationship (i.e. the negotiation *process*) and to isolate the role of information. This is important because the
negotiation process and the role of information have received scant attention in the existing literature on inter-firm relations.

2.2 Survey research method

While creating high internal validity by isolating only a few experimental factors from the general natural environment, experimental designs may impose constraints to the external validity of certain findings. To address this problem to a certain extent, the third manuscript is survey-based which allows us to validate some of the findings from the experimental studies while studying the phenomena in a more natural setting.

Because surveys are in general used to study naturally occurring phenomena, it is rarely possible to randomly assign subjects or respondents to systematically treatments on explanatory variables as in experiments (Brownell, 1995). While this implies that our survey study is less well suited to isolate the causal affects of information on the inter-firm negotiation process, the survey method is capable of producing results that vastly enhances the generalizability of results of the experiments (Brownell, 1995).

Surveys in management accounting research have been criticized, with the central concern being the reliability of the data obtained (Young, 1996). However, if surveys are constructed and administered appropriately, then they can be a source of large-scale, high-quality data which allow a cross-sectional investigation of a rich set of management accounting variables (Van der Stede et al., 2005). Extreme care was therefore taken to adhere to the principles of good survey design and administration. This is discussed in more detail in the research method section of manuscript 3.

Since no research method dominates the others on all criteria, it has been argued that multiple research methods should be used to investigate management accounting phenomena (Ittner & Larcker, 2001). As the extant empirical literature on inter-firm relations has mainly been inspired by case study research (especially in accounting research) and by survey-research, we believe that the multiple-research method design used in this dissertation contributes to existing literature on inter-firm relations as it enables us to isolate information as an important governance mechanism for inter-firm relations (the experiments) and to extend the existing frameworks by explicitly incorporating information in these frameworks (the survey study).
3. Overview of the three manuscripts

In this dissertation we present three different manuscripts. Each manuscript tackles one specific research problem and is written so that it can be read independently of the other manuscripts. Therefore there may be some overlap in the discussed literature. In this section, we give a brief overview of the different manuscripts and highlight the connection between them. When reading the manuscripts, it becomes clear that our work is far from completed and that many interesting pathways remain to be discovered. A concluding chapter, immediately following the three manuscripts, will highlight some interesting avenues for further research and will explain the practical implications of this dissertation.

Manuscript 1
The first manuscript was mainly inspired by recurring claims in the literature on the usefulness of Total Cost of Ownership (TCO) information as a tool for negotiation between buyers and suppliers (Ellram, 1995a & 1995b; Roodhooft et al., 2003 & 2005). The idea is that the refined cost and cost driver information resulting from a TCO analysis can be used to optimize and better coordinate the performance of activities across the supply chain.

The strategic importance of purchasing makes it relevant for firms to understand which purchasing approaches are effective and efficient, and can thus contribute to their overall success and profitability by cutting hidden costs of waste, rework, returns, etc. (Janda & Seshardi, 2001). This is especially relevant for TCO systems, as gathering more refined information is costly and purchasing professionals in many companies still need to demonstrate the contribution they make to the firm (Carr & Pearson, 1999).

Previous research has highlighted the importance of information sharing to the effectiveness of buyer–supplier relationships (e.g. Bensaou, 1999) and the usefulness of TCO information to support purchasing decision-makers by undertaking a Value Chain Analysis (Shank & Govindarajan, 1992). However, due to the reluctance of people involved to share the information necessary for inter-firm cost minimization, firms may not always realize all gains from buyer-supplier negotiations. Research is therefore needed to untangle the interplay between the need to share information to optimize the activities across the supply chain and the reluctance to share private information.

In the first manuscript we analyze how information sharing is impacted by the relative power structure between buyers and suppliers. The relative power structure is an important element in supply chains and in inter-firm relations (Anderson & Dekker; 2005; Buvik & Reve, 2002). Recent research also indicates that power differences influence information search strategies during negotiation (De Dreu & Van Kleef, 2004) and that it drives the processing of information about other people (Fiske & Depret, 1996).
Manuscript 1 demonstrates that, contrary to what is popularly believed, more refined information (i.e. TCO information) does not always result in better outcomes. The results of manuscript 1 also give insights into how information is employed to (jointly) solve problems, to share information and to be co-operative, and into how a buyer uses information to signal his non-opportunistic behavior to the other partner in the relationship. This inspired the research setting for manuscript 2.

**Manuscript 2**

Manuscript 2 has been set up as a follow-up study to further investigate the role of information in relational signaling and in building trust. The relation between information and trust has received scant attention in the literature on inter-firm relations (Tomkins, 2001), certainly when compared to the relation between formal controls and trust, which has been extensively studied.

In addition, recent experimental research shows contradicting results on the relation between these trust and formal controls. Malhotra & Murnighan (2002) found that the presence of formal control systems inhibits the development of trust, whereas Coletti et al. (2005) came to the opposite conclusion: if the nature of the control system is such that it initially provides economic incentives for cooperation, a more trusting relationship may develop out of this cooperation, and control systems may eventually facilitate the development of trust.

Although Coletti et al. (2005) have hinted at the mediating role of control-induced cooperation, their study lacks the context of typical interpersonal actions. Like in other prior work they used prisoners’ dilemma games to simulate trusting interactions. However, these studies provide no insights into real negotiation behavior, and the role of information and the exchange of information that characterize a real negotiation setting.

To overcome these shortcomings, we designed an experiment that explicitly manipulates the available information and the formal control system, while allowing participants to share their private information. This enables us to fully explore the way in which trust is built in the relationship (the *how* of the trust building process) and the role that information plays in this process.

The results of manuscript 2 also contribute to the ongoing discussion on the relation between formal controls and trust (i.e. whether they are substitutes or complements). Prior studies (Dekker; 2004; Tomkins, 2001) suggested that the relation between information, trust and formal controls may actually be non-linear. The results of manuscript 2 provide empirical support for these claims.

**Manuscript 3**

The third manuscript continues the line of research and has also been designed to further contribute to the discussion on the relation between trust and formal controls in inter-firm relations. This study is survey-
based since such set-up allows us to validate some of the findings from the experimental studies in a more natural setting. It also allows us to treat trust, control and information as complex, multidimensional constructs and to study their simultaneous impact on the relation.

In this manuscript we extend the existing models that consider the design of control systems in inter-firm relationships (Das & Teng, 2001a; van der Meer-Kooistra & Vosselman, 2000), by explicitly incorporating information as an important governance mechanism for inter-firm relationships. Based on the existing literature on inter-firm control systems, information is identified as a key inter-firm governance mechanism. This is in line with the findings of the experimental studies in manuscript 1 & 2.

The central aim of manuscript 3 is then to discuss how trust, formal controls and information reduce perceived risk. Manuscript 3 places the decision maker at the central core and reveals what type of governance mechanisms are used to counter different types of perceived risks. Risk perceptions of the decision makers serve as the heuristic that helps to form their governance mechanisms (Das & Teng, 2001b).

While previous studies on the relation between trust and controls typically treated the different governance mechanisms as uni-dimensional constructs, we explicitly model them as multidimensional constructs. By doing so, manuscript 3 reveals that the relation between the different governance mechanisms is far more complex than simply substitutive or complementary.

Finally, as in manuscript 2, we hypothesize some non-linear relations between information, controls and trust (cf. Dekker, 2004; Tomkins, 2001). We make a distinction between buyer-supplier relations with and without prior ties and we find some important differences between these two groups in the effectiveness of the different governance mechanisms in reducing perceived risk.
Abstract

We investigate the influence of cost information on buyer-supplier negotiations in different power settings. Based on exchange theory, we expect that buyers with detailed cost information and less power than their opponent may try to (re)gain control over their own outcomes by sharing information. The results of our experiment indicate that the performance disadvantage of less powerful buyers is less pronounced when the buyer has detailed cost information and that this result can be explained by the buyer’s negotiation behavior.
1. Introduction

The academic accounting literature recurrently depicts Total Cost of Ownership (TCO) analysis as an important tool for negotiation between buyers and suppliers (Ellram, 1995a & 1995b; Roodhooft et al., 2003 & 2005) as the refined cost and cost driver information resulting from a TCO analysis can be used to optimize and better coordinate the performance of activities across the supply chain. Previous research has highlighted the importance of information sharing to the effectiveness of buyer–supplier relationships (Bensaou, 1999; Cachon & Fisher, 2000; Cachon & Lariviere, 2001; Gavirneni et al., 1999). Due to the reluctance of people involved to share the information necessary for inter-firm cost minimization, firms may not realize all gains from buyer-supplier negotiations (Baiman & Rajan, 2002; Drake & Haka, 2005).

The objective of this study is to investigate whether power can motivate a failure to share private TCO information, and whether this might result in less effective negotiation outcomes between buyers and suppliers. The relative power structure is an important element in supply chains and in inter-firm relations (Buvik & Reve, 2002). Recent research (De Dreu & Van Kleef, 2004; Fiske, 1993; Fiske & Depret, 1996) also indicates that power differences influence information search strategies and drive the processing of information about other people. This literature suggests thus that power may have a key role in the interplay between the need to share information to optimize the activities across the supply chain and the reluctance to share private information.

Power can be broadly defined as the capacity to exert influence on other people (Kelley & Thibaut, 1978). Although power may derive from a variety of “power bases” (French & Raven, 1959), it is the mutual dependence of individuals that allows power to occur. In exchange relations such as negotiations, B’s dependence on A increases with the value of the benefits A can give B, and it decreases with B’s access to alternative sources for those benefits (Emerson, 1972; Kelley & Thibaut, 1978). Accordingly, in many negotiation studies power has been operationalized as the availability of alternatives (e.g. Giebels et al., 1998 & 2000; Pinkley, 1995; Pinkley et al., 1994). In this study we use a similar manipulation of power, when we analyze how information sharing is impacted by the relative power structure between buyers and suppliers.

Researching this topic is important because purchasing professionals in many companies still need to demonstrate the contribution they make to their firm (Carr & Pearson, 1999). In addition, the supply side of companies has become increasingly important over the last few decades. Costs of purchased goods and services represent the majority of total costs for most companies (Degraeve & Roodhooft, 2001). It is relevant for both powerful and less powerful purchasing firms to understand which negotiation approaches will contribute to market success and profitability (Janda & Seshardi, 2001).

Total Cost of Ownership (TCO) information is such a tool of which recurrently has been claimed in the literature (Ellram, 1995a & 1995b; Roodhooft et al., 2003 & 2005) that it can be employed by buyers when
negotiating with suppliers to optimize and better coordinate the performance of activities across the supply chain. This study demonstrates that contrary to what is popularly believed, more refined TCO information not always results in better outcomes and that the effect of power on information exchange is an important element to explain these results.

The results of our experiment show that the performance disadvantage of less powerful buyers is less pronounced when the buyer has detailed TCO information. Based on exchange theory, we expect that buyers with detailed TCO information and less power than their opponent may try to (re)gain control over their own outcomes by sharing information and by creating an integrative bargaining situation. Detailed analyses of the bargaining behavior support this hypothesis: we find that bargaining behavior mediates the moderating effects of cost information on the power to individual profit relation.

The next section reviews the relevant literature and develops hypotheses. The experimental procedures are outlined in section three and the results are analyzed in section four. Section five includes discussion and suggestions for future research.

2. Literature review

2.1 Exchange models for negotiation

Economic models of negotiation assume rational and self-interested action by all parties. If these economic models provide fully accurate descriptions of negotiation outcomes, empirical research would be unnecessary: behavior could simply be deduced from theory. Recent research, however, indicates that negotiation behavior differs from the predictions of game-theoretic models. Building on behavioral decision making, research on two-party negotiations suggests that negotiators tend to (i) ignore the cognitions of others, (ii) be overconfident, (iii) escalate commitment, (iv) assume that outcomes are fixed-sum, and therefore overestimate the competitiveness of their negotiation, (v) overweight readily available information, and (vi) be highly affected by the way their negotiation is framed (for a review see Bazerman et al., 2000).

Evidence shows that, despite the existence of an agreement zone, deviations from rationality in individual decisions lead to disagreements and Pareto-inefficient agreements. Raiffa (1982) has argued that rational models are insufficient for either understanding or prescription and that advice to negotiators should depend on an understanding of the actual decision process of the opponent, rather than assuming that the other party is fully rational. Behavioral decision models and research offers a set of adjustments to rational models.

Exchange models offer some perspective here (Bottom et al., 2006). Exchange models generally describe bargaining and negotiation as a process characterized by information exchange, joint-problem solving and persuasion (Alexander et al., 1994). A majority of research on industrial negotiations is based on theoretical perspectives drawn from both social exchange theory (Druckman, 1977; Gergen, 1969; Thibaut & Kelley,
1959) and exchange theory (Bagozzi, 1978; Homans, 1974). In this framework, negotiation outcomes (e.g. level of buyer and/or seller satisfaction, profits, whether or no agreement is reached) are seen as a complex interaction of three constructs: namely negotiator characteristics, situational characteristics, and the characteristics of the negotiation process itself (Campbell et al., 1988). In this view, negotiator characteristics and situational characteristics are seen as affecting both process-related behaviors and performance outcomes (Alexander et al., 1994).

In this study, we control for negotiator characteristics\(^1\) and focus on two situational characteristics. We test the influence of the availability of detailed cost information and the influence of the relative power structure of a buyer on the negotiation process and the resulting impact on the negotiation outcomes. First, we briefly discuss two basic types of negotiation behavior that may characterize the negotiation process. Then we discuss how cost information and power may influence the negotiation process and resulting outcomes.

2.2 The negotiation process

Distributive bargaining and problem solving are the two basic negotiation strategies that purchasing agents appear to pursue. Each strategy has a different role in the purchase process.

Distributive bargaining (aggressive or competitive bargaining) addresses the issue of how the available benefits are to be distributed between the two parties (Walton & McKersie, 1966). More specifically, distributive bargaining is characterized by the use of zero-sum or “win-lose” tactics such as communicating implicit or explicit threats, making excessive demands, promises, positional commitments, and persuasive arguments (Pruitt & Lewis, 1975). Distributive tactics can be appropriate for issues that are equally valued by both parties (i.e. distributive issues). However, it has been suggested that distributive tactics are counterproductive when they are inappropriately applied to integrative issues and that they set a confrontational tone to the negotiation (Lax & Sebenius, 1986).

Problem solving primarily involves discovering ways to increase the benefits available in the relationship (Walton & McKersie, 1966). In purchasing, bargaining is integrative to the extent that purchasing agents actively seek coordination with sellers to develop alternative purchasing arrangements that have the potential for reducing costs and/or increasing performance. The focus is on seeking an integrative solution that is achieved via open and accurate informational exchange, mutually concessionary behaviors, and mutual respect for individual goals (Campbell et al., 1988). In a coordinative context, the focal negotiator will seek to minimize the use of any deleterious influence tactics (e.g. threats) in the negotiation because of his/her desire for a mutually beneficial outcome (Dant & Schul, 1992). Coordinative behavior such as open and accurate exchange of information and option flexibility have been linked to integrative agreements when tradeoffs based on issue priorities are evident (Pruitt & Lewis, 1975).

---

\(^1\) Negotiator characteristics are typically studied in marketing and psychology literature (e.g. Alexander et al., 1994).
2.3 Total Cost of Ownership and the concept of Value Chain Analysis

Value Chain Analysis (VCA) is described as a technique that can play an important role in the management of supply chain relationships. This analysis was developed by Porter (1985), and in the accounting literature further developed by Shank (1989) and Shank and Govindarajan (1992 & 1993). VCA is used to analyze, coordinate and optimize linkages between activities in the value chain, by focusing on the interdependence between these activities. It facilitates the optimization and coordination of interdependent activities in the value chain, which may cross organizational boundaries (Dekker, 2003a). Accounting information is an important constituent of VCA.

Traditional management accounting practices often only track the purchase price associated with a particular product or supplier and bury the costs of ordering, receiving, inspecting and using purchased goods in overhead accounts or general expenses (Carr & Ittner, 1992). By obscuring these additional costs, traditional management accounting systems encourage purchasing managers to focus on price and to select the lowest bidder without taking into account additional costs this supplier may introduce in the value chain of the purchasing organization (Degraeve & Roodhooft, 1999).

Porter's criticism on what are now termed ‘traditional’ accounting systems refers to the inability of those systems to adequately support a VCA. Traditional management accounting practices are based on the internally oriented concept of value added, which hinders firms in taking advantage of the opportunities to coordinate interdependence in the value chain. The value added perspective focuses on (maximizing) the difference between the firm's purchasing costs and selling price. Thereby it ignores linkages in the wider value chain, such as the causes of this purchasing price, the costs of activities related to the product, and the consequences of the product for the buyer's activities (Dekker, 2003a).

Total Cost of Ownership (TCO) accounting systems account for costs that are caused by buying from a certain supplier, such as costs of ordering, delivery, quality and administration (Carr & Ittner, 1992). The TCO concept attempts thus to quantify all of the costs related to the purchase of a given quantity of products or services from a given supplier (Ellram, 1995a). The TCO approach received considerable attention during the last decade (for a review see Wouters et al., 2005).

Many different types of TCO systems have been reported. A recent survey study even suggests that a generic model of TCO is not appropriate (Ferrin & Plank, 2002). TCO-based models basically summarize and quantify all costs associated with the choice of supplier and subsequently adjust or penalize the unit price quoted by the supplier with this figure in some way (De Boer et al., 2001). Some firms have applied a dollar based approach while others have kept it to some form of weighted point method to circumvent quantification problems (Ellram, 1994 & 1995b). Many TCO systems nowadays are ABC supported. Recent literature even defines TCO as an extension of ABC to a boundary-spanning context (Wouters et al., 2005).
They assert that TCO can be seen as an application of ABC that quantifies the costs that are involved in acquiring and using purchased goods and services. We adopt a view on TCO as it is described by Wouters et al. (2005): they explain that TCO presumes the existence of boundary spanning activities and that the intent of TCO information is to detect trade-offs along the value chain and to improve profitability by modifying how partners do business with each other, such as, which firm undertakes which activities.

The literature suggests that a clear understanding of the TCO is beneficial in many purchasing situations. The information derived from a TCO analysis provides decision makers with an objective and easily understood argument for supporting and motivating a variety of purchasing decisions. It can be used to compare and evaluate different suppliers or supply contracts. The data allow managers to quantify and communicate areas of non-performance and to guide supplier performance improvement efforts. It can also be used in negotiations with suppliers to identify areas requiring contractual performance improvement. Suppliers can be made aware of the extra costs they generate and of ways to improve their competitive position by reducing these costs at the buyer side (Ellram, 1995a & 1995b; Monczka et al., 2002; Roodhooft et al., 2003 & 2005). The cost (and cost driver) information resulting from the analysis can be used, as suggested by Porter (1985), to optimize and better coordinate the performance of activities across the supply chain.

Prior research demonstrates that the presentation of costs/accounting data may have important implications on decisions. Northcraft & Neale (1986) reported that opportunity costs are relatively abstract and therefore less salient, in comparison to outright losses; therefore opportunity costs are more often overlooked. Prior research also found that financial quantifications carry more weight in decisions than non-financial data (Ittner et al, 2003; Reck, 2001; Schiff & Bento, 2000; Schiff & Hoffman, 1996) and that quantified information enhances persuasion, especially if it is regarded as objective (Kadous et al., 2005).

TCO information quantifies the costs that are involved in acquiring and using purchased goods and services (Wouters et al., 2005) and makes that the buyer not solely focuses on the price, but also on the other costs. This is in contrast with traditional management accounting practices that often only track the purchase price associated with a particular product or supplier (Carr & Ittner, 1992). The financially quantified costs in a TCO system can be easily communicated and are perceived as more objective and persuasive. The possession of relevant information for the interactions places the buyer in a good position to work with the seller in identifying and assessing alternative courses of action and, thus, increases the likelihood that problem-solving efforts will be effective. Prior management accounting literature found indeed that common behaviors and understandings can be built up more readily if participants can draw on a commonly understood management accounting methodology (Seal et al., 1999). Their research shows that the specification and sharing of this information can play a central role in inter-organizational negotiations as both sides in a manufacturing partnership learn about and respect each other’s constraints and objectives. The possession of commonly understood accounting information serves thus an important function in relational signaling and in building trust. Therefore we expect that:
H1a: Buyers with TCO information will obtain a higher individual profit in negotiations than buyers with more traditional cost information.

H1b: TCO information increases a buyer’s level of problem solving behavior.

2.4 The relative power structure

Of all variables that have been identified as factors in negotiations, power is among the most important (De Dreu & Van Kleef, 2004). Especially power resulting from the availability of alternative negotiation partners is a core element in many negotiations (Anderson & Dekker, 2005; Giebels et al., 2000 & 2003). For instance, sellers who know of other buyers interested in their goods or services are able to exit the negotiation and continue the negotiations with someone else. Having an alternative negotiator at hand reduces their dependence on the other side and accordingly weakens the other party’s power position (Thibaut & Kelley, 1959; Emerson, 1962). Empirical research indeed shows that negotiators with an attractive alternative feel less dependent and achieve higher personal outcomes than negotiators with a less attractive or no alternative option (Pinkley et al., 1994). People with less power tend to have lower aspirations, demand less, make more concessions, and receive smaller outcomes than those with more power (for a review see Pruitt & Carnevale, 1993).

H2a: In an equal power setting buyers will obtain a higher individual profit than in an unequal power setting in which the buyer is dependent on the seller.

A buyer’s relative power will affect his level of aggressive bargaining. As supplier competition increases, buyers can be expected to capitalize on the natural rivalry among suppliers to keep prices down and to promote product and service improvements. The buyer's use of aggressive bargaining tactics, many of which involve implicit or explicit threats (e.g. suggesting that the seller is in danger of losing the contract), should also be more credible when several suppliers are interested in the purchase contract. Compared to power balance, power differences lead to greater use of threats and punishments, making conflict escalation more likely (De Dreu, 1995; De Dreu et al., 1998). The increased effectiveness of aggressive bargaining associated with high supplier competition should reduce the buyer's need to solve problems with any given supplier or group of suppliers, and the marginal benefits of doing so under these conditions often may not be worth the cost (Perdue & Summers, 1991). Consequently, we expect that:

H2b: Buyers in an equal power setting will use less problem solving techniques and more distributive bargaining techniques than buyers in an unequal power setting in which the buyer is dependent on the seller.
2.5 Interaction effect of power and cost information

As we expect that TCO information has a positive effect on buyer’s use of integrative bargaining, while supplier competition (outside options) has a negative effect on buyer’s use of integrative bargaining and a positive effect on buyer’s use of distributive bargaining techniques, we can reasonably expect interaction effects of power and information on the bargaining process and outcomes. All the more, as information can be regarded as a form of power. After all relative power manifests itself not only through the market structure, but also through (private) information (Chatterjee & Ulvilla, 1982), whether that information concerns a party’s own or that party’s opponent’s preferences, payoffs or alternatives.

Recent research indicates that power differences influence information search strategies during negotiation (Fiske, 1993; De Dreu & Van Kleef, 2004). Power not only influences strategic decisions involving demands and the use of threats during negotiation. It also drives the processing of information about other people (Fiske, 1993; Fiske & Depret, 1996). When people depend on others, they may try to (re)gain control over their own outcomes by paying close attention to those persons so as to accurately predict their intentions and behaviors.

Gelfand & Christakopoulou (1999) suggest that the interdependence can induce a person to be motivated to accurately predict other’s needs, desires, and possible actions, akin to low power individuals. Several studies support this view. Erber and Fiske (1984) found that outcome dependency produced heightened attention to information that was inconsistent with someone’s expectations about another person. Copeland (1994) has argued that individuals with a power disadvantage have higher impression motivation than individuals with a power advantage. The idea is that lower power individuals may seek situational control by managing positive impressions of themselves (Goodwin et al., 2000). De Dreu & Van Kleef (2004) showed that negotiators with less power ask more diagnostic than leading questions, and more belief-congruent than incongruent questions, when facing a competitive rather than cooperative partner. Their research suggests that this result is caused by stronger accuracy and impression motivation among less powerful negotiators and that belief-congruent rather than incongruent questions produce more positive impressions during negotiations.

Therefore, we expect that buyers with TCO information and less power than their opponent may try to (re)gain control over their own outcomes by sharing information and by paying close attention to their opponent so as to accurately predict their intentions and behaviors. This way they create a more integrative bargaining situation than buyers with TCO information and an outside option, which are more prone to use an aggressive bargaining strategy. Buyers without TCO information will not be able to create this integrative bargaining situation as they lack the necessary information. Therefore, we expect that:
H3: The performance disadvantage of less powerful buyers is less pronounced when the buyer has detailed TCO information because they will use more integrative bargaining strategies and less distributive bargaining strategies than more powerful buyers (with TCO information).

3. Research method

3.1 Experimental design

The experiment uses a 2 (power: equal versus low) x 2 (detailed TCO information versus more traditional cost information) design. The first factor is the relative power between buyers and sellers. Relative power was manipulated through the availability of an outside option. Many negotiation studies have operationalized power as the availability of alternatives (e.g. Giebels et al., 1998 & 2000; Pinkley, 1995 & 1994). In the case of two-sided exit options the written instructions of the buyer and the seller contained a short paragraph about the presence of an alternative negotiation partner. Buyers and sellers were equally powerful as they had an outside option that would generate a similar profit (namely an outside option of 1000 Euro). This outside option is relatively unattractive as higher gains can be obtained in the game by reaching an agreement. In the condition without an outside option for the buyer, buyers were given the standard negotiation task without exit options. These buyers had thus no outside option and were fully dependent on reaching an agreement with their partner to earn any money\(^2\). If no agreement was reached they would earn nothing, while their partner earned an outside option of 1000 Euro.

The second factor is the buyer’s cost information. Buyers with TCO information had a payoff table with detailed cost information (TCO information). The TCO information quantified all relevant costs (in this case price, spare parts and maintenance) associated with the purchase of a given quantity of products or services from a given supplier (Ellram, 1995a). A dollar based approach is applied as costs are expressed in the same currency as the price. Buyers without TCO information only had an indication of the costs and the relative importance of each of the issues to be negotiated (cf. appendix A). This corresponds to traditional management accounting practices that only track the purchase price associated with a particular product or supplier and that bury other costs of purchasing in overhead accounts or general expenses (Carr & Ittner, 1992). They were informed on the fact that price was the most expensive issue, followed by maintenance and then by spare parts. Sellers were the same in each of the experimental cells: they had always an outside option of 1000 Euro and full cost and income information.

\(^2\) Consistent with prior research (for an overview see Wolfe & McGinn, 2005), the individual parties were aware of their own alternatives but not of those of the other party. If the buyer had no alternative, it was explained to the buyer that in the short run only the seller she was going to negotiate with, could deliver the required machines. This makes the buyer highly dependent, while the seller is unaware of this. This situation allows us to fully focus on the effects of the buyer’s situation (information and alternative) and how this affects negotiation behavior and outcomes, without having to deal with the complexity of the seller’s perceptions of his or her power over the buyer. This manipulation also has the added advantage of being a strong manipulation from the viewpoint of the buyer, without having to deal with the “obvious” result of virtually all of the profits going to the seller if the latter would be aware of the full dependence of the buyer.
3.2 Subjects and procedures

Participants were recruited from a graduate management accounting course of a Masters program in business administration at a large West-European university. The course had covered traditional accounting methods, activity-based costing, TCO and supplier selection problems before the experiment took place. The experiment was run in a computer laboratory. Participation required appearing at a given place and time, and was restricted to one session of maximum 1 hour. The opportunity to earn cash, depending on their performance, was the only offered incentive. Participants earned 0.5% of their company’s profit (on average 5.74 Euro; min = 0 Euro; max = 15 Euro). In total there were 208 subjects. Participants were randomly assigned to one of the experimental conditions. Procedures were identical for all treatments. Participants were either buyer or supplier.

Buyers and suppliers sat in different rooms so that participants were unable to identify their partner’s identity; hence personality effects and collusion were precluded. Participants read the instructions, describing their role position and the nature of the bargaining task, and played the game on their own pace. The seller started the game by making a first offer. Participants could send messages along with their offers and counteroffers if they so desired. The game ended when (i) an agreement was reached, (ii) a player opted for the outside option or (iii) after 10 rounds. In the last case, participants were informed by the computer program that time was running out. This happened only in a few cases (4 out of 104).

3.3 The bargaining task

The bargaining task is based on a negotiation game developed by Kelley (1966) and applied by many other researchers (e.g. Campbell et al, 1988; De Dreu & Van Kleef, 2004; Neu et al., 1988; Pruitt & Lewis, 1975; Schurr & Ozanne, 1985). The game was adapted to suit a TCO setting. This means that the payoff tables of Kelley’s game were replaced by cost tables for the buyers and cost and income tables for the seller. The tables were constructed such that the minimum and maximum profits buyers and sellers could earn were the same (cf. appendix A).

Buyers and sellers had to negotiate a lease contract for a set of machines. The buyer could earn a fixed income (of 6000 Euro) by selling end products to an end customer. The instructions explained that maintenance and spare parts were needed to run the machines and to produce an end product. Consequently, the game involved the simultaneous negotiation of price, maintenance, and spare parts. For each of these issues nine different contracts were possible.

Price is an income for the seller, but a cost for the buyer. The price issue was thus distributive in nature. This issue was worth the same for each negotiator, with preferences on the issue going in opposite directions. Consequently, one party’s gain was equal to the other party’s loss. The task provided, however, an
opportunity for the parties to integrate their interests. The buyer had a comparative advantage in taking care of the spare parts and the seller had a comparative advantage in maintaining the machines. Since the issue that was most valuable to one party automatically was less valuable to the other party, it was possible for participants to trade off issues. Such “logrolling”, giving up on less valuable issues to maximize outcomes on the most valuable ones, would yield optimal joint outcomes. Optimal joint outcomes were reached when buyer and seller agreed on contract 5AZ. In this contract, the distributive issue (i.e. price) is set at the middle and the two integrative issues (maintenance and spare parts) are fully traded off. This situation is denoted with an asterisk (*) in appendix A. As cost tables were private, participants had to find out the possibility of a win-win solution through the process of offers and counteroffers and by exchanging information about their interests.

3.4 Dependent variables

3.4.1 Negotiation outcomes
This study focuses on one key negotiation outcome, namely the individual profit of the buyer. The individual profit is the amount of money earned by a buyer at the conclusion of negotiations and is measured as the player’s individual profit level associated with final agreement in (the adapted) Kelley’s (1966) negotiation simulation. Although not the core of the analysis, the study also briefly discusses the results for the individual profit of the seller and the joint profit for the dyad.

3.4.2 Negotiation behavior
Negotiation behavior is derived from two sets of measures: a first set is based on interaction analysis and a second set is based on participants’ responses to the post-game questionnaire administered immediately following the negotiation exercise.

First, interaction analysis (Putman & Fairhurst, 2001) was used for coding verbal behavior to examine categories and meanings embedded in structural pattern of talk. The classification scheme is based on negotiation communication coding schemes used in prior studies (e.g. Alexander et al., 1994; Boles et al., 2000; De Dreu et al., 1998; Giebels et al., 1998, 2000 & 2003; Neu et al., 1988; Schurr & Ozanne, 1985). The classification scheme is included in appendix B. Three judges, who were blind to conditions or hypotheses, coded each negotiation independently. Inter-rater agreements, expressed in Cohen’s Kappa, varied between 0.75 and 0.95, all satisfactory values (Landis & Koch, 1977). After completing the coding, the coders compared their coding and reconciled disagreements by jointly revisiting the negotiation messages and producing a single set of codes for each subject. Negotiation behavior was determined from analyses of these codes.

Messages sent by participants were coded for (a) integrative behavior, measured as information exchange, and (b) distributive behaviors such as sending threats and issuing warnings. Three independent judges established the participant’s information exchange about priorities and numerical values reflecting
integrative behavior. Based on Neu et al. (1988), information exchange was coded “0” for participants not revealing any information about their cost structure; “1” for participants revealing the relative importance of each of the three to be negotiated issues without revealing any numerical values and “2” for participants revealing the relative importance of each of the three to be negotiated issues and the numerical values of the different contracts. Distributive behavior is a summated scale calculated by adding five behavior types together and determining the mean value. The five behavior types are: general threats, exit threats, warnings, commitment and punishments (Cronbach’s alpha = 0.81).

Second, bargaining behavior was also derived from post-bargaining questionnaires. Participants rated their opponent’s bargaining strategies on four items. The different items were derived from prior studies (e.g. Campbell et al., 1988) and are listed in appendix B. They measure the overall problem solving approach of the buyers as assessed by the seller (Cronbach’s alpha = 0.88). Again a summated scale was obtained by adding the four items together and determining the mean value.

4. Results

4.1 Experimental checks

On completion of the task, participants filled out a post-bargaining questionnaire with five-point scales checking for motivation, task understanding and their usage of cost reports. All of the checks on the experimental inductions (on cost information relevance and power) are statistically significant and have means in the appropriate direction. More powerful buyers judged themselves as more powerful (F(1,102) = 14.61, p < 0.01) and buyers with TCO information judged the cost information they had more relevant than the buyers with traditional cost information (F(1,102) = 41.62, p < 0.01). Checks on procedures, including the subject involvement in the task (motivation, fun), their understanding of the instructions and the payoff tables and whether they had enough time to complete the exercise, appropriately showed no differences between conditions (p > 0.10). Means on these questions indicated that they were highly involved (Mean = 4.33; st.d. = 0.69), that they assessed the exercise as “fun” (Mean = 4.07; st.d. = 0.70), that they understood the instructions (Mean = 4.41; st.d. = 0.77) and the payoff tables (Mean = 4.62; st.d. = 0.51) and that they had enough time to complete the task (Mean = 4.40; st.d. = 0.98). We also checked whether participants in different experimental cells required an equal amount of time to read the instructions and get familiar with the game before actually starting the game. No differences between the experimental conditions were found (p > 0.10). Participants needed on average 559 seconds (9.3 minutes) to read the instructions. Analyses revealed neither main nor interaction effects for participant gender on negotiation process or outcomes. Therefore gender was excluded from further analysis.
4.2 Negotiation outcomes

Results\textsuperscript{3,4} are reported in Table 1.1. H1a predicted that buyers with TCO information would obtain a higher individual profit than buyers with more traditional cost information. As expected, buyers with TCO information obtained significantly higher individual profits ($F(1, 100) = 52.90, p < 0.01$). As expected in H2a, buyers in an equal power setting obtained higher individual profits ($F(1, 100) = 14.02, p < 0.01$), than buyers who were dependent on the seller. The results also yielded a power*cost information interaction ($F(1, 100) = 4.58, p < 0.05$). The performance deficit for less powerful buyers actually disappeared when they had TCO information: the individual profits of buyers with TCO information, and with or without an outside option, do not differ significantly (mean =1148.33 versus mean =1007.69; $F(1,54) = 2.46, p > 0.10$). The performance deficit of less powerful buyers is thus less pronounced when the buyers have detailed TCO information, providing support for hypothesis H3.

Table 1.1: Analysis of the negotiation outcome and behavior of the buyer

Panel A: Summary statistics for the negotiation outcomes and behavior of the buyer\textsuperscript{a}

<table>
<thead>
<tr>
<th>TCO information</th>
<th>traditional cost information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>outside option</strong></td>
<td><strong>no outside option</strong></td>
</tr>
<tr>
<td>individual profit buyer</td>
<td>1148.33 (184.99)</td>
</tr>
<tr>
<td>individual profit seller</td>
<td>1188.33 (205.81)</td>
</tr>
<tr>
<td>joint profit</td>
<td>2336.67 (324.29)</td>
</tr>
<tr>
<td>information exchange</td>
<td>0.37 (0.49)</td>
</tr>
<tr>
<td>distributive behavior</td>
<td>0.57 (0.73)</td>
</tr>
<tr>
<td>problem solving approach</td>
<td>2.98 (0.71)</td>
</tr>
</tbody>
</table>

Panel B: ANOVA for the negotiation outcomes and behavior of the buyer\textsuperscript{b}

<table>
<thead>
<tr>
<th>cost information</th>
<th>Power</th>
<th>cost information * power</th>
</tr>
</thead>
<tbody>
<tr>
<td>individual profit</td>
<td>52.90 (***</td>
<td>14.02 (***</td>
</tr>
<tr>
<td>individual profit seller</td>
<td>15.80 (***</td>
<td>17.46 (***</td>
</tr>
<tr>
<td>joint profit</td>
<td>15.78 (***</td>
<td>0.13 (***</td>
</tr>
<tr>
<td>information exchange</td>
<td>6.14 (***</td>
<td>4.16 (***</td>
</tr>
<tr>
<td>distributive behavior</td>
<td>5.77 (**</td>
<td>14.20 (***</td>
</tr>
<tr>
<td>problem solving approach</td>
<td>242.00 (***</td>
<td>15.85 (***</td>
</tr>
</tbody>
</table>

\textsuperscript{a} Variable definitions in Appendix C. The cells of the table in Panel A contain, for each of the experimental cells, the means and the (standard deviation) for the variables individual profit, information exchange, integrative behavior, requests for information and distributive behavior.

\textsuperscript{b} Panel B presents the results of five ANOVA analyses. The dependent variables are respectively individual profit, information exchange, integrative behavior, requests for cooperation and distributive behavior. Cost information and power are the between-subject factors. Reported are the F-statistics. (***), (**), (*) indicate significance levels of 1%, 5% and 10%.

\textsuperscript{3} A correlation matrix of all variables included in the study is provided in appendix C.

\textsuperscript{4} Analyses were performed for all subjects in the study. However, analyses of the data without including the subjects not reaching agreement yielded the same results.
Table 1.1 also reports the results of the analyses on the individual profit of the seller and on joint profit. An ANOVA on the individual profit of the seller revealed main effects for power and cost information. Sellers facing less powerful buyers earn higher individual profits \((F(1, 100) = 17.46, p < 0.01)\). However, sellers’ individual profit is lower when they play against buyers with TCO information \((F(1, 100) = 15.80, p < 0.01)\). Joint profits are significantly higher when the buyer possesses TCO information \((F(1, 100) = 15.78, p < 0.01)\).

These results imply that the high individual profits for buyers with TCO information but without an outside option are not to be explained by the fact that they know “how to fool” the (more powerful) sellers, but by the fact that these dyads realize higher joint profits than dyads in which the buyer has an outside option (mean joint profit = 2446.15 versus mean joint profit = 2336.67). Sellers facing a buyer without an outside option earn more than their less powerful opponent (mean individual profit buyer = 1007.69 versus mean individual power seller = 1438.46), reflecting the power imbalance. These less powerful buyers with TCO information are, however, somehow able to earn similar individual profits as buyers with an outside option.

In order to explain these negotiation results, we analyze the negotiation behavior of the participants.

### 4.3 Negotiation behavior

In order to test H1b and H2b, analyses were performed on the negotiation behavior variables. An ANOVA on information exchange\(^5\) revealed main effects for cost information \((F(1,100) = 6.14, p < 0.05)\) and power \((F(1,100) = 4.16, p < 0.05)\): buyers with TCO information disclosed more information than buyers with traditional information and more powerful buyers disclosed less information than less powerful buyers.

An ANOVA on distributive behavior resulted in main effects for cost information \((F(1,100) = 5.77, p < 0.05)\) and power \((F(1,100) = 14.20, p < 0.01)\), and in a significant interaction effect \((F(1,100) = 4.89, p < 0.05)\). The two main effects are positive. This indicates that TCO information as well as power significantly increase the use of distributive bargaining tactics. The interaction effect is also positive, meaning that buyers with TCO information and with an outside option significantly use more distributive bargaining techniques than buyers in the three other experimental conditions.

Negotiation behavior of the buyer was also assessed by the composite measure of problem solving approach. Main effects were found for cost information \((F(1,100) = 242.00, p < 0.01)\) and power \((F(1,100) = 15.85, p < 0.01)\), as well as an interaction effect \((F(1,100) = 3.44, p < 0.10)\). Thus, according to the sellers, less

---

\(^5\) Problem solving behavior was also derived from the messages sent by participants. Integrative behavior is based on two measures: the number of rewards and the number of positive normative appeals (Cronbach’s alpha = 0.70). Cooperative behavior was also assessed by counting the explicit requests for cooperation. However, this latter measure did not load with the rewards and the appeals on one factor and was therefore excluded from the cooperative behavior measure. An analysis on the composite measure of integrative behavior revealed a main effect for power \((F(1,100) = 4.13, p < 0.05)\) and an interaction effect of cost information and power on integrative behavior \((F(1,100) = 5.02, p < 0.05)\). Less powerful buyers use more integrative bargaining techniques \((F(1,102) = 4.71, p < 0.05)\) than buyers with an outside option. However, within the group of less powerful buyers, buyers with TCO information made more extensive use of integrative bargaining techniques \((F(1,46) = 3.40, p < 0.10)\). An ANOVA on the explicit requests for cooperation revealed main effects for cost information \((F(1,100) = 10.45, p < 0.01)\) and power \((F(1,100) = 6.39, p < 0.05)\), as well as an interaction effect \((F(1,100) = 5.73, p < 0.05)\). Pairwise comparisons with Tukey tests indicated that buyers with TCO information and no outside option request more frequently for active cooperation than buyers in the three other conditions \((p < 0.01)\).
powerful buyers used more problem solving techniques than buyers with an outside option and buyers with TCO information made more extensive use of problem solving techniques than buyers with traditional information. Overall these results provide strong support for hypotheses H1b and H2b.

4.4 Test of mediation and moderation

Based on exchange theory, we hypothesized a mediation effect of the negotiation process on the negotiation outcome (H3). More specifically, we expected that the interaction effect of power and cost information could be explained by the negotiation behavior. We hypothesized that negotiation behavior mediates the moderating effect of cost information on individual profit. To test this relationship, we use Baron & Kenny’s (1986) framework for combining mediation and moderation. We performed the analyses for the two most widely used negotiation behaviors, namely integrative (measured as information exchange) and distributive behavior (e.g. Giebels et al., 2000), as well as for the measure of the overall problem solving approach of the buyers as assessed by the seller.

First, we consider the effect of information exchange. The analysis proceeds in three steps as shown in Table 1.2. The first step is a regression analysis of power, cost information and their interaction on the outcome variable (individual profit). The two main effects were significant and the significant interaction effect indicated moderation. In the second step, two equations were estimated. First information exchange is regressed on power, cost information, and their interaction effect power*cost information. Second, individual profit is regressed on power, cost information, their interaction and information exchange.

Eventually, in step three, one equation is estimated: individual profit is regressed on power, cost information, power*cost information, information exchange and the interaction term cost information*information exchange. This last equation is identical to the second Step 2 equation, but the cost information*information exchange term has been added. The key question is the extent to which the power*cost information effect on individual profit is reduced in moving from Step 2 to Step 3. Information exchange mediates the moderating effects of cost information on power if the following conditions are met (Baron & Kenny, 1986): (1) power*cost information must have less of an effect on individual profit at Step 3 than at Step 2, and the interaction term cost information*information exchange must affect individual profit and (2) in Step 2 cost information should affect information exchange, which results in power*cost information and cost information*information exchange being correlated.

As can been seen in Table 1.2, all these conditions are met: the interaction effect on individual profit is reduced in Step 3 and has dropped to a non-significant level. This implies that information exchange and not cost information moderates the power to individual profit relation. Hence, information exchange mediates the moderating effects of cost information on power.
### Table 1.2: Three step regression procedure for testing mediation and moderation of information exchange

<table>
<thead>
<tr>
<th></th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>individual profit</td>
<td>information exchange</td>
<td>individual profit</td>
</tr>
<tr>
<td>constant</td>
<td>181.82 (*)</td>
<td>0.32 (*** )</td>
<td>165.53 ( *)</td>
</tr>
<tr>
<td>cost information</td>
<td>825.87 (***)</td>
<td>0.41 (**)</td>
<td>804.75 (***)</td>
</tr>
<tr>
<td>power</td>
<td>516.26 (*** )</td>
<td>-0.09 (** )</td>
<td>520.73 (*** )</td>
</tr>
<tr>
<td>power*cost information</td>
<td>-375.62 (**)</td>
<td>-0.28 (** )</td>
<td>-361.45 (** )</td>
</tr>
<tr>
<td>information exchange</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cost information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*information exchange</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F for R²</td>
<td>(*** )</td>
<td>(*** )</td>
<td>(*** )</td>
</tr>
</tbody>
</table>

*a Variable definitions in Appendix C. The table presents the results of four regression analyses. In Step 1, the dependent variable individual profit is regressed on the variables cost information, power and the interaction term power*cost information. In Step 2, first the dependent variable information exchange is regressed on the variables cost information, power and the interaction term power*cost information. Then, the dependent variable individual profit is regressed on the variables cost information, power, the interaction term power*cost information and information exchange. In Step 3, the dependent variable individual profit is regressed on the variables cost information, power, the interaction term power*cost information, information exchange and the interaction term cost information*information exchange. Regression coefficients are reported. (***), (**), (*) indicate significance levels of 1%, 5% and 10%.

The same three-step procedure is undertaken for problem solving approach (cf. Table 1.3). The results are very similar to the results obtained in Table 1.2. Lastly, the three-step procedure is also undertaken for distributive bargaining behavior (cf. Table 1.4). Again we see that the power*cost information effect on individual profit is reduced in moving from Step 2 to Step 3 (though it does not drop to non significance). This implies that distributive behavior only partially moderates the cost information to individual profit relation.

### Table 1.3: Three step regression procedure for testing mediation and moderation of problem solving approach

<table>
<thead>
<tr>
<th></th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>individual profit</td>
<td>problem solving approach</td>
<td>individual profit</td>
</tr>
<tr>
<td>constant</td>
<td>181.82 (*)</td>
<td>1.71 (*** )</td>
<td>174.60 (*** )</td>
</tr>
<tr>
<td>cost information</td>
<td>825.87 (***)</td>
<td>1.91 (*** )</td>
<td>817.78 (*** )</td>
</tr>
<tr>
<td>power</td>
<td>516.26 (*** )</td>
<td>-1.45 (*** )</td>
<td>517.25 (*** )</td>
</tr>
<tr>
<td>power*cost information</td>
<td>-375.62 (**)</td>
<td>-1.85 (*)</td>
<td>-373.89 (**)</td>
</tr>
<tr>
<td>problem solving approach</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cost information * problem solving approach</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>0.41 (*** )</td>
<td>0.72 (*** )</td>
<td>0.41 (*** )</td>
</tr>
<tr>
<td>F for R²</td>
<td>(*** )</td>
<td>(*** )</td>
<td>(*** )</td>
</tr>
</tbody>
</table>

*a Variable definitions in Appendix C. The table presents the results of four regression analyses. In Step 1, the dependent variable individual profit is regressed on the variables cost information, power and the interaction term power*cost information. In Step 2, first the dependent variable problem solving approach is regressed on the variables cost information, power and the interaction term power*cost information. Then, the dependent variable individual profit is regressed on the variables cost information, power, the interaction term power*cost information and problem solving approach. In Step 3, the dependent variable individual profit is regressed on the variables cost information, power, the interaction term power*cost information, problem solving approach and the interaction term cost information*problem solving approach. Regression coefficients are reported. (***), (**), (*) indicate significance levels of 1%, 5% and 10%.
Table 1.4: Three step regression procedure for testing mediation and moderation of distributive behavior

<table>
<thead>
<tr>
<th></th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>individual profit</td>
<td>distributive behavior</td>
<td>individual profit</td>
</tr>
<tr>
<td>constant</td>
<td>181.82</td>
<td>0.05</td>
<td>179.73</td>
</tr>
<tr>
<td></td>
<td>(*)</td>
<td></td>
<td>(*)</td>
</tr>
<tr>
<td>cost information</td>
<td>825.87</td>
<td>0.02</td>
<td>825.13</td>
</tr>
<tr>
<td></td>
<td>(***</td>
<td></td>
<td>(***</td>
</tr>
<tr>
<td>power</td>
<td>516.26</td>
<td>0.13</td>
<td>510.21</td>
</tr>
<tr>
<td></td>
<td>(***</td>
<td></td>
<td>(***</td>
</tr>
<tr>
<td>power*cost information</td>
<td>-375.62</td>
<td>0.37</td>
<td>-392.81</td>
</tr>
<tr>
<td></td>
<td>(**)</td>
<td></td>
<td>(**)</td>
</tr>
<tr>
<td>distributive behavior</td>
<td>46.00</td>
<td></td>
<td>942.23</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>power</td>
<td></td>
<td></td>
<td>-931.62</td>
</tr>
<tr>
<td>*distributive behavior</td>
<td></td>
<td></td>
<td>(*)</td>
</tr>
<tr>
<td>R²</td>
<td>0.41</td>
<td>0.21</td>
<td>0.41</td>
</tr>
<tr>
<td>F for R²</td>
<td>(***</td>
<td>(***</td>
<td>(***</td>
</tr>
</tbody>
</table>

a Variable definitions in Appendix C. The table presents the results of four regression analyses. In Step 1, the dependent variable individual profit is regressed on the variables cost information, power and the interaction term power*cost information. In Step 2, first the dependent variable distributive behavior is regressed on the variables cost information, power and the interaction term power*cost information. Then, the dependent variable individual profit is regressed on the variables cost information, power, the interaction term power*cost information and distributive behavior. In Step 3, the dependent variable individual profit is regressed on the variables cost information, power, the interaction term power*cost information, distributive behavior and the interaction term power*distributive behavior. Regression coefficients are reported. (***, (**, (*) indicate significance levels of 1%, 5% and 10%.

As a last set of analyses, we test for the overall mediation effects of the negotiation process (cf. Table 1.5).

A hierarchical regression analysis was conducted in which dummy variables representing the manipulations were entered at Step 1 and the proposed sets of mediators were entered at Step 2 (cf. Weingart et al., 1996).

Results for regression (1) are very similar to the results we obtained with the ANOVA analysis: both main effects and the interaction effect are significant. The R² of the model is 0.41 and is highly significant (p < 0.01). When the process variables are added to the equation, the interaction effect of power*cost information drops to a non-significant level (coefficient = -233.69, p > 0.10). All process variables reach significance. Information exchange has a negative impact on individual profit (coefficient = -467.70, p < 0.01). However, the positive and significant interaction effect of cost information*information exchange (coefficient = 700.11, p < 0.01) implies that this negative relation between information exchange and individual profit is only true for buyers lacking TCO information. Buyers with TCO information and exchanging information have a significant higher individual profit. Distributive behavior has a positive effect on individual profit (coefficient = 1188.89, p < 0.05), but not for the buyers with power (coefficient = -1181.94, p < 0.05). In addition, the R² of the model increased significantly from 0.41 to 0.52 (F for change in R² = 5.76, p < 0.01). These results provide support for hypothesis H3, as well as for the exchange model of negotiations.

6 The process variables in Table 1.5 are information exchange and distributive behavior (and their interaction with respectively cost information and power). Replacing the information exchange variable by the problem solving behavior variable yielded the same results.

Finally, also some sensitivity analyses were performed to test the robustness of the results against different ways of measuring negotiation behavior. First, similar results are obtained when information exchange was coded 0 for participants not revealing any information about their cost structure; 1 for participants revealing the relative importance of each of the three to be negotiated issues (with or without the numerical values). Second, participants also rated their own bargaining strategies. The problem solving behavior of the buyer assessed by the buyer is highly correlated with the problem solving behavior of the buyer assessed by the seller (Pearson correlation = 0.41, p < 0.01). However, as one of the four items (the item asking whether they were honest or deceptive) assessed by the buyer, did not load with the other items on one factor, the problem solving construct is based on the seller’s assessment of the buyer’s behavior. Similar results are obtained and conclusions remain the same in case the problem solving approach construct combines the items from both the sellers’ and the buyers’ questionnaires.
Table 1.5: Hierarchical regression results for individual profit of the buyer

<table>
<thead>
<tr>
<th></th>
<th>Equation 1: situational characteristics</th>
<th>Equations 2: situational characteristics and negotiation process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>181.82</td>
<td>276.58</td>
</tr>
<tr>
<td></td>
<td>(*)</td>
<td>(**)</td>
</tr>
<tr>
<td>cost information</td>
<td>825.87</td>
<td>488.09</td>
</tr>
<tr>
<td></td>
<td>(***</td>
<td>(***</td>
</tr>
<tr>
<td>Power</td>
<td>516.26</td>
<td>528.19</td>
</tr>
<tr>
<td></td>
<td>(***</td>
<td>(***</td>
</tr>
<tr>
<td>power*cost information</td>
<td>-375.62</td>
<td>-233.69</td>
</tr>
<tr>
<td></td>
<td>(**)</td>
<td></td>
</tr>
<tr>
<td>information exchange</td>
<td>-467.67</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(***</td>
<td></td>
</tr>
<tr>
<td>cost information*information exchange</td>
<td>700.11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(***)</td>
<td></td>
</tr>
<tr>
<td>distributive behavior</td>
<td>1188.89</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(***)</td>
<td></td>
</tr>
<tr>
<td>power*distributive behavior</td>
<td>-1181.94</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(***)</td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>0.41</td>
<td>0.52</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F for R²</td>
<td>22.66</td>
<td>14.84</td>
</tr>
<tr>
<td></td>
<td>(***</td>
<td>(***</td>
</tr>
<tr>
<td>Change in R²</td>
<td></td>
<td>0.11</td>
</tr>
<tr>
<td>F for change in R²</td>
<td></td>
<td>5.76</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(***</td>
</tr>
</tbody>
</table>

* Variable definitions in Appendix C. The table presents the results of two regression analyses. First, the dependent variable individual profit is regressed on the variables cost information, power and the interaction term power*cost information. Second, the dependent variable individual profit is regressed on the variables cost information, power, the interaction term power*cost information, information exchange, the interaction term cost information*information exchange, distributive behavior and the interaction term power*distributive behavior. Regression coefficients are reported. (***), (**), (*) indicate significance levels of 1%, 5% and 10%.

5. Discussion and conclusion

This paper examined the moderating effect of cost information (TCO information versus traditional information) on a buyer’s individual profit when buyer power was high or low. The interaction effect of cost information and power on buyers’ individual profit is supported. Our results indicate that the availability of detailed TCO information can alleviate the disadvantage dependent buyers face vis-à-vis a more powerful seller. This result has profound managerial implications. On the one hand, this result implies that less powerful buyers can compensate their power disadvantage by gathering more detailed cost information. On the other hand, powerful buyers do not seem to be able to use this more detailed cost information to enhance their power advantage so as to obtain an even higher individual profit.

We obtained insights into this result by examining the negotiation process. Consistent with exchange theory, we expected that buyers with detailed cost information and less power than their opponent try to (re)gain control over their own outcomes by sharing information and by paying close attention to their partners so as to accurately predict their intentions and behaviors. Detailed analyses of the bargaining behavior indeed support this hypothesis. We find that more powerful buyers choose a more distributive and less integrative strategy. These results confirm findings from prior research (Perdue & Summer, 1991; De Dreu et al., 1998). We find also an unexpected positive main effect of cost information on distributive behavior. However, as indicated by the interaction effect of cost information and power on distributive behavior, this main effect can be explained by the finding that specifically the buyers with TCO information and power are prone to use distributive techniques.
From these results we can conclude that the manipulation of power and cost information resulted in buyers using different negotiation techniques or strategies. The less powerful buyers who have access to TCO data will use problem solving behavior, whereas powerful buyers rely on aggressive bargaining techniques. Particularly interesting is, however, that the problem solving strategy of less powerful buyers with TCO information seems to be effective, whereas the aggressive bargaining strategy of more powerful buyers appears to fail. Indeed, we find that the individual profit of these two groups did not significantly differ. These results may be explained by the fact that less powerful buyers are able to create a cooperative and coordinated relationship, in which the seller is willing to consider the objectives of the buyer. When the source gives information about needs and preferences and/or makes concessions generating movement towards a prominent solution, the target is likely to reciprocate (Campbell et al., 1988; Gouldner, 1960). This may explain the higher individual profits for less powerful buyers with TCO information. Less powerful buyers lacking TCO information are not able to communicate the right information and are therefore unable to create this integrative situation. More powerful buyers, on the other hand, have a false feeling of power and choose an aggressive bargaining strategy that, in a tit-for-tat fashion, is responded to by an aggressive bargaining strategy of the seller. The aggressive bargaining strategy of the powerful buyer may not be effective when he is facing a powerful seller.

First support for these conjectures was found in our follow-up analyses, in which we tested whether the moderation effect of cost information on the power to individual profit relation (i.e. interaction effect of power and TCO information) can be explained by the choice of a negotiation strategy. We found indeed that the interaction effect of power and cost information is mediated by the bargaining behavior of the buyer. Furthermore, a limited analysis of the bargaining behavior of the seller (not reported) disclosed the reciprocate nature of his bargaining behavior. An ANOVA on information exchange of the seller revealed a main effect for cost information: sellers facing buyers with TCO information disclosed more information than sellers facing buyers with traditional information. Furthermore, we also found that sellers facing a powerful buyer with TCO information issued more threats and referred more often to their outside option than sellers in the other experimental conditions. Recall that the experimental manipulation for the sellers was the same in each of the experimental conditions: sellers had always an outside option and full cost information. The differences in bargaining behavior of the sellers across the different experimental cells need thus to be explained as a result of their interaction with the buyers. These findings provide support for our conjecture that less powerful buyers are able to create a cooperative relationship, in which the seller is willing to follow. This resulted not only in higher individual profits, but also in higher joint profits for the dyad.

Our results suggest thus that powerful buyers with refined TCO information may not realize all possible benefits from buyer-supplier interactions due to their bargaining strategy. Their (false) feeling of power causes an increase of distributive bargaining tactics and a reluctance to share the necessary information for optimizing the activities across the supply chain (i.e. logrolling of the activities). This implies that powerful
buyers may only benefit from more refined accounting information systems if these firms undertake efforts to encourage information sharing and to discourage aggressive bargaining strategies of their employees.

Finally, we present some limitations and further research possibilities.

First, while the experimental context induced by a simple negotiation game (Kelley, 1966) allows maintaining control over exogenous variables, the scope for generalizing the conclusions is somewhat limited. Other factors, such as the incentive system, past negotiation history, future negotiations probabilities, etc. have been shown to impact negotiated outcomes but were not manipulated here. Further research is necessary to determine the sensitivity of the results to several experimental parameters included in the current study.

Second, this study did not manipulate the negotiation context for the seller: the sellers faced the same experimental conditions in all four cells. They were always fully informed and powerful. As a consequence, our conclusions do not generalize beyond negotiation settings in which the seller is always at least as powerful as the buyer. Further research can alter the experimental conditions and examine the role of TCO information from both buyer and seller perspectives.

Third, although optimal joint outcomes are introduced, the paper focuses mainly on the outcome of one party. This focus underplays the cost/benefit trade-off of obtaining the additional information needed for TCO. It is interesting to consider whether buyers would be willing to incur a cost in order to obtain TCO information if it had been efficient to do so.

Fourth, a related issue is the gathering of high quality TCO information. This is not a trivial challenge. In TCO systems costs need to be captured with a great level of detail: by supplier and by item purchased (Ellram, 1995a). Part of the problem of calculating TCO seems to come from the fact that purchasing managers must rely on important information provided to them by other departments in the organization (Milligan, 1999). Degraeve et al. (2005) provide case studies of three different industrial components groups in a firm to illustrate how a TCO system can be constructed from a firm’s information systems. TCO information can be acquired from prior experiences or from comparable transactions and/or suppliers. In its most progressive form, however, TCO is a boundary spanning concept that involves supplier cooperation and information sharing (Wouters et al., 2005). In the latter case, the TCO knowledge resides (partly) with the seller. This may be the case for instance when the buyer has little experience in buying a particular product. In this case, the results of the experiment may no longer hold as the seller may only be willing to share his information if he is confident that it is not subsequently used against him during price negotiations. Or more importantly, if the seller does share the information required by the buyer to calculate his TCO, the buyer may have more difficulty to demonstrate his willingness to be vulnerable and to create an integrative
bargaining situation. The latter element, as demonstrated by our experiment, is a crucial element for less powerful buyers to regain control over their outcomes.

Fifth, our manipulation of TCO information obviously remained a simplification of reality, providing many avenues for further research. The focus in this study is on the use of TCO data and on how this information influences buyer-supplier negotiations. We took a deterministic approach to TCO information which allows us to study the impact of cost information on negotiation behavior and outcomes. The aim was neither to describe a value chain and ABC analysis or to discuss how the data can be collected and what the problems related to this aspect are (cf. Degraeve et al., 2005), nor to identify and categorize important TCO cost drivers (cf. Ferrin & Plank, 2002) or to discuss the drivers for successful adaptation of TCO systems (cf. Wouters et al., 2005). However, more research is needed on this topic as survey studies with purchasing professionals indicate that firms are unsure about their ability to effectively identify the critical cost drivers for estimating TCO (Ferrin & Plank, 2002) and that they are largely in the dark when it comes to making TCO calculations (Milligan, 1999).

Future research may consider aspects such as how buyers gather TCO data (e.g. from the seller, benchmarking, past experience) and the type of TCO systems (formal vs. informal, standardized vs. unique models) installed and how these design aspects impact buyer-supplier relations and negotiations. Interesting is also the examination of the effects of imperfect TCO information. In our study, we provided perfect TCO information. In a real business environment, TCO information is, however, characterized by mistakes and simplifications, which may have important implications on the negotiation process and outcomes. Related to this it would be interesting to consider how costs that are difficult to measure (e.g. costs related to downtime as a result of poor quality or opportunity costs of lower sales and margins due to consumer dissatisfaction) are or can be included in a TCO system. Although ideally TCO systems also account for these costs (Carr & Ittner, 1992), most total cost systems do not include this type of costs such as productivity losses resulting from increased congestion, confusion and downtime or revenue losses from lost goodwill when defective products reach the customer because of the difficulty in measuring these costs reliably (Ittner et al., 2001). Note that these costs are typically not recorded in a buyer’s accounting system (Baiman et al., 2000), but they may represent a substantial cost in total costs (Ittner et al., 2001). Future research may therefore investigate how the negotiation process and outcomes are influenced when these less objective or less reliable figures are explicitly included in the TCO system. Finally, further research may consider whether audited TCO figures would be considered more reliable and what the implications are of audited (either by a third party or by the partner) TCO figures on trust and the relation.

Further research is thus needed to unravel the usefulness of accounting information in inter-firm negotiations and to demonstrate how accounting information affects behavior and outcomes.
## APPENDICES

### Appendix A.

**Experimental cells and corresponding cost tables**

<table>
<thead>
<tr>
<th>Power</th>
<th>No outside option</th>
<th>Outside option</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCO information</td>
<td>Cell 1 (n= 30)</td>
<td>Cell 2 (n= 26)</td>
</tr>
<tr>
<td>Traditional cost information</td>
<td>Cell 3 (n= 26)</td>
<td>Cell 4 (n= 22)</td>
</tr>
</tbody>
</table>

### Cost table for the seller (in cell 1, 2, 3 and 4)³:

<table>
<thead>
<tr>
<th>Contract</th>
<th>Price (=income)</th>
<th>Maintenance</th>
<th>Spare parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>600</td>
<td>1350</td>
<td>2250</td>
</tr>
<tr>
<td>2</td>
<td>1200</td>
<td>1200</td>
<td>2000</td>
</tr>
<tr>
<td>3</td>
<td>1800</td>
<td>1050</td>
<td>1750</td>
</tr>
<tr>
<td>4</td>
<td>2400</td>
<td>900</td>
<td>1500</td>
</tr>
<tr>
<td>5 *</td>
<td>3000</td>
<td>750</td>
<td>1250</td>
</tr>
<tr>
<td>6</td>
<td>3600</td>
<td>600</td>
<td>1000</td>
</tr>
<tr>
<td>7</td>
<td>4200</td>
<td>450</td>
<td>750</td>
</tr>
<tr>
<td>8</td>
<td>4800</td>
<td>300</td>
<td>500</td>
</tr>
<tr>
<td>9</td>
<td>5400</td>
<td>150</td>
<td>250</td>
</tr>
</tbody>
</table>

### Cost table for the buyer with TCO information (in cell 1 and 2):

<table>
<thead>
<tr>
<th>Contract</th>
<th>Price (=cost)</th>
<th>Maintenance</th>
<th>Spare parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>600</td>
<td>250</td>
<td>150</td>
</tr>
<tr>
<td>2</td>
<td>1200</td>
<td>500</td>
<td>300</td>
</tr>
<tr>
<td>3</td>
<td>1800</td>
<td>750</td>
<td>450</td>
</tr>
<tr>
<td>4</td>
<td>2400</td>
<td>1000</td>
<td>600</td>
</tr>
<tr>
<td>5 *</td>
<td>3000</td>
<td>1250</td>
<td>750</td>
</tr>
<tr>
<td>6</td>
<td>3600</td>
<td>1500</td>
<td>900</td>
</tr>
<tr>
<td>7</td>
<td>4200</td>
<td>1750</td>
<td>1050</td>
</tr>
<tr>
<td>8</td>
<td>4800</td>
<td>2000</td>
<td>1200</td>
</tr>
<tr>
<td>9</td>
<td>5400</td>
<td>2250</td>
<td>1350</td>
</tr>
</tbody>
</table>

### Cost table for the buyer with traditional cost information (in cell 3 and 4):

<table>
<thead>
<tr>
<th>Contract</th>
<th>Price (=cost)</th>
<th>Number of maintenance sessions performed by the buyer each month</th>
<th>Spare parts procured by the buyer from a third party each month</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>600</td>
<td>1</td>
<td>Contract R 3</td>
</tr>
<tr>
<td>2</td>
<td>1200</td>
<td>2</td>
<td>Contract S 6</td>
</tr>
<tr>
<td>3</td>
<td>1800</td>
<td>3</td>
<td>Contract T 9</td>
</tr>
<tr>
<td>4</td>
<td>2400</td>
<td>4</td>
<td>Contract U 12</td>
</tr>
<tr>
<td>5 *</td>
<td>3000</td>
<td>5</td>
<td>Contract V 15</td>
</tr>
<tr>
<td>6</td>
<td>3600</td>
<td>6</td>
<td>Contract W 18</td>
</tr>
<tr>
<td>7</td>
<td>4200</td>
<td>7</td>
<td>Contract X 21</td>
</tr>
<tr>
<td>8</td>
<td>4800</td>
<td>8</td>
<td>Contract Y 24</td>
</tr>
<tr>
<td>9</td>
<td>5400</td>
<td>9</td>
<td>Contract Z * 27</td>
</tr>
</tbody>
</table>

³ The tables were constructed such that the minimum (-3000 Euro) and maximum profits (5000 Euro) buyers and sellers could earn were the same. Optimal joint outcomes were reached when buyer and seller agreed on contract 5AZ. This situation is denoted with an asterisk (*).
Appendix B.
Measuring negotiation behavior

B1. Behavioral coding categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Examples</th>
</tr>
</thead>
</table>
| **Information exchange** | - Maintenance is more expensive for my company than spare parts.  
                         | - The contracts for maintenance starts at €250 (=contract A) and increases with €250 until €2250 (= contract I); the contracts for spare parts starts at €150 (=contract R) and increases with €150 until €1350 (= contract Z). |
| **General threats**  | - Make a concession or you will be in trouble.                                                                                                                                                         |
| **Exit threats**     | - Respond with a concession or I will call another supplier.                                                                                                                                              |
| **Punishment**       | - This negotiation is going nowhere.                                                                                                                                                                     |
| **Warnings**         | - My company has a policy against uncooperative supplier.                                                                                                                                                 |
| **Positional commitment** | - I refuse to concede any further.  
                         | - I refuse to drop below my present level.                                                                                                                                                               |

B2. Buyers’ problem solving approach

<table>
<thead>
<tr>
<th>Observed ratings from sellers’ questionnaires (items were reverse coded)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you feel that the person with whom you were paired was more interested in solving your mutual problem, or more self-interested?</td>
</tr>
<tr>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Rate your partner’s bargaining strategies on the following scales:</td>
</tr>
<tr>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>
Appendix C.

Bivariate correlation matrix (n=104).

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.71</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.54</td>
<td>0.21</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.14</td>
<td>0.19</td>
<td>0.41</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.22</td>
<td>-0.20</td>
<td>0.07</td>
<td>0.09</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0.41</td>
<td></td>
<td>0.44</td>
<td>0.35</td>
<td>0.09</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0.55</td>
<td></td>
<td>0.36</td>
<td>0.23</td>
<td>0.23</td>
<td>0.82</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>0.27</td>
<td></td>
<td>-0.35</td>
<td>-0.20</td>
<td>0.35</td>
<td>-0.23</td>
<td>0.00</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.71</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.54</td>
<td>0.21</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.14</td>
<td>0.19</td>
<td>0.41</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.22</td>
<td>-0.20</td>
<td>0.07</td>
<td>0.09</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0.41</td>
<td></td>
<td>0.44</td>
<td>0.35</td>
<td>0.09</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0.55</td>
<td></td>
<td>0.36</td>
<td>0.23</td>
<td>0.23</td>
<td>0.82</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>0.27</td>
<td></td>
<td>-0.35</td>
<td>-0.20</td>
<td>0.35</td>
<td>-0.23</td>
<td>0.00</td>
<td>1</td>
</tr>
</tbody>
</table>

* Buyer’s individual profit at the end of the game (based on the cost table provided in Appendix A).
* Seller’s individual profit at the end of the game (based on the cost table provided in Appendix A).
* Joint profit is the sum of buyer’s individual profit and seller’s individual profit at the end of game.
* Information exchange was coded “0” for buyers not revealing any information about their cost structure; “1” for buyers revealing the relative importance of each of the three to be negotiated issues without revealing any numerical values and “2” for buyers revealing the relative importance of each of the three to be negotiated issues.
* Coded from the messages sent by buyers (based on the behavioral coding scheme in Appendix B1). Based on five distributive behavior types (general threats, exit threats, positional commitment, punishments, warnings) with Cronbach’s alpha = 0.81.
* Buyer’s problem solving approach based on observed ratings from seller’s questionnaire (based on the four items included in Appendix B2) with Cronbach’s alpha = 0.88.
* Dummy variable, experimentally manipulation: 0 for traditional cost information, 1 for TCO information.
* Dummy variable, experimentally manipulation: 0 for buyers with no outside option, 1 for buyers with an outside option.

(*) Correlation is significant at the 0.05 level (2-tailed).
(**) Correlation is significant at the 0.01 level (2-tailed).
Abstract

This study explores the way trust is built at the level of the inter-firm relationship and the role that controls and information play in this process. We use a 3 (no, weak or strong control system) X 2 (traditional versus more refined Total Cost of Ownership information) experimental design to investigate the influence of cost information and its interaction with inter-firm control systems on buyer-supplier negotiations and on resulting outcomes. Based on Tomkins (2001) and Dekker (2004) we expect some non-linear relations between information, controls and trust. In an early phase of the relationship, we expect and find evidence of a positive relation between formal controls and trust as well as a positive association between information and trust on negotiation outcomes. Furthermore, we find that information and controls form substitutes in the formation of trust. We explain these results by explicitly investigating the negotiation process. At a later stage in the relation, information has no longer a positive impact on joint profits, while, depending on the information available, trust may replace the need for information exchange. We conclude that the negotiation process, characterized by information exchange, plays a crucial role in explaining inter-firm negotiation outcomes.
1. Introduction

Inter-firm relationships are characterized by a number of specific risks such as the exchange of sensitive information, the fair division of cost and benefits and the appropriation of investments to be made in specific assets (Dekker, 2003a). These concerns require cooperating firms to have confidence that opportunistic behavior will not occur. Confidence may be derived from the presence of trust or it may be gained from formal controls or refined information. It is important for managers to cultivate an optimal mix of these governance mechanisms because they interact with each other (Lui & Ngo, 2004) and they are not costless to develop (Parkhe, 1993).

Prior studies showed contradictory results on the relation between trust and controls, i.e. whether trust is a substitute or a complement for formal control mechanisms. Some prior studies provide evidence of the complementary roles of trust and control in cooperative relationships (Luo, 2002; Poppo & Zenger, 2002). Other researchers argue that the more trust one has, the less control one needs over a partner (Madhok 1995; Nooteboom 1996). Malhotra and Murnighan (2002) even found that the presence of control systems inhibits the development of trust.

Recent research indicates that the relationship between trust and control is more complex: trust and control may be complements or substitutes depending on the situation. Woolthuis et al. (2005) conducted four longitudinal case studies to reveal that trust and controls can be complements as well as substitutes, depending on the purpose and the content of the formal agreement. Lui & Ngo (2004) showed that the relationship between contractual safeguards and cooperative outcomes depends on both the level and the type of trust (goodwill trust and competence trust). Fryxell et al. (2002) examined the moderating effects of age and partner trust on the relationship between control mechanisms and perceptions of performance in international joint ventures (IJVs) and found a positive relation in younger IJVs, but a negative relation in more mature IJVs.

One prior study, although in an intra-organizational context, hints at a more dynamic perspective according to which the interpersonal interaction involved in the execution of control systems may actually contribute to the development of trust. If the nature of the control system is such that it initially provides economic incentives for cooperation, a more trusting relationship may develop out of this cooperation, and control systems may eventually facilitate the development of trust (Coletti et al., 2005).

Coletti et al. (2005) have hinted at the mediating role of control-induced cooperation, but their study lacks the context of typical interpersonal actions. Like in other prior work they used prisoners’ dilemma games to simulate trusting interactions. However, these studies do not provide insights into real negotiation behavior, such as the use of distributive tactics and the exchange of information that characterize a real negotiation setting, and that influences negotiation outcomes.
We argue that prior studies have neither fully explored the way in which trust is built in the relationship (the how of the trust building process), nor the role that information plays in this process. While several authors have raised questions about the relationship between trust, information and control (e.g. Langfield-Smith & Smith, 2003; Dekker, 2004; Tomkins, 2001), there is hardly any study on how information and formal controls relate to the process of trust building (Vosselman & van der Meer-Kooistra, 2004).

Our contribution is threefold. First, we conduct the first empirical investigation of the role of information in the relation between inter-firm controls and trust. We demonstrate empirically the existence of non-linear relations between information, trust and controls (cf. Dekker, 2004; Tomkins, 2001). At an early stage of the relation, we find evidence of a positive relation between formal controls and trust as well as a positive association between information and trust on negotiation outcomes. Later in the relationship, information has no longer a positive impact on joint profits, while, depending on the information available, trust may replace the need for information exchange. Our second contribution is the investigation of the interpersonal processes by which trust is built at the level of the relationship. We not only explain negotiation outcomes, but also take into account the negotiation process that leads to these outcomes. This process, characterized by information exchange and distributive behavior has largely been ignored in the accounting literature. Our study demonstrates that the negotiation process, characterized by information exchange, plays a crucial role in explaining negotiation outcomes. Third, this study operationalizes more refined cost information as Total Cost of Ownership (TCO) information and provides evidence on how TCO may help building a higher level of buyer-supplier trust. A recurring theme in the accounting literature on TCO information is that it represents an important and useful tool for negotiation between buyers and suppliers (Ellram, 1995a & 1995b; Monczka et al., 2002; Roodhooft et al., 2003 & 2005). This study is one of the first to provide empirical evidence for these claims.

Furthermore, we study the effects of control strength. The everyday use of formal controls leads to questions about the ultimate strength of the bonds that they have created. Investigating the effects of contract strength has therefore been identified as a clear avenue for new research (Malhotra & Murnighan, 2002). For example, a weaker control system may fail to provide strong enough incentives for cooperation. In such a case, the feedback may reveal shirking and, as a result, lead to heightened levels of distrust among collaborative partners.

The remainder of the paper is organized as follows: in section two, the relevant literature is reviewed and hypotheses are formulated. Section three covers the research method, whereas results are reported in section four. Finally, in section five, results are discussed and possibilities for further research are formulated.
2. Literature review and hypotheses

Dekker (2004) and Tomkins (2001) provided interesting insights into the relation between trust and control, and between trust and information, respectively. Dekker (2004) argues that the relationship between trust and controls may be nonlinear. Until a certain threshold (determined by the relation’s transaction hazards) the use of formal controls may be complementary and enhancing to trust. However, since trust is the low-cost solution, it will substitute formal controls whenever a sufficient level of control is realized for safeguarding the transaction. Partners will not unnecessarily use expensive formal control mechanisms and in addition risk damaging the quality of their relationship (Dekker, 2004). This implies that, in an early phase of the relation, where trust still needs to be built, one would expect a positive relation between formal controls and trust. However, at a later stage in the relation, trust may replace formal controls.

While Dekker (2004) provides us with insights into the relation between trust and formal control systems, Tomkins (2001) gives us a better understanding of how information and trust are related. While prior literature (e.g. Wicks et al., 1999) conclude that there is an inverse relationship between the willingness to trust and the need for information, Tomkins (2001) describes the relationship between trust and information during different stages of the relationship life cycle as an inverted U-shape: in the early stages of the relationship trust and information are additively related, while later on they become substitutes. Tomkins (2001) reasons that it is probably true to say that, at any specific point of time, there is a reasonably strict inverse association between information and the level of trust (i.e. trust intensity), but this assumes that the level of trust intensity is somehow given, quite independent of any other activity. It ignores the fact that trust derives from learned, usually interactive, experiences and that this process itself depends upon information as well as appropriate information depending upon the state of trust.

Although the exchange of information and its relation to inter-firm controls and trust has been less well investigated, Seal et al. (1999) offer some suggestions on how management accounting may contribute to the development of dyadic business relationships. Although their fieldwork revealed that a partnership may be organized by the enactment of inter-dependence and through the establishment of shared meanings, these common behaviors and understandings can be built up more readily if participants can draw on a commonly understood management accounting methodology. Indeed, their research shows that the specification and sharing of cost data can play a central role in inter-organizational negotiations as both sides in a manufacturing partnership learn about and respect each other’s financial and commercial constraints and objectives. Therefore they submit that, both in inter- and intra-organizational environments, accounting may play a constitutional role in the establishment and management of trusting and collaborative business relationships (Seal et al., 1999). Thus accounting proves to be able to serve an important function in relational signaling and thus in building trust. It generates information in order to (jointly) solve problems, to share information for allocation purposes, to be cooperative and supporting in a need-situation or to account for a mishap (Vosselman & Van der Meer-Kooistra, 2004). Ness & Haugland (2005) came to similar
conclusions in their case study on the cooperation between the Norwegian Road Authorities (NRA) and a private contractor. The initial information-sharing and problem-solving behavior, followed by successful implementation, gave the parties positive experiences. These initial positive experiences from exploiting the integrative potential led to a reinforcement of trust as a governance mechanism and problem solving as a negotiation strategy. Such explicit and implicit information sharing made it possible to understand the partner’s concerns and interests, and the parties learned to identify the integrative potential in different situations. Trust and relational norms were reinforced over time, and became important structural conditions that fostered a more cooperative climate where both parties yielded on issues to the other’s advantage. It also restrained the use of contending tactics (Ness & Haugland, 2005).

So, once one takes a dynamic view of a relationship, one sees that there is likely to be a positive association between information and trust at earlier stages of relationship development simply because trust itself cannot be increased without further information. However, as trust intensity becomes established at higher levels in later stages of the relationship, it is likely that less information will be needed to sustain that relationship (Tomkins, 2001).

We can conclude that controls and information serve a similar role in the trust building process and can thus be regarded as substitutes. In an early stage, information or controls are required to build up trust; however, once a certain level of trust has been established, it is expected that controls and information are less needed to sustain the relation. This can be explained through the negotiation process: trust gives rise to expectations that the other party will continue to behave cooperatively and non-opportunistically during the remainder of the relationship (Vosselman & Van der Meer-Kooistra, 2004). Indeed, exchange theory prescribes that norms develop through interactions, as do trust and other key variables (Roloff, 1981). As Ring & Van de Ven (1992) point out, relational norms evolve over time, as exchange partners establish behavioral rules for processes such as conflict resolution, monitoring, joint problem solving, and the like.

So far, the discussion has been in general terms about the role of information in inter-firm relations. Many different forms of inter-firm relations exist, however, each with specific information needs (for a detailed listing see Tomkins, 2001). In this study, we focus on buyer-supplier relations and the use of Total Cost of Ownership (TCO) information.

Total Cost of Ownership (TCO) accounting systems account for costs that are caused by buying at a certain supplier, such as costs of ordering, delivery, quality and administration (Carr & Ittner, 1992). The TCO concept attempts thus to quantify all of the costs related to the purchase of a given quantity of products or services from a given supplier (Ellram, 1995a). Many TCO systems nowadays are ABC supported (Wouters et al., 2005) and the cost (and cost driver) information resulting from the analysis can be used to optimize and better coordinate the performance of activities across the supply chain. TCO information can be used when negotiating with suppliers to identify areas requiring performance improvement: suppliers can be made
aware of the extra costs they generate and the ways to improve their competitive position by reducing these costs at the buyer side (Ellram, 1995a & 1995b; Monczka et al., 2002; Roodhooft et al., 2003 & 2005).

We focus on TCO information for two specific reasons. First, it allows us to test recurring claims in the literature on the usefulness of TCO information for negotiation between buyers and suppliers (Ellram, 1995a & 1995b; Monczka et al., 2002; Roodhooft et al., 2003 & 2005). Although it has often been claimed that TCO information can be used in negotiations with suppliers to identify areas requiring contractual performance improvement, empirical evidence is still lacking. Second, by focusing on TCO we can test the above expectations on the non-linear relation between trust and information in a concrete context. Although it is clear that different inter-firm relations have different information needs, all of them exhibit a staged development of the balance between trust and information as the relationship develops (Tomkins, 2001). We expect therefore that the relation between TCO information and trust will also be non-linear.

Based on the above observations, we formulate the following hypotheses:

At an early stage of the relationship
H1: TCO information has, through its positive impact on a dyad’s problem solving behavior, a positive impact on (a) the dyad’s trust and (b) joint profit.
H2: Formal controls have, through their positive impact on problem solving behavior and their negative impact on a dyad’s bargaining behavior, a positive impact on (a) the dyad’s trust and (b) joint profit.
H3: As both formal controls and TCO information help building trust at an initial stage, we expect controls and information to form substitutes in their relation to (a) a dyad’s trust and (b) joint profit.

At a later stage of the relationship
H4: TCO information has, through its positive impact on a dyad’s problem solving behavior, a positive impact on joint profit.
H5: Trust has, through its positive impact on problem solving behavior and its negative impact on a dyad’s distributive bargaining behavior, a positive impact on a dyad’s joint profit.
H6: Trust and TCO information form substitutes in their relation to a dyad’s joint profit.
3. Research method

3.1 Experimental design

An experiment has been used as research method. The experiment consists of three consecutive negotiation games between buyers and sellers\(^9\) and uses a 3 (control system: no, weak or strong) x 2 (information: traditional cost information vs. more refined TCO information) design. Manipulation of control and information was as follows.

3.1.1 Control system

The participants under the “strong control system” (SCS) condition were informed that an auditor had been hired to supervise the negotiations and that both firms had agreed on this control system (cf. Coletti et al., 2005). If the auditor observed that a player had shared false or faulty information in order to mislead his/her partner, the player would be penalized\(^10\). For the participant this meant that he would earn no bonus for that negotiation round. Participants under the “weak control system” (WCS) condition were informed that there was a 10% chance that an auditor would observe the negotiations and that both firms had agreed on this control system. If the auditor observed that a player had shared false or faulty information in order to mislead his/her partner, the player would be penalized in the same way (= no bonus). Participants under the “no control system” (NCS) condition did not face the possibility of auditor controls. Once participants had completed the two first negotiation rounds, the computer program informed them that no auditor would supervise in the final game. Thus, in the last round, the “strong control system”, the “weak control system” and the “no control system” conditions are identical in structure. This identical control structure in the last game allows us to isolate the effect of trust\(^11\). As a result we can measure and compare the development of trust over the different control conditions. This is further explained in the section on the measurement of the dependent variables.

3.1.2 Information

Information was manipulated by providing the buyer with traditional cost information or Total Cost of Ownership (TCO) information, the latter being our operationalization of more refined cost information. A recurring theme in the accounting literature on TCO information is that it represents an important and useful tool for negotiation between buyers and suppliers (Ellram, 1995a & 1995b; Monczka et al., 2002; Roodhooft et al., 2003 & 2005). TCO information can be used when negotiating with suppliers to identify areas requiring performance improvement: suppliers can be made aware of the extra costs they generate and the

\[^9\] Inter-firm relations come in a variety of forms and structures – such as joint ventures, minority equity alliances, joint R&D, joint production, long-term supply agreements, and so on. The type of the relation has significant implications for the roles of trust, control and information (Birnberg, 1998; Tomkins, 2001). As our experiment involves the negotiation between buyers and suppliers, our results may not be generalizable to other types of inter-firm relations.

\[^10\] The control literature distinguishes between two main modes of formal control: behavioral and outcome control (Ouchi & Maguire, 1975). The operationalization of the control system in this experiment focuses on behavioral control as the control system is intended to reduce opportunistic behavior (i.e. sharing false information in order to mislead the partner) and not on outcome control. This may restrict the validity of our results to behavioral control situations.

\[^11\] In order to avoid end-of-game effects, players were not aware of the fact that the third round was the last one. This is discussed in more detail in the procedure section (3.2).
ways to improve their competitive position by reducing these costs at the buyer side (Ellram, 1995a & 1995b; Monczka et al., 2002; Roodhooft et al., 2003 & 2005). The cost (and cost driver) information resulting from the analysis can be used, as suggested by Porter (1985), to optimize and better coordinate the performance of activities across the supply chain. The possession of relevant information for the interactions places the buyer in a strong position to work with the seller in identifying and assessing alternative courses of action and, thus, increases the likelihood that problem-solving efforts will be effective (Barlow & Eisen, 1983). Buyers with TCO information had a payoff table with detailed cost information showing all costs expressed in monetary figures, whereas buyers with traditional information only had an indication of the costs and the relative importance of each of the issues to be negotiated. This corresponds to traditional management accounting practices that only track the purchase price associated with a particular product or supplier and that bury other costs of purchasing in overhead accounts or general expenses (Carr & Ittner, 1992). Sellers received the same information in each of the experimental cells: they always had full cost and income information. This manipulation results in six experimental cells as indicated in Appendix A.

3.2 Subjects and procedures

Participants were recruited from a graduate management accounting course of a Masters program in business administration at a large West-European university. The course had covered traditional accounting methods, ABC, TCO and supplier selection problems before the experiment took place. The experiment was run in a computer laboratory. Participation required attendance at a specific place and time, and was restricted to one session of maximum two hours. The opportunity to earn cash, depending on their performance, was the only incentive offered. In total there were 294 subjects. Participants were randomly assigned to one of the six experimental conditions. Procedures were identical for all conditions. Participants were either buyer or supplier. Buyers and suppliers sat in different class rooms so that participants were unable to identify their counterpart; hence personality effects and collusion are precluded. Participants read the instructions, describing their role position and the nature of the bargaining task, and played the game on their own pace. The seller started the game by making a first offer. Every participant played three different, but similar, games against the same partner. The games are simplified Kelley (1966) games. During the first two games, one third of the dyads were under the no controls situation, one third was under the weak controls situation and the last third was under the strong controls situation. After playing two games, the control systems disappeared. This meant that all experimental cells were similar with respect to the control system (no controls) in the third, last game. However, manipulation of the information remained the same during the three games: buyers had during the three games either traditional information or TCO information. Participants could send messages along with their offers and counteroffers if they desired. Each game ended when (i) an agreement was reached, (ii) a player opted to end the game, receiving nothing, or (iii) after 10 bidding rounds. In the last case, participants were informed by the computer program that time was running up. This happened only in 2 out of 147 cases. Participants earned 3 Euro for participating, plus a bonus of

12 All participants played three negotiation games. In order to avoid end-of-game effects, all players were informed that they would play anything between 2 and 5 rounds against the same counter-partner. In reality, however, all participants played three rounds.
0.1% of their company’s profit (on average participants earned 9.26 Euro; min = 4.53 Euro; max = 13.28 Euro).

3.3 The bargaining tasks

The bargaining tasks are based on a negotiation game developed by Kelley (1966) and have been applied by many other researchers over the last decades\(^\text{13}\). The game was adapted to suit a TCO setting. This means that the “payoff tables” of Kelley’s game were replaced by cost tables for the buyers and cost and income table for the seller (cf. appendix B). Participants were not shown their counter-partner’s payoff table; they were only able to gain insights into their counter-partner’s profit and costs schedule through the process of offers and counteroffers and through the messages they sent throughout the negotiations.

In the first negotiation game, buyers and sellers had to negotiate a lease-contract for a set of machines. The buyer could earn a fixed income by selling end-products to an end customer. The instructions explained that maintenance and spare parts were needed to keep the machines running and to produce an end-product for the end customer. The game thus involved the simultaneous negotiation of three issues: a price contract, a maintenance contract and a spare part contract. For each of these issues five different contracts were possible. Price was an income for the seller, but a cost for the buyer. Consequently, the price issue was distributive in nature. This issue was worth the same for each negotiator, with preferences on the issue going in opposite directions. Consequently, one’s gain was equal to the other’s loss. The task provided, however, an opportunity for the parties to integrate their interests and thus for win-win situations. The buyer had a comparative advantage in taking care of the spare parts while the seller had a comparative advantage in maintaining the machines. Since the issue that was most valuable to one party automatically was less valuable to the other party, it was possible for participants to trade off issues. Such “logrolling”, giving up on less valuable issues to maximize outcomes on the most valuable one, would yield a fully integrative solution or Pareto optimal solution. The Pareto optimal solution is the solution whereby no dyad member can improve without the opposite party being worse off; no other combination of contracts offers as much or more profit to both parties. The Pareto optimal solution was reached when buyer and seller agreed on contract 3AV. In this agreement, the distributive issue (i.e. price) is set at the middle and the two integrative issues (maintenance and spare parts) are fully traded off. This situation is highlighted in bold in appendix B. As cost tables were private, participants had to find out the Pareto optimal solution through the process of offers and counteroffers and by exchanging information about their interests. The second and the third negotiation games were very similar. The second game involved the simultaneous negotiation of three issues concerning a set of spare parts: a price contract, the delivery time and the payment terms. Buyers were instructed that they preferred a short delivery time for the spare parts, but a long payment term as this costs less to them. For each issue seven different contracts were available. Again a Pareto optimal solution (4GR) could be reached by setting the distributive issue (i.e. price) at the middle contract and by trading off the two integrative issues.

\(^\text{13}\) e.g. De Dreu & Van Kleef, 2004; Neu et al., 1988; Pruitt & Lewis, 1975; Schurr & Ozanne, 1985
(delivery time and payment terms). The third game involved the negotiation for a lease contract of a new set of machines and was almost identical to the first game, except that the costs were somewhat different. The cost tables for game 2 and 3 are also provided in appendix B.

3.4 Dependent variables

3.4.1 Negotiation outcomes
Trust is the central outcome variable of interest. H2 predicts that participants in the “control system” conditions will be judged as more trustworthy than those in the “no control system” condition. This prediction depends on the ability of the control system to provide feedback, so that both buyer and seller can observe control-induced cooperation. Therefore we allow for two periods of play before assessing the perceived trustworthiness of each participant’s partner. Before playing the last game, participants judged the likelihood that their counter-partners would honestly share information (= behave cooperatively). Specifically, they answered, “How likely is it that your partner will cooperate?” on a 7-point Likert scale (cf. Coletti et al., 2005). Trust may be conceptualized as the perceived likelihood that another person will cooperate, absent any economic incentives to do so (Coletti et al., 2005). Because this question was asked after game 2, after the prospect of an auditor’s visit had been removed, this question operationalizes our definition of trust.4 A dyad’s trust was obtained by averaging the responses of the buyer and the seller per dyad. A second important outcome variable is the joint profit of the dyad. The joint profit of dyad is the total of the buyer’s profit and the seller’s profit at the end of a game. Joint profit is measured after game 1, game 2 and game 3.

3.4.2 Negotiation behavior
Interaction analysis (Putman & Fairhurst, 2001) was used for coding verbal behavior to examine categories and meanings embedded in structural pattern of talk. The classification scheme is based on negotiation communication coding schemes used in prior studies (e.g. Alexander et al., 1994; Boles et al., 2000; De Dreu et al., 1998; Giebels et al., 1998, 2000 & 2003; Neu et al., 1988; Schurr & Ozanne, 1985). The classification scheme is included in appendix C. Three judges, who were blind to conditions or hypotheses, coded each negotiation independently. Inter-rater agreements, expressed in Cohen’s Kappa, varied between 0.68 and 0.89, all satisfactory values (Landis & Koch, 1977). After completing the coding, the coders compared their coding and reconciled disagreements by together reviewing the negotiation messages and producing a single set of codes for each subject. Negotiation behavior was determined from analyses of these codes.

---

4 Our operationalization of trust is not concerned with a partner’s ability to perform in accordance with agreements (competence trust), but with his intentions to do so (goodwill trust) (cf. Sako, 1992). The generalizability of our results may therefore be restricted to situations of goodwill trust. Furthermore, it is also important to note that our definition of trust differs from a game-theoretic perspective (e.g. Williamson, 1993), which assumes that trust occurs when the economic incentives favor cooperative behavior (Coletti et al, 2005).

5 Results are reported for the dyad’s trust, joint profits and behavior. Analyses for buyers and sellers separately indicate that trust, joint profits and behavior results for buyers and seller are very similar for dyads in which the buyer has TCO information. For dyads in which the buyer has traditional information, however, buyers earn less and have less trust than their counter-parts.
Messages sent by participants were coded for (a) problem solving behavior, operationalized as information exchange about numerical values and priorities (b) distributive behavior such as sending threats and issuing warnings. The three independent judges established the participant’s information exchange about priorities and numerical values reflecting integrative problem solving behavior. Information exchange was coded 0 for participants not revealing any information about their cost structure; 1 for participants revealing the relative importance of each of the three issues to be negotiated. Distributive behavior is based on five behavior types: lies, threats, warnings, commitment and punishments. Each of these five types of distributive behavior was coded 1 if the behavior was present in the messages sent by a participant and 0 if not (cf. Neu et al., 1988). A participant’s distributive behavior is measured as the average of these five types of behaviors. As with the outcome variables, a dyad’s problem solving behavior and distributive behavior were obtained by averaging the result for the buyer and the seller.

Appendix D lists the descriptive statistics for each variable in the study, including reliability measures (Cronbach’s alpha), which ranged from 0.75 to 0.84. These all exceed the minimum value of 0.70, which is usually considered acceptable (Nunnally, 1978). Thus, the items within each variable are highly correlated with one another and therefore reliable predictors of that latent variable (Hair et al., 1998). The high reliability measures also provide confidence that the items in each variable were measuring a single construct. Factor analyses (not reported) indicate that the different distributive behavior tactics load on one factor in each negotiation round. Appendix E contains a correlation matrix, which reveals that none of the variables are too highly correlated with each other.

4. Statistical analysis and results

The analyses proceed in two stages. First, the effects of controls and information on the trust building process and on joint profit are analyzed. Then, in a second stage, we analyze the effects of the built-up trust and information on subsequent performance.

4.1 Early stage of the relation

We analyzed the data using 2 x 3 analysis of variance (ANOVA) designs. Table 2.1 presents descriptive statistics and ANOVA results for the behavioral variables (problem solving and distributive behavior) and for the outcome variables (trust and joint profit). As experimental conditions and results in game 1 and 2 are

---

16 Some experimental checks were performed before statistical analyses were undertaken. On completion of the task, participants filled out a post-bargaining questionnaire with seven-point scales checking for motivation, task understanding and their usage of cost reports. Checks on procedures, including the subject involvement in the task (motivation, fun), their understanding of the instructions and the payoff tables, and whether they had enough time to complete the exercise, appropriately showed no differences between conditions (p > 0.10). Means indicated that they were highly involved (Mean = 5.88; st.d. = 1.08), that they assessed the exercise as “fun” (Mean = 5.70; st.d. = 1.13) and that they understood the instructions (Mean = 6.39; st.d. = 1.03). Buyers with TCO information judged the cost information they had more relevant than the buyers with traditional cost information (F(1,146) = 27.53, p < 0.001). Analyses revealed neither main nor interaction effects for gender of participants on negotiation process and outcomes. Because this variable did not influence other measures and did not interact with the experimental manipulations, gender was excluded from further analyses.
very similar, and in order to make the reporting of the results not unnecessary complex, the results for game 1 and 2 were averaged. As the experimental conditions changed after the second game, the results on the third game are reported separately in the next section.

The first set of ANOVA tests contains the main effects of the type of information (information = 0 for traditional cost data and 1 for TCO information) and inter-firm control system (no control system (NCS) = 0, weak control system (WCS) = 1, and strong control system (SCS) =2) on dyads’ behavior, on joint profits in the first two games and on the dyads’ trust. It also induces their interaction. H1 and H2 predict that controls, respectively information, will have a positive impact on a dyad’s trust and on a dyad’s joint profit and that these results can be explained by the mediating effect of behavior. Furthermore, H3 predicts that controls and information form substitutes in their relation to trust and joint profit. In order to test these hypotheses, an ANOVA was performed on the trust variable and on the joint profit variable. We find a main effect for information (F(1,141) = 5.92, p < 0.05): participants in dyads with TCO information trust each other more. This result provides support for hypothesis H1a. As predicted in H2a, we also find a main effect for controls (F(1,141) = 5.39, p < 0.01). Thus, after all control system had been removed, participants judged their opponent as more trustworthy in the conditions where a control system was in place during the first two negotiation rounds than in the condition where control systems were never in place. A Tukey HSD post hoc test for homogenous subsets (not reported) reveals that the WCS and the SCS form a homogenous subset, whereas the NCS condition forms a separate subset, indicating that the weak control system is equally effective in building trust as the strong control system. The significant interaction effect of cost information and control system on the trust variable (F(1,141) = 2.78, p < 0.10) indicates that controls and information are, to a certain extent, substitutes in their relation to trust. More specific, we find that in the presence of a control system participants judge others to be equally trustworthy, irrespective of the cost information available (TCO information or not), but that in the absence of a control system, participants will judge others to be more trustworthy when there is TCO information available than when there is no TCO information available. These results support hypothesis H3a. An ANOVA on joint profit reveals a main effect for controls (F(1,141) = 2.51, p < 0.10), indicating that dyads reached higher joint profits in the control conditions than in the no control condition (as predicted in H2b). We also find a highly significant main effect for information (supporting H1b): participants in dyads with more refined information obtain higher joint profits (F(1,141) = 9.65, p < 0.01). Contrary to H3b, no interaction effect of information and control system on joint profit was found (F(1,141) = 0.77, p > 0.10). These results imply that more refined information as well as control systems have a positive effect on a dyad’s trust and on a dyad’s joint profit. However, control systems and refined information only form substitutes in their relation to a dyad’s trust and not in relation to joint profits.

17 Analyses were performed for all subjects in the study. However, analyses of the data without including the subjects not reaching agreement yielded the same results. Very few dyads did not reach an agreement: in game 1 all dyads reached agreement, in game 2 only two dyads out of 147 did not reach agreement, while in game 3 three out of 147 dyads did not reach agreement.
Table 2.1: Descriptive statistics (mean and standard deviation) and AN(C)OVA results (F-statistic and significance) averaged over the first two games

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (standard deviation)</th>
<th>ANOVA</th>
<th>ANCOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No tco; NCS</td>
<td>No tco; WCS</td>
<td>No tco; SCS</td>
</tr>
<tr>
<td>Trust (a)</td>
<td>2.83 (0.94)</td>
<td>3.77 (1.13)</td>
<td>4.02 (0.91)</td>
</tr>
<tr>
<td>Joint profit_12 (b)</td>
<td>7.55 (1.07)</td>
<td>7.85 (0.39)</td>
<td>7.94 (0.43)</td>
</tr>
<tr>
<td>Problem solving_12 (c)</td>
<td>0.14 (0.22)</td>
<td>0.46 (0.37)</td>
<td>0.49 (0.34)</td>
</tr>
<tr>
<td>Distributive behavior_12 (d)</td>
<td>0.22 (0.09)</td>
<td>0.07 (0.09)</td>
<td>0.07 (0.24)</td>
</tr>
</tbody>
</table>

ANOVA

<table>
<thead>
<tr>
<th>Variable</th>
<th>Information control system</th>
<th>Information control system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust</td>
<td>5.92 **</td>
<td>5.39 ***</td>
</tr>
<tr>
<td>Joint profit_12</td>
<td>9.65 ***</td>
<td>2.51 *</td>
</tr>
<tr>
<td>Problem solving_12</td>
<td>10.67 ***</td>
<td>3.04 **</td>
</tr>
<tr>
<td>Distributive behavior_12</td>
<td>0.01 ***</td>
<td>16.30 ***</td>
</tr>
</tbody>
</table>

ANCOVA

<table>
<thead>
<tr>
<th>Variable</th>
<th>Information control system</th>
<th>Information control system</th>
<th>Problem solving</th>
<th>distributive behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust</td>
<td>2.78 **</td>
<td>0.94</td>
<td>1.40</td>
<td>8.20 ***</td>
</tr>
<tr>
<td>Joint profit_12</td>
<td>4.53 **</td>
<td>0.26</td>
<td>0.05</td>
<td>14.21 **</td>
</tr>
</tbody>
</table>

F-statistics are reported. ***, **, * indicates a p-value of ≤ 0.01, 0.05, 0.10 in a two-tailed test.

(a) Participants’ assessment of their partners’ trustworthiness on a 7-point Likert scale. Specifically, participants answered “How likely is it that your partner will cooperate?” after being told that no control system would be in place in the future. Results were averaged per dyad.
(b) Joint profit of dyad is the total of the buyer’s profit and the seller’s profit.
(c) Problem solving is coded 1 if participant shares private cost information, zero otherwise.
(d) Based on 5 distributive behaviors (lies, threats, positional commitment, punishments, and warnings).

To test for the mediating effect of behavior, we first performed ANOVA’s to test the effect of controls and information on behavior, then in a second stage, ANCOVA’s, with behavior as covariates, are used to test the overall effect of controls, information and behavior on trust and joint profits. The ANOVA on problem solving behavior reveals that participants in the control conditions display more problem solving behavior (F(1, 141) = 3.04, p = 0.05) than participants in the no control condition and that participants in the TCO condition use more problem solving techniques (i.e. share more often private cost information) than participants in the no TCO condition (F(1, 141) = 10.67, p < 0.01). Looking at the means and standard deviations for problem solving behavior in game 1 and 2, we see that players in the no TCO and NCS condition use significantly less problem solving behavior (i.e. they share less often private cost information). An ANOVA on distributive behavior for game 1 and 2 revealed a main effect for control system (F(1, 141) = 16.30, p < 0.01): participants under the control conditions used less distributive bargaining techniques than participants in the no control condition. No effect of information on distributive behavior was found (F(1,141) = 0.01, p > 0.10), nor an interaction effect (F(1,141) = 0.05, p > 0.10). A Tukey HSD post hoc test for homogenous subsets (not reported) reveals that, at a 95% confidence interval, the WCS and the SCS form a homogenous subset, whereas the NCS condition forms a separate subset, indicating that participants in the no control condition use significantly more distributive tactics than participants in the control conditions.
This result indicates that the WCS and the SCS are, compared to the NCS, equally effective in reducing distributive bargaining tactics.

The ANCOVA results indicate that negotiation behavior (problem solving and distributive behavior) mediates the effects of information and controls on trust. Once problem solving and distributive behavior are added, the main effects of controls on trust and on joint profit drop to a non-significant level, \((F(1,139) = 0.94, p > 0.10)\) and \((F(1,139) = 0.26, p > 0.10)\) respectively. Also the interaction effect of controls and information on trust drops to a non-significant level (from \((F(1,141) = 2.78, p < 0.10)\) to \((F(1,139) = 1.40, p > 0.10)\)). Only the main effects of information on trust and joint profits remain significant, although the significance level drops substantially in both cases. These results clearly indicate that it is not so much the direct effects of the control system, nor of the more refined information that induce higher trust and higher joint profits, but that their indirect effect on the negotiation process, characterized by problem solving and distributive behavior, explains the negotiation outcomes.

### 4.2 Later stage of the relation

After analyzing the trust building process in game 1 and 2, we concentrate, in a second stage, on the effect of trust and information on negotiation behavior and joint profits after controls had been removed. Based on Tomkins (2001), we expect that in later stages of the relationship, it is likely that less information will be needed to sustain a relationship as trust intensity becomes established at higher levels. After controls are removed, we expect therefore that information and trust have a positive impact on a dyad’s joint profit (H4 and H5) and that trust and refined information form substitutes in their relation to a dyad’s joint profit (H6). To test these hypotheses we ran a set of regressions (cf. Table 2.2).

First, we regressed joint profits on information, trust and their interaction term as independent variables. Contrary to our predictions, we find no significant effects (coefficient for trust = 0.07, \(p > 0.10\) and coefficient for information = 0.20, \(p > 0.10\)), nor an interaction effect of trust and information on joint profits (coefficient = 0.05, \(p > 0.10\)). These results indicate that in the third game (when formal controls have been removed and a certain level of trust has been built up) the joint profit of the dyad is not significantly higher for dyads in which the buyer possesses refined TCO information than when the buyer has traditional information. Nor does the possession of this information interact with trust to explain joint profits.

---

18 It has been suggested that the passing of time may reflect learning in the task as well as “trust”. However, some further analyses on the data rule out major learning effects. First, the number of pairs reaching the Pareto optimal solution in the three different negotiation games is respectively 20, 10 and 33 (out of 147 dyads). Thus even in the third game the number of dyads reaching the Pareto optimal solution is rather low (around 22%). Second, if important learning effects would exist, the dispersion between the mean joint profit and the Pareto optimal solution would diminish over time. However, this dispersion remains stable over the three games (respectively 10%, 9%, and 11%).

19 As trust is not a categorical variable regression analyses are used in the second part instead of ANOVA’s.
Table 2.2: Descriptive statistics (mean and standard deviation) and regression result for the third game

<table>
<thead>
<tr>
<th>Variable</th>
<th>No tco (n=74)</th>
<th>Tco (n=73)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint profit_3 (a)</td>
<td>4.40 (1.05)</td>
<td>4.81 (0.50)</td>
</tr>
<tr>
<td>Problem solving_3 (b)</td>
<td>0.27 (0.41)</td>
<td>0.41 (0.42)</td>
</tr>
<tr>
<td>Distributive behavior_3 (c)</td>
<td>0.11 (0.15)</td>
<td>0.08 (0.17)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Low trust (trust &lt;3.76)</th>
<th>High trust (trust &gt;3.76)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint profit_3</td>
<td>4.49 (0.92)</td>
<td>4.72 (0.76)</td>
</tr>
<tr>
<td>Problem solving_3</td>
<td>0.21 (0.36)</td>
<td>0.47 (0.43)</td>
</tr>
<tr>
<td>Distributive behavior_3</td>
<td>0.12 (0.18)</td>
<td>0.07 (0.14)</td>
</tr>
</tbody>
</table>

Regression (relation information and trust)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Constant</th>
<th>Information</th>
<th>Trust</th>
<th>Information * trust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint profit_3</td>
<td>4.15 ***</td>
<td>(0.51)</td>
<td>0.07</td>
<td>(0.26)</td>
</tr>
<tr>
<td>Problem solving_3</td>
<td>-0.08 **</td>
<td>-0.06 (0.71)</td>
<td>0.10</td>
<td>(0.00)**</td>
</tr>
<tr>
<td>Distributive behavior_3</td>
<td>0.20 ***</td>
<td>(0.64)</td>
<td>-0.03</td>
<td>(0.05)**</td>
</tr>
</tbody>
</table>

Regression (relation problem solving and trust)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Constant</th>
<th>Problem solving_3</th>
<th>Trust</th>
<th>Problem solving_3 * trust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint profit_3 (full sample)</td>
<td>3.99 ***</td>
<td>1.32</td>
<td>0.11</td>
<td>-0.17</td>
</tr>
<tr>
<td>Joint profit_3 (sample with TCO)</td>
<td>4.15 ***</td>
<td>1.45</td>
<td>0.13</td>
<td>-0.26</td>
</tr>
<tr>
<td>Joint profit_3 (sample with traditional cost information)</td>
<td>4.10 ***</td>
<td>0.95</td>
<td>0.02</td>
<td>-0.02</td>
</tr>
</tbody>
</table>

Regression (relation controls and trust)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Constant</th>
<th>Control system</th>
<th>Trust</th>
<th>Control system*trust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint profit_3</td>
<td>4.02 ***</td>
<td>0.07</td>
<td>0.18</td>
<td>-0.05</td>
</tr>
</tbody>
</table>

Regression coefficients are reported. ***, **, * indicates a p-value of ≤ 0.01, 0.05, 0.10 in a two-tailed test.

(a) Joint profit of dyad is the average of the buyer’s profit and the seller’s profit.
(b) Problem solving is coded 1 if participant shares private cost information, zero otherwise.
(c) Based on 5 distributive behaviors (lies, threats, positional commitment, punishments, and warnings).

Results become more interesting, however, if we consider the negotiation process. We performed similar regressions on problem solving and distributive behavior: we find that information has no longer a significant impact on negotiation behavior in game 3, while trust is highly significant in explaining both problem solving behavior as well as distributive behavior. It is therefore interesting to look at the combined effect of trust, information and behavior. While trust and information have no main effects, nor an interaction effect on joint profit, we notice that the problem solving behavior of the participants has a highly significant and positive effect on joint profits in the third game (coefficient = 0.63, p < 0.00). Recall that trust has a positive and highly significant effect on problem solving behavior (coefficient = 0.10, p < 0.00). These results indicate that, although trust has no significant direct effect on joint profits (coefficient 0.07, p = 0.28); trust has indirect effect on joint profits through its significant impact on problem solving behavior.
In order to more fully understand the role of problem solving behavior, we performed some detailed analyses on the relation between information, the exchange of this information (i.e. the problem solving behavior) and trust. We regressed therefore the exchange of information in the third game, represented by the problem solving behavior variable, the trust variable and their interaction on joint profits. We ran this regression three times: once for the full sample, once for the dyads in which the buyer possess TCO information and once for the dyads in which the buyer possess traditional information. For the full sample, we see that, problem solving behavior becomes highly significant in explaining joint profits (coefficient = 1.32, p < 0.05). However, in contradiction to what we expected, we find, for the full sample, no interaction effect of problem solving behavior and trust on joint profits. Running the same regression for two sub samples separately, namely for the dyads with TCO information and the dyads with traditional information, yields however different and interesting results. For the sub sample with traditional information, we find no main effects, nor an interaction effect on joint profits. For the sub sample with TCO information, however, we see in Table 2.2 that problem solving behavior (coefficient = 1.45, p < 0.01) and trust (coefficient = 0.13, p = 0.11), although the latter to a somewhat lesser extent, are important factors in explaining joint profits in the third game. Both variables have a positive effect on joint profits. However, we also notice a significant negative interaction effect of problem solving and trust (coefficient = -0.26, p < 0.05). This result provides support for our prediction on the substitution effects of trust and information in later stages of the relation.\textsuperscript{20} We conclude that H6, namely that trust and the exchange of refined information form substitutes in their relation to joint profit for dyads for which a certain level of trust has been built up, holds as long as the buyer possesses refined TCO information. However, no substitutive effects are found when the buyer possess traditional information.

Finally, we also analyze the relation between controls and trust at a later stage of the relation. We ran a regression to check whether control systems remain to have an impact on the negotiation outcomes after they have been removed and a certain level of trust has been built. Although we find no significant effect of controls on joint profit (p > 0.10), we do find a significant effect of trust on joint profits (coefficient = 0.18, p > 0.10). This result indicates that trust may replace the need for controls at a later stage of the relation. However, if we control for information (not reported), we find that nor the control system nor trust, but the available information explains the joint profits in the third game.

\textsuperscript{20} Finally, some sensitivity analyses were performed to test the robustness of the results against different ways of measuring negotiation behavior. After game 3, participants rated their own and their counter-partner’s bargaining strategies with respect to information exchange. Information exchange was measured as the average of the participant’s assessment of their own and their partner’s bargaining strategy. Similar results are obtained and conclusions remain the same in case the exchange of information is assessed by the participants themselves.
5. Conclusion and further research

This study explores the way in which trust is built at the level of the relationship and the role that controls and information play in this process. Prior studies on this topic focused on trust and control and their effect on negotiation outcomes, without paying attention to the negotiation process leading to these outcomes. By setting up an experiment in which we use a set of negotiation games with potential for integrative solutions, we provide more insight into the role of information in strengthening the links between control, trust, and cooperation in the negotiation process.

Based on Tomkins (2001) and Dekker (2004) we expected nonlinear relations between trust and controls and between trust and information. More specific, based on Dekker (2004), we hypothesized that, in an early stage of the relation, where trust still needs to be built, a positive relation between formal controls and trust. However, in a later stage in the relation trust may replace these formal controls. Based on Tomkins (2001), we reasoned that as the relationship matures from the initial state of low level of trust, there will be a positive association between trust and information, but as trust intensity becomes established at higher levels in later stages of the relationship, it is likely that less information will be needed to sustain that relationship.

We provide evidence that controls and refined TCO information have a positive impact on a dyad’s trust and on a dyad’s joint profit in an early stage of a relationship. These results are explained through the mediating effect of controls and TCO information on a dyad’s bargaining behavior. Furthermore, we also find that, as expected, both controls and TCO information can help building trust in an initial stage of the relationship. This implies that, in an early stage of the relationship, controls and TCO information form, to a certain extent, substitutes in the trust building process.

In a second stage, we tested the relation between trust and information on the negotiation process and outcomes after controls have been removed. We expected that trust would, through its mediating effect on a dyad’s bargaining behavior, have a positive impact on a dyad’s joint profit and that trust and information would form substitutes in their relation to a dyad’s joint profit. Partial support was found for these expectations: the relation holds when the buyer possesses more refined TCO information.

This study thus provides empirical support for what earlier studies (Ness & Haugland, 2005; Seal et al., 1999; Vosselman & Van der Meer-Kooistra, 2004) have suggested on how management accounting may contribute to the development of dyadic business relationships. Accounting information proves to be able to serve an important function in relational signaling and thus in building trust. Information sharing made it possible to understand the partner’s interests and to identify the integrative potential in different situations. Trust and relational norms were reinforced over time, and became conditions that fostered a more cooperative climate and restrained the use of distributive behavior.
This study shows that the specification and sharing of cost data play a central role in inter-organizational negotiations. We conclude that the negotiation process, characterized by information exchange and distributive behavior, plays a crucial role in explaining negotiation outcomes and we argue that prior studies on this topic have failed to fully explore the negotiation and the trust building process. The results of this study indicate that future research should pay more attention to behavior of people involved to explain outcomes in accounting setting.

Finally, we also studied the effects of formal control strength. Although not the core objective of this study, we were interested to see whether a weaker control system would provide similar results as a strong control system or on the other hand, whether this weak control system may fail to provide strong enough incentives for cooperation. Our results indicate that the weak (and in theory, less expensive) control system is equally effective as the strong (and more expensive) control system in reducing distributive tactics and in building trust. However, our manipulations of weak and strong controls were exemplars in some sense. Other contract types provide open ground for future research. Further research can give for instance more insights into the boundary conditions within which a control system will or will not positively affect cooperation and trust. The logical next step is to identify the boundary conditions within which a control system will positively affect cooperation and trust.

With this study we provide some important contributions to the discussion on the relations between trust, information and controls. Of course, many other possible extensions are conceivable which can make a contribution to the understanding of when, why and how benefits of more accurate information are obtained in inter-firm negotiation settings.

While the experimental context induced by a simple negotiation game (Kelley, 1966) allows maintaining control over exogenous variables, the scope for generalizing the conclusions is somewhat limited. Other factors, such as the incentive system, future negotiations probabilities, etc. have been shown to impact negotiated outcomes but were not manipulated here. Further research is necessary to determine the sensitivity of the results to several experimental parameters included in the current study.

Further research may manipulate different types of control mechanisms. In this study, the control system was introduced to manipulate the fair exchange of sensitive information. Control mechanisms implemented to counter some other important risks in inter-firm relationships, such as the fair division of cost and benefits, and the appropriation of investments to be made in specific assets, can be a fruitful direction for further study.

Apart from studying these formal accounting controls, it may also be interesting to study the informal information systems. It is important to examine these social motives and values because individuals make decisions in a broad social context that serves to frame behavior and outcomes. It is for in stance interesting
to understand whether (and how) the relative distribution of rewards, in addition to the absolute distribution of rewards, affects the control and management accounting systems to motivate individuals to reveal private information or exert high levels of effort.

We expected and found evidence that trust and information may substitute each other in later stages of the relationship. Over time one could also expect the developing level of trust to influence the use of controls. Malhotra & Murnighan (2002) investigated in two experiments the effects of the use and removal of binding and non-binding contracts. When binding contracts were removed, trust dropped significantly. In contrast, non-binding contracts led to considerable cooperation, and their removal reduced trust less than removing binding contracts. However, as in our study, it was never the decision maker that decided to remove the control system, but it was the counterpart (which was in fact the computer) that made this decision. Furthermore, it was clearly in the economic best interest of the decision maker to accept all contracts. It would be interesting to design an experiment in which decision makers could decide themselves to remove controls (or reduce the level of control), especially if it may not be in the best interest of the decision makers to keep the control system (e.g. when the control system is not costless). Interesting is then to examine what factors may lead to a (faster) relaxation of control systems or whether keeping control systems would harm the relation.

Furthermore, our manipulation of TCO information obviously remained a simplification of reality. In our study, we provided perfect TCO information. In a real business environment, TCO information is not perfect, but characterized by mistakes and simplifications. Further research can examine the effects of imperfect or uncertainty in the TCO information on the negotiation process. Future research may also consider aspects such as how buyers gather TCO data (e.g. from the seller, benchmarking, past experience), the type of TCO systems (formal vs. informal, standardized vs. unique models) installed and how these design aspects impact buyer-supplier relations and negotiations.

We focused on buyer-supplier relations and TCO data to test the expectations on the non-linear relation between trust and information in a concrete context. Although it is clear that different inter-firm relations have different information needs, Tomkins (2001) predicts that all of them exhibit a staged development of the balance between trust and information as the relationship develops. Tomkins (2001) makes a conceptual distinction between different types of information for inter-firm relations. It would be interesting to extend the scope of this research from TCO data to other types of information for inter-firm relations (e.g. Type 1 and Type 2 information as distinguished by Tomkins (2001)) and to investigate whether the relation between these types of information and trust are also non-linear.

Because of the way we measured trust, the validity of our results may be restricted to situations of goodwill trust. The operationalization of trust in this study was not concerned with a partner's ability to perform according to agreements (competence trust), but with his intentions to do so (goodwill trust) (cf. Sako, 1992).
It would be interesting to see whether the results also stand in situations of competence trust. Similarly, the operationalization of the control system focuses on behavioral control as the control system is indented to reduce opportunistic behavior (i.e. sharing false information in order to mislead the partner) and not on outcome control. It would be interesting to study in future research whether outcome controls (e.g. a maximum level of allowable joint costs and thus a required minimum level of joint profits) would yield similar results.

Not only the type of information, the type of trust and the type of control system, but also the type of the relation may have significant implications on the results. Further research should therefore investigate whether the results found in this study also hold beyond buyer-supplier relationships. Other types of inter-firm relationships could be joint ventures, joint R&D, joint production, and so on. For instance, Das & Teng (2001a) suggest that goodwill trust has a more significant role in joint ventures than in non-equity alliances and thus that individual and team-level trust building may be more promising in joint ventures. This contingent approach is important because a mismatch could be costly to an alliance (Das & Teng, 2001a).

Lastly, insights from this study need to be examined by using alternative methods involving different settings, subjects and operationalizations to further investigate the proposed hypotheses and the obtained results.
## APPENDICES

### Appendix A.

**Experimental cells.**

<table>
<thead>
<tr>
<th>Control system</th>
<th>Cost information</th>
</tr>
</thead>
<tbody>
<tr>
<td>No controls in game 1 &amp; 2; no controls in game 3</td>
<td>Cell 1 (n= 24 dyads)</td>
</tr>
<tr>
<td>(NC, NC, NC)</td>
<td>Cell 2 (n= 26 dyads)</td>
</tr>
<tr>
<td>Weak controls in game 1 &amp; 2; no controls in game 3</td>
<td>Cell 3 (n= 24 dyads)</td>
</tr>
<tr>
<td>(WC, WC, NC)</td>
<td></td>
</tr>
<tr>
<td>Strong controls in game 1 &amp; 2; no controls in game 3</td>
<td></td>
</tr>
<tr>
<td>(SC, SC, NC)</td>
<td></td>
</tr>
</tbody>
</table>
### Appendix B. Payoff tables of the three negotiation games.

#### GAME 1: buying machines

**Payoff table of the seller (all cells)**

<table>
<thead>
<tr>
<th>Price (€)</th>
<th>Contract</th>
<th>Income (€)</th>
<th>Maintenance Cost (€)</th>
<th>Spare parts Cost (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2000 A</td>
<td>1350 R</td>
<td>2250</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3000 B</td>
<td>750 T</td>
<td>1250</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4000 C</td>
<td>450 U</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5000 D</td>
<td>750 V</td>
<td>2000</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>6000 E</td>
<td>150 V</td>
<td>2000</td>
<td></td>
</tr>
</tbody>
</table>

**Payoff table buyer with TCO (cell 1, 2 and 3)**

<table>
<thead>
<tr>
<th>Income = 8000</th>
<th>Price (€)</th>
<th>Contract</th>
<th>Maintenance Cost (€)</th>
<th>Spare parts Cost (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2000 A</td>
<td>1350 R</td>
<td>2250</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3000 B</td>
<td>750 T</td>
<td>1250</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4000 C</td>
<td>450 U</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5000 D</td>
<td>750 V</td>
<td>2000</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>6000 E</td>
<td>150 V</td>
<td>2000</td>
<td></td>
</tr>
</tbody>
</table>

**Payoff table buyer with traditional information (cell 4, 5 & 6)**

<table>
<thead>
<tr>
<th>Income = 8000</th>
<th>Price (€)</th>
<th>Contract</th>
<th>Maintenance # maintenance sessions</th>
<th>Spare parts # spare parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2000 A</td>
<td>1 R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3000 B</td>
<td>3 S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4000 C</td>
<td>5 T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5000 D</td>
<td>7 U</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>6000 E</td>
<td>9 V</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### GAME 2: buying spare parts

**Payoff table seller (all cells)**

<table>
<thead>
<tr>
<th>Price (€)</th>
<th>Contract</th>
<th>Income (€)</th>
<th>Delivery time Cost (€)</th>
<th>Payment terms Cost (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2300 A</td>
<td>1900 R</td>
<td>1250</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2650 B</td>
<td>1600 S</td>
<td>1050</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3350 D</td>
<td>1000 U</td>
<td>650</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>3700 E</td>
<td>700 V</td>
<td>450</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>4050 F</td>
<td>400 W</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>4400 G</td>
<td>100 X</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

**Payoff table buyer with TCO (cell 1, 2 and 3)**

<table>
<thead>
<tr>
<th>Income = 6700</th>
<th>Price (€)</th>
<th>Contract</th>
<th>Maintenance Cost (€)</th>
<th>Spare parts Cost (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2300 A</td>
<td>1 A</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2650 B</td>
<td>5 B</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3350 D</td>
<td>9 C</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>3700 E</td>
<td>17 E</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>4050 F</td>
<td>21 F</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>4400 G</td>
<td>25 G</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Payoff table buyer with traditional information (cell 4, 5 & 6)**

<table>
<thead>
<tr>
<th>Income = 6700</th>
<th>Price (€)</th>
<th>Contract</th>
<th>Maintenance # maintenance sessions</th>
<th>Spare parts # spare parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2300 A</td>
<td>1 R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2650 B</td>
<td>5 S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3350 D</td>
<td>9 T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>3700 E</td>
<td>17 U</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>4050 F</td>
<td>21 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>4400 G</td>
<td>25 X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### GAME 3: buying new machines

**Payoff table of the seller (all cells)**

<table>
<thead>
<tr>
<th>Price (€)</th>
<th>Contract</th>
<th>Income (€)</th>
<th>Maintenance Cost (€)</th>
<th>Spare parts Cost (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2100 A</td>
<td>2100 R</td>
<td>550</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2675 B</td>
<td>1600 S</td>
<td>425</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3250 C</td>
<td>1100 T</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>3825 D</td>
<td>600 U</td>
<td>175</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>4400 E</td>
<td>100 V</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

**Payoff table buyer with TCO (cell 1, 2 and 3)**

<table>
<thead>
<tr>
<th>Income = 6500</th>
<th>Price (€)</th>
<th>Contract</th>
<th>Maintenance Cost (€)</th>
<th>Spare parts Cost (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2100 A</td>
<td>50 R</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2675 B</td>
<td>175 S</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3250 C</td>
<td>300 T</td>
<td>1100</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>3825 D</td>
<td>425 U</td>
<td>1600</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>4400 E</td>
<td>550 V</td>
<td>2100</td>
<td></td>
</tr>
</tbody>
</table>

**Payoff table buyer with traditional information (cell 4, 5 & 6)**

<table>
<thead>
<tr>
<th>Income = 6500</th>
<th>Price (€)</th>
<th>Contract</th>
<th>Maintenance # maintenance sessions</th>
<th>Spare parts # spare parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2100 A</td>
<td>2 R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2675 B</td>
<td>7 S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3250 C</td>
<td>12 T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>3825 D</td>
<td>17 U</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>4400 E</td>
<td>22 V</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix C.
Behavioral coding categories.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coding categories</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem solving</td>
<td>Information exchange</td>
<td>- Price is for me the most expensive issue, then spare part. Maintenance is less important to me.</td>
</tr>
<tr>
<td>Distributive behavior</td>
<td>Lies</td>
<td>- I have an outside option off 1500 Euro.</td>
</tr>
<tr>
<td>General threats</td>
<td></td>
<td>- Make a concession or you will be in trouble.</td>
</tr>
<tr>
<td>Punishment</td>
<td></td>
<td>- Respond with a concession or I will call another supplier.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- This negotiation is going nowhere.</td>
</tr>
<tr>
<td>Warnings</td>
<td></td>
<td>- My company has a policy against uncooperative supplier.</td>
</tr>
<tr>
<td>Positional commitment</td>
<td></td>
<td>- I refuse to concede any further.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I refuse to drop below my present level.</td>
</tr>
</tbody>
</table>

Appendix D.
Descriptive statistics

<table>
<thead>
<tr>
<th>Game</th>
<th>Variable</th>
<th>Theoretical range</th>
<th>Actual Range</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Game 1</td>
<td>Problem solving (a)</td>
<td>0 – 1</td>
<td>0 – 1</td>
<td>0.46</td>
<td>0.45</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>Distributive behavior (b)</td>
<td>0 – 1</td>
<td>0 – 1</td>
<td>0.13</td>
<td>0.18</td>
<td>0.76</td>
</tr>
<tr>
<td></td>
<td>Joint gain (c)</td>
<td>0 – 4.80</td>
<td>3.20 – 4.80</td>
<td>4.31</td>
<td>0.31</td>
<td>n/a</td>
</tr>
<tr>
<td>Game 2</td>
<td>Problem solving (a)</td>
<td>0 – 1</td>
<td>0 – 1</td>
<td>0.46</td>
<td>0.45</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>Distributive behavior (b)</td>
<td>0 – 1</td>
<td>0 – 1</td>
<td>0.12</td>
<td>0.20</td>
<td>0.84</td>
</tr>
<tr>
<td></td>
<td>Joint Gain (c)</td>
<td>0 – 4.00</td>
<td>0.00 – 4.00</td>
<td>3.62</td>
<td>0.49</td>
<td>n/a</td>
</tr>
<tr>
<td>After game 2, before game 3</td>
<td>Trust (d)</td>
<td>1 – 7</td>
<td>1.00 – 6.50</td>
<td>3.76</td>
<td>1.16</td>
<td>n/a</td>
</tr>
<tr>
<td>Game 3</td>
<td>Problem solving (a)</td>
<td>0 – 1</td>
<td>0 – 1</td>
<td>0.34</td>
<td>0.42</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>Distributive behavior (b)</td>
<td>0 – 1</td>
<td>0 – 0.70</td>
<td>0.10</td>
<td>0.16</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>Joint Gain (c)</td>
<td>0 – 5.20</td>
<td>0 – 5.20</td>
<td>4.60</td>
<td>0.85</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Descriptive statistics for variables (across different experimental cells)
(a) Problem solving is coded 1 if participant shares private cost information, zero otherwise.
(b) Based on 5 distributive behaviors (lies, threats, positional commitment, punishments, warnings). Each of these distributive behavior tactics was coded 1 if present and 0 otherwise. Distributive behavior is the average of these five variables.
(c) Joint gain of dyad is the total of the buyer’s profit and the seller’s profit of the final agreement.
(d) Participants’ assessment of their partners’ trustworthiness on a 7-point Likert scale. Specifically, participants answered “How likely is it that your partner will cooperate?” after being told that no control system would be in place in the future. The average per dyad is taken.
## Appendix E.
### Correlation matrix

<table>
<thead>
<tr>
<th></th>
<th>Tco</th>
<th>Cs</th>
<th>Problem solving1</th>
<th>Problem solving2</th>
<th>Problem solving3</th>
<th>Distributive1</th>
<th>Distributive2</th>
<th>Distributive3</th>
<th>Joint profit1</th>
<th>Joint profit2</th>
<th>Joint profit3</th>
<th>Trust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control system</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem solving1</td>
<td>0.21</td>
<td>0.20</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem solving2</td>
<td>0.21</td>
<td>0.10</td>
<td>0.37</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem solving3</td>
<td>0.17</td>
<td>0.18</td>
<td>0.36</td>
<td>0.54</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distributive1</td>
<td>-0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.04</td>
<td>0.06</td>
<td>0.02</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distributive2</td>
<td>0.01</td>
<td>-0.29</td>
<td>-0.08</td>
<td>-0.06</td>
<td>-0.10</td>
<td>0.41</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distributive3</td>
<td>-0.07</td>
<td>-0.20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joint profit1</td>
<td>0.30</td>
<td>0.12</td>
<td>0.36</td>
<td>0.15</td>
<td>0.17</td>
<td>0.03</td>
<td>0.00</td>
<td>-0.07</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joint profit2</td>
<td>0.12</td>
<td>0.14</td>
<td>0.22</td>
<td>0.23</td>
<td>0.15</td>
<td>-0.06</td>
<td>-0.32</td>
<td>-0.02</td>
<td>0.13</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joint profit3</td>
<td>0.25</td>
<td>-0.05</td>
<td>0.14</td>
<td>0.33</td>
<td>0.35</td>
<td>0.05</td>
<td>-0.07</td>
<td>-0.01</td>
<td>0.10</td>
<td>0.16</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Trust</td>
<td>0.19</td>
<td>0.24</td>
<td>0.23</td>
<td>0.31</td>
<td>0.33</td>
<td>-0.24</td>
<td>-0.24</td>
<td>-0.21</td>
<td>0.16</td>
<td>0.23</td>
<td>0.16</td>
<td>1</td>
</tr>
</tbody>
</table>

**Correlation coefficients (n=147)**

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).
Manuscript 3: Information as an inter-firm governance mechanism, and its relation to formal controls, trust and perceived risk

Abstract

This paper identifies information as an inter-firm governance mechanism and examines how the use of different inter-firm governance mechanisms (information, formal control and trust) affect perceived risk. We test our hypotheses with a cross-sectional sample of 287 transactions between buyers and their suppliers of IT products and services. A key finding of this study is that, besides formal control and trust, information constitutes an important inter-firm governance mechanism. The findings also highlight the importance of studying the multidimensional nature of trust, control and information to reveal what type of governance mechanisms are used to counter different types of perceived risks. Finally, the results also emphasize the importance of taking into account the life cycle of the inter-firm relationship: we distinguish relations with prior ties from those without prior ties and we find that controls and information are more effective in reducing perceived risk at early stages of the relation, while trust becomes more important at later stages of the relationship.
1. Introduction

Inter-firm relations are increasingly popular ways to leverage core competencies, to penetrate new markets, to protect old ones and/or to learn or acquire new strategic capabilities (Judge & Dooley, 2006). Inter-firm cooperative arrangements provide a way for organizations to pool their resources to create value that each partner could not achieve if they acted alone (Inkpen & Ross, 2001). These inter-firm cooperative relations are even said to be a source of competitive advantage (Ireland et al., 2002). However, there is also a growing body of evidence of a high failure rate in such arrangements (Gerwin, 2004). One important cause is that inter-firm relationships are characterized by a number of specific risks such as the exchange of sensitive information, the fair division of cost and benefits and the appropriation of investments to be made in specific assets (Dekker, 2003a). Firms install governance mechanisms in order to reduce these risks.

The mainstream control literature suggests that there are only two basic approaches to control: formal control and social control (Eisenhardt, 1985; Ouchi, 1979). Prior studies on inter-firm control systems (e.g. Das & Teng, 2001a; van der Meer-Kooistra & Vosselman, 2000) also mainly focus on trust and formal controls as inter-firm control mechanisms. However, this framework is incomplete. If output and behavior can not be accurately measured (requirements for formal controls) and social controls or trust has not yet developed, firm need another type of control mechanism to govern the inter-firm relation. In this case, firms may want to search more proactively for information about their partner.

In this paper we extend prior models on inter-firm control systems by explicitly incorporating proactive information collection as an important governance mechanism for inter-firm relationships. By reviewing the existing literature on inter-firm control systems, information emerges as an important tool for governing relations with partners, especially in situations where formal controls are difficult to install (e.g. because of high uncertainty and/or strong dependencies) and where trust has not (yet) developed (e.g. in an early stage of the relation).

After we have identified information as an inter-firm governance mechanism, we discuss how trust, formal controls and information reduce perceived risk. Our study places the decision maker at the central core and reveals what type of governance mechanisms are used to counter different types of perceived risks. Risk perceptions of the decision makers serve as the heuristic that helps form their governance mechanisms (Das & Teng, 2001b).

Importantly, our study treats trust, control, information and risk as complex, multidimensional constructs. Previous studies on the relation between trust and controls typically treated the different governance mechanisms as uni-dimensional constructs. This has produced ambiguous conclusions about the relationship between these governance mechanisms.
Based on Tomkins (2001) and Dekker (2004) we hypothesize some non-linear relations between information, controls and trust. We make a distinction between buyer-supplier relations with and without prior ties and expect that perceived risk is reduced more effectively by formal controls and information at early stages of the relation (no prior ties) and by trust at later stages of the relation (relations with prior ties).

Finally, we empirically test the simultaneous effects of multiple governance mechanisms on perceived risk. This is important as firms often implement multiple controls systems simultaneously (for an overview of current control practices in inter-firm relations see Anderson et al., 2006).

We test our propositions using a sample of 287 buyer-supplier inter-firm transactions on IT purchases. We find that the combined impact of trust, control and information leads to reduced perceived risk in inter-firm relations. A key finding of this study is that information constitutes an important inter-firm governance mechanism. While formal controls and trust appear to be more effective in reducing perceived risk at respectively early stages and later stages of the relation, information constitutes an inter-firm governance mechanism that reduces perceived risk in early stages of the relation as well as at later stages of the relation.

The paper is organized as follows. Section two brings together the literature to identify proactive information collection as an inter-firm governance mechanism and reviews the literature on risk and governance mechanisms in inter-firm settings to develop the hypotheses. Section three describes the data collection and the variable measures. Section four reports the results of estimating different inter-firm governance mechanisms on two types of perceived risk. Finally, section five concludes with a summary of the key results, a discussion of the limitations of the study and directions for further research.

2. Literature review

2.1 Proactive information collection as an inter-firm governance mechanism

The mainstream control literature suggests that there are only two basic approaches to control: formal control and social control (Eisenhardt, 1985; Ouchi, 1979). The first approach emphasizes the establishment and utilization of formal rules, procedures, and policies to monitor and reward desirable performance. Formal controls either measure the behaviors (behavioral control) or the outcomes of these behaviors (output control). The characteristics of formal controls are that they are designed to measure performance, that desired output and/or behavior are specified from the beginning and that this requires that either the output is measurable or the transformation process (i.e. the desired behavior) is known (Das & Teng, 2001a). The second approach relies on the establishment of norms, values, culture, and the internalization of goals to encourage desirable behavior and outcome (Eisenhardt, 1985). Trust can be regarded as an important component of social control (Adler, 2001; Ring & Van de Ven, 1992; Dekker, 2004). Social control or trust
can not be designed explicitly; it may develop from norms, beliefs, values, etc. and can be shaped by frequent interactions, meetings and negotiation (Das & Teng, 2001a).

Eisenhardt (1985) has suggested, based on Thompson (1967) and Ouchi (1979), that the choice of an appropriate control mode depends on two task characteristics: task programmability (or knowledge of the transformation process) and output measurability. Task programmability refers to the degree to which managers understand the transformation process in which appropriate behaviors are to take place. Output measurability refers to the ability to measure outputs in a precise and objective manner. Output control is appropriate with high output measurability and low task programmability. Behavior control works best in the opposite situation: high task programmability and low output measurability. If both behaviors and outcomes can be measured, than either behavioral or output control can be used. Finally, when the task is neither programmed nor has a measurable outcome, then the alternative control strategy of minimizing divergence of preferences (i.e. social control) becomes appropriate (Eisenhardt, 1985).

This well-established model for studying the design of management control systems typically focus on control systems within an organization. Only a few comprehensive frameworks consider the design of control systems in inter-firm relationships. These frameworks also focus on formal control systems and trust. For example, Das & Teng (2001a) modeled the relationships between control systems, trust and risk in various types of inter-firm relationships and van der Meer-Kooistra & Vosselman (2000) developed a comprehensive model of management control, which was based on principles of Transaction Cost Economics, but which integrated the role of trust.

Van der Meer-Kooistra & Vosselman (2000) argue that the presence of trust for governing the relationship between cooperating parties is especially important in situations characterized by uncertainty and strong dependencies between the parties owing to specific investments, because in such situations it is difficult to install appropriate formal controls or contracts. In this type of situations formal contracts will in the course of time require changes and revisions. In the case of trust between the parties they will assume at the drafting stage of the contract that such revisions will be made to the satisfaction of all parties and thus is it easier for these parties to reach agreements (van der Meer-Kooistra & Vosselman, 2000).

This line of reasoning assumes that trust can be used as an alternative for formal controls. It also assumes that the level of trust is somehow given quite independent of any other activity. It ignores the dynamic process of building trust and the role that information has in that (Tomkins, 2001). Close relationships are usually not created overnight and they take time to build: trust derives from learned, usually interactive, experiences and that process itself depends upon information (Tomkins, 2001).

These frameworks on inter-firm control, with their focus on formal control systems and trust, are thus incomplete. If transaction and situation characteristics prevent partners to install appropriate formal controls
and the relation has not (yet) built high enough levels of trust, cooperating firms will need another
governance mechanism to achieve sufficient confidence that cooperation will be successful. In this case,
firms may want to search more proactively for information\textsuperscript{21} about their partner. Although the need for other
types of governance mechanisms than formal control and trust become clear when the latter has not (yet)
developed and when output and behavior can not be accurately measured, proactively searching for
information can also be effective when formal controls and/or trust are present.

Although Das & Teng (2001a) do not explicitly consider information as an inter-firm governance tool, as
many other authors, they emphasize the importance of being open and free about sharing information in the
process of building trust. Anderson & Sedatole (2003) also emphasize the key role of exchange of
information in the control of inter-firm relations. Reputation and social knowledge about a partner firm are
important factors in alliances. To this end, partner firms need to proactively collect information about
various aspects of partner firms (Das & Teng, 2001a). There are two basic ways to collect such information
(Das & Teng, 2001a): (i) direct and open communication with the partner and (ii) through networking
activities with other firms. Networking provides a unique way to gain inside information about a firm’s
competence and alliance history -- which is often not publicly available.

In a case study on IT outsourcing, Langfield-Smith & Smith (2003) explicitly discuss information sharing as
a control mechanism. Because of difficulties in task programmability and output measurability, formal
controls were difficult to install, particularly in the early stages of the relationship between the case company
and its IT supplier. Essential to achieving control in the relationship was the development of trust. This trust
took time to emerge. Their case study revealed that a major trust-building mechanism is proactive
information collection. The case company was careful to ensure that the outsourcing company that they
engaged had a strong reputation in the IT industry and strong technical competence. Evidence from the case
points to the importance of establishing communication with the outsourcer in the early days of the
relationship, when contracts were incomplete, to set the ground rules and expectations of each party
(Langfield-Smith & Smith, 2003). Joint dispute resolution allows partners to a relationship to develop a
strong understanding of perspectives and approaches, and is of particular importance in situations where
formal controls are difficult to install (Langfield-Smith & Smith, 2003; Ring & Van de Ven, 1994).

Other studies also offer suggestions on how (accounting) information may contribute to the development of
dyadic business relationships. Seal et al. (1999) show that the specification and sharing of cost information
can play a central role in inter-firm negotiations as both sides learn about and respect each other’s financial
and commercial constraints and objectives. Therefore they submit that information may play a constitutional

\textsuperscript{21} Information is also an important element of formal control systems, however not all information is per definition equal to formal control. Consider, for instance, on the one hand a contractual agreement with a supplier on the minimum required quality level and on the other hand a buyer that proactively gathers information about the quality reputation of a certain supplier. In both cases information plays a crucial role. However, while the first situation represents a type of formal control, the second situation can not be regarded as formal control: the objective is not to measure performance, no requirements are specified and the output/behavior is not measured. Still, the buyer gathers this information to reduce (perceived) risk and to govern his relation with the supplier. In the latter case, information should thus also be considered as a type of governance mechanism – but distinct from formal controls.
role in the establishment and management of trusting and collaborative relationships (Seal et al., 1999). A case study on the cooperation between the Norwegian Road Authorities (NRA) and a private contractor revealed that explicit and implicit information sharing made it possible to understand the partner’s concerns and interests and to learn the integrative potential in different situations (Ness & Haugland, 2005). Trust and relational norms were reinforced over time, and became important structural conditions that fostered a more cooperative climate (Ness & Haugland, 2005). Information proves to be able to serve an important function in relational signaling and thus in building trust (Vosselman & van der Meer-Kooistra, 2004).

In conclusion, although many studies have implicitly referred to the importance of information for governing inter-firm relations, proactive information collection has seldom been explicitly studied for that purpose. Prior studies on inter-firm governance mechanisms mainly focused on the relation between trust and formal controls (e.g. Lui & Ngo, 2004; Luo, 2002; Madhok 1995; Nooteboom 1996; Poppo & Zenger, 2002; Woolthuis et al., 2005). The relation between information and formal inter-firm control systems and trust received however scant attention in the literature. This may be due to the fact that some authors have argued that trust and control reduce perceived risk and that there is no third determinant that is of comparable importance (Das & Teng, 2001a). Other authors even assume that contractual and procedural coordination, or formal controls and information, are closely linked to each other (e.g. Helper, 1991). Empirical evidence, however, suggests that this is not necessarily the case. Sobrero & Schrader (1998) refer to several examples of firms having established a high level of procedural coordination without intense contractual coordination, and other firms that have set up considerable contractual coordination without establishing significant procedural coordination. The study of Sobrero & Schrader (1998) shows that both dimensions fulfill different roles in the governance of inter-firm relations.

In the next sections, we argue that perceived risk is mainly reduced by three inter-firm governance tools: trust, formal controls and information. Although their influences are not independent, these inter-firm governance mechanisms have distinct characteristics.

Formal control is about influencing the behavior of the partner, so that undesirable outcomes are less likely. Formal control systems generally include (Christ et al., 2006): (i) scrutiny or direct monitoring and

---

22 Sobrero & Schrader (1998) identify two fundamental dimensions which characterize the structuring of inter-firm relations: (i) contractual coordination and (ii) procedural coordination. Contractual coordination encompasses contractually determined means to coordinate the behavior of the partner in the relationship. Procedural coordination, on the other hand, relates to the mutual exchange of information for the combination of parties towards the production of results. It describes the extent to which the parties coordinate their processes by exchanging information, thereby making them learn to adjust their activities to each other. These concepts are in line with what we have called formal controls and proactive information exchange.

23 We need to note the critical difference between risk and perceived risk. Risk (or objective risk) is based on the consequences or outcomes of alternatives and their probabilities. Risk can be objective because it is something inherent in given situations (Das & Teng, 2001a). On the other hand, perceived risk (or subjective risk) is decision makers’ estimate of objective risk. Interestingly, just the perception of opportunism can degrade inter-firm relationship performance – whether it is real or just perceived (Judge & Dooley, 2006). If members of one organization perceive the other organizational members as willing to take advantage of them, then the relationship starts to unravel, or monitoring mechanisms need to be put in place (Ring & Van de Ven, 1994). Decision makers, thus, may have different estimates about the level of risk in a given situation. While trust enables us to act as if the uncertainty that we face is reduced, it does not reduce that actual uncertainty (Tomkins, 2001). Similarly, formal control does not always reduce objective risk, as it may be only an ‘illusion of control’. Besides, firms may opt for control that is excessive (Garney & Wilkinson, 1994), precluding increased productivity that may accrue if a degree of autonomy is granted in alliances. Finally, increased information may reduce perceived risk without reducing objective risk because of problems with the technical quality and reliability with the information itself. Accordingly, risk, as used in this article, refers to subjective or perceived risk rather than objective risk.
observation of the operations and/or output, (ii) *intrusion* or interference with normal processes and activities, and (iii) a reduction in the controlled firm’s *autonomy* (i.e., a loss of decision rights). Formal control is thus a proactive and interventionist approach and leads to a low risk perception through affecting the behavior of the partner (Das & Teng, 2001a).

The role of information is essentially one of *uncertainty reduction*, which has been widely discussed and analyzed, especially in information economics (Tomkins, 2001). In this approach, the firm proactively collects information about various aspects of partner firms without necessarily doing anything about the partner. So the main thrust of gathering information is to reduce uncertainty, rather than influencing behavior. The information can be gathered through direct communication with the partner or from third parties (Das & Teng, 2001a).

Trust, on the other hand, entails a positive expectation about the partner, suggesting that unpleasant outcomes are less likely (Lane & Bachmann, 1996). Trust is not a behavior (e.g. cooperation) or a choice (e.g. taking a risk), but an underlying psychological state to accept vulnerability based upon positive expectations of the intentions or behavior of another (Rousseau et al., 1998). It entails thus positive expectations regarding the other in a risky situation, irrespective of the ability to control the other party (Mayer et al., 1995; Serva et al., 2005) and without having full information to confirm that belief (Tomkins, 2001).

In the next sections, we discuss how different dimensions of theses three governance mechanisms impact two dimensions of perceived risk. Risk perceptions of the decision makers serve as the heuristic that helps form their governance mechanisms (Das & Teng, 2001b).

### 2.2 Different dimensions of governance mechanisms and their effect on perceived risk

#### 2.2.1 Perceived risk

While inter-firm collaborations undoubtedly provide many advantages, they are also quite unstable (Das & Teng, 2000; Parkhe, 1993). Collaborations are vulnerable to failure because they are exposed to some distinct sets of risks. Risk is used to denote both outcome variations in general and negative variations specifically in outcomes of importance (Das & Teng, 2001a). Prior literature has made the distinction between two types of risks or control problems that seem especially relevant in the context of inter-firm relations: performance risk and relational risk (Das & Teng, 1996, 1999, 2001a & 2001b).

Performance risk is the probability that collaboration objectives will not be achieved, despite the full cooperation of the partners (Das & Teng, 2001a). This type of risk essentially relates to the management of tasks to be performed in the relationship in the pursuit of value creation. Gulati & Singh (1998) and Dekker (2004) argue that an important source of performance risk is *the coordination of interdependent tasks*, while
Tomkins (2001) refers to this coordination problem as the *mastery of events*. Anderson et al. (2000) provide an empirical investigation of interdependencies in supply relations and novel negotiations. Factors influencing performance risk are elements such as intensified competition, demand fluctuations and changing policies. Lack of competence is also an important constitute of performance risk (Das & Teng, 2001a).

Relational risk reflects decision-makers’ concerns about the level of co-operation between the partners. Opportunistic behavior by any partner is a source of relational risk. Examples of opportunistic behavior include withholding or distorting information, shirking or failing to fulfill promises or obligations, appropriation of the partner firm's technology or key personnel, late payments, and delivery of substandard products (Parkhe, 1993). Gulati & Singh (1998) and Dekker (2004) refer to this control problem as *the management of appropriation concerns*, while Tomkins (2001) positions the use of information for this type of control problem as the *development of trust*.

The distinction between relational and performance risk is crucial because, depending on which risk is perceived to be more of a threat, decision makers may decide on the governance strategy that is best for acquiring others’ valuable resources while protecting their own (Das & Teng, 2001b). Indeed for an alliance to work, only a certain degree of risk can be tolerated in any particular alliance. Governance structures provide a source of control to deal with risks as different forms can mitigate the total risk of the alliance. Thus, managers’ perceptions of the risk inherent in a prospective alliance can drive the type of governance mechanisms, such as trust, formal controls and information, used to manage the relation.

In the next sections, we explain how different dimensions of formal controls, trust and information reduce perceived relational and performance risk.

### 2.2.2 Formal controls

There are two main modes of formal control (Ouchi & Maguire, 1975). Organizations can control either by measuring the behaviors or the outcomes of these behaviors. Measuring behavior (or behavior control) is to ensure that the process is appropriate, while measuring outcomes only (or outcome control) is to rely on an accurate and reliable assessment of members’ performance.

Outcome control is essentially a *laissez-faire* managerial approach (Oliver & Anderson, 1994) that assumes that suppliers themselves are best able to determine their direction and level of effort to achieve the goals (de Mortagnes & Vossen, 1999). The buyer does not translate his intentions into standardized operating procedures for the supplier to perform, but instead sets targets to pursue which are then compared to periodic outcomes. Outcome-based control is often administered by means of a ‘carrot and stick’ policy, where the supplier is not compensated for its efforts unless and until expected outcomes are met. This requires that the buyer has clearly set standards of desirable and expected performance, that these can be effectively
measured, and that the supplier is in a position to reach the objectives more or less on his own. The major advantage of outcome-based control in the buyer–supplier relationship is that it allows for maximum supplier autonomy, yet provides both the incentive and responsibility for final results (de Mortagnes & Vossen, 1999). A possible disadvantage of outcome controls is the uncertainty associated with judgments and subjectivity in ascertaining that supplies meet specifications. For instance, in a study on sourcing decision in the US auto industry, Anderson et al. (2000) report that strict design tolerances (i.e. strict outcome requirements) for metal parts often increase die development time and costs without producing substantially better or different parts.

Behavior-based control, on the other hand, has a more paternalistic approach to supplier management. The buyer has a well-defined idea of what the supplier should do and works to ensure that he behaves accordingly (Oliver & Anderson, 1994). In order to ensure that the desired actions take place, behavior-based control mechanisms include standard operating procedures, behavioral performance appraisals, as well as close supervision and feedback (Snell & Youndt, 1995). This requires an understanding of what behavior is desirable and an ability to ensure that desirable actions occur. A prime advantage of behavior control is its directness (Gencturk & Aulakh, 1995). A working paper of Christ et al. (2006), however, provides some indications that behavioral control systems are perceived as more intrusive and as a greater threat to autonomy and that therefore they may be more damaging to trust and cooperation than outcome control.

Das & Teng (2001a) describe how these formal control mechanisms are related to the different forms of perceived risk. Relational risk entails characteristics that favor behavior control -- low output measurability and high knowledge of the process. Essentially, relational risk is about partners’ opportunistic behavior. Behavior control mechanisms should be used to regulate the conduct of partners to prevent major surprises. In this sense, behavior control can effectively reduce relational risk. Situations with high relational risk are typically characterized by low output measurability. In such situations, it is difficult for partners to accurately measure the adverse consequences of relational risk, and thus to develop effective outcome control mechanisms. Outcome control is therefore less relevant for managing relational risk than behavioral control mechanisms.

In contrast to relational risk, performance risk is more result oriented, because the latter is about whether or not the inter-firm relation achieves the objectives of the partner firms, given satisfactory cooperation. Performance risk accords with low knowledge of the transformation process, coupled with both high and low output measurability. Given these considerations, outcome control appears to be appropriate since this control is exercised through close monitoring of the outcomes. As performance risk is characterized by low knowledge of the transformation process, behavior control will be hard to develop because managers hardly know what kind of behavior could help in assuring better performance (Das & Teng, 2001a).
Trust is a difficult concept to study as it has been defined and classified in many ways (Langfield-Smith, 2005). Rousseau et al. (1998, p.395) conclude after an extensive cross-disciplinary collection of scholarly writings that a widely held definition of trust is as follows: “Trust is a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another.” Most definitions of trust focus thus on exposing oneself to vulnerability. It has been argued that trust is particularly relevant to inter-firm relations, as trust is only important in situations where there is risk, and risk management is a critical aspect of inter-firm relations (Ring & Van de Ven, 1992; Das & Teng, 2001b). While many definitions of trust exist, two definitions of trust have emerged as particularly relevant to the formation and management of inter-firm relations. These are competence trust and goodwill trust (Sako, 1992).

Competence trust focuses on perceptions of ability and expertise. In an inter-firm setting, competence trust relates to the expectation of a partner’s ability to perform its role competently (Sako, 1992). Competence trust involves thus the expectation that the partner has the necessary technical and management competences at his disposal. Competence trust may be acquired by purchasing existing competences or by investing in their development. In the latter case the outsourcing party is for example actively involved in the development of a product or service, or there is ‘transfer’ of technology to the supplier (van der Meer-Kooistra & Vosselman, 2000). In contrast, goodwill trust can be defined as perceptions of a partner’s intention to perform in accordance with those agreements (Ring & van de Ven, 1992; Nooteboom, 1996). In case of goodwill trust there are no predetermined professional standards that have to be met (competence trust). Goodwill trust is associated with integrity, responsibility and dependability (Das & Teng, 2001a). It refers to the mutual expectations of open commitment to each other (Sako, 1992).

The two dimensions of trust, goodwill trust and competence trust, are closely related to the calculation of different types of perceived risk (Das & Teng, 2001a; Lui & Ngo, 2004). This distinction parallels the idea that trust is the expectation of a partner fulfilling a collaborative role in a risky situation (Nooteboom, 1996), and relies on both the partner’s intention to perform and its ability to do so. Goodwill trust is linked to relational risk, and refers to the expectation that a partner intends to fulfill his role in the relationship. Goodwill trust would reduce the perception of relational risk, simply because a positive assessment of one's intentions would lead to a belief that opportunistic behavior is less likely (Das & Teng, 1998). Similarly, it can be argued that competence trust would reduce perceived performance risk because of a positive belief in one's ability. Competence trust refers thus to the expectation that partners have the ability to fulfill their roles. This is related to performance risk.
2.2.4 Information

The role of information as an inter-firm governance mechanism has been extensively discussed in section 2.1. Tomkins (2001) positions the use of information, including accounting, in inter-firm relationships in a broader framework by relating it to two purposes, the mastery of events and the development of trust. These two purposes refer to the two control problems discussed earlier: the coordination of interdependent tasks and the management of appropriation concerns, as identified by Gulati & Singh (1998) and Dekker (2004), or more generally to performance risk and relational risk.

Tomkins (2001) distinguishes two main types of information to help counter these control problems. Type 1 information is information that relates to the willingness to trust; that is what is needed to create trust and check on the state of the relationship. Examples are information on the reputation for price, quality and delivery of the supplier, information on the supplier’s values, integrity and ethics, as well as information on the supplier’s likelihood to stay in business and the adaptiveness of the supplier’s technology development to the buyer’s needs. Type 2 is information required for mastery of events by that relationship as an entity itself. Type 2 information thus concerns planning what each party is going to do. Examples of Type 2 information include agreed expectations of each other on the way to cooperate, scenarios with broad consensus on relationship option values and possibilities for extending the relationship to new businesses, markets, technologies etc. These two types of information are not totally separate from each other, but there is a different emphasis in content of the information needed mainly to plan and make decisions on collaborative futures compared to that needed mainly for building trust in the actions of ones partners (Tomkins, 2001). The difference lays thus in the purpose of the information.

It can be concluded from the above discussion that formal controls, trust and information are multidimensional constructs and that they are important factors in reducing perceived risk in inter-firm relations. However, the discussion reveals also that some aspects of these inter-firm governance mechanisms will be more effective in reducing perceived performance risk than perceived relational risk and vice versa. More specific we expect that:

\textbf{H1: Perceived relational risk will be reduced more effectively}
\begin{itemize}
  \item[a)] by goodwill trust than by competence trust
  \item[b)] by behavior control than by outcome control
  \item[c)] by Type 1 information than by Type 2 information.
\end{itemize}

\textbf{H2: Perceived performance risk will be reduced more effectively}
\begin{itemize}
  \item[a)] by competence trust than by goodwill trust
  \item[b)] by outcome control than by behavior control
  \item[c)] by Type 2 information than by Type 1 information.
\end{itemize}

Note: Hypotheses H1a&b and H2a&b have been proposed before (e.g. by Das & Teng, 2001a). To our knowledge, their propositions have never been empirically tested.
The diagram in appendix A depicts the different hypotheses. The effects of goodwill trust, behavioral control and Type 1 information on perceived relational risk are represented by full arrows as these governance mechanisms are expected to reduce perceived relational risk more effectively than competence trust, outcome control and Type 2 information. The latter effects are therefore represented by dotted arrows. The mirror picture situation exists for the effects of the governance mechanisms on perceived performance risk. The effects of having a prior relation with the supplier are discussed in the next section.

2.3 Substitutes or complements: a dynamic view

Prior studies on inter-firm governance mechanisms mainly focused on the relation between trust and controls, i.e. whether trust is a substitute or a complement for formal control mechanisms. These studies show contradictory results. Some prior studies provide evidence of the complementary roles of trust and control in cooperative relationships (Luo, 2002; Poppo & Zenger, 2002). Other researchers argue that the more trust one has, the less control one needs over a partner (Madhok 1995; Nooteboom 1996). Malhotra & Murnighan (2002) even found that the presence of control systems inhibits the development of trust. Recent research, however, indicates that the relationship between trust and control is more complex: trust and control may be complements or substitutes depending on the situation. Woolthuis et al. (2005) conducted four longitudinal case studies to reveal that trust and controls are both complements and substitutes. Lui & Ngo (2004) showed that the relationship between contractual safeguards and cooperative outcomes depends on both the level and the type of trust (goodwill trust and competence trust).

In conclusion, there is still a lot of ambiguity on the relation between trust and formal controls and whether they form complements or substitutes. The existing literature also failed to fully explore the role that (accounting) information plays in this process (Vosselman & van der Meer-Kooistra, 2004). We believe that this ambiguity arises because of two main reasons. First, previous research typically treated the different governance mechanisms as uni-dimensional constructs. Second, the literature has ignored the dynamic relation between these governance mechanisms.

Adopting a more contingent perspective, Das & Teng (2001a) have suggested that the relation between control and trust may not be the same across all situations. Although Das & Teng (2001a) recognize the multidimensional nature of trust and controls, their study remains ambiguous on the relation between these two governance mechanisms. On the one hand they propose (p. 265) that goodwill trust and competence trust will enhance the effectiveness of controls (behavior as well as outcome control), on the other hand, they also propose (p. 264) that both outcome control and behavior control will undermine goodwill trust and competence trust in an alliance. These at first sight contradictory propositions may be reconciled if we take a dynamic view on the relation.
Dekker (2004) and Tomkins (2001) hint at a more dynamic perspective and provide interesting insights into the relation between trust and control, and between trust and information, respectively. Dekker (2004) argues that the relationship between trust and controls may be nonlinear. Until a certain threshold (determined by the relation’s transaction hazards) the use of formal controls may be complementary and enhancing to trust. We expect therefore that the first proposition of Das & Teng (2001a), namely that goodwill trust and competence trust will enhance the effectiveness of controls holds for relations at an early stage. A certain level of trust is needed in order to implement effective controls over a partner in an alliance (Das & Teng 1998). Behavior control and outcome control work better with the presence of trust (Das & Teng, 2001a). Without a certain level of trust, it will be difficult to accept outcome measurements and to follow specified behavior patterns.

However, since trust is the low-cost solution, it will substitute formal controls whenever a sufficient level of control is realized for safeguarding the transaction. Partners will not unnecessarily use expensive formal control mechanisms and in addition risk damaging the quality of their relationship (Dekker, 2004). We expect thus that at later stages of the relationship formal control - that is, behavior control and outcome control - may undermine trust. The employment of strict rules (behavioral control) and objectives (outcome control) means that suppliers’ goodwill and competence is thrown in doubt. As a result, an atmosphere of mistrust is created. We maintain therefore that Das & Teng’s (2001a) second proposition, namely that outcome control and behavior control will undermine goodwill trust and competence trust, holds for relations with a prior relation. This implies that, in an early phase of the relation, where trust still needs to be built, one would expect a positive relation between formal controls and trust. However, at a later stage in the relation, trust may replace formal controls.

Tomkins (2001) gives us a better understanding of how information and trust are related. While prior literature (e.g. Wicks et al., 1999) conclude that there is an inverse relationship between the willingness to trust and the need for information, Tomkins (2001) describes the relationship between trust and information during different stages of the relationship life cycle as an inverted U-shape: in the early stages of the relationship trust and information are additively related, while later on they become substitutes. Tomkins (2001) reasons that it is probably true to say that, at any specific point of time, there is a reasonably strict inverse association between information and the level of trust (i.e. trust intensity), but this assumes that the level of trust intensity is somehow given, quite independent of any other activity. It ignores the fact that trust derives from learned, usually interactive, experiences and that this process itself depends upon information as well as appropriate information depending upon the state of trust. The findings in Langfield-Smith & Smith’s (2003) case study on IT outsourcing support this dynamic view on the relation between trust and information. Evidence from the case points to the importance of proactive information collection in the early

---

25 Dekker (2003a) argues that this “threshold” not necessarily relates to the stage of the relationship, but rather to the level of trust at a certain point in time (which may also result from other sources than prior interactions) and the need for control. This is a valid argument and we recognize that other sources may determine the level of trust at a certain point in time, but still it is widely recognized that having a prior relation is an important determinant for the level of trust. Having a prior relation has even often been used as a proxy for trust (e.g. Dekker, 2003b).
days of the relationship to establish ground rules and expectations. This enabled the development of trust over time.

Based on this dynamic view of a relationship, and taking into account the multidimensional nature of the different governance mechanisms we discussed above, we expect that:

**H3:** At an early stage of the relation, perceived relational risk will be reduced more effectively by (a) behavioral control and by (b) Type 1 information than by goodwill trust. At later stages of the relation, goodwill trust will substitute behavioral controls and Type 1 information and perceived relational risk will be reduced more effectively by goodwill trust than by (c) behavioral controls and by (d) Type 1 information.

**H4:** At an early stage of the relation, perceived performance risk will be reduced more effectively by (a) outcome control and by (b) Type 2 information than by competence. At later stages of the relation, competence trust will substitute outcome controls and Type 2 information and perceived relational risk will be reduced more effectively by competence trust than by (c) outcome control and by (d) Type 2 information.

### 3. Data and method

#### 3.1 Data collection

We obtained the data for this study through a survey instrument. The population of our study was drawn from Amadeus. Companies were required to meet the following criteria for inclusion in the study: (i) located in Flanders, (ii) number of employees between 50 and 250 and (iii) either one of the following two criteria: either a turnover between 10 million and 50 million Euro or total assets between 10 million and 43 million Euro. This resulted in a list of 1538 medium sized firms, all of whom were contacted by telephone. Characteristics of the population are provided in Panel A of Table 3.1. Survey participants were pre-screened using a structured telephone interview and those who agreed to participate identified the most important IT investment made within the last five years. Of those contacted, 275 were eliminated as unsuitable and 668 refused to participate.

---

26 AMADEUS is a Pan-European financial database, created and distributed by Bureau Van Dijk, containing information on approximately 8 million public and private companies in 38 European countries. To be included in AMADEUS, Belgium companies (as for many other countries) must comply with at least one of the following criteria: (i) operating revenue equal to at least 1 million Euro, (ii) total assets equal to at least 2 million Euro and (iii) number of employees equal to at least 15.

27 Inclusion criteria (ii) and (iii) were based on the Commission recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises (2003/361/EG).

28 Reasons for exclusion: (i) 137 firms were not contactable (e.g. wrong telephone number, firm had gone out of business, location change and general organizational change), (ii) 98 firms were a subsidiary with no individual IT investment decision rights, and (iii) 41 firms belonged to the same group as another firm already in the sample (i.e. key informant was already identified for another firm in the group and therefore excluded).
Of the firms that initially agreed to participate in the study, a key informant (typically an IT manager) who was responsible for IT investments was identified and asked for a direct e-mail address. Subsequently an e-mail with a direct link to the on-line survey instrument was sent to 595 key informants. An extensive contacting procedure was used over a time period of 10 weeks. Respondents were first pre-notified by phone, which is likely to lead to more involvement and commitment by the respondent from the beginning of the project (Van der Stede et al., 2005). Secondly an e-mail and two telephone reminders were used to increase survey response rates. This procedure resulted in 310 responses, which represent a field response of 52% (310/595) and an effective response rate of 25% (310/1263). Observations with missing data were excluded, which reduced the sample to 287 transactions between medium sized firms and their relation with a supplier of IT products and services.

We focus on this type of transactions for some specific reasons. IT purchases and outsourcing are nowadays characterized by an unprecedented growth rate and IT outsourcing is expected to continue to grow for the foreseeable future (Barthélemy, 2001; Fish & Seydel, 2006). The spectrum of IT products and services ranges from relatively routine commodities such as computer supplies and office software licenses to highly specialized and customized development projects. While the former transactions are relatively simple, the latter transactions often require relationship-specific investments and a high level of integration and coordination by both parties (Anderson & Dekker, 2005; Wang et al., 1997; Whang, 1992). The gamut of possible supplier relationships ranges thus from purely transactional, price-based interactions to highly interdependent partnerships (Heckman, 1999).

Extant research has mainly concentrated on large organizations and large-valued IT outsourcing contracts (e.g. Arnett & Jones, 1994; Choudhury & Sabherwal, 2003; Collins & Millen, 1995; Lacity & Hirschheim, 1993). Our study focuses on SMEs. SMEs represent over 95% of enterprises in most OECD countries, generate a substantial share of GDP and account for well over half of private sector employment (OECD, 2000). This economic significance makes them worth while to study. Differences between small and large firms could lead to different IT items being outsourced and different outsourcing agreements governing these arrangements (Rohde, 2004). Many smaller firms do not have designated IT departments and, therefore, are less likely to have the same level of IT skills within their organizations (Chan & Chung, 2002). Their limited IT resources and expertise make SMEs receptive for outsourcing IT (Barthélemy & Geyer, 2005; Dekker, 2003b). In fact, many of their IT-related functions are outsourced through necessity (Rohnde, 2004). And because of their limited firm size, IT investments often represent substantial investments for SME (Dekker, 2003b).

Inter-firm control issues are likely to be important in this type of transactions (Dekker, 2003b). First, SMEs power and skills to negotiate contracts and to manage contractual relationships with large outsourcing vendors may be limited and the process of contract negotiation is costly and requires expert legal advice that is often prohibitive for smaller organizations (Rohde, 2003). Second, opportunistic behavior, high cost, poor
quality and service, loss of control and expertise, and over-dependence on supplier are often reported control problems in IT outsourcing relationships (Barthélemy, 2001). As SMEs often lack the knowledge to adequately specify desired outcomes and to monitor performance ex-post, opportunism concerns and coordination difficulties are especially relevant for SMEs (Dekker, 2003b). Third, difficulties in task programmability and output measurability mean that formal controls are difficult to implement in IT outsourcing, particular in the early stages of the relationship (Langfield-Smith & Smith, 2003). Rohnde (2004) reports that the manner in which functions are outsourced differ depending on the size of the firm: the larger the firm, the greater the reliance on more formal procedures.

Table 3.1: Sample, population and transaction characteristics

Panel A. Characteristics of the population (N = 1538) and the sample (N = 287). The population was drawn from Amadeus. Companies were required to meet following criteria: (i) located in Flanders, (ii) number of employees between 50 and 250 and (iii) either one of the following two criteria: either a turnover between 10 million and 50 million Euro or total assets between 10 million and 43 million Euro in 2003. The means for the population and the sample are not significantly different at the 0.10 level.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Population (N=1538)</th>
<th>Sample (N=287)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Revenue</td>
<td>Mean 29 million Euro</td>
<td>Mean 28 million Euro</td>
</tr>
<tr>
<td></td>
<td>Median 22 million Euro</td>
<td>Median 21 million Euro</td>
</tr>
<tr>
<td>Number of Employees</td>
<td>Mean 111</td>
<td>Mean 114</td>
</tr>
<tr>
<td></td>
<td>Median 96</td>
<td>Median 101</td>
</tr>
<tr>
<td>Industry</td>
<td>Utilities companies 13%</td>
<td>Manufacturing firms 12%</td>
</tr>
<tr>
<td></td>
<td>Construction companies 21%</td>
<td>Construction companies 46%</td>
</tr>
<tr>
<td></td>
<td>Service companies 25%</td>
<td>Service companies 20%</td>
</tr>
</tbody>
</table>

Panel B. Description of the products and services included in the 287 transactions studied

<table>
<thead>
<tr>
<th>Product or service included in transaction</th>
<th>Frequency (max = 287)</th>
<th>Rating used to create measure of product complexity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard software</td>
<td>154</td>
<td>1</td>
</tr>
<tr>
<td>Personal computers</td>
<td>94</td>
<td>1</td>
</tr>
<tr>
<td>Work stations</td>
<td>62</td>
<td>1</td>
</tr>
<tr>
<td>Side equipment</td>
<td>71</td>
<td>1</td>
</tr>
<tr>
<td>Cabling</td>
<td>36</td>
<td>1</td>
</tr>
<tr>
<td>Network configuration</td>
<td>91</td>
<td>2</td>
</tr>
<tr>
<td>Mini system</td>
<td>38</td>
<td>2</td>
</tr>
<tr>
<td>Mainframe</td>
<td>39</td>
<td>2</td>
</tr>
<tr>
<td>Computer-controlled machines</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Branch-specific software</td>
<td>39</td>
<td>3</td>
</tr>
<tr>
<td>Training</td>
<td>65</td>
<td>3</td>
</tr>
<tr>
<td>Instruction</td>
<td>52</td>
<td>3</td>
</tr>
<tr>
<td>Documentation</td>
<td>87</td>
<td>3</td>
</tr>
<tr>
<td>Customized software</td>
<td>87</td>
<td>3</td>
</tr>
<tr>
<td>Consulting</td>
<td>110</td>
<td>4</td>
</tr>
<tr>
<td>Accompaniments</td>
<td>127</td>
<td>4</td>
</tr>
<tr>
<td>Design</td>
<td>30</td>
<td>5</td>
</tr>
<tr>
<td>Tailor-made software</td>
<td>55</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 3.1 Panel B includes a description of the transactions included in the study. The IT product or service could range from standard software or hardware to very complex and customized IT investments. This resulted in a dataset including transactional relationships that vary from simple market transactions with few associated control problems to extensive and complicated transactions with potentially larger control problems. Based on Anderson & Dekker (2005)\textsuperscript{29}, we grouped the 18 types of software, hardware, and

\textsuperscript{29} The data for the study of Anderson & Dekker (2005) come from a database called The external Management of Automation 1995 (mat 95) that was developed to study the management of purchased information technology (Batenburg & Raub, 1995). The constructs developed by Anderson &
services that may be included in the transaction into five categories that represent increasing demands for coordination and interaction between the buyer and seller (Table 3.1, Panel B). 27% of the responses involved standardized transactions, ranging from standard software and hardware to network configurations and mainframes, while 36% of the projects involved highly complex purchases such as tailor made software and design. This variety allows us to study a large variety in relations and consequent relational risks, controls, trust, etc. On average, respondents were 40 years old and worked 11 years in their firms. The average (median) buying firm included in the study had an operating revenue in 2003 of 27.88 million Euro (20.80 million Euro) and 114 (101) employees. Unlike most of the previous studies on this topic, which constrained their sample to single industries (e.g. Zaheer & Venkatraman, 1995; Lui & Ngo, 2004; Judge & Dooley, 2006), we sought to enhance the external validity of this study by using a broader population across different industries. Firms represented the following industries: 13% utilities companies, 40% manufacturing firms, 22% construction companies, 25% service companies.

Non-response analysis suggested that non-participating firms did not significantly differ from participating firms on these important firm characteristics. Table 3.1 Panel A presents an overview of the population and sample characteristics. A question from the structured telephone interview indicated that the main reasons for not participating were: (i) 45% had no time, (ii) 10% were not involved in the purchase decisions process as IT investments were completely outsourced to a third company, (iii) 7% was not interested, (iv) 7% had a company policy not to participate in surveys, (v) 5% of the key informant was either sick or on holidays and (vi) 27% of the companies provided no or another reason (e.g. some firms identified themselves as too small, other indicated that their main IT investments were in-house development, or that their company made no IT investments). We also compared early-returned questionnaires to late-returned questionnaires on a number of variables: respondent’s profile (age, years with company), company size, industry, transaction attributes and governance systems to further test for a non-response bias. The assumption of this analysis is that late respondents share similar characteristics and response biases with non-respondents. Analyses indicated that no significant mean differences exist between early and late respondents. Hence, we found no evidence of obvious response bias in the sample.

While we believe that our sample is without response bias, there remains a potential problem of sample selection bias. The choice as whether a particular IT investment is internalized or outsourced is determined by the transactional hazards in our model (the control variables). For example, exchanges with very high levels of asset specificity or environmental uncertainty may be more often internalized and therefore underrepresented in our sample (Poppo & Zenger, 2002). This problem was (partially) countered by focusing on SMEs, which typically lack expertise and resources for in-house production, making them receptive for outsourcing IT needs. Indeed, our sample does not show a restricted range on these variables. Moreover, a

Dekker (2005) are thus based on survey items included in the dataset originally developed by Batenburg & Raub (1995). The full questionnaire is available in The External Management of Automation: Codebook for the Combined Data from the Netherlands and Germany (Buskens & Batenburg, 2000).

Although the survey was administered exclusively to IT buyers, limited data about suppliers was collected. In 43 cases the identity of the supplier was omitted. The remaining transactions involve 155 different suppliers. The maximum number of transactions with a single supplier (IBM) is 16 and only six suppliers accounted for 6 or more transactions each (IBM, Dell, Dolmen, HP, Edan and AXI).
question from the structured telephone interview indicated that less than 1% of the companies could not participate because of internal development.

3.2 Variables and measures

Table 3.2 reports the details of the measurement items and constructs used to operationalize the theoretical constructs. Questionnaire items, unless stated otherwise, were measured using a 5-point Likert scale in which “1” represented “low degree” and “5” represented “high degree”. Where available, we used measurement instruments from the literature to develop constructs. Some items were modified to reflect the specific context of the study. The Cronbach’s alpha reliability value for each construct is also reported in Table 3.2. The reliability values of the measurement scales all exceed the recommended value of 0.70 (Nunnally & Bernstein, 1994) with the exception of that for Task Complexity, which is marginal at 0.60.

The construct scores are calculated by adding the original scale responses together and determining the mean value. Using these summated scores provide some specific benefits (Hair et al., 1998). First, it is a composite measure, thus reducing measurement error and representing multiple facets of a concept. Second, it includes only the variables that load highly on the factor and excludes those having little impact, which makes interpretation more easy. Third, summated scales allow for easy replication between samples. Finally, summated scales are not necessarily orthogonal.

A factor analysis is used to verify the constructs that were developed for the governance mechanisms (Behavioral Control, Outcome Control, Type 1 Information, Type 2 Information, Goodwill Trust and Competence Trust). Five factors were extracted, accounting for 66.24% of the variation. The different factors clearly indicate that trust, controls and information form different governance mechanisms. Although the items for Goodwill Trust and Competence Trust loaded on one factor, we conceptualized them as two separate constructs (cf. Lui & Ngo, 2004). Table 3.3 presents the results for the factor analysis. Details of the development of the construct follows.

Table 3.2: Descriptive statistics

Descriptive statistics for the measures (in bold and italic) and the items used to construct measures (below the measures) for perceived risk, governance mechanisms and transaction characteristics. All items were measured on a 5-point Likert scale unless otherwise mentioned. N= 287 transactions

Panel A. Dependent variables

<table>
<thead>
<tr>
<th>Perceived risk</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>Sd</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perceived Performance Risk (α = 0.78)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-The supplier's product/service may not perform as described</td>
<td>1</td>
<td>4</td>
<td>2.15</td>
<td>0.74</td>
</tr>
<tr>
<td>-The supplier’s product/service may not work satisfactorily</td>
<td>1</td>
<td>5</td>
<td>2.06</td>
<td>0.76</td>
</tr>
<tr>
<td><strong>Perceived Relational Risk (α = 0.96)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-The supplier may not carry out its duties if it is not checked up</td>
<td>1</td>
<td>4</td>
<td>2.03</td>
<td>0.90</td>
</tr>
<tr>
<td>-The supplier may not always do things that it promises to do</td>
<td>1</td>
<td>5</td>
<td>2.05</td>
<td>0.97</td>
</tr>
<tr>
<td>-The supplier may not be fair in its dealings</td>
<td>1</td>
<td>4</td>
<td>1.94</td>
<td>0.96</td>
</tr>
<tr>
<td>-The interests of the supplier may conflict with our interests</td>
<td>1</td>
<td>5</td>
<td>2.11</td>
<td>0.96</td>
</tr>
</tbody>
</table>

This is further justified because a factor analysis (not reported) on the full sample (no listwise deletion, n= 302) indicated that the five trust-items did load, as expected, on two separate factors.
Panel B. Independent variables

<table>
<thead>
<tr>
<th>Governance mechanisms</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>Sd.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcome Control (α = 0.87)</strong></td>
<td>1</td>
<td>5</td>
<td>3.25</td>
<td>0.94</td>
</tr>
<tr>
<td>- We established specific performance goals for the supplier</td>
<td>1</td>
<td>5</td>
<td>3.13</td>
<td>1.10</td>
</tr>
<tr>
<td>- We monitored the extent to which the supplier attains the performance goals</td>
<td>1</td>
<td>5</td>
<td>3.39</td>
<td>1.08</td>
</tr>
<tr>
<td>- If the supplier did not meet the performance goals, he was required to explain why</td>
<td>1</td>
<td>5</td>
<td>3.37</td>
<td>1.14</td>
</tr>
<tr>
<td>- We gave feedback concerning the extent to which the supplier achieved his goals</td>
<td>1</td>
<td>5</td>
<td>3.29</td>
<td>1.15</td>
</tr>
<tr>
<td>- The supplier’s rewards were based upon how his performance compared to the goals</td>
<td>1</td>
<td>5</td>
<td>3.06</td>
<td>1.31</td>
</tr>
<tr>
<td><strong>Behavioral Control (α = 0.91)</strong></td>
<td></td>
<td></td>
<td>4.83</td>
<td>1.00</td>
</tr>
<tr>
<td>- We monitored the extent to which the supplier followed established procedures</td>
<td>1</td>
<td>5</td>
<td>2.86</td>
<td>1.19</td>
</tr>
<tr>
<td>- We evaluated the procedures the supplier used to accomplish a given task</td>
<td>1</td>
<td>5</td>
<td>3.12</td>
<td>1.15</td>
</tr>
<tr>
<td>- We tried to modify the supplier’s procedures when desired results were not obtained</td>
<td>1</td>
<td>5</td>
<td>2.69</td>
<td>1.23</td>
</tr>
<tr>
<td>- We gave the supplier feedback on how he accomplished his performance goals</td>
<td>1</td>
<td>5</td>
<td>3.02</td>
<td>1.19</td>
</tr>
<tr>
<td>- We participated in the costs of certain activities if they were carried out according to our guidelines</td>
<td>1</td>
<td>5</td>
<td>2.90</td>
<td>1.21</td>
</tr>
<tr>
<td>- To be able to evaluate the supplier’s methods, the supplier had to report periodically</td>
<td>1</td>
<td>5</td>
<td>2.31</td>
<td>1.25</td>
</tr>
<tr>
<td><strong>Information Type 1 (to warrant trust) (α = 0.84)</strong></td>
<td>1</td>
<td>5</td>
<td>3.37</td>
<td>0.73</td>
</tr>
<tr>
<td>Once the supplier was chosen, the extent to which we pursued following information</td>
<td>1</td>
<td>5</td>
<td>3.64</td>
<td>0.85</td>
</tr>
<tr>
<td>- The reputation of the supplier for quality, price, delivery</td>
<td>1</td>
<td>5</td>
<td>3.33</td>
<td>0.87</td>
</tr>
<tr>
<td>- Likelihood that the seller will continue its activities in a similar way</td>
<td>1</td>
<td>5</td>
<td>3.34</td>
<td>0.99</td>
</tr>
<tr>
<td>- Information on the reliable achievement of milestones (e.g. costs and quality)</td>
<td>1</td>
<td>5</td>
<td>3.40</td>
<td>0.92</td>
</tr>
<tr>
<td>- Adaptiveness of supplier’s technology development to our needs</td>
<td>1</td>
<td>5</td>
<td>3.12</td>
<td>1.03</td>
</tr>
<tr>
<td>- Common knowledge of technology development plans</td>
<td>1</td>
<td>5</td>
<td>3.59</td>
<td>0.76</td>
</tr>
<tr>
<td><strong>Information Type 2 (to master events collaboratively) (α = 0.78)</strong></td>
<td>1</td>
<td>5</td>
<td>3.45</td>
<td>0.64</td>
</tr>
<tr>
<td>Once the supplier was chosen, the extent to which we pursued following information</td>
<td>1</td>
<td>5</td>
<td>3.22</td>
<td>0.87</td>
</tr>
<tr>
<td>- Mutual dependence: both the dependence of your company with respect to the supplier and the dependence of the supplier with respect to your company</td>
<td>1</td>
<td>5</td>
<td>3.47</td>
<td>0.83</td>
</tr>
<tr>
<td>- Scenario development with broad consensus on relationship option values</td>
<td>1</td>
<td>5</td>
<td>3.53</td>
<td>0.86</td>
</tr>
<tr>
<td>- Agreed expectations of each other on the way to cooperate</td>
<td>1</td>
<td>5</td>
<td>3.56</td>
<td>0.77</td>
</tr>
<tr>
<td>- Possibilities for extending the relationship to new businesses, markets, technologies etc.</td>
<td>1</td>
<td>5</td>
<td>3.63</td>
<td>0.91</td>
</tr>
<tr>
<td><strong>Competence Trust (α = 0.79)</strong></td>
<td>1</td>
<td>5</td>
<td>3.31</td>
<td>0.96</td>
</tr>
<tr>
<td>- The supplier had been chosen because of good reputation</td>
<td>1</td>
<td>5</td>
<td>3.73</td>
<td>0.90</td>
</tr>
<tr>
<td>- The supplier had been chosen because of rich resources of capital and labor</td>
<td>1</td>
<td>5</td>
<td>3.40</td>
<td>1.16</td>
</tr>
<tr>
<td>- The supplier had been chosen because of his technical skills</td>
<td>1</td>
<td>5</td>
<td>3.53</td>
<td>0.76</td>
</tr>
<tr>
<td><strong>Goodwill Trust (α = 0.84)</strong></td>
<td>1</td>
<td>5</td>
<td>3.91</td>
<td>0.88</td>
</tr>
<tr>
<td>- The supplier had been chosen because he had been fair in negotiations</td>
<td>1</td>
<td>5</td>
<td>3.76</td>
<td>0.86</td>
</tr>
<tr>
<td>- The supplier had been chosen because he could be counted on to act as expected</td>
<td>1</td>
<td>5</td>
<td>3.61</td>
<td>0.96</td>
</tr>
</tbody>
</table>

Panel C. Control variables

<table>
<thead>
<tr>
<th>Transaction characteristics</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>Sd.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Uncertainty (α = 0.75)</strong></td>
<td>1</td>
<td>5</td>
<td>2.94</td>
<td>0.91</td>
</tr>
<tr>
<td>- Difficulty of assessing quality of supplier’s product at delivery</td>
<td>1</td>
<td>5</td>
<td>2.85</td>
<td>1.16</td>
</tr>
<tr>
<td>- Difficulty of comparing different suppliers’ products</td>
<td>1</td>
<td>5</td>
<td>2.99</td>
<td>1.08</td>
</tr>
<tr>
<td>- Difficulty of comparing the price/quality ratio of different suppliers’ products</td>
<td>1</td>
<td>5</td>
<td>3.00</td>
<td>1.08</td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td></td>
<td></td>
<td>3.27</td>
<td>1.42</td>
</tr>
<tr>
<td>- Initial contract price to supplier (in Euro): select one of five price ranges where 1 is small and 5 is large (less than 12 500, between 12 500 &amp; 25 000, between 25 000 &amp; 50 000, between 50 000 &amp; 100 000, more than 100 000 Euro)</td>
<td>1</td>
<td>5</td>
<td>3.18</td>
<td>1.14</td>
</tr>
<tr>
<td><strong>Asset Specificity (α = 0.81)</strong></td>
<td>1</td>
<td>5</td>
<td>4.06</td>
<td>2.00</td>
</tr>
<tr>
<td>- If the product failed and had to be replaced, what would have been the loss in terms of time and money associated with replacing the product</td>
<td>1</td>
<td>5</td>
<td>2.56</td>
<td>1.35</td>
</tr>
<tr>
<td>- Time and money associated with training your personnel</td>
<td>1</td>
<td>5</td>
<td>2.96</td>
<td>1.35</td>
</tr>
<tr>
<td>- Time and money associated with data entry</td>
<td>1</td>
<td>5</td>
<td>3.17</td>
<td>1.37</td>
</tr>
<tr>
<td>- Time and money associated with idle production</td>
<td>1</td>
<td>5</td>
<td>2.99</td>
<td>1.47</td>
</tr>
<tr>
<td><strong>Task Complexity (α = 0.60)</strong></td>
<td>1</td>
<td>5</td>
<td>4.45</td>
<td>3.08</td>
</tr>
<tr>
<td>- No. of components/services bought (select from list of 18 possibilities cf. Panel A)</td>
<td>1</td>
<td>5</td>
<td>3.67</td>
<td>1.37</td>
</tr>
<tr>
<td>- Product complexity (cf. Coded from 1 to 5 cf. Panel A)</td>
<td>1</td>
<td>5</td>
<td>3.67</td>
<td>1.37</td>
</tr>
<tr>
<td><strong>Competition (α = 0.85)</strong></td>
<td>1</td>
<td>5</td>
<td>2.56</td>
<td>1.08</td>
</tr>
<tr>
<td>- Number of potential suppliers at time of purchase</td>
<td>1</td>
<td>5</td>
<td>2.62</td>
<td>1.16</td>
</tr>
<tr>
<td>- Number of alternative products at time of purchase</td>
<td>1</td>
<td>5</td>
<td>2.49</td>
<td>1.14</td>
</tr>
<tr>
<td><strong>Dependence Buyer (α = 0.80)</strong></td>
<td>1</td>
<td>5</td>
<td>2.16</td>
<td>1.05</td>
</tr>
<tr>
<td>- If the supplier failed to deliver, - it would be very difficult for our firm to find substitute suppliers - our company would face severe economic problems</td>
<td>1</td>
<td>5</td>
<td>2.30</td>
<td>1.21</td>
</tr>
<tr>
<td>- Prior Relation</td>
<td>0</td>
<td>1</td>
<td>0.57</td>
<td>0.50</td>
</tr>
</tbody>
</table>

(0= no, 1= yes)
### Table 3.3: Scale development for governance mechanisms

This table presents the results of a factor analysis of the use of governance mechanisms using Principal Component Analysis as extraction method Varimax with Kaiser Normalization as rotation method. Five factors with eigenvalues greater than one explain 66.24% of the total variance. N= 287.

<table>
<thead>
<tr>
<th>Factor 1: Outcome Control</th>
<th>Factor 2: Behavioral Control</th>
<th>Factor 3: Type 1 Info</th>
<th>Factor 4: Trust</th>
<th>Factor 5: Type 2 Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>We monitored the extent to which the supplier attains the performance goals</td>
<td>0.844</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If the supplier did not meet the performance goals, he was required to explain why</td>
<td>0.811</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We gave feedback concerning the extent to which the supplier achieved his goals</td>
<td>0.781</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We established specific performance goals for the supplier</td>
<td>0.740</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The supplier’s rewards were based upon how his performance compared to the goals</td>
<td>0.604</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We tried to modify the supplier’s procedures when desired results were not obtained</td>
<td></td>
<td>0.822</td>
<td></td>
<td></td>
</tr>
<tr>
<td>We gave the supplier feedback on how he accomplished his performance goal</td>
<td></td>
<td>0.791</td>
<td></td>
<td></td>
</tr>
<tr>
<td>We monitored the extent to which the supplier followed established procedures</td>
<td></td>
<td>0.695</td>
<td></td>
<td></td>
</tr>
<tr>
<td>To be able to evaluate the supplier’s methods, the supplier had to report periodically</td>
<td>0.467</td>
<td>0.659</td>
<td></td>
<td></td>
</tr>
<tr>
<td>We participated in the costs of certain activities if they were carried out according to our guidelines</td>
<td>0.498</td>
<td>0.641</td>
<td></td>
<td></td>
</tr>
<tr>
<td>We evaluated the procedures the supplier used to accomplish a given task</td>
<td>0.464</td>
<td>0.640</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adaptiveness of supplier’s technology development to our needs</td>
<td></td>
<td></td>
<td>0.819</td>
<td></td>
</tr>
<tr>
<td>Information on the reliable achievement of milestones (e.g. costs and quality)</td>
<td></td>
<td></td>
<td>0.786</td>
<td></td>
</tr>
<tr>
<td>Common knowledge of technology development plans</td>
<td></td>
<td></td>
<td>0.664</td>
<td></td>
</tr>
<tr>
<td>Likelihood that the seller will continue its activities in a similar way</td>
<td></td>
<td></td>
<td>0.635</td>
<td></td>
</tr>
<tr>
<td>The reputation of the supplier for quality, price, delivery</td>
<td></td>
<td></td>
<td>0.628</td>
<td>0.410</td>
</tr>
<tr>
<td>The supplier had been chosen because of good reputation</td>
<td></td>
<td></td>
<td>0.787</td>
<td></td>
</tr>
<tr>
<td>The supplier had been chosen because of his technical skills</td>
<td></td>
<td></td>
<td>0.787</td>
<td></td>
</tr>
<tr>
<td>The supplier had been chosen because he had been fair in negotiations</td>
<td></td>
<td></td>
<td>0.716</td>
<td></td>
</tr>
<tr>
<td>The supplier had been chosen because he could be counted on to act as expected</td>
<td></td>
<td></td>
<td>0.429</td>
<td>0.716</td>
</tr>
<tr>
<td>The supplier had been chosen because of rich resources of capital and labor</td>
<td></td>
<td></td>
<td>0.661</td>
<td></td>
</tr>
<tr>
<td>Agreed expectations of each other on the way to cooperate</td>
<td></td>
<td></td>
<td>0.761</td>
<td></td>
</tr>
<tr>
<td>Scenario development with broad consensus on relationship option values</td>
<td></td>
<td></td>
<td>0.710</td>
<td></td>
</tr>
<tr>
<td>Mutual dependence: both the dependence of your company with respect to the supplier and the dependence of the supplier with respect to your company</td>
<td></td>
<td></td>
<td>0.707</td>
<td></td>
</tr>
<tr>
<td>Possibilities for extending the relationship to new businesses, markets, technologies etc.</td>
<td></td>
<td></td>
<td>0.426</td>
<td>0.573</td>
</tr>
</tbody>
</table>

#### 3.2.1 Dependent variables

Previous empirical studies on the relation between trust and controls focused on governance efficiency or satisfaction (e.g. Lui & Ngo, 2004; Poppo & Zenger, 2002). However, these types of analyses do not reveal what type of governance mechanisms are used to counter different types of risks. Therefore this study has two independent variables: perceived performance risk and perceived relational risk.

**Perceived Performance Risk.** We measure perceived performance risk with two items derived from Agarwal & Teas (2001). These items reflect the combined performance risk that, after taking into account the control systems in place and information gathered, the product may not perform as described or the product may not work satisfactorily. The Cronbach’s alpha for this construct is 0.78.
**Perceived Relational Risk.** This measure is based on Das & Teng’s (2001b) approach of measuring relational risk. The construct includes four items to assess four types of risks, again taking into account the control systems in place and information gathered. We the buyers expects that (i) the supplier may not carry out its duties if it is not checked up, (ii) the supplier may not always do things that he promises to do, (iii) the supplier may not be fair in its dealings, and (iv) the interests of the supplier may conflict with the buyer’s interests. The Cronbach’s alpha for this construct is 0.96.

### 3.2.2 Independent variables

**Outcome Control.** This five-item construct is based on the constructs used by de Mortanges & Vossen (1999) and Jaworski & MacInnis (1989). The items focus on setting targets and comparing outcomes, without interfering in the procedures the supplier uses to obtain his goals. The five statements were: (i) we established specific performance goals for the supplier, (ii) we monitored the extent to which the supplier attains the performance goals, (iii) if the supplier did not meet the performance goals, he was required to explain why, (iv) we gave feedback concerning the extent to which the supplier achieved his goals and (iv) the supplier’s rewards were based upon how his performance compared to the goals. Cronbach’s alpha for this construct is 0.87.

**Behavioral Control.** The behavioral control construct is derived from the constructs used by de Mortanges & Vossen (1999) and Jaworski and MacInnis (1989). The construct includes six items that focus on the procedures to achieve certain goals (*how* goals are obtained, and not so much the *extent* in which goals are obtained). The construct involved the following six statements: (i) we monitored the extent to which the supplier followed established procedures, (ii) we evaluated the procedures the supplier used to accomplish a given task, (iii) we tried to modify the supplier’s procedures when desired results were not obtained, (iv) we gave the supplier feedback on how he accomplished his performance goals, (v) we participated in the costs of certain activities if they were carried out according to our guidelines and (vi) to be able to evaluate the supplier’s methods, the supplier had to report periodically. The Cronbach’s alpha for this construct is 0.91.

**Goodwill Trust.** We measure goodwill trust between the buyer and the seller, as perceived by the buyer, based on a scale developed by Zaheer et al. (1998) and Lui & Ngo (2004). The construct includes two items. The first item asked whether the supplier had been chosen because he had been fair in negotiations and the second whether the supplier had been chosen because he could be counted on to act as expected. The construct has a Cronbach’s alpha of 0.84.

**Competence Trust.** This construct is based on Lui & Ngo (2004)’s scale for competence trust. We added one item to reflect the importance of technical skills in IT purchase decisions. The items asked whether the supplier had been chosen for (i) his good reputation, (ii) his rich resources of capital and labor and (iii) his technical skills. The Cronbach’s alpha for this construct is 0.79.
Type 1 Information. The information constructs are derived from Tomkins’ (2001) detailed listings of information characteristics for Type 1 and Type 2 information. Type 1 information is information to warrant trust. The construct consists of five items. More specifically, we asked buyers to indicate to which extent following information was pursued or exchanged: (i) the reputation of the supplier for quality, price, delivery, (ii) the likelihood that the seller will continue its activities in a similar way, (iii) information on the reliability of achieving milestones (e.g. costs and quality), (iv) adaptiveness of supplier’s technology development to the buyer’s needs and (v) mutual knowledge of technology development plans. The Cronbach’s alpha for this construct is 0.84.

Type 2 Information. The Type 2 information construct was also derived from Tomkins (2001) detailed listings of information characteristics. Type 2 information is information to master events together. The construct consists of four items. More specific, we asked buyers to indicate to which extent following information was pursued or exchanged: (i) mutual dependence, (ii) scenario development with broad consensus on relationship option values, (iii) agreed expectations of each other on the way to cooperate and (iv) possibilities for extending the relationship to new businesses, markets, technologies etc. The Cronbach’s alpha for this construct is 0.78.

Control variables. We included several control variables to further specify the model. Transaction Cost Economics is based on the notion that firms choose efficient organizational forms or governance structures based on transactional issues, such as firm-specific investments and uncertainty. Empirical work in the Transaction Cost literature uses transaction properties and characteristics of the relationship between the transacting partners to proxy for transaction hazards that explain firms’ choices about organizational boundaries (e.g. Anderson & Dekker, 2005). Milgrom & Roberts (1992) identified five characteristics of transactions that give rise to information asymmetries and opportunistic hazards: (i) uncertainty in assessing performance, (ii) infrequency of transacting, (iii) investments in transaction-specific assets, (iv) task complexity, and (v) interdependencies with other transactions. In our research setting, interdependence among transactions does not apply (cf. Anderson & Dekker, 2005): although the IT purchases are often comprised of bundles of products and services (i.e. task complexity), they typically do not reflect a bundle of products and services purchased from different suppliers (i.e. interdependence). The other transaction characteristics are represented in our analysis.

The constructs for transaction characteristics (Uncertainty, Asset Specificity, Task Complexity and Size) were derived from Anderson & Dekker (2005). Uncertainty (α = 0.75) reflects the difficulty of defining ex ante and verifying ex post the products and services for which the parties are contracting. Asset specificity (α = 0.81) refers to exposure of the transacting parties to ex post opportunistic hold-up that is caused by significant investments in human or physical assets that have little or no value outside of the transaction. Task complexity (α = 0.60) introduces ambiguity about the cause of possible transaction failure, which in turn makes it difficult to apportion blame between the transacting partners. In addition, complexity creates a need for
coordination among transaction partners. Size is used as a proxy for transaction frequency, which is intended to capture the degree to which future transaction opportunities serve as a bond against opportunism in the present period. Complex IT transactions are unlikely to be repeated in substance for any pair of transaction partners. However, it makes sense to control for size as large IT projects take some time to complete and are typically paid in installments in proportion to work completed (Anderson & Dekker, 2005).

Two critical characteristics of the relationship are the buyer’s dependence (i.e. supplier bargaining power) and competition in supplier markets (Porter, 1980). Dependence Buyer \((\alpha = 0.80)\) was derived from Buvik & Reve (2002) and reflects the buyer's costs and efforts associated with the replacement of the supplier. Competition \((\alpha = 0.85)\) was derived from Anderson & Dekker (2005). As compared to other measures of transaction and relation characteristics, the intensity of competition in the supplier’s product market is typically a relationship characteristic that reduces transaction hazards. Finally we also identified whether partners had transacted before or not. We measure Prior Relationship as dummy variable (cf. Lui & Ngo, 2002). Its value equaled 1 if the buyer and the supplier had previous dealings, and 0 otherwise. Panel C of Table 3.2 provides a detailed description of the control variables.

4. Results

Table 3.4 provides a correlation matrix of the constructs. The correlation matrix shows that all governance mechanisms are positively correlated with one another, while each of the governance mechanisms is negatively correlated with perceived performance risk and relational risk. Not surprisingly, we find that the two types of formal control, the two types of trust and the two types of information are positively and relatively highly correlated (respectively 66%, 59% and 55%). However, these values do not present serious concerns for multicollinearity. Furthermore, we find almost no significant correlations between the transaction characteristics and the two forms of perceived risk. Perceived risk is thus more strongly correlated with the governance mechanisms in place than with the characteristics of transaction. The transaction characteristics are positively correlated with formal controls, but to a lesser extent with information and trust. Finally, as expected, we notice that having a prior relation is highly correlated with most of the variables in the study: having a prior relation is negatively correlated with perceived risk as well as with the use of formal controls. On the other hand, a prior relation is positively correlated with both types of information. On the other hand, a prior relation is positively correlated with both types of information. Finally, although prior studies have repeatedly used prior relation as a proxy for trust (e.g. Gulati & Singh, 1998; Dekker, 2003b), we only find modest correlations between prior relation and trust. This is consistent with other studies that also only found a moderate correlation between prior relation and these two forms of trust (e.g. Lui & Ngo, 2004).

We used multiple OLS regressions to examine the hypothesized effects of governance mechanisms on perceived performance risk and perceived relational risk. Table 3.5 reports the regression results of the relation between perceived risk (relational as well as performance risk) and the different types of governance mechanisms for the full sample \((N = 287)\). Results presented in this table are used to discuss hypotheses H1
Table 3.4: Pearson correlation matrix
This table reports the Pearson correlation matrix for the dependent and independent variables. N = 287 and ***, **, * indicates that the correlation is significant at the 0.01, 0.05, 0.10 level in a two-tailed test.

<table>
<thead>
<tr>
<th></th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
<th>7.</th>
<th>8.</th>
<th>9.</th>
<th>10.</th>
<th>11.</th>
<th>12.</th>
<th>13.</th>
<th>14.</th>
<th>15.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>0.31***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>-0.27***</td>
<td>-0.09</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>-0.18***</td>
<td>-0.18***</td>
<td>0.66***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>-0.30***</td>
<td>-0.36***</td>
<td>0.31***</td>
<td>0.42***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>-0.38***</td>
<td>-0.16***</td>
<td>0.36***</td>
<td>0.36***</td>
<td>0.55***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>-0.40***</td>
<td>-0.14***</td>
<td>0.29***</td>
<td>0.32***</td>
<td>0.36***</td>
<td>0.35***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>-0.33***</td>
<td>-0.38***</td>
<td>0.27***</td>
<td>0.36***</td>
<td>0.46***</td>
<td>0.27***</td>
<td>0.59***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>-0.02</td>
<td>0.07</td>
<td>0.30</td>
<td>0.18***</td>
<td>-0.07***</td>
<td>-0.04***</td>
<td>0.09**</td>
<td>0.02**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>-0.05</td>
<td>-0.06</td>
<td>0.19***</td>
<td>0.28***</td>
<td>0.17***</td>
<td>0.12***</td>
<td>0.03**</td>
<td>0.06***</td>
<td>0.25***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>0.11**</td>
<td>0.02</td>
<td>0.22***</td>
<td>0.36***</td>
<td>0.19***</td>
<td>-0.05**</td>
<td>0.09***</td>
<td>0.16***</td>
<td>0.26***</td>
<td>0.37***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>0.07</td>
<td>0.14**</td>
<td>0.10</td>
<td>0.12**</td>
<td>0.05</td>
<td>0.07**</td>
<td>0.06**</td>
<td>0.09**</td>
<td>0.03**</td>
<td>0.02**</td>
<td>0.09**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>0.07</td>
<td>-0.01</td>
<td>-0.04</td>
<td>0.11**</td>
<td>0.04</td>
<td>-0.01</td>
<td>0.00</td>
<td>0.01***</td>
<td>-0.17***</td>
<td>-0.15***</td>
<td>0.01**</td>
<td>-0.09**</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>0.00</td>
<td>-0.09</td>
<td>0.19***</td>
<td>0.23***</td>
<td>0.21***</td>
<td>0.20***</td>
<td>0.05***</td>
<td>0.13***</td>
<td>0.20***</td>
<td>0.26***</td>
<td>0.29***</td>
<td>0.11**</td>
<td>-0.12***</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>-0.20***</td>
<td>-0.22***</td>
<td>-0.14***</td>
<td>-0.19***</td>
<td>0.19***</td>
<td>0.14***</td>
<td>0.03***</td>
<td>0.16***</td>
<td>-0.19***</td>
<td>-0.21***</td>
<td>-0.20***</td>
<td>-0.03***</td>
<td>-0.04***</td>
<td>0.00***</td>
<td>1.00</td>
</tr>
</tbody>
</table>

4.1 Relation between perceived risk and the different dimensions of the governance mechanisms

Hypothesis 1 predicts that perceived relational risk will be reduced more effectively by goodwill trust (H1a), behavior control (H1b) and by Type 1 information (H1c), than by respectively competence trust, outcome control and Type 2 information. In accordance with H1a, we observe in Model 1 of Table 3.5 a strong and negative impact from goodwill trust on perceived relational risk (b = -0.44, p < 0.01). On the other hand, we
find no significant effect of competence trust on relational risk. Although competence trust is negatively correlated with relational risk ($r = -0.14, p < 0.05$ in Table 3.4), this effect is not significant once we control for goodwill trust. Model 2 in Table 3.5 provides support for hypothesis H1b. As expected, we find a strong negative effect of behavioral controls on relational risk ($b = -0.23, p < 0.01$). No significant effect of outcome control on relational risk is found. Finally, we tested whether perceived relational risk is more effectively reduced by Type 1 information than by Type 2 information. The Pearson correlation matrix in Table 3.4 indicates that Type 1 as well as Type 2 information are strongly and negatively related with perceived relational risk (respectively $r = -0.36$ and $r = -0.16$). Model 3 in Table 3.5 indicates that only Type 1 ($b = -0.45, p < 0.01$) significantly reduces relational risk when both types of information are regressed on perceived relational risk. Together these results provide strong support for hypothesis H1.

Table 3.5: Relation between perceived risk and governance mechanisms

This table presents the regression analyses of the relation between perceived risk and the different types of governance mechanisms. The dependent variable in models 1-3 is perceived relational risk (a composite construct of four items measured on a 5-point Likert scale as presented in Table 3.2 Panel A) and the dependent variable for models 4-6 is perceived performance risk (a composite construct of two items measured on a 5-point Likert scale as presented in Table 3.2 Panel A). In each cell we report the coefficient estimate, the t-statistic (in parentheses) and the standardized coefficients. N= 287 and ***, **, * indicates a p-value of ≤ 0.01, 0.05, 0.10 in a two-tailed test.
Models 4, 5 and 6 examine whether perceived performance risk is reduced more effectively by competence trust (H2a), by outcome control (H2b), and by Type 2 information (H2c) than by respectively goodwill trust, behavioral control and Type 1 information. Model 4 shows that goodwill trust as well as competence trust both significantly reduce perceived performance risk. The effect of competence trust is stronger than the effect of goodwill trust (beta = -0.32, p < 0.01 vs. beta = -0.15, p < 0.05). This result supports hypothesis H2a. Model 5 shows that outcome control (beta = -0.25, p < 0.01) is more effective in reducing perceived performance risk than behavioral control (b = -0.13, p > 0.10). These results provide strong support for hypothesis H2b. Finally, the data also supports H2c: Model 6 shows that Type 2 information (beta = -0.29, p < 0.01) is more effective than Type 1 (beta = -0.16, p < 0.05) in reducing perceived performance risk. Together these results strongly support H2.

4.2 The joint effects of different governance mechanisms on perceived risk

Our expectations of the effects of the different dimensions of the governance mechanisms on the different types of perceived risk are thus supported by the data. Models 7 and 8 in Table 3.6 test the overall effect of the different governance mechanisms on respectively perceived relational risk and perceived performance risk to examine the relative importance of these different governance mechanisms.

For the full sample, the results indicate that in particular trust and information reduce perceived risk, while control systems seem less effective. First, behavioral control does not significantly reduce perceived relational risk once we control for goodwill trust and Type 1 information. Secondly, the significance of outcome control in reducing perceived performance risk drops substantially if we control for competence trust and Type 2 information (from 1% level to 10% level).

However, Models 7 and 8 indicate that there are some important differences between the two sub-groups (PR vs. NPR). First, we discuss the results for perceived relational risk. The results show that perceived relational risk for the NPR group is mainly reduced by Type 1 information (beta = -0.25, p < 0.05) and by behavioral control (beta = -0.22, p < 0.10). Furthermore, we notice that for the NPR group the effectiveness of goodwill trust in reducing perceived relational risk drops to a non-significant level if we control for behavioral control and Type 1 information. For, the NPR group, we find even an unexpected significant and positive effect of competence trust on relational risk (b = 0.30, p < 0.05). Competence trust and relational risk are uncorrelated (r = 0.00, ns) for this sub-group (not reported). The effect of competence trust on relational risk becomes positive once we behavioral control for goodwill trust. Perhaps one reason for this unexpected effect is that buyers that have not transacted before with a particular supplier, are willing to compromise on relational risk, as long as the supplier has the technical skills at his disposal. As competence trust increases, a firm may actually expose itself to higher risks of opportunism (Das & Teng, 2001a; Madhok, 1995). If the buyer is confident of the supplier’s ability to perform as expected, he may increase the scope of cooperation. This may
lock the buyer firm in and expose it to the risk of opportunistic behavior from the partner. High competence trust may therefore increase vulnerability to opportunism (Lui & Ngo, 2004).

**Table 3.6: Relation between perceived risk and governance mechanisms for groups with and without a prior relation**

This table presents the regression results of the joint effects of different types of governance mechanisms on perceived risk for the full sample as well as for sub-groups of buyer-supplier relations with (PR, N = 164) and without (NPR, N = 123) a prior relation. The dependent variable in model 7 is perceived relational risk (a composite construct of four items measured on a 5-point Likert scale as presented in Table 3.2 Panel A) and the dependent variable for models 8 is perceived performance risk (a composite construct of two items measured on a 5-point Likert scale as presented in Table 3.2 Panel A). In each cell we report the coefficient estimate, the t-statistic (in parentheses) and the standardized coefficients. ***, **, * indicates a p-value of ≤0.01, 0.01, 0.10 in a two-tailed test.

<table>
<thead>
<tr>
<th></th>
<th>Perceived relational risk</th>
<th>Perceived performance risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 7</td>
<td>Model 8</td>
</tr>
<tr>
<td></td>
<td>Full sample NPR</td>
<td>PR</td>
</tr>
<tr>
<td>Intercept</td>
<td>3.33 (0.57)**</td>
<td>3.20 (5.17)**</td>
</tr>
<tr>
<td>Goodwill trust</td>
<td>-0.36 (-4.85)**</td>
<td>-0.19 (-1.45)</td>
</tr>
<tr>
<td>Competence trust</td>
<td>0.15 (1.90)*</td>
<td>0.30 (2.33)**</td>
</tr>
<tr>
<td>Behavioral control</td>
<td>-0.09 (-1.22)</td>
<td>-0.21 (-1.68)*</td>
</tr>
<tr>
<td>Outcome control</td>
<td>0.03 (0.40)</td>
<td>0.06 (0.48)</td>
</tr>
<tr>
<td>Type 1 info</td>
<td>-0.28 (-3.07)**</td>
<td>-0.32 (-2.03)**</td>
</tr>
<tr>
<td>Type 2 info</td>
<td>0.07 (0.74)</td>
<td>0.08 (0.51)</td>
</tr>
<tr>
<td>Prior relation</td>
<td>-0.24 (-2.25)**</td>
<td>-0.13 (-2.63)**</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>0.02 (0.37)</td>
<td>0.01 (0.06)</td>
</tr>
<tr>
<td>Asset specificity</td>
<td>0.10 (2.03)**</td>
<td>-0.00 (-0.03)</td>
</tr>
<tr>
<td>Size</td>
<td>-0.04 (-1.03)</td>
<td>-0.04 (-0.53)</td>
</tr>
<tr>
<td>Task complexity</td>
<td>0.08 (1.17)**</td>
<td>0.04 (1.03)</td>
</tr>
<tr>
<td>Dependence</td>
<td>-0.04 (-1.73)</td>
<td>-0.07 (-0.84)</td>
</tr>
<tr>
<td>Competition</td>
<td>0.01 (-0.17)</td>
<td>-0.01 (-0.12)</td>
</tr>
<tr>
<td>F value</td>
<td>7.45** (2.89)**</td>
<td>2.89** (6.01)**</td>
</tr>
<tr>
<td>R2</td>
<td>0.26 (0.26)</td>
<td>0.24 (0.24)</td>
</tr>
<tr>
<td>Adj R2</td>
<td>0.23 (0.23)</td>
<td>0.16 (0.16)</td>
</tr>
</tbody>
</table>

On the other hand, the results for the PR group indicate that goodwill trust and Type 1 information significantly reduce perceived relational risk. Interestingly, the standardized coefficients indicate that goodwill trust is almost twice as effective in reducing perceived relational risk as Type 1 information (beta = -0.41 vs. beta = -0.22, both p < 0.01). In contrast, behavioral control does not reduce perceived relational risk for the PR group. Together these results suggest that buyers in the NPR group reduces perceived relational risk mainly through gathering Type 1 information and by imposing behavioral controls, while buyers in the
PR group mainly rely on goodwill trust and in the second place on Type 1 information. These results provide support for H3. These findings suggest that partners will not unnecessarily use expensive formal control mechanisms and in addition risk damaging the quality of their relationship (Dekker, 2004).

Furthermore, we tested whether the dynamic view also holds for perceived performance risk. More specifically, we expect that perceived performance risk will be reduced more effectively by outcome control and Type 2 information for the NPR group and by competence trust for the PR group. Model 8 in Table 3.6 presents the results. Overall, results for the PR and the NPR group are very similar for both sub-groups. Perceived performance risk is in the first place reduced by competence trust and in the second place by Type 2 information. We find no significant effect of outcome control on perceived performance risk, not even for the NPR group. This is not in line with what we expected in H4. In unreported analyses we ran Model 5 for two the subgroups (PR vs. NPR) separately. The analyses revealed that outcome control reduces significantly performance risk, especially for the NPR group (at the 1% level). However, as can be derived from Model 8, the effect of outcome control on perceived performance risk drops for both sub-groups to a non-significant level once the model controls for Type 2 information and competence trust. So, contrary to what we expected in H4, output control, in comparison to Type 2 information and competence trust, seems less effective in reducing perceived performance risk, even at an early stage of the relation. A possible explanation is that outcome-based controls require that the buyer can clearly set standards of desirable and expected performance and that these can be effectively measured. The rather complex and uncertain nature of the transactions in this study (average product complexity = 3.83 and average environmental uncertainty = 3.14 for the NPR group, both measured on a scale from 1 to 5) may have prevented the firms to install effective outcome controls32.

4.3 Does trust substitute information and control at later stages of the relation?

Our analyses so far, clearly indicate that trust, control and information are complex, multidimensional constructs and that they have distinct impacts on two dimensions of perceived risk. Based on Tomkins (2001) and Dekker (2004) we expect that the relation between trust and respectively information and formal control is non-linear, i.e. we expect that trust complements formal control and information at early stages of the relation, while we expect that trust will substitute (to a certain extent) formal control and information at later stages. We found already some evidence for these hypotheses through the analyses on the joint effects of the different governance mechanisms (cf. section 4.2). In order to more formally test these substitutive effects, we ran a set of regression analyses that include the interaction effects between trust and respectively information and formal control. The variables were mean-centered to reduce the potential problems of multicollinearity before the creation of the interaction terms (cf. Cronbach, 1987). Examination of the variance inflation factors (VIF) associated with each regression coefficient showed no serious problems of multicollinearity. Most VIF

---

32 Some support for this idea is found when Model 8 is performed on a sub-sample of transactions with environmental uncertainty lower than 3.5. In this analysis we find that outcome control is an important and significant factor in reducing perceived performance risk, even after controlling for trust and information. Despite this support, we can not rule out other explanations. Recall that perceived risk was measured after taking into account the control systems in place. An alternative explanation can therefore be that outcome controls were already effectively included to reduce perceived performance risk.
values ranged between 1 and 2, although some interaction terms were associated with higher VIF values, the maximum value being 4.5. These values are well below the recommended threshold value of 10 (Hair et al., 1998). Table 3.7 presents the results.

4.3.1 The relation between trust and information

Based on Tomkins (2001), we expect that trust complements the need for information at early stages of the relation, while at later stages in the relation, we expect that trust will substitute information. Model 9 on perceived performance risk is the same model as Model 7, except that it also introduces the interaction effects between trust and information. As expected, we find for the PR group a positive and significant interaction effect of goodwill trust and Type 1 information on perceived relational risk \( (b = 0.21, p < 0.10) \). This interaction effect is not significant for the NPR group \( (b = 0.07, \text{ns}) \). This result implies that goodwill trust substitutes the need for Type 1 information for the PR group, but not for the NPR group. We also find a positive and significant interaction effect of competence trust and Type 2 information on perceived performance risk \( (b = 0.24, p < 0.05) \). Again this interaction effect is not significant for the NPR group \( (b = -0.13, \text{ns}) \).

In conclusion: although we find no evidence for the complementary role of trust and information for the NPR group, we find, as expected in H3, evidence of the substitutive effects of these two governance mechanisms for the PR group. Together these results provide support for Tomkins (2001) description of the relationship between trust and information during different stages of the relationship life cycle as an inverted U-shape: in the early stage of the relationship both trust and information help reducing perceived risk, while later on these two governance mechanisms become substitutes. It is important to distinguish between the different dimensions of trust and information since goodwill trust only substitutes Type 1 information and competence trust only substitute Type 2 information.

No other interactions between information and trust were identified, except for the NPR group where the interaction term between competence trust and Type 1 information has a significant negative impact on perceived relational risk \( (b = -0.33, p < 0.10) \). This interaction effect should be interpreted in light of the positive effect of competence trust on perceived relational risk that we discussed above. We reasoned that buyers that have not transacted before with a particular supplier, may be willing to compromise on relational risk as long as the supplier has the necessary technical skills at his disposal. The negative interaction term takes away this positive effect of competence trust on perceived relational risk for buyers with high levels of Type 1 information; this is information to warrant trust. So for buyers with sufficient information on the trustworthiness of their partner (Type 1 information), competence trust no longer increases perceived relational risk.
Table 3.7: Interaction effects between different governance mechanisms

This table presents the regression results of the joint effects of different types of governance mechanisms and their interaction effects on perceived risk for sub-groups of buyer-supplier relations with (PR, N = 164) and without (NPR, N = 123) a prior relation. The dependent variables are perceived relational risk and perceived performance risk (composite constructs as presented in Table 3.2 Panel A). Model 9 presents the results for interaction effects between trust and information, Model 10 presents the interaction effects for trust and control. In each cell we report the coefficient estimate, the t-statistic (in parentheses) and the standardized coefficients. ***, **, * indicates a p-value of ≤ 0.01, 0.05, 0.10 in a two-tailed test.

### Table 3.7: Interaction effects between different governance mechanisms

<table>
<thead>
<tr>
<th></th>
<th>Perceived relational risk</th>
<th>Perceived performance risk</th>
<th>Perceived relational risk</th>
<th>Perceived performance risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NPR PR</td>
<td>NPR PR</td>
<td>NPR PR</td>
<td>NPR PR</td>
</tr>
<tr>
<td>Intercept</td>
<td>2.81 (4.38)**</td>
<td>2.72 (4.72)**</td>
<td>4.79 (8.94)**</td>
<td>3.62 (7.36)**</td>
</tr>
<tr>
<td>Goodwill trust</td>
<td>-0.13 (-0.90)</td>
<td>-0.15 (-1.15)</td>
<td>-0.30 (-2.87)**</td>
<td>-0.11 (-0.73)</td>
</tr>
<tr>
<td>Competence trust</td>
<td>0.24 (1.81)*</td>
<td>0.29 (2.11)**</td>
<td>0.03 (0.25)</td>
<td>-0.20 (-1.88)*</td>
</tr>
<tr>
<td>Behavioral control</td>
<td>-0.21 (-1.57)</td>
<td>-0.17 (-1.17)</td>
<td>-0.02 (-0.16)</td>
<td>-0.13 (-0.25)</td>
</tr>
<tr>
<td>Outcome control</td>
<td>0.05 (0.42)</td>
<td>0.02 (0.16)</td>
<td>-0.03 (-0.11)</td>
<td>-0.11 (-0.10)</td>
</tr>
<tr>
<td>Competence trust *</td>
<td>0.07 (1.46)</td>
<td>0.07 (1.18)</td>
<td>0.14 (1.18)</td>
<td>0.07 (1.18)</td>
</tr>
<tr>
<td>Goodwill trust *</td>
<td>0.00 (0.30)</td>
<td>-0.09 (-0.63)</td>
<td>-0.13 (-1.20)</td>
<td>-0.13 (-1.20)</td>
</tr>
<tr>
<td>Competence trust *</td>
<td>0.19 (1.04)</td>
<td>-0.13 (-0.87)</td>
<td>0.24 (1.24)**</td>
<td>0.00 (0.10)</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>-0.02 (-0.17)</td>
<td>-0.04 (-0.16)</td>
<td>0.04 (0.62)</td>
<td>0.00 (0.09)</td>
</tr>
<tr>
<td>Asset specificity</td>
<td>0.00 (0.02)</td>
<td>0.09 (1.32)</td>
<td>1.11 (2.28)**</td>
<td>0.07 (0.78)</td>
</tr>
<tr>
<td>Size</td>
<td>0.02 (0.24)</td>
<td>0.09 (0.80)</td>
<td>-0.03 (-0.74)</td>
<td>-0.07 (-0.74)</td>
</tr>
<tr>
<td>Task complexity</td>
<td>0.05 (1.02)</td>
<td>0.03 (0.69)</td>
<td>0.16 (1.55)</td>
<td>0.03 (1.24)**</td>
</tr>
<tr>
<td>Dependence</td>
<td>-0.08 (-0.95)</td>
<td>0.07 (1.0)</td>
<td>0.02 (0.69)</td>
<td>-0.11 (0.10)</td>
</tr>
<tr>
<td>Competition</td>
<td>-0.02 (-0.25)</td>
<td>0.03 (0.10)</td>
<td>-0.03 (0.10)</td>
<td>-0.05 (0.59)</td>
</tr>
<tr>
<td>F value</td>
<td>2.41***</td>
<td>3.34***</td>
<td>4.66***</td>
<td>2.63***</td>
</tr>
<tr>
<td>R2</td>
<td>0.27 (0.27)</td>
<td>0.34 (0.30)</td>
<td>0.31 (0.31)</td>
<td>0.28 (0.37)</td>
</tr>
<tr>
<td>Adj R2</td>
<td>0.16 (0.16)</td>
<td>0.28 (0.28)</td>
<td>0.23 (0.23)</td>
<td>0.18 (0.18)</td>
</tr>
</tbody>
</table>

**Note:** Table 3.7 presents the regression results of the joint effects of different types of governance mechanisms and their interaction effects on perceived risk for sub-groups of buyer-supplier relations with (PR, N = 164) and without (NPR, N = 123) a prior relation. The dependent variables are perceived relational risk and perceived performance risk (composite constructs as presented in Table 3.2 Panel A). Model 9 presents the results for interaction effects between trust and information, Model 10 presents the interaction effects for trust and control. In each cell we report the coefficient estimate, the t-statistic (in parentheses) and the standardized coefficients. ***, **, * indicates a p-value of ≤ 0.01, 0.05, 0.10 in a two-tailed test.
4.3.2 The relation between trust and controls

Model 10 provides the results for the interaction effects between the different types of trust and control. First, we discuss the results for perceived relational risk. We find for the NPR group no significant effect of goodwill trust and behavioral controls on perceived relational risk. On the other hand, for the PR group, we find, as expected a positive and significant interaction effect (b = 0.20, p < 0.10) of goodwill trust and behavioral control on perceived relational risk. Although the idea that goodwill trust will enhance the effectiveness of behavioral controls in an early stage of the relation is not supported by the data, the findings support the idea that behavior control undermines goodwill trust for relations with a prior relation (H3). Finally, while the interaction term between competence trust and outcome control gives evidence of a strong complementary role for the NPR group (b = -0.48, p < 0.01), we see that the interaction effect becomes positive for the PR group (b = 0.07, ns). Although the effect is not significant, it provides some support for the idea that the complementary role between competence trust and outcome control in an early stage of the relation becomes a substituting role at later stages of the relation (H4).

Model 10 also reveals some unexpected interaction effects. For, the NPR group, we find a significant (at 10% level) and positive interaction effect of competence trust and outcome control on relational risk. This effect is in line with the other unexpected results we discussed above, namely that competence trust increases perceived relational risk in the NPR group. We reasoned that a buyer that has not transacted before with a particular supplier, is maybe willing to compromise on relational risk, as long as the supplier has the technical skills at his disposal. Apparently, imposing outcomes controls increases this effect. A possible explanation is that a buyer that has not transacted before with a particular supplier, may focus on reducing performance risk by choosing a supplier for whom the buyer has a strong competence trust and for whom he expects that outcome controls will be effective, while being aware that this may actually jeopardize his relation with the supplier and in fact increase relational risk. So again, by focusing on performance risk, and thus on outcome control and competence trust, a firm may actually expose itself to higher risks of opportunism (Lui & Ngo, 2004; Das & Teng, 2001a; Madhok, 1995).

The second unexpected interaction effect for the NPR group in Model 10 is a significant negative interaction effect of competence trust and behavioral controls on performance risk (b = -0.19, p < 0.05). A possible explanation is that the increased vulnerability to potential opportunism that arises from high competence trust can be countered by formal controls which specify the basic behavior of partners and lay down punishment for opportunism (Lui & Ngo, 2004).

5. Discussion and conclusion

Overall, we believe that this paper refines and extends the literature regarding the interplay between different governance mechanisms in inter-firm relationships. It appears that it is the combined impact of trust, control and information that lead to confidence in partner cooperation and reduced perceived risk in inter-firm
relations. Primarily building on the studies of Das & Teng (2001a), Tomkins (2001) and Dekker (2004), we hypothesize and find evidence of the multidimensional nature of these governance mechanisms. We also distinguish between two types of perceived risk: relational and performance risk because depending on which risk is perceived to be more of a threat, decision makers decide on the governance strategy that is best for them (Das & Teng, 1998, 2001b). A key finding of this study is that information constitutes an important inter-firm governance mechanism. Prior studies (e.g. Das & Teng, 2001a) typically focused on the relation between trust and controls, ignoring the role of information. Finally, we distinguished relations with prior ties from those without prior ties and we find that formal controls and information are more effective in reducing perceived risk at early stages of the relation, while trust become more important at later stages of the relationship.

More specifically we expected that perceived relational risk is reduced more effectively by goodwill trust, behavior control and by Type 1 information (i.e. information to warrant trust), than by respectively competence trust, outcome control and Type 2 information (i.e. information for the mastery of events). On the other hand, we hypothesized that perceived performance risk is reduced more effectively by competence trust, by outcome control, and by Type 2 information than by respectively goodwill trust, behavioral control and Type 1 information. In general, we find strong support for these hypotheses. While the statistical impact of trust and information is greater than the statistical impact of controls, all of them appear to be important to reduce perceived risk.

However, our analyses also reveal that there are some important differences between transactions with and without prior ties, supporting the idea of a more dynamic relation. If no prior ties with the seller exist, perceived relational risk of buyers is mainly reduced by Type 1 information and by behavioral control. However, behavioral controls are replaced by goodwill trust at later stages of the relation. These findings suggest that partners will not unnecessarily use expensive formal behavioral control mechanisms and in addition risk damaging the quality of their relationship.

We found weaker support for this dynamic view in relation to perceived performance risk. The effects of outcome control on performance risk become insignificant once we control for trust and information, even for transactions with no prior ties. A possible explanation is that the rather complex and uncertain nature of the transactions in this study, may have prevented the firms to install effective outcome controls. Future research should examine whether this dynamic view holds for less uncertain environments.

Finally, our analyses on the interaction effects between the different governance mechanisms showed some interesting results. Especially the relation between trust and information is interesting as this relation has, to our knowledge, not empirically been studied in the past. While information is an important governance mechanism, we find that, to a certain extent, trust replaces the need for information at later stages of the relation. These results provide some support for Tomkins (2001) description of the relationship between trust
and information during different stages of the relationship life cycle as an inverted U-shape: in the early stages of the relationship trust and information are additively related, while later on they become substitutes. It is important to distinguish between the different dimensions of trust and information as goodwill trust only substitutes Type 1 information and competence trust only substitutes Type 2 information. This finding reinforces the observation that it is necessary to identify specific relationships among the different dimensions of trust, information and control in inter-firm relations.

Our results have some important implications for managers. For instance, it may be important for firms to invest in greater Type 1 information when trust is based primarily on competence. This is because competence trust has the potential to encourage opportunistic behavior and may lead to less favorable cooperative outcomes. Our analyses also reveal that buyers try to reduce potential dangers of overly relying on competence trust by complementing it with behavioral control. It is important for managers to be aware of the need to cultivate an optimal mix of governance mechanisms because these governance mechanisms interact with each other. Decision makers also need to be aware of the potential (negative) impact of the governance mechanisms they employ on their partner. A recent study of Christ et al. (2006), for instance, indicates that behavioral control systems are perceived as more intrusive and as a greater threat to autonomy and therefore they may be more damaging to trust and cooperation than outcome control. More research is needed to understand the impact of governance mechanisms on the perception of the partner (i.e. the controlled firm). Finally, although it is interesting to study risk perceptions of the decision makers as an heuristic that helps understand the governance mechanisms they rely on, decision makers should be aware that perceived risk does not necessarily coincide with objective risk and that governance mechanisms may only provide the illusion of less uncertainty or more control.

Certain caveats are appropriate when interpreting the results of this study. In common with the majority of survey research, our study relied on a single informant. Our data reflect thus the perspective of one side of the partnership, raising the question whether the respondent was biased. Some studies have employed matched pairs of respondents from both transaction parties (e.g., Judge & Dooley, 2006). However, for the issues that we address, it is not obvious that a single respondent from the buyer presents serious limitations since this study focuses on how governance mechanisms influence the perceived risk of the buyer (cf. Anderson & Dekker, 2005). Therefore, we do not believe that the absence of the supplier perspective is a serious threat to our conclusions about the influence of governance mechanisms on perceived risk.

Since the data we gathered is essentially not longitudinal in nature, we must consider the possibility that, for example, some events (e.g. the occurrence of transaction problems later in the relationship) causes respondents to recall specific elements of the transaction differently than they might otherwise (cf. Anderson & Dekker, 2005). To partially offset these concern of recall bias, we carefully framed the reference time for each section of the survey. However, our cross-sectional sample design clearly constrains our capacity to carefully and fully examine the nature of the dynamics between the different governance mechanisms. Thus
longitudinal data or experimental methods are needed to further test the dynamics of these complex relationships.

We enhanced the external validity of this study in several ways. Focusing on joint ventures, strategic alliances, or consortia is a typical approach in many studies, which limits ex-ante the variance in governance mechanisms employed (Sobrero & Schrader, 1998). Furthermore, most of the previous studies on this topic constrained their sample to single industries (e.g. Zaheer and Venkatraman, 1995; Lui and Ngo, 2004; Judge & Dooley, 2006). We focused on a broader population across different industries and included a broad range of transactions in our study, including transactional relationships that vary from simple market transactions with few associated control problems to extensive and complicated transactions with potentially larger control problems. Notwithstanding these efforts to enhance the external validity, this study has some limitations that imply caution in generalizing the findings. We restricted our sample to SMEs in Flanders and their relation with a supplier of IT products and services as differences between small and large firms can lead to different IT items being outsourced and different outsourcing agreements governing these arrangements (Rohde, 2004). Moreover, the rapid changing IT environment create difficulties in task programmability and output measurability. Formal controls are therefore often difficult to implement in IT outsourcing, particular in the early stages of the relationship (Langfield-Smith & Smith, 2003). The relation between, and the need for, specific governance mechanisms may be very different in other types of business relationships. Tomkins (2001) and Das & Teng (2001a) made detailed listing of respectively information needs and formal control needs for different types of relations. For instance, in minority equity alliances competence trust is expected to be primordial for the investing firm, while for the recipient firm goodwill trust is expected to be more relevant (Das & Teng, 2001a). Examining more closely their proposals appears to be a prime area for future research.

Obviously, our models explain only a certain range of the total variation in perceived risk. Clearly, there remains much heterogeneity among inter-firm relations and in the contexts in which they are embedded. Differences in management structures between the partners, historical events such as a financial crisis and competitor responses are some of the many factors that influence inter-firm relations (Fryxell & Dooley, 2002) and consequently the risk perception of these relationships. This study could be refined with some extra control variables that were not included in the study. Das and Teng (2001b) point to a series of psychological characteristics of the decision maker (such as trust propensity) that may have an important influence on perceived risk. Furthermore, we only included one observation per buyer firm. Including a series of observations per buyer, would have provided us the possibility to sort out some firm specific effects on inter-firm governance systems, such as culture, style of dealing with outside partners, etc (Dekker, 2003b). Regardless, it seems unlikely that the inclusion of such controls would have negated our findings.

Off course, further study is required in our understanding about firms’ choices in governance mechanisms. Our paper focused on governance mechanisms and how they reduce perceived risk, while we controlled for
transaction and supplier characteristics that generate management control problems such as size, asset specificity, task complexity and competition. Prior studies have indicated the importance of adapting governance mechanisms to these transaction characteristics or hazards. Anderson & Dekker (2005), for instance, studied how different sets of terms of contracting (i.e. formal controls) are related to transaction characteristics and how misalignment between transaction hazards and several contract dimensions is related with higher transaction problems. Future research could extend their research by examining whether transaction hazards are related to the distinct dimensions of the governance mechanisms discussed in this paper (thus besides formal controls, also trust and information). Furthermore it is also promising to study whether these relations are different for transactions with serious problems than for successful transactions, i.e. making the link with performance (cf. Anderson & Dekker, 2005).

Another fruitful path for future research is to consider the cost/benefit trade-off between the different governance mechanisms. Governance mechanisms are not costless to develop (Parkhe, 1993). Our study did not take into account the costs related to install or maintain governance mechanisms. This focus underplays the cost/benefit trade-off.

Other trade-offs may also need a closer examination: while trust between partners may have many benefits (including a reduced perceived risk as described in this paper), recent studies have started to reveal some drawbacks of trust such as reduced information search (Krishnan et al., 2006). Future research is needed to understand how this affects cooperation and inter-firm performance.

This study reveals the importance of examining control, trust and information simultaneously in future inter-firm relations research. We hope that this study encourages new thinking and research into the dynamic and multidimensional nature of inter-firm governance mechanisms, and inspires practitioners in inter-firm relations to seek an appropriate balance between trust, control and information to achieve mutually beneficial ends.
Appendix A

Diagram of the expected relation between the governance mechanisms and perceived risk

Goodwill trust

Behavioral control

Type 1 information

Competence trust

Outcome control

Type 2 information

Perceived relational risk

Perceived performance risk

Prior relation

H1a

H1b

H1c

H2a

H2b

H2c

H3&4
General conclusion

The main findings of this dissertation were already discussed at the end of each manuscript. In this general conclusion, we briefly summarize the main contributions of the different manuscripts to the literature. We also address their managerial implications. Finally, we identify some limitations and provide a number of suggestions for further research.

1. Contributions to the literature

The first two manuscripts in this dissertation provide experimental evidence on the usefulness of Total Cost of Ownership (TCO) information as a Value Chain Analysis (VCA) tool for inter-firm cost management and resulting negotiations between buyers and suppliers. Although VCA has been described as a technique that can play an important role in the management of supply chain relationships, the extant literature provided little empirical evidence of its usefulness. The relevance of the concept for practice has therefore been criticized (Lord, 1996). Manuscript 1 & 2 contributes to this literature by providing evidence on how TCO information is used by decision makers for a VCA in inter-firm settings. The experiments show that cost information can be used to carry out a Value Chain Analysis (VCA) in order to reveal the cost-reduction potential and to exploit cost reduction potentials across the boundaries of companies.

Manuscript 1 & 2 also contribute to the accounting literature by explicitly testing the usefulness of the Total Cost of Ownership (TCO) concept as a tool for negotiation between buyers and suppliers, something that has been recurrently claimed in the literature (Ellram, 1995a & 1995b; Monczka et al., 2002; Roodhooft et al., 2003 & 2005). The idea is that the refined cost and cost driver information resulting from a TCO analysis can be used to optimize and better coordinate the performance of activities across the supply chain. However, empirical evidence for this claim had not yet been provided. Manuscript 1 & 2 provide evidence on the usefulness of TCO information for negotiating with suppliers. However, an important condition is that decision makers must be willing to share their private TCO information.

Manuscript 1 shows that contrary to what is popularly believed, more refined information (i.e. TCO information) does not always result in better outcomes. The results of manuscript 1 suggest that powerful buyers with refined TCO information may not realize all possible benefits from buyer-supplier interactions due to their bargaining strategy. Their (false) feeling of power causes an increase of distributive bargaining tactics and a reluctance to share the necessary information for inter-firm cost minimization. This finding adds to the literature that highlight the importance of information sharing to the effectiveness of buyer–supplier relationships (Bensaou, 1999; Drake & Haka, 2005), by identifying an important factor (i.e. power) that influences the usefulness of more refined cost information in buyer-supplier negotiations.
These experiment-based manuscripts also add to the undernourished intersection between accounting and negotiation. Although accounting information is widely acknowledged to provide the basis for many contractual agreements, the impact of accounting information on bargaining behavior has received little attention (Luft et al., 1998), especially in inter-firm settings (Peffer, 2000). Our experimental design allows us to look at the impact of information on the decision and the negotiation process as it gradually shows through actors’ behaviors. These elements received scant attention in the extant inter-firm literature (Ring & Van de Ven, 1994).

A final conclusion that we can draw from these experiment-based manuscripts is that information can serve as an important governance mechanism in inter-firm relations. Manuscript 1 showed that buyers with detailed cost information and less power than their opponent may gain control over their own outcomes by sharing information and by creating an integrative bargaining situation. Manuscript 2 provides evidence on how accounting information is able to serve as an important function in relational signaling and in building trust. Manuscript 2 shows that trust and relational norms were reinforced over time, and became important structural conditions of the relation that fostered a more cooperative climate and restrained the use of distributive behavior.

This final finding, namely that information can serve as a key governance mechanism in inter-firm relations, was further investigated in manuscript 3. Although many studies have implicitly referred to the importance of information for governing inter-firm relations, proactive information collection has seldom been explicitly studied for that purpose. Prior studies on inter-firm governance mechanisms mainly focused on the relation between trust and formal controls (e.g. Lui & Ngo, 2004; Luo, 2002; Madhok 1995; Nooteboom 1996; Poppo & Zenger, 2002; Woolthuis et al., 2005). The relation between information and formal inter-firm control systems and trust received however scant attention in the literature. This constitutes the main theoretical contribution of manuscript 3: the study extends prior frameworks on inter-firm control systems (e.g. Das & Teng, 2001a; van der Meer-Kooistra & Vosselman, 2000) by explicitly incorporating information as a governance mechanism for inter-firm relationships.

A final contribution to the literature is that manuscript 2 & 3 provide some important findings that may advance the wide-spread discussion in the literature on the substitutive or complementary role of different governance mechanisms. Manuscript 2 & 3 provide evidence that controls and information are more effective as governance mechanisms at early stages of the relation, while trust becomes more important at later stages of the relationship. These results emphasize the importance of taking into account the life cycle of the inter-firm relationship when studying the relation between different governance mechanisms. Finally, manuscript 3 also advances this literature by treating trust, formal control, information and risk as complex, multidimensional constructs. Previous studies on the relation between trust and controls typically treated the different governance mechanisms as uni-dimensional constructs. This has produced ambiguous conclusions.
about the relationship between these governance mechanisms. The findings of manuscript 3 clearly indicate that perceived relational risk is reduced more effectively by goodwill trust, behavior control and by Type 1 information (i.e. information to warrant trust), while perceived performance risk is more effectively reduced by competence trust, outcome control and Type 2 information (i.e. information for the mastery of events). In conclusion, to advance the discussion on the complementary or substitutive effects of different governance mechanisms, future research should take into account the life cycle of the relation and the multidimensional nature of the governance mechanisms.

2. Managerial implications

This dissertation provides empirical research on the impact of more refined cost and management accounting information on buyer-supplier relations and outcomes. Researching this topic is important because purchasing professionals in many companies still need to demonstrate the contribution they make to their firm (Carr & Pearson, 1999). In addition, the supply side of companies has become increasingly important over the last few decades. Costs of purchased goods and services represent the majority of total costs for most companies (Degraeve & Roodhooft, 2001). It is therefore relevant for purchasing firms to understand which negotiation approaches and which inter-firm management accounting and control tools will contribute to their success and profitability (Janda & Seshardi, 2001).

Managers, busy with cost system design, often claim that more refined cost systems are costly to design and to maintain. In addition, the difficulty of measuring and quantifying the benefits or even the lack of any perceived benefits derived from more refined cost information, are often arguments for firms not to implement more refined costing techniques (Innes & Mitchell, 1995). However, the results of manuscript 1 & 2 clearly indicate that in some circumstances refined cost information may be very beneficial.

The results of manuscript 1 indicate that the availability of detailed TCO information can alleviate the disadvantage dependent buyers face vis-à-vis a more powerful seller. This result has profound managerial implications. On the one hand, this result implies that less powerful buyers can compensate their power disadvantage by gathering more detailed cost information. On the other hand, powerful buyers do not seem to be able to use this more detailed cost information to enhance their power advantage so as to obtain an even higher individual profit than less powerful buyers with the same information. Powerful buyers with refined TCO information may thus not realize all possible benefits from buyer-supplier interactions due to their bargaining strategy. Their (false) feeling of power causes an increase of distributive bargaining tactics and a reluctance to share the necessary information for inter-firm cost minimization. This implies that powerful buyers may only benefit from more refined accounting information systems if these firms undertake efforts (e.g. through incentive systems) to encourage information sharing and to discourage aggressive bargaining strategies of their employees.
Manuscript 2 provides empirical support for what earlier studies (Ness & Haugland, 2005; Seal et al., 1999; Vosselman & Van der Meer-Kooistra, 2004) have suggested on how management accounting may contribute to the development of dyadic business relationships. Decision makers learn from this manuscript that accounting information proves to be able to serve an important function in relational signaling and thus in building trust or distrust. Managers should be aware that the sharing of detailed information (e.g. TCO information) makes it possible to understand the partner’s interests and to identify the integrative potential in different situations. On the other hand, the results of manuscript 2 also indicate that buyers with more traditional information were unable to signal trustworthy behavior, which resulted in lower levels of trust and outcomes. Managers should be aware of this signaling function of (accounting) information.

Finally, the results of manuscript 3 also have relevant implications for managers. It is important for managers to be aware of the need to cultivate an optimal mix of governance mechanisms because these governance mechanisms interact with each other. For instance, it may be important for firms to invest in greater Type 1 information when trust is based primarily on competence. This is because competence trust has the potential to encourage opportunistic behavior and may lead to less favorable cooperative outcomes. Our analyses also reveal that buyers try to reduce potential dangers of overly relying on competence trust by complementing it with behavioral control. Decision makers need to be aware of the potential (negative) impact of the governance mechanisms they employ on their partner. For instance, in a study on sourcing decision in the US auto industry, Anderson et al. (2000) report that strict design tolerances (i.e. strict outcome requirements) for metal parts often increase die development time and costs without producing substantially better or different parts.

The analyses on the interaction effects between trust and information showed that perceived risk of decision makers at later stages of the relation is mainly reduced by trust and that, to a certain extent, trust replaces the need for information. Decision makers should be aware that while trust may reduce perceived risk, recent studies have started to reveal some drawbacks of trust such as reduced information search (Krishnan et al., 2006), which may ultimately result in lower outcomes. This is related to the fact that decision makers should be aware that perceived risk does not necessarily coincide with objective risk and that governance mechanisms may only provide the illusion of less uncertainty or more control.

3. Limitations and suggestions for further research

The manuscripts presented in this dissertation provide new insight into the role of information on buyer-supplier relations and outcomes. Naturally, our research has its limitations and gives rise to several questions that deserve further attention. Also, since management accounting research has only recently begun to consider issues that arise when firms transact (Anderson, 2006; Anderson & Sedatole, 2003), many interesting topics remain. In this section, we will shortly discuss a selection of the most important limitations and ideas for future research.
Buyer-supplier relations versus other inter-firm relations

Inter-firm relations come in a variety of forms and structures -- such as joint ventures, minority equity alliances, joint R&D, joint production, co-marketing, licensing, long-term supply agreements, and so on. Although our discussion so far has sometimes been couched in general terms of inter-firm relations, our empirical results are based on buyer-supplier relations.

As the type of the relation may have significant implications for the roles of trust, control and information (Birnbirg, 1998; Das & Teng, 2001a; Tomkins, 2001), further research should also investigate whether the results found in this study hold beyond buyer-supplier relationships. Tomkins (2001) and Das & Teng (2001a) make detailed listing of respectively information needs and formal control needs for different types of relations. Examining more closely their proposals appears to be a prime area for future research.

One side of the story

This dissertation mainly focused on the buyer’s perspective of the partnership. The experimental setting in manuscript 1 did not manipulate the negotiation context for the seller, while in manuscript 2 only the control system of the sellers, and not their information, was manipulated. The cost information of the seller was never manipulated. Similarly to the majority of survey research, our survey study in manuscript 3 relied on a single informant. For the issues that we addressed in manuscript 3, it is not obvious that a single respondent from the buyer presents serious limitations since this study focuses on how governance mechanisms influence the perceived risk of the buyer.

However, further research can benefit from incorporating the view of the seller by altering the experimental conditions and examining the role of TCO information from both buyer and seller perspectives, or by employing a matched pairs of respondents from both transaction parties (e.g. Judge & Dooley, 2006). This would enable us to examine the potential (negative) impact of the governance mechanisms decision makers employ on their partner.

Cost benefit trade-off

Another fruitful path for future research is to consider the cost/benefit trade-off between the different governance mechanisms. Governance mechanisms are not costless to develop (Parkhe, 1993). Our study did not take into account the costs related to install or maintain governance mechanisms. Managers busy with cost system design, often claim that more refined cost systems are costly to design and to maintain. This focus underplays the cost/benefit trade-off.

Future research could develop experiments to consider whether buyers would be willing to incur a cost in order to obtain TCO information if it had been efficient to do so. It has been suggested that field based research may be required to better understand the relation between costs and the mechanisms of management control that firms employ (Anderson, 2006; Tirole, 1999).
The link with performance

Although manuscript 1 & 2 explicitly considered the impact of information and other governance mechanisms on outcomes (e.g. individual profit and joint profits), manuscript 3 did not consider the link with performance. Manuscript 3 placed the decision maker at the central core and revealed what type of governance mechanisms are used to counter different types of perceived risks. Risk perceptions of the decision makers served as the heuristic that helps form their governance mechanisms (Das & Teng, 2001b).

Prior studies on this topic typically regress the different governance mechanisms (i.e. trust and control) on a measure of inter-firm relation outcomes. The operationalization of inter-firm relation outcomes has varied considerably. Inter-firm outcomes have previously been operationalized as historical accounting measures, market-based measures, operational efficiency measures and perceptual satisfaction measures (Judge & Dooley, 2006). Because of this extreme variation, it becomes clear why the findings have yet to coalesce.

One of our targets for additional follow-up work is to make this link with performance and to study whether trust, information and formal controls substitute or complement each other. The study of Anderson & Dekker (2005) provide an interesting methodology to accomplish this. Anderson & Dekker (2005) studied how different sets of terms of contracting are related to a set of transaction characteristics and how misalignment between these transaction hazards and several contract dimensions is related with higher transaction problems. Future research could extend their research by examining whether transaction hazards are related to the distinct dimensions of the governance mechanisms discussed in manuscript 3 (thus besides formal controls, also trust and information). Furthermore it is also promising to study whether these relations are different for transactions with serious problems than for successful transactions, i.e. making the link with performance.

In summary, the recent changes in inter-firm relations have highlighted new and interesting area of research in accounting. There already exists a literature which has implications for the design of inter-firm information systems. However, a number of interesting issues remain to be addressed.
List of tables

Table 1.1: Analysis of the negotiation outcome and behavior of the buyer 29
Table 1.2: Three step regression procedure for testing mediation and moderation of information exchange 32
Table 1.3: Three step regression procedure for testing mediation and moderation of problem solving approach 32
Table 1.4: Three step regression procedure for testing mediation and moderation of distributive behavior 33
Table 1.5: Hierarchical regression results for individual profit of the buyer 34
Table 2.1: Descriptive statistics and AN(C)OVA results averaged over the first two games 53
Table 2.2: Descriptive statistics and regression result for the third game 55
Table 3.1: Sample, population and transaction characteristics 80
Table 3.2: Descriptive statistics 82
Table 3.3: Scale development for governance mechanisms 84
Table 3.4: Pearson correlation matrix 88
Table 3.5: Relation between perceived risk and governance mechanisms 89
Table 3.6: Relation between perceived risk and governance mechanisms for groups with and without a prior relation 91
Table 3.7: Interaction effects between different governance mechanisms 94

List of figures

Figure 1: Research framework 10

29 32 32 33 34 53 55 80 82 84 88 89 91 94 10
References


Gietzmann M. B. (1996). Incomplete contracts and the make or buy decision: governance design and attainable flexibility. Accounting, Organizations and Society, 21 (6), pp 611-626


Hopwood A. (1996). Looking across rather than up and down: on the need to explore the lateral processing of information. Accounting, Organizations and Society, 21(6), pp 589-590


118
1. GEPTS, Stefaan  
   Stability and efficiency of resource allocation processes in discrete commodity spaces.  

2. PEETERS, Theo  
   Determinanten van de internationale handel in fabrikaten.  

3. VAN LOOY, Wim  
   Personeelsopleiding: een onderzoek naar investeringsaspekten van opleiding.  

4. THARAKAN, Mathew  
   Indian exports to the European community: problems and prospects.  

5. HERROELEN, Willy  
   Heuristische programmatie: methodologische benadering en praktische toepassing op complexe combinatorische  
   problemen.  

6. VANDENBULCKE, Jacques  
   De studie en de evaluatie van data-organisatiemethodes en data-zoekmethodes.  
   Leuven, s.n., 1973. 3 V.

7. PENNYCUICK, Roy A.  
   The economics of the ecological syndrome.  

8. KAWATA, T. Bualum  
   Formation du capital d'origine belge, dette publique et stratégie du développement au Zaire.  

9. DONCKELS, Rik  
   Doelmatige oriëntering van de sectorale subsidiepolitiek in België: een theoretisch onderzoek met empirische  
   toetsing.  

10. VERHELST, Maurice  
    Contribution to the analysis of organizational information systems and their financial benefits.  
    Leuven, K.U.Leuven, 1974. 2 V.

11. CLEMEUR, Hugo  
    Enkele verzekeringstechnische vraagstukken in het licht van de nutstheorie.  

12. HEYVAERT, Edward  
    De ontwikkeling van de moderne bank- en krediettechniek tijdens de zestiende en zeventiende eeuw in Europa en  
    te Amsterdam in het bijzonder.  

13. VERTONGHEN, Robert  
    Investeringscriteria voor publieke investeringen: het uitwerken van een operationele theorie met een toepassing op  
    de verkeersinfrastructuur.  

15. VANOVERBEKE, Lieven
   Microeconomisch onderzoek van de sectoriële arbeidsmobiliteit.

16. DAEMS, Herman
   The holding company: essays on financial intermediation, concentration and capital market imperfections in the
   Belgian economy.

17. VAN ROMPUY, Eric
   Groot-Brittannië en de Europese monetaire integratie: een onderzoek naar de gevolgen van de Britse toetreding op
   de geplande Europese monetaire unie.

18. MOESEN, Wim
   Het beheer van de staatsschuld en de termijnstructuur van de intrestvoeten met een toepassing voor België.

19. LAMBRECHT, Marc
   Capacity constrained multi-facility dynamic lot-size problem.

20. RAYMAECKERS, Erik
   De mens in de onderneming en de theorie van het producenten-gedrag: een bijdrage tot transdisciplinaire analyse.

21. TEJANO, Albert
   Econometric and input-output models in development planning: the case of the Philippines.

22. MARTENS, Bernard
   Prijsbeleid en inflatie met een toepassing op België.

23. VERHEIRSTRAETEN, Albert
   Geld, krediet en intrest in de Belgische financiële sector.

24. GHEYSSENS, Lieven
   International diversification through the government bond market: a risk-return analysis.
   Leuven, s.n., 1977. 188 pp.

25. LEFEBVRE, Chris
   Boekhoudkundige verwerking en financiële verslaggeving van huurkooptransacties en verkopen op afbetaling bij
   ondernemingen die aan consumenten verkopen.

26. KESENNEN, Stefan
   Tijdsallocatie en vrijetijdsbesteding: een econometrisch onderzoek.

27. VAN HERCK, Gustaaf
   Aspecten van optimaal bedrijfsbeleid volgens het marktwaardecriterium: een risico-rendementsanalyse.
28. VAN POECK, Andre
World price trends and price and wage development in Belgium: an investigation into the relevance of the Scandinavian model of inflation for Belgium.

29. VOS, Herman
De industriële technologieverwerving in Brazilië: een analyse.
Leuven, s.n., 1978. onregelmatig gepagineerd.

30. DOMBRECHT, Michel
Financial markets, employment and prices in open economies.

31. DE PRIL, Nelson
Bijdrage tot de actuariële studie van het bonus-malussysteem.

32. CARRIN, Guy
Economic aspects of social security: a public economics approach.

33. REGIDOR, Baldomero

34. DE GROOT, Roger
Ongelijkheden voor stop loss premies gebaseerd op E.T. systemen in het kader van de veralgemeende convexe analyse.

35. CEYSSENS, Martin
On the peak load problem in the presence of rationizing by waiting.

36. ABDUL RAZK ABDUL
Mixed enterprise in Malaysia: the case study of joint venture between Malysian public corporations and foreign enterprises.

37. DE BRUYNE, Guido
Coordination of economic policy: a game-theoretic approach.

38. KELLES, Gerard
Demand, supply, price change and trading volume on financial markets of the matching-order type. = Vraag, aanbod, koersontwikkeling en omzet op financiële markten van het Europese type.

39. VAN EECKHOUDT, Marc
De invloed van de looptijd, de coupon en de verwachte inflatie op het opbrengstverloop van vastrentende financiële activa.

40. SERCU, Piet
Mean-variance asset pricing with deviations from purchasing power parity.
41. DEQUAE, Marie-Gemma
   Inflatie, belastingsysteem en waarde van de onderneming.

42. BRENAN, John

43. COLLA, Annie
   Een econometrische analyse van ziekenhuiszorgen.

44. Niet toegekend.

45. SCHOKKAERT, Eric
   Modelling consumer preference formation.

46. DEGADT, Jan
   Specificatie van een econometrisch model voor vervuilingsproblemen met proeven van toepassing op de
   waterverontreiniging in België.
   Leuven, s.n., 1982. 2 V.

47. LANJONG, Mohammad Nasir
   A study of market efficiency and risk-return relationships in the Malaysian capital market.

48. PROOST, Stef
   De allocatie van lokale publieke goederen in een economie met een centrale overheid en lokale overheden.
   Leuven, s.n., 1983. onregelmatig gepagineerd.

49. VAN HULLE, Cynthia (08/83)
   Shareholders' unanimity and optimal corporate decision making in imperfect capital markets.
   s.l., s.n., 1983. 147 pp. + appendix.

50. VAN WOUWE, Martine (2/12/83)
   Ordening van risico's met toepassing op de berekening van ultieme ruïnekansen.

51. D'ALCANTARA, Gonzague (15/12/83)
   SERENA: a macroeconomic sectoral regional and national account econometric model for the Belgian economy.

52. D'HAVE, Piet (24/02/84)
   De vraag naar geld in België.

53. MAES, Ivo (16/03/84)
   The contribution of J.R. Hicks to macro-economic and monetary theory.

54. SUBIANTO, Bambang (13/09/84)
   A study of the effects of specific taxes and subsidies on a firms' R&D investment plan.

55. SLEUWAEGEN, Leo (26/10/84)
   Location and investment decisions by multinational enterprises in Belgium and Europe.

122
56. GEYSKENS, Erik (27/03/85)
Produktietheorie en dualiteit.

57. COLE, Frank (26/06/85)
Some algorithms for geometric programming.

58. STANDAERT, Stan (26/09/86)
A study in the economics of repressed consumption.

59. DELBEKE, Jos (03/11/86)
Trendperioden in de geldhoeveelheid van België 1877-1983: een theoretische en empirische analyse van de "Banking school" hypothese.

60. VANTHIENEN, Jan (08/12/86)
Automatiseringaspecten van de specificatie, constructie en manipulatie van beslissingstabellen.

61. LUYTEN, Robert (30/04/87)
A systems-based approach for multi-echelon production/inventory systems.
s.l., s.n., 1987. 3V.

62. MERCKEN, Roger (27/04/87)
De invloed van de data base benadering op de interne controle.

63. VAN CAYSEELE, Patrick (20/05/87)
Regulation and international innovative activities in the pharmaceutical industry.

64. FRANCOIS, Pierre (21/09/87)
De empirische relevantie van de independence from irrelevant alternatives. Assumptie indiscrete keuzemodellen.

65. DECOSTER, André (23/09/88)
Family size, welfare and public policy.

66. HEIJNEN, Bart (09/09/88)
Risicowijziging onder invloed van vrijstellingen en herverzekeringen: een theoretische analyse van optimaliteit en premiebepaling.

67. GEEROMS, Hans (14/10/88)
Belastingvermijding. Theoretische analyse van de determinanten van de belastingontduiking en de belastingontwijking met empirische verificaties.

68. PUT, Ferdi (19/12/88)
Introducing dynamic and temporal aspects in a conceptual (database) schema.

69. VAN ROMPUY, Guido (13/01/89)
A supply-side approach to tax reform programs. Theory and empirical evidence for Belgium.
70. PEETERS, Ludo (19/06/89)
Een ruimtelijk evenwichtsmodel van de graanmarkten in de E.G.: empirische specificatie en beleidstoepassingen.

71. PACOLET, Jozef (10/11/89)
Marktstructuur en operationele efficiëntie in de Belgische financiële sector.

72. VANDEBROEK, Martina (13/12/89)
Optimalisatie van verzekeringsscontracten en premieberekeningsprincipes.

73. WILLEKENS, Francois ()
Determinance of government growth in industrialized countries with applications to Belgium.

74. VEUGELERS, Reinhilde (02/04/90)
Scope decisions of multinational enterprises.

75. KESTELOOT, Katrien (18/06/90)
Essays on performance diagnosis and tacit cooperation in international oligopolies.

76. WU, Changqi (23/10/90)
Strategic aspects of oligopolistic vertical integration.

77. ZHANG, Zhaoyong (08/07/91)
A disequilibrium model of China's foreign trade behaviour.

78. DHAENE, Jan (25/11/91)
Verdelingsfuncties, benaderingen en foutengrenzen van stochastische grootheden geassocieerd aan verzekeringsspolissen en -portefeuilles.

79. BAUWELINCKX, Thierry (07/01/92)
Hierarchical credibility techniques.

80. DEMEULEMEESTER, Erik (23/3/92)
Optimal algorithms for various classes of multiple resource-constrained project scheduling problems.

81. STEENACKERS, Anna (1/10/92)
Risk analysis with the classical actuarial risk model: theoretical extensions and applications to Reinsurance.

82. COCKX, Bart (24/09/92)
The minimum income guarantee. Some views from a dynamic perspective.

83. MEYERMANS, Eric (06/11/92)
Econometric allocation systems for the foreign exchange market: Specification, estimation and testing of transmission mechanisms under currency substitution.
84. CHEN, Guoqing (04/12/92)
Design of fuzzy relational databases based on fuzzy functional dependency.

85. CLAEYS, Christel (18/02/93)
Vertical and horizontal category structures in consumer decision making: The nature of product hierarchies and the
effect of brand typicality.

86. CHEN, Shaoxiang (25/03/93)
The optimal monitoring policies for some stochastic and dynamic production processes.

87. OVERWEG, Dirk (23/04/93)
Approximate parametric analysis and study of cost capacity management of computer configurations.

88. DEWACHTER, Hans (22/06/93)
Nonlinearities in speculative prices: The existence and persistence of nonlinearity in foreign exchange rates.

89. LIN, Liangqi (05/07/93)
Economic determinants of voluntary accounting choices for R & D expenditures in Belgium.

90. DHAENE, Geert (09/07/93)
Encompassing: formulation, properties and testing.

91. LAGAE, Wim (20/09/93)
Marktconforme verlichting van soevereine buitenlandse schuld door private crediteuren: een neo-institutionele
analyse.

92. VAN DE GAER, Dirk (27/09/93)
Equality of opportunity and investment in human capital.

93. SCHROYEN, Alfred (28/02/94)
Essays on redistributive taxation when monitoring is costly.

94. STEURS, Geert (15/07/94)
Spillovers and cooperation in research and development.

95. BARAS, Johan (15/09/94)
The small sample distribution of the Wald, Lagrange multiplier and likelihood ratio tests for homogeneity and
symmetry in demand analysis: a Monte Carlo study.

96. GAEREMYNCK, Ann (08/09/94)
The use of depreciation in accounting as a signalling device.

97. BETTENDORF, Leon (22/09/94)
A dynamic applied general equilibrium model for a small open economy.
98. TEUNEN, Marleen (10/11/94)
   Evaluation of interest randomness in actuarial quantities.

99. VAN OOTEGEM, Luc (17/01/95)
   An economic theory of private donations.

100. DE SCHEPPE, Ann (20/03/95)
    Stochastic interest rates and the probabilistic behaviour of actuarial functions.

101. LAUWERS, Luc (13/06/95)
    Social choice with infinite populations.

102. WU, Guang (27/06/95)
    A systematic approach to object-oriented business modeling.

103. WU, Xueping (21/08/95)
    Term structures in the Belgian market: model estimation and pricing error analysis.

104. PEPERMANS, Guido (30/08/95)
    Four essays on retirement from the labor force.

105. ALGOED, Koen (11/09/95)
    Essays on insurance: a view from a dynamic perspective.

106. DEGRYSE, Hans (10/10/95)
    Essays on financial intermediation, product differentiation, and market structure.

107. MEIR, Jos (05/12/95)
    Het strategisch groepsconcept toegepast op de Belgische financiële sector.

108. WIJAYA, Miryam Lilian (08/01/96)
    Voluntary reciprocity as an informal social insurance mechanism: a game theoretic approach.

109. VANDAELE, Nico (12/02/96)
    The impact of lot sizing on queueing delays: multi product, multi machine models.

110. GIELENS, Geert (27/02/96)
    Some essays on discrete time target zones and their tails.

111. GUILLAUME, Dominique (20/03/96)
    Chaos, randomness and order in the foreign exchange markets. Essays on the modelling of the markets.

112. DEWIT, Gerda (03/06/96)
    Essays on export insurance subsidization.
113. VAN DEN ACKER, Carine (08/07/96)
Belief-function theory and its application to the modeling of uncertainty in financial statement auditing.

114. IMAM, Mahmood Osman (31/07/96)
Choice of IPO Flotation Methods in Belgium in an Asymmetric Information Framework and Pricing of IPO’s in the Long-Run.

115. NICAISE, Ides (06/09/96)
Poverty and Human Capital.

116. EYCKMANS, Johan (18/09/97)
On the Incentives of Nations to Join International Environmental Agreements.

117. CRISOLOGO-MENDOZA, Lorelei (16/10/97)
Essays on Decision Making in Rural Households: a study of three villages in the Cordillera Region of the Philippines.

118. DE REYCK, Bert (26/01/98)
Scheduling Projects with Generalized Precedence Relations: Exact and Heuristic Procedures.

119. VANDEMAELE Sigrid (30/04/98)

120. VERGAUWEN Filip (30/04/98)

121. LEEMANS Herlinde (29/05/98)
The Two-Class Two-Server Queueing Model with Nonpreemptive Heterogeneous Priority Structures.

122. GEYSKENS Inge (4/09/98)
Trust, Satisfaction, and Equity in Marketing Channel Relationships.

123. SWEENEY John (19/10/98)
Why Hold a Job? The Labour Market Choice of the Low-Skilled.

124. GOEDHUYYS Micheline (17/03/99)
Industrial Organisation in Developing Countries, Evidence from Côte d'Ivoire.

125. POELS Geert (16/04/99)
On the Formal Aspects of the Measurement of Object-Oriented Software Specifications.

126. MAYERES Inge (25/05/99)
The Control of Transport Externalities: A General Equilibrium Analysis.
127. LEMAHIEU Wilfried (5/07/99)  
Improved Navigation and Maintenance through an Object-Oriented Approach to Hypermedia Modelling.  

128. VAN PUYENBROECK Tom (8/07/99)  
Informational Aspects of Fiscal Federalism.  

129. VAN DEN POEL Dirk (5/08/99)  
Response Modeling for Database Marketing Using Binary Classification.  

130. GIELENS Katrijn (27/08/99)  

131. PEETERS Anneleen (16/12/99)  
Labour Turnover Costs, Employment and Temporary Work.  

132. VANHOENACKER Jurgen (17/12/99)  

133. NUNES Paulo (20/03/2000)  
Contingent Valuation of the Benefits of Natural Areas and its Warmglow Component.  

134. VAN DEN CRUYCE Bart (7/04/2000)  
Statistische discriminatie van allochtonen op jobmarkten met rigide lonen.  

135. REPKINE Alexandre (15/03/2000)  
Industrial restructuring in countries of Central and Eastern Europe: Combining branch-, firm- and product-level data for a better understanding of Enterprises' behaviour during transition towards market economy.  

136. AKSOY, Yunus (21/06/2000)  
Essays on international price rigidities and exchange rates.  

137. RYANTO, Yohanes Eko (22/06/2000)  
Essays on the internal and external delegation of authority in firms.  

138. HUYGHEBAERT, Nancy (20/12/2000)  
The Capital Structure of Business Start-ups.  

139. FRANCKX Laurent (22/01/2001)  
Ambient Inspections and Commitment in Environmental Enforcement.  

140. VANDILLE Guy (16/02/2001)  
Essays on the Impact of Income Redistribution on Trade.  

141. MARQUERING Wessel (27/04/2001)  
Modeling and Forecasting Stock Market Returns and Volatility.  
142. FAGGIO Giulia (07/05/2001)
Labor Market Adjustment and Enterprise Behavior in Transition.

143. GOOS Peter (30/05/2001)
The Optimal Design of Blocked and Split-plot experiments.

144. LABRO Eva (01/06/2001)
Total Cost of Ownership Supplier Selection based on Activity Based Costing and Mathematical Programming.

145. VANHOUCKE Mario (07/06/2001)
Exact Algorithms for various Types of Project Scheduling Problems. Nonregular Objectives and time/cost Trade-offs. 316

146. BILSEN Valentijn (28/08/2001)
Entrepreneurship and Private Sector Development in Central European Transition Countries.

147. NIJS Vincent (10/08/2001)
Essays on the dynamic Category-level Impact of Price promotions.

148. CHERCHYE Laurens (24/09/2001)
Topics in Non-parametric Production and Efficiency Analysis.

149. VAN DENDER Kurt (15/10/2001)

150. CAPEAU Bart (26/10/2001)
In defence of the excess demand approach to poor peasants' economic behaviour. Theory and Empirics of non-recursive agricultural household modelling.

151. CALTHROP Edward (09/11/2001)
Essays in urban transport economics.

152. VANDER BAUWHEDE Heidi (03/12/2001)
Earnings management in an Non-Anglo-Saxon environment.

153. DE BACKER Koenraad (22/01/2002)
Multinational firms and industry dynamics in host countries: the case of Belgium.

154. BOUWEN Jan (08/02/2002)
Transactive memory in operational workgroups. Concept elaboration and case study.

155. VAN DEN BRANDE Inge (13/03/2002)
The psychological contract between employer and employee: a survey among Flemish employees.

156. VEESTRAETEN Dirk (19/04/2002)
Asset Price Dynamics under Announced Policy Switching.
157. PEETERS Marc (16/05/2002)
   One Dimensional Cutting and Packing: New Problems and Algorithms.

158. SKUDELNY Frauke (21/05/2002)
   Essays on The Economic Consequences of the European Monetary Union.

159. DE WEERDT Joachim (07/06/2002)
   Social Networks, Transfers and Insurance in Developing countries.

160. TACK Lieven (25/06/2002)
   Optimal Run Orders in Design of Experiments.

161. POELMANS Stephan (10/07/2002)
   Making Workflow Systems work. An investigation into the Importance of Task-appropriation fit, End-user Support and other Technological Characteristics.

162. JANS Raf (26/09/2002)

163. VIAENE Stijn (25/10/2002)
   Learning to Detect Fraud from enriched Insurance Claims Data (Context, Theory and Applications).

164. AYALEW Tekabe (08/11/2002)
   Inequality and Capital Investment in a Subsistence Economy

165. MUES Christophe (12/11/2002)
   On the Use of Decision Tables and Diagrams in Knowledge Modeling and Verification.

166. BROCK Ellen (13/03/2003)
   The Impact of International Trade on European Labour Markets.

167. VERMEULEN Frederic (29/11/2002)

168. CLUDTS Stephan (11/12/2002)
   Combining participation in decision-making with financial participation: theoretical and empirical perspectives.

169. WARZYNSKI Frederic (09/01/2003)
   The dynamic effect of competition on price cost margins and innovation.

170. VERWIMP Philip (14/01/2003)
   Development and genocide in Rwanda; a political economy analysis of peasants and power under the Habyarimana regime.
<table>
<thead>
<tr>
<th>No.</th>
<th>Author</th>
<th>Date</th>
<th>Title</th>
<th>Institution</th>
<th>Pages</th>
</tr>
</thead>
</table>
186. ALI Daniel (19/12/2003)  
Essays on Household Consumption and Production Decisions under Uncertainty in Rural Ethiopia.  

187. WILLEMS Bert (14/01/2004)  
Electricity networks and generation market power.  

188. JANSSENS Gust (30/01/2004)  
Advanced Modelling of Conditional Volatility and Correlation in Financial Markets.  

189. THOEN Vincent (19/01/2004)  
"On the valuation and disclosure practices implemented by venture capital providers"  

190. MARTENS Jurgen (16/02/2004)  
“A fuzzy set and stochastic system theoretic technique to validate simulation models”  

191. ALTAVILLA Carlo (21/05/2004)  
“Monetary policy implementation and transmission mechanisms in the Euro area.”  

192. DE BRUYNE Karolien (07/06/2004)  
“Essays in the location of economic activity”.  

193. ADEM Jan (25/06/2004)  
“Mathematical programming approaches for the supervised classification problem.”,  

194. LEROUGE Davy (08/07/2004)  
“Predicting Product Preferences : the effect of internal and external cues.”,  

195. VANDENBROECK Katleen (16/07/2004)  
“Essays on output growth, social learning and land allocation in agriculture : micro-evidence from Ethiopia and Tanzania”.  

196. GRIMALDI Maria (03/09/004)  
“The exchange rate, heterogeneity of agents and bounded rationality”.  

197. SMEDTS Kristien (26/10/2004)  
“Financial integration in EMU in the framework of the no-arbitrage theory”.  

“Essays on Unions, Wages and Employment”  

199. CALLENS Marc (22/11/2004)  
“Essays on multilevel logistic Regression”  

200. RUGGOO Arvind (13/12/2004)  
“Two stage designs robust to model uncertainty”  
201. HOORELBEKE Dirk (28/01/2005)
"Bootstrap and Pivoting Techniques for Testing Multiple Hypotheses."

202. ROUSSEAU Sandra (17/02/2005)
"Selecting Environmental Policy Instruments in the Presence of Incomplete Compliance”,

203. VAN DER MEULEN Sofie (17/02/2005)
“Quality of Financial Statements : Impact of the external auditor and applied accounting standards”.

204. DIMOVA Ralitza (21/02/2005)
“Winners and Losers during Structural Reform and Crisis : the Bulgarian Labour Market Perspective”.

205. DARKIEWICZ Grzegorz (28/02/2005)
“Value-at-risk in Insurance and Finance : the Comonotonicity Approach”

206. DE MOOR Lieven (20/05/2005)

207. EVERAERT Greetje (27/06/2005)
“Soft Budget Constraints and Trade Policies : The Role of Institutional and External Constraints”

208. SIMON Steven (06/07/2005)

209. MOONEN Linda (23/09/2005)
“Algorithms for some graph-theoretical optimization problems”.

210. COUCKE Kristien (21/09/2005)
“Firm and industry adjustment under de-industrialisation and globalization of the Belgian economy”.

211. DECAMPS MARC (21/10/2005)
“Some actuarial and financial applications of generalized diffusion processes”.

212. KIM HELENA (29/11/2005)
“Escalation games: an instrument to analyze conflicts. The strategic approach to the bargaining problem”.

213. GERMENJI ETLEVA (06/01/2006)
“Essays on the economics of emigration from Albania”.

214. BELIEN JEROEN (18/01/2006)
“Exact and heuristic methodologies for scheduling in hospitals: problems, formulations and algorithms”.

215. JOOSSENS KRISTEL (10/02/2006)
“Robust discriminant analysis”.

216. VRANKEN LIESBET (13/02/2006)
“Land markets and production efficiency in transition economies”.
217. VANSTEENKISTE ISABEL (22/02/2006)
“Essays on non-linear modelling in international macroeconomics”.

218. WUYTS Gunther (31/03/2006)
“Essays on the liquidity of financial markets”.

219. DE BLANDER Rembert (28/04/2006)
“Essays on endogeneity and parameter heterogeneity in cross-section and panel data”.

220. DE LOECKER Jan (12/05/2006)
“Industry dynamics and productivity”.

221. LEMMENS Aurélie (12/05/2006)
“Advanced classification and time-series methods in marketing”.

222. VERPOORTEN Marijke (22/05/2006)
“Conflict and survival: an analysis of shocks, coping strategies and economic mobility in Rwanda, 1990-2002”.

223. BOSMANS Kristof (26/05/2006)
“Measuring economic inequality and inequality aversion”.

224. BREMKERS Randy (29/05/2006)
“Policy reform in a market with differentiated products: applications from the car market”.

225. BRUYNEEL Sabrina (02/06/2006)
“Self-control depletion: Mechanisms and its effects on consumer behavior”.

226. FAEMS Dries (09/06/2006)
“Collaboration for innovation: Processes of governance and learning”.

227. BRIERS Barbara (28/06/2006)
“Countering the scrooge in each of us: on the marketing of cooperative behavior”.

228. ZANONI Patrizia (04/07/2006)
“Beyond demography: Essays on diversity in organizations”.

229. VAN DEN ABBEELE Alexandra (11/09/2006)
“Management control of inter-firm relations: the role of information”.