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UNCOVERING THE HIDDEN COSTS OF OFFSHORING: THE INTERPLAY OF COMPLEXITY, ORGANIZATIONAL DESIGN, AND EXPERIENCE

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This study investigates estimation errors due to hidden costs—the costs of implementation that are neglected in strategic decision-making processes—in the context of services offshoring. Based on data from the Offshoring Research Network, we find that decision makers are more likely to make cost-estimation errors given increasing configuration and task complexity in captive offshoring and offshore outsourcing, respectively. Moreover, we show that experience and a strong orientation toward organizational design in the offshoring strategy reduce the cost-estimation errors that follow from complexity. Our findings contribute to research on the effectiveness of sourcing and global strategies by stressing the importance of organizational design and experience in dealing with increasing complexity. Copyright © 2012 John Wiley & Sons, Ltd.

INTRODUCTION

Many firms find that the implementation of strategic decisions can trigger substantial hidden costs that negatively affect firm performance. For example, a firm may find that the implementation of a diversification strategy requires substantially more coordination than initially expected. A firm may also discover that knowledge transfer in the context of internationalizing business activities is more costly than expected. By hidden costs, we refer to the unanticipated costs of implementation that arise in strategic decision-making processes (see Dibbern, Winkler, and Heinzl, 2008; Reitzig and Wagner, 2010; Stringfellow, Teagarden, and Nie, 2008). In this paper, we investigate the nature of estimation errors due to hidden costs. In particular, we seek to better understand why certain costs are hidden from managerial attention and thus not accounted for in initial cost estimations.

We study hidden costs in the context of offshoring of administrative and technical services, that is, the sourcing of business services supporting domestic and global operations from abroad in internal or external arrangements (Contractor *et al.*, 2010; Manning, Massini, and Lewin,

2008). The offshoring of service activities has gained momentum in recent years. Today, many western firms not only offshore standardized IT and business processes but also more complex, knowledge-intensive activities and product development (Lewin, Massini, and Peeters, 2009). However, many firms have begun to realize that managing an increasingly globally dispersed organization is more difficult and costly than initially expected (Dibbern *et al.*, 2008; Stringfellow *et al.*, 2008). In particular, decision makers often fail to accurately estimate the costs of offshoring and are therefore surprised by unexpected—or hidden—costs of implementing offshoring decisions.

Most research on offshoring to date has focused on why firms offshore particular functions, the governance modes they choose, the locations they select to host offshored activities, and the outcomes that they achieve (e.g., Lewin *et al.*, 2009; Kedia and Mukherjee, 2009; Mol, van Tulder, and Beije, 2005). In this paper, we focus on the organizational design of offshoring, and the challenge of coordinating and integrating offshoring activities in globally organized firms (Srikanth and Puranam, 2011). In this regard, offshoring can be described as an organizational reconfiguration in which originally co-located activities are relocated across distances in captive or outsourced arrangements, which must subsequently be reintegrated (Mudambi and Venzin, 2010). Consequently, firms are often presented with new complexities and uncertainties, which have an impact on decision makers' abilities to estimate the costs of offshoring.

Using comprehensive data from the Offshoring Research Network, we argue that the increased complexity that follows from offshoring involves a number of operational challenges and related costs, part of which are ignored or not anticipated when offshoring decisions are made. As a result, we observe a significant gap between expected and achieved performance, as measured by the distance between expected and achieved cost savings. However, we also argue that this relationship is moderated by the organizational design orientations of firms' offshoring strategies and by firms' offshoring experience. Firms with strategies characterized by a strong orientation toward an overall system of structures and processes, and firms with prior experience are more likely to anticipate and align offshoring complexity with corresponding organizational structures and processes. Thus, organizational design orientation and experience

nurture decision makers' abilities to anticipate the costs of complex organizations.

Our findings contribute to the growing stream of literature on the operational challenges of offshoring (Srikanth and Puranam, 2011; Stringfellow *et al.*, 2008) by emphasizing the importance of hidden costs, complexity, design strategies, and experience. On a more general level, these findings have important implications for estimation biases in strategic decision making, and improve our understanding of the role of experience and organizational design orientation in relation to those biases (e.g., Durand, 2003; Hogarth and Makridakis, 1981; Kahneman and Lovallo, 1993; Makadok and Walker, 2000; March and Simon, 1958). This research emphasizes the organizational design of a firm and highlights how organizational changes should be incorporated into strategic analyses. This may stimulate future research on the evolution of global firm designs and architectures by stressing the role, magnitude, and consequences of complexity in organizations (e.g., Ethiraj and Levinthal, 2004; Nadler and Tushman, 1997; Sinha and Van de Ven, 2005).

THEORY AND HYPOTHESES DEVELOPMENT

Hidden costs, complexity, and bounded rationality

Hidden costs can be understood as implementation costs that are not anticipated in the various stages of strategic decision making. A key function in strategic decision making—defined as the commitment to important decisions in terms of actions to be taken, resources to be devoted, or precedents set (Dean and Sharfman, 1996; Eisenhardt and Zbaracki, 1992; Mintzberg, Raisinghani, and Théorêt, 1976)—is the ability to estimate the costs of implementing a strategic decision (Durand, 2003; Makadok and Walker, 2000). Often, however, firms find that unanticipated costs or 'post-decision surprises' (Harrison and March, 1984) erupt and challenge the strategic intent and rationale of the decision. In such cases, these costs have been ignored or overlooked—thus hidden—by the decision maker in the strategic decision-making process. Hidden costs are thus *ex ante* unaccounted for, which is why they materialize *ex post* as a discrepancy between expected and realized costs.

A direct consequence of hidden costs is a negative effect on a decision maker's ability to estimate the impact of strategic decisions, as important costs are hidden from managerial attention. Previous research has emphasized that individual biases may impact decision makers' estimation abilities (e.g., Kahneman and Tversky, 1984; Das and Teng, 1999), that routines may short-circuit individuals' autonomous judgments (Nelson and Winter, 1982), and that dominant logic may result in blind spots in decision making (Prahalad and Bettis, 1986). In this paper, however, we focus on the role of the organizational context in decision makers' estimation abilities (e.g., Durand, 2003; Hogarth and Makridakis, 1981; March and Simon, 1958) and, in particular, on how organizational complexity influences decision makers' abilities to account for costs of implementation. Thus, we seek to understand the impact of complexity on the ability of firms to anticipate the actual costs of a strategic implementation. In this regard, we are able to explain how decision makers systematically ignore or overlook important costs in strategic decision-making processes.

The organizational impacts and consequences of complexity have long been part of the research tradition (Langlois and Robertson, 1992; Loasby, 1976; Nickerson and Zenger, 2002; Rawley, 2010; Simon, 1962; Williamson, 1975). Simon (1962: 468) defines complexity in systems as 'a large number of parts that interact in a nonsimple way.' If organizations are viewed as networks of tasks (Grandori 2001; Thompson 1967), then complexity exists when a large number of tasks are interdependent. For example, an organization is complex if change in one unit requires change in many other units. Moreover, a growing number of interdependent parts in an organization increases combinatorial complexity, as the addition of one element results in an exponential increase in the number of possible interfaces and interdependencies (Ethiraj and Levinthal, 2004).

A firm's complexity can affect its decision making in many ways. For example, a firm that decides to disaggregate its organization into a number of smaller, semiautonomous units will experience a rise in the total number of interfaces within the organizational system. As organizational tasks and activities require ongoing communication to coordinate decisions and behaviors, interdependencies arise along with a growing number of channels to coordinate joint and interdependent organizational actions (Thompson, 1967). This has consequences for information-processing demand (Simon, 1955), which, in turn, increases the likelihood of decision errors (Levinthal, 1997). As such, increasing complexity progressively creates difficulties for decision makers attempting to grasp and anticipate the effects of emerging interdependencies on system behavior and performance (Ethiraj and Levinthal, 2004; Zhou, 2011). Complexity limits the ability of managers to rationally account for all important decision factors (March and Simon, 1958), which increases the risk that certain performance-detrimental consequences will remain hidden in the strategic decision-making process. Hidden costs, therefore, relate to implementation costs that are hidden from managerial attention at the point of strategic decision making (see Ocasio, 1997).

The hidden costs of offshoring

We investigate hidden costs in the context of services offshoring. Offshoring refers to the internal and external sourcing of tasks and services from a location outside the home country in support of domestic and global operations (Contractor *et al.*, 2010; Manning *et al.*, 2008). Many offshored activities are interlinked with domestic processes and often require complex coordination (Srikanth and Puranam, 2011). This setting is therefore suitable for investigating the interplay between complexity and hidden costs.

A substantial body of research has demonstrated that offshoring decisions are driven by a number of factors, including expectations of lower labor and production costs (Dossani and Kenney, 2003), access to talent and qualified labor (Lewin *et al.*, 2009), and opportunities to learn (Jensen, 2009). At the same time, however, there are also indications that the initial objectives of offshoring are not always achieved and that offshoring decisions may eventually prove more costly than expected (Dibbern *et al.*, 2008; Massini, Perm-Ajchariyawong, and Lewin, 2010; Stringfellow *et al.*, 2008). For instance, the multinational information technology (IT) corporation Dell Inc. decided to backsource its Indian service centers after encountering unexpected challenges of cultural and geographic distance (Frauenheim, 2003).

The concept of hidden costs can be related to three streams of offshoring research (see Table 1). The first stream focuses on the impact of hidden

Table 1.   Three streams of research on the hidden costs of offshoring

Theoretical focus	Research question	Examples/consequences of hidden costs	Indicative literature
Performance indicator	How might the practice of offshoring eventually undermine anticipated financial value?	• Costs of selecting a vendor • Costs of layoffs • Cultural costs • Ramp-up costs • Costs of managing an offshore contract	• Barthélemy (2001) • Overby (2003)
Noncontractual costs	How does international outsourcing (in contrast to vertical integration) create unexpected costs for firms?	• Reduce learning capabilities • Reduce robustness • Reduce long-term responsiveness • Reduce coordination ability • Undermine core competences	• Bettis *et al.* (1992) • Hendry (1995) • Reitzig and Wagner (2010)
Costs of reconfiguration and relocation	How does the global relocation and reconfiguration of business tasks and activities create unexpected costs for firms?	• Coordination costs • Design/specification costs • Control costs • Knowledge transfer costs	• Dibbern *et al.* (2008) • Kumar *et al.* (2009) • Stringfellow *et al.* (2008) • Srikanth and Puranam (2011)

costs on the financial value of offshore outsourcing (e.g., Barthélemy, 2001; Overby, 2003)—a question of interest to business practitioners, in particular. In emphasizing the challenges of offshoring, these practitioner-oriented articles have attempted to specify and quantify the hidden financial costs of offshoring.

The second stream discusses hidden costs in relation to strategic choices between international outsourcing and vertical integration, where outsourcing—and the resulting loss of control and transaction costs resulting from the shift of ownership to an external partner—might erode firms' capabilities and resources (e.g., Bettis, Bradley, and Hamel, 1992; Hendry, 1995; Reitzig and Wagner, 2010). For example, Stringfellow *et al.* (2008: 166) label 'invisible costs in offshoring services work' as 'hidden communication-related costs associated with the use of foreign service providers.' Reitzig and Wagner (2010) argue that hidden outsourcing costs can disrupt incremental in-house learning processes. Dibbern *et al.* (2008: 333) identify four particular types of unexpected 'extra costs' arising from outsourcing software projects to third-party providers abroad:

'(1) requirements specification and design, (2) knowledge transfer, (3) control, and (4) coordination.'

A third and more recent stream focuses more fundamentally on hidden costs associated with relocating and redesigning tasks and processes within an orchestrated value-generating system; that is, the costs of reconfiguring a firm's internal and external value chains (e.g., Kumar, van Fenema, and von Glinow, 2009; Levy, 1995; Srikanth and Puranam, 2011). According to this view, offshoring can be regarded as the process of reconfiguring value chain activities across dispersed locations regardless of whether outsourcing or an internal delivery model is chosen (Contractor *et al.*, 2010; Manning *et al.*, 2008). Therefore, hidden costs might arise from unanticipated organizational needs, and can be related to areas such as knowledge transfer, new interdependencies, training and coaching, the protection of intellectual capital, or the monitoring of performance of offshore units.

In this study, we address all three research streams, but we focus in particular on the third stream by examining why certain costs of reconfiguring a firm's value chain in the implementation of

both captive offshoring and offshore outsourcing are hidden from managerial attention in decision-making processes and thus not accounted for in initial cost estimations. Obviously, the offshoring of services might also encapsulate hidden benefits, such as unanticipated advantages of relocating tasks and activities abroad. For instance, the well-known 'went for price, stayed for quality' reference (Dossani and Kenney, 2003) captures a situation in which firms encounter 'positive externalities' of offshoring. In other words, firms may find that certain outcomes, such as higher service quality, exceed initially expected benefits, such as lower labor costs. However, in this paper we focus on a setting in which the practice of offshoring typically undermines initial objectives.

The complexity of offshoring

We propose that cost-estimation errors as a manifestation of hidden costs can be explained by increasing offshoring complexity. In contrast to a company undertaking all of or the majority of its activities at home in proximity to its headquarters, a firm sourcing a large number of activities from multiple internal and external providers in different countries is likely to face higher complexity. In the following, we distinguish between two types of complexity in offshoring that challenge decision makers' estimation abilities: configuration complexity and task complexity.

Configuration complexity refers to complexity in terms of the interdependencies in the organizational configuration. In this regard, we distinguish between the structural, operational, and social layers of the organizational configuration, which together challenge decision makers' cost-estimation abilities. First, structural complexity arises because new interdependencies emerge between functional units and across country borders as a consequence of offshoring. For instance, when an organizational subtask is relocated to a foreign location, its interdependencies with other organizational units are obscured by geographic, political, and institutional differences (Kumar *et al*., 2009). Similarly, prior research finds that extensive outsourcing of manufacturing creates new interdependencies, which increase the likelihood of delays and disruptions in global supply chains (e.g., Levy, 1995). Second, research suggests that the process of offshoring presents companies with a higher number of tasks and

activities (Contractor *et al*., 2010; Mudambi and Venzin, 2010), thus increasing operational complexity. Driven by the potential to lower costs and increase efficiency by identifying specific tasks to be offshored, firms break down and 'fine slice' value chain activities into a larger number of subprocesses. For example, while research and development (R&D) might constitute one distinct, integrated value chain activity in a home country context, firms might choose to disaggregate the function into a number of more narrowly defined tasks and activities when subjecting them to captive and outsourced offshoring. As a result, firms face a higher number of interdependencies among processes and, hence, increased operational complexity.

Third, we argue that the two types of complexity identified above relate to a third type, which we call social complexity. Recent research indicates that offshoring may not only provoke internal resistance (Lewin and Couto, 2007) but also hamper operational efficiency due to a lack of trust, status differences between onsite and offshore units, and a lack of understanding and communication in the process of delivering tasks and interacting with offshore units (Vlaar, van Fenema, and Tiwari, 2008; Levina and Vaast, 2008). A lack of face-to-face interaction, as well as cultural and language differences among employees at geographically dispersed locations, may increase social complexity given the need for 'non-simple' practices of relationship-building between employees and teams.

Task complexity, in contrast, relates to the complexity of the individual offshoring implementations (e.g., Mudambi and Tallman, 2010; Kumar *et al*., 2009). A number of different task characteristics can influence the complexity of an offshoring implementation, including the task's degree of standardized versus tacit knowledge flows; the presence of inexact and unknown means-ends connections; the number and interdependence of subtasks; and the existence of path-goal multiplicity (e.g., Campbell, 1988; Wood, 1986). In comparison with simpler tasks for which such aspects as input and output requirements are easily defined, complex tasks with imprecise and ambiguous requirements are more likely to subject the decision maker to bounded rationality and uncertainty in the decision-making process. Indeed, research suggests that firms are increasingly offshoring more complex tasks, such as

design, engineering, and analytical services (Lewin *et al*., 2009). Accordingly, we argue that the task complexity of different offshoring implementations can challenge decision makers' abilities to estimate the costs of relocating a service activity abroad.

In sum, we define offshoring complexity as a combination of configuration and task complexity. While task complexity resides within the actual implementation, configuration complexity occurs as a result of new interdependencies between countries, activities, and people. In line with research on complexity (e.g., Anderson, 1999; Ethiraj and Levinthal, 2004; Rawley, 2010), we argue that a higher degree of offshoring complexity makes it difficult for decision makers to consider all important decision-making factors, especially the overarching organizational system and its effect on organizational behavior and performance, prior to an offshoring implementation. In particular, complexity has consequences for decision makers' cost-estimation abilities, as the managerial task of understanding the globally reconfigured organization becomes complicated and is more likely to be misguided, thus resulting in costs that are hidden from the decision makers' view. Therefore, there is a greater risk that decision makers facing a high degree of offshoring complexity will make cost-estimation errors in the decision-making process. Accordingly:

> *Hypothesis 1: A higher degree of offshoring complexity is likely to increase cost-estimation errors.*

The moderating effect of organizational design orientation and experience

A number of recent studies report that many firms experience improved performance as a result of offshoring, despite high complexity (e.g., Lewin *et al*., 2009; Massini *et al*., 2010). For instance, firms taking a more strategic approach to offshoring, such as those adopting consistent ways of selecting locations, implementing projects, and coordinating operations, report better performance (Massini *et al*., 2010). Thus, we posit that the hypothesized relationship between offshoring complexity and cost-estimation errors is moderated by factors that explain why some firms are comparatively better than others in accounting for hidden costs of offshoring in the strategic decision-making

process. In the following, we argue that firms' organizational design orientation and offshoring experience help decision makers to better estimate costs as offshoring complexity increases.

Hidden costs become more likely as the complexity of an organizational system increases. This makes it difficult for decision makers to direct appropriate attention during the decision-making process to future changes in organizational structures and the interdependencies that may result from offshoring. In this respect, the congruence between different components in an organizational system spread across different locations becomes central (Nadler and Tushman, 1997; Russo and Harrison, 2005). Organizational congruence is defined as 'the degree to which the needs, demands, goals, objectives, and/or structures of one component are consistent with those of the other' (Nadler and Tushman, 1997: 34). While typical models of fit look at dyadic relationships, such as the fit between strategy and structure (Chandler, 1962), the congruence model is based on the assumption that fit can be multifaceted, simultaneously encapsulating different organizational dimensions. Accordingly, we use the congruence model to portray the fit between globally dispersed organizational processes, activities, and people, that is, the degree to which structures and interdependencies across and within organizational boundaries remain consistent as offshoring complexity grows. High congruence corresponds to high consistency in the organizational system encapsulating the functional units and human resources spanning national borders and the interdependencies among them. Similarly, a low degree of congruence corresponds to low consistency in the organizational system.

The degree to which organizational congruence is reflected in a firm's offshoring strategy is important for how accurately decision makers estimate the consequences of offshoring complexity. A dominant perception has been that a firm's primary objective when offshoring is to reduce labor costs by targeting low-wage sourcing destinations, such as China and India, and to access qualified personnel and new markets (Dossani and Kenney, 2003; Kedia and Lahiri, 2007). However, research suggests that offshoring may also be motivated by the opportunity to improve a firm's organizational system (Lewin and Couto, 2007). For example, a number of firms view the potential for increased

organizational flexibility, business process reengineering, and reduced system redundancy as an important driver of offshoring. Moreover, firms with corporate-wide offshoring strategies report a range of offshoring outcomes besides reduced costs, such as organizational flexibility (Massini *et al.*, 2010).

We therefore argue that offshoring strategies involving a strong orientation toward the overall system of structures and processes, rather than the mere relocation of particular tasks for resource-seeking reasons, are better able to account for the hidden costs that follow from increasing offshoring complexity, as managerial attention is directed toward how the organization and its interdependencies are affected by the offshoring decision (Ocasio, 1997). In such situations, decision makers can match the impact of the anticipated organizational changes caused by offshoring with resource allocations so that the main offshoring objectives can be met. Thus, a higher degree of orientation toward the organizational design of offshoring promotes the decision maker's ability to align offshoring complexity with corresponding organizational structures and processes, and consequently negatively moderates the positive relationship between complexity and cost-estimation errors. Hence:

Hypothesis 2: The positive association between offshoring complexity and cost-estimation errors is negatively moderated by firms' strategic orientation toward organizational design.

A necessary prerequisite for recognizing the most efficient mechanisms for managing complex organizations is extensive organizational system knowledge. Organizational system knowledge can be defined as knowledge about individual organizational activities comprising an organizational system and about how those activities are integrated into an orchestrated organizational system (Brusoni and Prencipe, 2006; Henderson and Clark, 1990). In order to make effective decisions based on expectations of how the organization is going to change, decision makers need knowledge about individual activities and about the ways in which different activities are integrated and linked together in a coherent organizational system. For example, Brusoni and Prencipe (2006) argue that knowledge evolution is a strong and

important mediator in organizational change. Similarly, Haunschild and Sullivan (2002) suggest that complex and heterogeneous circumstances spur positive learning in organizations. Accordingly, firms' abilities to estimate the consequences of the complexity of offshoring are affected by their organizational system knowledge, including knowledge of interdependencies and interfaces between different units and activities.

Thus, a central question is the following: how do firms acquire and accumulate knowledge to successfully integrate a vast array of heterogeneous activities into an orchestrated system? In this respect, offshoring is often portrayed as a learning-by-doing process (Jensen, 2009; Maskell *et al.*, 2007). In particular, research shows that firms with previous offshoring experience generally display better performance in new offshoring ventures (Hutzschenreuter, Pedersen, and Volberda, 2007; Manning *et al.*, 2008). Hutzschenreuter *et al.* (2007) argue that firms' past offshoring experience may influence the range of issues and possibilities that managers consider when making offshoring decisions. Thus, we argue that firms with prior offshoring experience are more likely to have accumulated organizational system knowledge and will therefore be comparatively better in estimating the costs of offshoring associated with complexity. In other words, firms with experience are more likely to anticipate the hidden costs of offshoring and therefore avoid estimation errors. We therefore hypothesize the following:

Hypothesis 3: The positive association between offshoring complexity and cost-estimation errors is negatively moderated by the firms' offshoring experience.

In sum, we derive a theoretical model of hidden costs in which offshoring complexity is likely to increase cost-estimation errors but is negatively moderated by organizational design orientation and experience (see Figure 1).

DATA AND METHODS

We examine both the effect of offshoring complexity on cost-estimation errors as a manifestation of hidden costs, and the moderating effects of design orientation and offshoring experience of the firm using primary data collected by the Offshoring
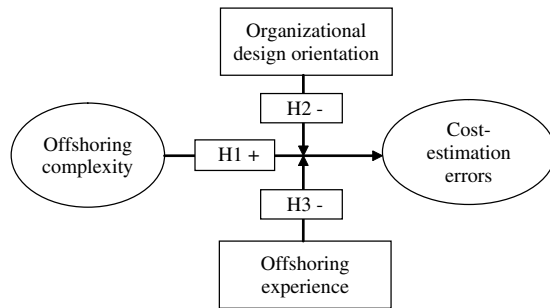
Figure 1. Theoretical model: the hidden costs of offshoring

Research Network (ORN) and data gathered from secondary sources (on distances). The ORN is a network of scholars and organizations based in the United States, Europe, and Australia that study the emergence of trends in services offshoring (e.g., Lewin *et al*., 2009; Massini *et al*., 2010; Manning, Lewin, and Schuerch, 2011). Since its foundation in 2004, the ORN research team has conducted two major surveys annually—a corporate client survey and a service provider survey—to collect offshoring-related data. As both the client and provider surveys are taken online, respondents reach the survey Web site through external links or e-mail invitations. Once registered and approved by the ORN survey team, respondents are added to the database. The fact that both surveys are utilized for this study, in combination with other secondary sources, helps us address the common method variance problem (Chang, van Witteloostuijn, and Eden, 2010).

The corporate client survey collects data from U.S. firms (since 2004) and European firms (since 2006) on their offshoring strategies, drivers, concerns, risks, outcomes, future plans, and concrete offshore implementations, including information on tasks offshored, launch years, location choices, delivery models (both captive and outsourced), and performance data. The dataset used for this study includes data from 183 firms, of which 102 are based in the United States and 81 are European. These firms are active in different industries: manufacturing (32%), software (18%), finance and insurance (18%), and technical services (14%). Thirty-five percent of the firms are large (>10,000 employees), 47 percent are medium size (500–10,000 employees), and 18 percent are small (<500 employees). These firms reported 531 offshore implementations, defined as

the allocation of particular tasks or processes to a location outside the home country. This implies that each firm has provided data for an average of 3.2 offshore implementations. Offshored tasks may include IT services, administrative services (e.g., Human Resources, legal, finance, and accounting), call centers, software and product development, marketing and sales, and procurement. The three most common services offshored in our sample are IT services (22%), call centers (17%), and engineering services (10%). Offshoring implementations include captive offshoring projects (48%) as well as offshore outsourcing projects (52%). The statistical analysis is conducted on the level of (these 531) offshore implementations.

In addition, we use data from the ORN service provider survey. The service provider survey has collected information from business service providers at the firm and services level since 2007. Survey participants provide information on the services they provide; the locations from which they provide those services; perceived client expectations and operational risks; the performance of service delivery; and various features of the services provided. The latter include such items as the degree of commoditization and the complexity of tasks. The service provider database contains data (as of 2011) from 755 providers based in different countries and regions, including the United States (32%), India (18%), China (4%), other Asian countries (8%), Western Europe (19%), Eastern Europe (7%), and Latin America (6%). The database contains data from all major large providers (19% of the sample had more than 10,000 employees), including Infosys, Genpact, IBM Global Services, and Wipro. It also covers mid-size providers (37%; 500–10,000 employees) and small providers (44%; <500 employees). Providers in the database offer various services, such as IT services (74% of providers), software development (65%), call centers (48%), finance and accounting (41%), HR services (30%), engineering services (29%), marketing and sales (26%), procurement (25%), R&D (25%), design (19%), and legal (13%). Altogether, the database contains 3,399 service-specific entries, that is, observations related to particular services that providers offer.

For the analysis, we use a hierarchical regression analysis with successive linear regression models, adding more explanatory variables to each model. Ordinary least squares (OLS) models are most

suitable for this analysis, as we have a dependent variable with continuous values and as we propose a linear relationship between our dependent variable and the explanatory variables. The hierarchical feature refers to the gradual building of separate but related models with an increasing number of explanatory variables until we reach the final model. We use three different versions of the final model in which all explanatory variables are included. First, we include all implementations in our sample (N = 531) to investigate the hypotheses. This model contains both captive and outsourced implementations. However, because there are transactional differences between captive offshoring and offshore outsourcing (see Williamson, 1985), we also split the sample into captive implementations (N = 253) and outsourced implementations (N = 278), and run the full model for both samples.

Variable construction

The variables, their sources, and their operationalization are presented in Table 2. *Cost-estimation error* is measured as the difference between the cost savings expected from the offshoring project and the achieved cost savings. Most firms offshore with the objective of reducing costs (Manning *et al.*, 2008). Thus, a strong empirical proxy of latent hidden costs is the deviation between expected and realized cost savings in offshoring. If expectations perfectly match the savings achieved through offshoring, then there has been no estimation error, but if expectations exceed achieved savings, then expectations have not been met and estimation error has occurred (costs are higher than expected). The few cases in which achieved savings are above expectations ('hidden benefits') are deleted from the sample, as this phenomenon might be explained by factors other than hidden costs. Both expected savings and achieved savings are measured as a share of total costs, so the value of cost-estimation error can vary from zero percent (when achieved savings are equal to expectations) to 100 percent (when expected savings are very high but no savings are actually achieved).

Offshoring complexity is measured along two dimensions: configuration complexity and task complexity. *Configuration complexity* is a composite measure consisting of three dimensions with the purpose of capturing structural, operational, and social complexity, respectively: global diversity of offshore operations (i.e., the number of countries in which a firm is conducting offshoring), disaggregation of activities (the number of services for which a firm engages in offshoring), and spread of employees (the number of persons employed in offshore projects). After each of these dimensions is measured, they are then standardized and mean-centered around zero. The measure of configuration complexity is constructed as the product of these dimensions, which all have an equal weight in the composite measure. This measure is inspired by previous studies measuring organizational complexity as the degree of firms' functional and occupational differentiation (e.g., Aiken, Bacharach, and French, 1980; Blau and McKinley, 1979; Damanpour, 1996). *Task complexity* is measured as the degree to which service providers view a particular task or process as complex. Data on this item is collected in the service provider survey by asking service providers to rank the complexity of different types of tasks on a five-point Likert scale (1 = not complex at all; 5 = very complex). The relatively low correlation of −0.06 (see Table 3) between configuration complexity and task complexity indicates that these are two distinct dimensions of offshoring complexity.

Offshoring experience is a simple measure made for each implementation. It is measured as the time (in years) between the launch of the first offshoring project by the focal firm and the initiation of the focal implementation. The assumption is that the longer the respective firm has been engaged in offshoring projects, the more experience it has accumulated. There may be other ways to measure experience, perhaps by taking the number of services offshored or the number of locations offshored to into account. However, as we distinguish between experience and offshoring complexity, we focus on years of experience. Importantly, some firms offshore a variety of services to different locations in a short period of time, so that they have little saturated experience. Other firms might focus on offshoring particular functions over a longer period of time. The approach adopted here is akin to that used in other papers (e.g., Lewin *et al.*, 2009).

Organizational design orientation is measured by asking respondents to indicate the extent to which 'business process redesign' is a driver for offshoring particular services on a five-point Likert scale (1 = not important at all; 5 = very important). The measure captures the extent to which

Table 2. Operationalization of variables in the models

Variable	Operationalization	Data Source
Cost-estimation error	Percentage of savings expected minus the percentage of savings achieved when offshoring	ORN Client survey
Configuration complexity	The product of the number of services, number of countries, and number of employees (in thousands) that are offshored	ORN Client survey
Task complexity	The average scores at the service level of the provider's assessment of 'the complexity of tasks' (on a five-point scale).	ORN Provider survey
Offshoring experience	Years from the launch of the firm's first offshoring project to the focal implementation	ORN Client survey
Organizational design orientation	Based on the question: *Please indicate the importance of enhancing efficiency through business process redesign as a strategic driver for the offshore implementations* (1 = not important at all; 5 = very important)	ORN Client survey
Cost orientation	Based on the question: *Please indicate the importance of labor cost savings as a strategic driver for the offshore implementations* (1 = not important at all; 5 = very important)	ORN Client survey
Interaction with client	The average scores at the service level of the provider's assessment of 'the frequency of client interaction' (on a five-point scale).	ORN Provider survey
Interdependency of client	The average scores at the service level of the provider's assessment of 'the interdependency with processes in client organization' (on a five-point scale).	ORN Provider survey
Disagreement with client	The average scores at the service level of the provider's assessment of 'the frequency of disagreement with client in performing tasks' (on a five-point scale).	ORN Provider survey
Commoditization	The average scores at the service level of the provider's assessment of 'the extent of commoditization today' (on a five-point scale).	ORN Provider survey
Use of collaborative technologies	The average scores at the service level of the provider's assessment of 'the collaborative technologies used in performing tasks' (on a five-point scale).	ORN Provider survey
Geographical distance	The distance in air miles (in thousands km) between the home location and the offshore location	Google distance calculator
Cultural distance	The Kogut-Singh index of distance between the home location and the offshore location	Hofstede's measures
Language distance	A dummy indicating whether the main language spoken in the home location is the same as the language spoken in the offshore location (1 = different)	MLA language map
Home employment	Number of employees in home country in thousands	ORN Client survey
IT service	A dummy indicating whether the implementation is an IT service (1 = IT service)	ORN Client survey
Call center service	A dummy indicating whether the implementation is a call center service (1 = call center service)	ORN Client survey
Engineering service	A dummy indicating whether the implementation is an engineering service (1 = engineering service)	ORN Client survey
Outsourcing	A dummy indicating whether the offshore implementation is captive offshoring (= 0) or offshore outsourcing (= 1)	ORN Client survey
Time	Months since the respective offshoring project was implemented	ORN Client survey

offshoring projects that are related to particular services have been implemented in conjunction with optimizing the entire work process. In other words, we use this item as a proxy for the level of managerial attention (Ocasio, 1997) given to the orchestration of globally distributed processes. The correlation of -0.21 ($p < 0.001$) between the 'business process redesign' and 'labor cost savings' drivers indicates that the business process redesign driver is clearly distinct from the cost driver. The latter primarily captures managerial attention given to the cost benefits of offshoring particular processes without necessarily considering the impact of any one project on the entire

workflow. Therefore, the attention respondents pay to business process redesign when offshoring is viewed as a good proxy for whether they consider the organizational design in the offshoring process.

In addition, a number of control variables are included. First, we control for *cost orientation* (in contrast to organizational design orientation) by including an item on 'labor cost savings' as a driver of offshoring implementation. We also include a number of variables from the ORN Service Provider Survey in order to control for different factors at the service level. We control for three transaction-related effects for each offshored service: the frequency of *interactions with the client* (as a proxy for frequency), *interdependence of client* activities (as proxy for asset specificity), and frequency of *disagreements with the client* (as a proxy for uncertainty) (Williamson, 1985). These are ranked on a five-point Likert scale by the service providers for each service in which they are engaged. We also include *commoditization of tasks*, which refers to the process by which processes become less specific to firm or product characteristics, thereby lowering transaction and coordination costs for those firms offshoring those processes (Davenport, 2005). Moreover, the use of *collaborative technologies* in the service is added to control for the use of information and communication technology in the firm. The abovementioned ORN Service Provider Survey control variables are measured using service-specific variables based on the perception of service providers, which are ranked using five-point Likert scales.

To capture other potential sources of hidden costs (e.g., Stringfellow *et al.*, 2008), we add control variables for interaction distance. These are measured using secondary data on the distance between the home location and the foreign location of the offshore implementation. Interaction distance includes three dimensions: *geographical distance*, measured as air miles between the home location and the offshore location; *cultural distance* between two locations based on the Kogut and Singh index (Kogut and Singh, 1988); and *language distance* as a dummy variable indicating whether the same language is spoken both in the home and offshore locations.

Controls are also included for the three most common services—*IT, call center, and engineering*—as the level of hidden costs might be affected by characteristics of particular services. As can be seen in the correlation matrix (Table 3), the nature

of these services is rather distinct in terms of such factors as task complexity. For example, call center services are negatively correlated, engineering services are positively correlated, and IT services are between these extremes. The services are added as dummy variables.

Along similar lines, we include the number of *employees in the home country* to control for firm size. We also control for the type of *delivery model* by using a dummy for captive offshoring versus offshore outsourcing. Finally, we control for the *time* passed (in months) since the project was implemented. As it can be more difficult to retrospectively assess discrepancies between expected and realized costs the older a project is, this control variable captures biases related to the perceptions of the respondents.

The correlation matrix and descriptive data (mean values, standard deviation, and minimum and maximum values) are provided in Table 3. In order to detect potential problems of multicolinearity, we look at the correlation coefficients among the independent variables in the models. None of the correlations are above the usual threshold of 0.4 that indicates a possibility of multicolinearity. Hence, the dataset does not seem to suffer from problems of multicolinearity. However, as the task complexity variable is relatively highly correlated with some of the control variables measured at the services level, we ran the models without these variables. All results were qualitatively the same.

The mean value of our dependent variable—cost-estimation errors—is 6.68, indicating that, on average, firms achieved 6.7 percent less savings on their offshoring implementations than they expected. The standard deviation of 10.11 signifies that the observed firms vary in terms of their estimation accuracy, as actually achieved savings span from 25 percent to 100 percent of expected savings. However, a closer look at the frequency of the cost-estimation error variable shows that 52 percent of the implementations (N = 278) show no cost-estimation errors at all (savings meet expectations), while 48 percent reveal different levels of cost-estimation errors (higher costs than expected). In 27 percent of cases, achieved cost savings are lower than expected, but not by more than 10 percent, while in approximately 21 percent of cases achieved savings are more than 10 percent lower than expected. These figures show that there is good variation in the dependent variable across the included firms and also provides evidence that

Table 3.   Correlation matrix (N = 531)*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1) Cost-estimation error	1.00																			
2) Configuration complexity	0.11	1.00																		
3) Task complexity	0.09	−0.06	1.00																	
4) Offshoring experience	−0.09	−0.06	−0.14	1.00																
5) Org. design orientation	0.02	0.07	−0.07	0.20	1.00															
6) Cost orientation	0.09	0.06	0.04	−0.31	−0.21	1.00														
7) Interaction with client	0.08	−0.06	0.31	0.03	−0.05	−0.06	1.00													
8) Interdependency of client	0.04	−0.05	0.21	−0.02	−0.01	0.09	0.31	1.00												
9) Disagreement with client	0.05	0.08	0.10	−0.12	0.03	0.09	−0.15	0.05	1.00											
10) Commoditization	−0.07	0.13	−0.32	−0.09	−0.05	0.11	−0.24	−0.33	−0.25	1.00										
11) Collaborative technology	−0.07	0.05	−0.23	0.04	−0.06	−0.07	−0.05	−0.19	0.01	0.30	1.00									
12) Geographical distance	0.04	0.11	0.08	−0.30	−0.08	0.26	−0.02	0.08	0.13	−0.01	0.01	1.00								
13) Cultural distance	−0.03	−0.01	0.03	0.01	0.01	−0.02	0.11	0.03	0.03	−0.12	0.11	0.18	1.00							
14) Language distance	0.01	−0.11	0.06	0.27	0.01	−0.25	0.20	0.01	−0.12	−0.17	0.04	−0.23	0.29	1.00						
15) Home employment	−0.03	0.23	−0.15	−0.12	−0.04	0.15	−0.16	−0.05	0.01	0.15	0.04	0.13	−0.03	−0.12	1.00					
16) IT service	0.04	0.01	−0.03	−0.15	−0.03	0.14	−0.31	−0.27	0.28	0.33	−0.21	0.07	−0.04	−0.12	0.10	1.00				
17) Call center service	−0.05	0.14	−0.35	0.06	−0.01	0.01	−0.27	−0.18	−0.29	0.38	0.36	−0.10	−0.07	−0.02	0.12	−0.23	1.00			
18) Engineering service	−0.06	−0.02	0.31	0.04	−0.05	0.03	0.11	0.35	−0.24	−0.27	−0.32	0.07	0.01	0.02	0.01	−0.18	−0.15	1.00		
19) Outsourcing	0.13	0.05	0.03	−0.19	−0.07	0.18	−0.03	−0.11	0.01	0.14	0.06	0.09	−0.01	−0.16	0.01	0.14	0.07	−0.07	1.00	
20) Time	−0.14	−0.01	0.06	0.12	0.01	−0.04	0.16	0.04	−0.10	−0.14	−0.06	−0.18	−0.12	0.15	0.02	−0.03	−0.06	−0.03	−0.14	1.00
Mean	6.68	0.04	3.55	4.46	3.32	4.24	3.89	3.63	2.45	3.19	3.36	8.52	8.89	0.56	21.8	0.22	0.17	0.10	0.52	7.40
Std. dev.	10.11	1.01	0.46	8.28	1.27	1.02	0.25	0.15	0.24	0.42	0.14	4.19	5.49	0.50	41.1	0.41	0.37	0.30	0.50	4.00
Min. values	0	−1.16	2.88	0	1	1	3.57	3.42	2.00	2.38	2.97	0	2	0	1	0	0	1	0	2
Max. values	75	8.20	4.47	41	5	5	4.36	4.00	2.83	3.87	3.75	16.24	31.48	1	385	1	1	1	1	38

* All values greater than 0.09 are significant at the 5% level.

cost-estimation errors are a significant problem facing many offshoring firms.

Moreover, if we divide the sample into captive offshoring and offshore outsourcing, our results show that relatively high cost-estimation error is more common in cases of offshore outsourcing than in cases of captive offshoring. The average levels of cost-estimation error are 7.92 for offshore outsourcing and 5.32 for captive offshoring (which is a significant difference in an analysis of variance, $p < 0.01$). Furthermore, 26 percent of all offshore outsourcing cases report that costs were more than 10 percent higher than expected, while this is true for only 16 percent of the captive offshoring cases. When expected and achieved savings are examined separately, we find that the difference in cost-estimation error is due to expected savings being significantly higher for offshore outsourcing, while the achieved savings are at the same level for captive and outsource offshoring. We explore this difference later in the paper.

RESULTS

The results of the hierarchical regression model are presented in Table 4. Model 1 includes the control variables and the two explanatory variables reflecting offshoring complexity: configuration complexity and task complexity. We add the two moderating variables—organizational design orientation and offshoring experience—in Model 2. In Model 3, we add the interaction effect between the two complexity variables and our two moderating variables.

In all three models, the two complexity variables are significant ($p < 0.05$) and positive, which supports the hypothesis that offshoring complexity is an important determinant of cost-estimation error as manifested in hidden costs of offshoring (Hypothesis 1). Model 1, which includes the two complexity variables, obtains an R^2 value of 0.11. When the two moderating variables are added in Model 2, the R^2 only increases to 0.12, which is due to the fact that none of the moderating variables are significant in this model. In Model 3, we go one step further and include the four interaction terms in order to test for the proposed moderating effects (Hypotheses 2 and 3). However, the model does not improve, as the R^2 only increases to 0.13 with the use of four additional degrees of freedom. Moreover, only the interaction terms

between task complexity and organizational design orientation are negative and significant as expected ($\beta = -1.78$, $p < 0.05$).

Notably, some of the control variables are significantly related to cost-estimation error. Those factors increasing cost-estimation errors include cost orientation, task interdependence with client activities, cultural distance, language distance, and call center services, while commoditization and time passed since the initiation of the offshoring project lower cost-estimation errors. These results support complementary explanations for cost-estimation error and hidden costs, as they highlight transactional factors, such as task interdependency with client operations and interaction distance like cultural and language distance (see Stringfellow *et al.*, 2008). In addition, the outsourcing variable is significant in Model 1 ($\beta = 1.78$, $p < 0.05$), which reflects the higher level of cost-estimation error for offshore outsourcing as compared to captive offshoring.

In order to go beyond just adding the outsourcing variable as a control variable, the full model is applied to the two samples of captive offshoring and offshore outsourcing in Models 4 and 5, respectively. Interestingly, the R^2 increases substantially in both cases, reaching 0.34 in the case of captive offshoring and 0.20 for offshore outsourcing. However, it is also obvious that the variables have different effects in the subsamples. In fact, no variable is significant in both subsamples. In the case of captive offshoring, configuration complexity significantly increases cost-estimation errors ($\beta = 2.14$, $p < 0.001$), while task complexity is insignificant. Both interaction terms—configuration complexity in terms of organizational design orientation and offshoring experience—are significant and negative ($\beta = -0.29$, $p < 0.01$ and $\beta = -0.06$, $p < 0.05$, respectively), while neither organizational design orientation nor offshoring experience by themselves have significant effects. These results are in line with Hypotheses 2 and 3, which propose that organizational design orientation and offshoring experience negatively moderate the positive relationship between complexity and hidden costs. Of the control variables, the most notable are the significant positive distance variables (geographical and language distance), which indicate that cost-estimation errors increase as the distance between the home location and the offshore location increases.

Table 4. Hierarchical regression models (N = 531)—standard errors in parenthesis

	Model 1	Model 2	Model 3	Model 4	Model 5
	Cost-estimation error in decision making				
	All implementations			Captive offshoring	Offshore outsourcing
Configuration complexity	**0.19****	**0.19****	**0.40***	**2.14****	0.10
	(0.06)	**(0.06)**	**(0.19)**	**(0.47)**	(0.63)
Task complexity	**6.71***	**6.41***	**12.59****	7.46	**23.09****
	(2.73)	**(1.86)**	**(3.86)**	(5.02)	**(5.53)**
Org. design orientation		−0.13	−0.67*	−1.64	**−1.09***
		(0.35)	(0.28)	(1.85)	**(0.41)**
Offshoring experience		−0.04	−0.48	−0.12	−0.14
		(0.06)	(0.46)	(0.08)	(0.09)
Configuration complexity* Org. design orientation			−0.04	**−0.29****	−0.02
			(0.09)	**(0.11)**	(0.17)
Configuration complexity* Offshoring experience			−0.04	**−0.06***	−0.03
			(0.03)	**(0.02)**	(0.06)
Task complexity* Org. design orientation			**−1.78***	0.60	**−2.80***
			(0.78)	(1.04)	**(1.11)**
Task complexity* Offshoring experience			0.13	0.01	**−0.45†**
			(0.14)	(0.14)	**(0.26)**
Costs orientation	1.07*	0.98*	1.04*	−0.46	2.25*
	(0.47)	(0.49)	(0.50)	(0.55)	(0.87)
Commoditization	−15.21***	−15.01***	−15.65***	−4.37	−23.99***
	(4.25)	(4.29)	(4.28)	(5.46)	(6.12)
Use of collaborative technologies	−1.77	−1.85	−1.61	−3.22	7.14
	(4.77)	(4.78)	(4.79)	(6.71)	(6.79)
Interaction with client	9.31	8.88	9.13	2.03	19.83*
	(5.98)	(6.03)	(6.03)	(7.55)	(8.99)
Interdependency of client	12.94**	12.91**	13.31**	2.60	25.16**
	(4.62)	(4.64)	(4.63)	(5.73)	(7.61)
Disagreement with client	7.49	7.41	8.46	0.19	6.38
	(4.61)	(4.61)	(4.67)	(6.04)	(7.91)
Geographical distance	0.21	0.20	0.21	0.39*	0.07
	(0.14)	(0.14)	(0.14)	(0.17)	(0.21)
Cultural distance	0.23*	0.23*	0.24*	0.15	0.36*
	(0.10)	(0.10)	(0.10)	(0.11)	(0.16)
Language distance	2.83*	2.93	2.91*	3.89*	1.35
	(1.28)	(1.29)*	(1.28)	(1.59)	(1.86)
Call center service	16.45**	16.20**	18.02***	0.95	25.22**
	(5.08)	(5.11)	(5.19)	(6.81)	(8.10)
IT service	2.49	2.45	2.73	3.78†	2.42
	(1.72)	(1.72)	(1.73)	(2.11)	(2.88)
Engineering service	−2.68	−2.51	−2.42	−1.88	−2.59
	(2.01)	(2.03)	(2.03)	(2.36)	(3.31)
Home employment	−0.01	−0.01	−0.01	−0.01	−0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Time	−0.39***	−0.38***	−0.38**	−0.37**	−0.29
	(0.11)	(0.11)	(0.11)	(0.13)	(0.19)
Outsourcing	1.78*	1.75†	1.47		
	(0.90)	(0.90)	(0.90)		
Intercept	55.20***	45.01**	35.32*	27.42	83.97†
	(14.43)	(18.00)	(19.14)	(16.67)	(44.62)
N	531	531	531	253	278
F-value	4.07***	3.66***	3.38***	5.42***	2.86***
R-square	0.11	0.12	0.13	0.34	0.20

†, *, **, and *** indicate significance levels of 10%, 5%, 1%, and 0.1%, respectively. The significant hypothesized relationships are in bold.

In the case of offshore outsourcing implementations, task complexity is significant and positive ($\beta = 23.09$, $p < 0.001$), while configuration complexity is insignificant. The two interaction terms with task complexity are also significantly negative, although the interaction term between task complexity and offshoring experience is only moderately significant ($\beta = -0.45$, $p < 0.1$). This provides further support for Hypotheses 2 and 3, indicating that organizational design orientation and experience mitigate cost-estimation errors in the case of offshore outsourcing as well. Of the control variables, it is evident that the more task-oriented variables (such as commoditization) and transaction-oriented variables (such as interaction with client and interdependency with client operations) are significant in predicting cost-estimation errors in outsourcing implementations.

In order to test the robustness of our findings, we conduct a number of alternative specifications of our models. These alternative specifications included Tobit models (as we have a skewed dependent variable), logistic models (a binary dependent model with or without hidden costs), and random coefficients models (controlling for firm effects). All of these models provide qualitatively similar, but weaker, results than the one reported here. In addition, we believe that from a theoretical point of view we have applied the most appropriate model in order to test the hypotheses, as our dependent variable is measured on a continuous scale, and as the question of whether hidden costs and cost-estimation error exist cannot be separated from the level of hidden costs. Both aspects are determined simultaneously in our preferred model.

Furthermore, we have addressed the issue of endogeneity, that is, whether the complexity variables are endogenously determined by the same factors as the estimation errors, because those managers who underestimate costs might also offshore more and thereby increase the complexity. We did so by running simultaneous equation models with instrumental variables. For this purpose, we used a set of instruments that is correlated with the endogenous variable (complexity, in our case) but not correlated with the error from the regression in which the endogenous regressor appears (Stock, Wright, and Yogo, 2002). From a theoretical perspective, it seems likely that the 'objective' instruments in our model—geographical distance, home employment, and call center service, which are all correlated with the complexity variables (see Table 3)—would pass this test. In addition, from an empirical perspective, there seems to be limited evidence of endogeneity problems as all of the results remain qualitatively the same in the simultaneous equation models with instrument variables. Accordingly, the Hausman test favors the use of OLS models, which is also hinted at by the low correlations (0.09–0.11) between the complexity variables and cost-estimation errors (see Table 3). In addition, to test for overidentifying restrictions, we regressed the residual from the cost-estimation error equation on the instruments for the model (Sargan, 1958). The R^2 value in this regression is very low (0.0084) and none of the predictors are statistically significant. We also inspected the bivariate correlations between the instruments and the residuals, all of which were insignificant and close to zero. In combination, these tests do not provide absolute proof of the absence of endogeneity (see, e.g., Hahn, Ham, and Moon, 2011), but they do suggest that the problem has been addressed in our model.

DISCUSSION

Firms and their managers often find that the initial objectives of strategic decisions are substantially undermined by hidden costs of implementation (e.g., Dibbern *et al.*, 2008; Reitzig and Wagner, 2010; Stringfellow *et al.*, 2008). In this paper, we have argued that hidden costs—implementation costs that are neglected in strategic decision making—occur in situations of complexity in which decision makers are likely to be subject to bounded rationality. Faced with high complexity, decision makers are more likely to ignore the consequences of implementation and organizational change, and therefore fail to estimate the actual costs of a strategic decision. Hence, estimation errors are the manifestation of underlying and latent hidden costs.

We have studied the phenomenon of such estimation errors in the context of the offshoring of administrative and technical services. Firms offshore service activities for a number of reasons: to reduce costs, to acquire strategic resources, and to gain market proximity (e.g., Lewin *et al.*, 2009). Accordingly, we have argued that hidden costs occur in offshoring when the relocation of service activities abroad entails implementation costs that

are initially ignored or unanticipated by decision makers.

Based on comprehensive data from the ORN, we have developed a model of hidden costs that highlights the roles of offshoring complexity (task and configuration complexity), organizational design orientation, and experience in explaining why decision makers systematically fail to estimate the actual costs of services offshoring. In general, we find empirical support for our model: offshoring complexity increases cost-estimation errors (Hypothesis 1), whereas design orientation (Hypothesis 2) and experience (Hypothesis 3) negatively moderate this relationship. However, while captive offshoring is much more responsive to broader configuration and design factors, hidden costs in offshore outsourcing are more driven by task- and transaction-related factors.

Our findings correspond to recent research suggesting that firms with a strategic, rather than opportunistic, approach to offshoring decisions are not only likely to generate higher savings but are also more accurate in their savings expectations (e.g., Lewin and Couto, 2007; Massini *et al.*, 2010). However, rather than looking at strategies in general, we focus on indicators of a firm's orientation toward improving and orchestrating organizational processes and structures through and alongside offshoring. Interestingly, a design orientation does not seem to reduce hidden costs *per se*; only when the complexity of offshore operations increases does a strong orientation toward orchestrating different structures and processes reduce hidden costs. This can be partly explained by the fact that as firms increase the scale and scope of offshoring, they may reach a tipping point where existing processes and structures conflict with the new setup of the globally dispersed operations (Massini *et al.*, 2010). At this point, only those firms actively seeking to reorganize their structures and processes in a coherent way may benefit from an increased scale and scope of offshoring. While this clearly hints at the transformational potential of offshoring, it also points to the need for firms to actively manage this potential, and to match the increasing relocation of processes with the adaptation of organizational structures and capabilities (Manning *et al.*, 2008).

In addition, we find that cost-estimation errors due to hidden costs are significantly higher in offshore outsourcing implementations than in captive offshore implementations. Our results also indicate

that in the case of captive (internal) offshoring, hidden costs increase with configuration complexity, whereas hidden costs result from increased task-level complexity in the case of offshore outsourcing. This highlights that task- and relationship-specific uncertainty, along with transaction costs, strongly affect overall operational costs in the case of outsourcing. In this regard, several studies show how certain design capabilities and mechanisms at the task level, such as contract design (Argyres and Mayer, 2007) and the alignment of client and vendor operations (Manning *et al.*, 2011), can help firms better anticipate and manage operational costs outside their immediate control. Similarly, outsourcing typically involves tasks that are more standardized than those in captive offshoring (as indicated by the significant positive correlation of 0.14 between task commoditization and outsourcing in Table 3). In contrast, captive offshoring is more exposed to configuration complexity issues, which increase the role of organizational design, as the decision maker has more discretion to make changes in the organization of internal activities. In comparison, task complexity in the case of captive operations does not significantly increase hidden costs, which indicates a greater internal capacity to manage (and plan for) complex tasks. Importantly, however, as offshoring complexity grows *beyond* certain tasks, hidden costs become an issue in captive operations, a finding that points to the roles of design and experience in safeguarding operations as offshoring increases in scale and scope.

The present study has important implications for ongoing research on hidden costs of globally dispersed and complex operations. The concept of hidden costs in the offshoring literature is new and has so far only been used conceptually to underscore how the relocation of activities abroad might be more challenging than initially expected (e.g., Dibbern *et al.*, 2008; Stringfellow *et al.*, 2008). We contribute to this research by uncovering drivers of estimation errors and the potential to foresee hidden costs when integrating globally dispersed and disaggregated operations into an orchestrated organization (Kumar *et al.*, 2009; Srikanth and Puranam, 2011).

On a more general level, this study helps us better understand estimation biases in strategic decision making, and the effects of experience and organizational design orientation on those biases (e.g., Durand, 2003; Hogarth and Makridakis, 1981; Kahneman and Lovallo, 1993; Makadok and

Walker, 2000; March and Simon, 1958). A firm's estimation ability captures how accurately it can estimate and forecast the outcomes of organizational changes resulting from the implementation of a strategic decision (Kahneman and Tversky, 1984). However, while the inhibiting role of complexity in decision-making processes is well established (Langlois and Robertson, 1992; Loasby, 1976; Nickerson and Zenger, 2002), we have shown that this relationship is negatively moderated by the organizational design orientation of the decision maker (Ocasio, 1997). As the implementation of a strategic decision, such as the relocation of activities abroad, entails organizational changes, the decision maker must direct attention to how these changes might affect such aspects as the coordination of joint and interdependent organizational action (Thompson, 1967), information processing demand (Simon, 1955), and organizational response capacity (Anderson, 1999).

Moreover, we have argued that the accumulation of organizational system knowledge (Brusoni and Prencipe, 2006; Henderson and Clark, 1990) is necessary for the decision maker to make effective strategic decisions in a context of complexity. Decision makers need experience and knowledge about the aspects of organizational design that deserve their attention. Thus, in viewing a firm's estimation ability as a distinctive organizational competence (Durand, 2003; Hogarth and Makridakis, 1981; Makadok and Walker, 2000), this study implies that the fit between complexity and organizational design plays a key role in the implementation of strategies and should therefore be incorporated in strategic analyses.

Our findings also add to research on appropriate organizational designs in complex environments (Ethiraj and Levintal, 2004; Nadler and Tushman, 1997) by stressing that the recent offshoring trend challenges the capacity of conventional organizational forms and structures to facilitate and safeguard globally dispersed operations (Srikanth and Puranam, 2011). Future research should aim to better understand the effects of different design alternatives and mechanisms that firms utilize when they reach a certain level of complexity. A related issue is the extent to which design elements can be 'firm specific'—reflecting more or less specific locations and processes across countries and locations.

In addition, we emphasize the role of experience in strengthening the moderating effect of complexity on hidden costs. In this regard, we support research that underscores the central role of knowledge evolution in organizational change and design (Brusoni and Prencipe, 2006; Henderson and Clark, 1990). We can assume that different forms of experience and learning might contribute differently to organizational behavior and performance (Haunschild and Sullivan, 2002; Madsen and Desai, 2010). Future research could therefore investigate which types of experience and learning contribute the most to the identification of organizational forms and structures in increasingly complex firms.

Limitations and future research

Our study has some limitations that should be addressed in future research. First, the concept of hidden costs is difficult to measure. We operationalized it as the respondents' perceptions of the difference between the expected and realized savings of offshoring, using cross-sectional observations. However, this operationalization might be skewed (Golden, 1992), especially as we ask for retrospective views about initial expectations. As a result, hidden costs might be underestimated in our study (although our results still hold despite the possible conservative bias of the dependent variable). A research design using observations collected before and after the offshoring implementation would have obvious advantages compared to the design used in this study. Also, as we primarily relied on survey data, we were unable to analyze the actual decision-making process and we did not look at specific implementation processes in detail. Future studies can use qualitative research designs to better address the various factors contributing to the ignorance of implementation costs in decision-making processes under conditions of complexity.

We have also limited the theoretical explanation of our dependent variable to the role of the organizational context in the decision maker's estimation ability, thus leaving out an important discussion on intentionality (Hutzschenreuter *et al.* 2007; Salas, Rosen, and DiazGranados, 2010). For instance, situations of complexity may entail increased uncertainty, which invites political processes in decision making. In such situations, stakeholders may seek influence by emphasizing arguments that serve their own interests while downplaying others

(Eisenhardt and Bourgeois, 1988). Decision makers may also follow institutional norms, bureaucratic procedures, and prior strategic commitments to reduce uncertainty and ambiguity (DiMaggio and Powell, 1983), thereby allowing for solutions that might be inefficient. Thus, while we assume that the organizational environment has a significant influence on decision-making processes in which some cost factors are unintentionally ignored, other cost factors may be intentionally downplayed in order to promote particular decisions. In this sense, a strong orientation toward organizational design could be a way to address politics within the organization. Future research could therefore investigate the ramifications of intentional underestimations of costs in complex organizations. For instance, is there evidence that decision makers intentionally underestimate the costs of implementing strategic decisions? How might variables such as complexity, organizational design orientation, and experience affect decision makers in terms of intentionally underestimating future costs?

Concluding remarks

In conclusion, by explaining deviations between strategic objectives and actual performance through the concept of hidden costs, an important field of research is unlocked that can more accurately clarify unintended consequences of firms' strategic behavior. While we found that complexity, along with experience and orientation toward organizational design, explained much of this deviation, a number of other contingencies should be examined in future research. In this regard, our study suggests that drivers of hidden costs within the boundary of the firm may differ from hidden costs in the context of interorganizational arrangements. This difference deserves further exploration. Finally, our study highlights services offshoring as an increasingly important empirical field for investigating strategic decision making, complexity, and design in contemporary organizations.

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