

Association for Information Systems AIS Electronic Library (AISeL)

ICIS 2009 Proceedings

International Conference on Information Systems
(ICIS)

2009

The Impact of Firm Learning on Financial Value in Strategic Outsourcing Relationships

Deepa Mani

Indian School of Business, Deepa_Mani@isb.edu

Anitesh Barua

University of Texas at Austin, Anitesh.Barua@mcombs.utexas.edu

Andrew Whinston

University of Texas at Austin, abw@uts.cc.utexas.edu

Follow this and additional works at: <http://aisel.aisnet.org/icis2009>

Recommended Citation

Mani, Deepa; Barua, Anitesh; and Whinston, Andrew, "The Impact of Firm Learning on Financial Value in Strategic Outsourcing Relationships" (2009). *ICIS 2009 Proceedings*. 52.

<http://aisel.aisnet.org/icis2009/52>

This material is brought to you by the International Conference on Information Systems (ICIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ICIS 2009 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

THE IMPACT OF FIRM LEARNING ON FINANCIAL VALUE IN STRATEGIC OUTSOURCING RELATIONSHIPS

Completed Research Paper

Deepa Mani

Indian School of Business
Hyderabad, India
Deepa_Mani@isb.edu

Anitesh Barua

University of Texas at Austin
Austin, TX 78712
Anitesh.Barua@mcombs.utexas.edu

Andrew Whinston

University of Texas at Austin
Austin, TX 78712
abw@uts.cc.utexas.edu

Abstract

We investigate whether managers in outsourcing firms, through their prior experience in managing similar strategic alliances and prior association with the provider, learn to create value in their outsourcing relationships. Value creation is estimated in terms of long-term abnormal stock returns to the outsourcing firm relative to an industry, size and book-to-market matched sample of control firms following the implementation of the outsourcing contract, announcement period returns, and allied wealth effects. We find that prior experience and prior association have a significant impact on long-term abnormal stock returns, suggesting that financial markets are slow to price learning effects in outsourcing. Further, while relational learning alone influences value creation in simpler fixed price contracts, both procedural learning through prior experience and relational learning through prior association with the provider have an impact on value creation in variable price contracts. This is because of greater ambiguity in cooperation and coordination between firms that characterizes variable price contracts. The results have implications for management of outsourcing engagements and their performance and valuation.

Keywords: outsourcing, contracts, learning effects, financial value, abnormal returns,

Introduction

Over the past decade, the outsourcing of value chain activities has emerged as an imperative for firm competitiveness and profitability. Evolving from its early focus on cost savings, the outsourcing of information technology and business processes today includes diverse strategic objectives ranging from faster time to market to innovation to organizational transformation (Linder, 2004). Yet, there are significant challenges inherent to the process of value creation through outsourcing, evidenced by the large number of firms that cite significant negative experiences with their outsourcing projects¹ and emergent research (e.g., Rouse and Corbitt 2006) highlighting the intrinsic complexity and high failure rate of outsourcing initiatives. What, then, drives performance of outsourcing relationships? Our theoretical and empirical analyses emphasize the role of prior experience in managing similar strategic alliances, prior association with the provider, and the existence of firm specific differences in outsourcing and contracting abilities in creating financial value through outsourcing.

Prior research attributes heterogeneity in the performance of outsourcing relationships to alignment of incentives or alignment of actions between the outsourcing firm and the provider (see Dibbern et al. 2004 for a review). The institutional economics literature (Williamson 1975, 1985; Klein 1978) views outsourcing relationships as *incomplete contracts* that increase the potential for opportunistic behavior and in turn, the magnitude of efficiency losses from costly bargaining and privately favorable distribution of ex post surplus. This school of research views the ability of the outsourcing firm to anticipate and respond to *contingencies in the outsourcing relationship* through appropriate *exchange of rights* as an important predictor of exchange performance. On the other hand, research in organization (Sinha and Van de Ven 2005) views outsourcing relationships as *complex work systems* that increase cognitive conflict and in turn, the magnitude of efficiency losses from complex coordination. These studies find that the ability of the outsourcing firm to anticipate and respond to contingencies in the *outsourced task environment* through *mutual exchange of information* is an important predictor of exchange performance. However, ex post adaptation to contingencies in the outsourcing relationship and outsourced task environment is not costless; the outsourcing firm expends costly effort in anticipating contingencies, designing responses to these contingencies, and implementing these expectations, all of which emphasize the scope for improvement and hence, learning in the relationship. Consequently, we argue that important learning dynamics may underlie the management and performance of outsourcing relationships. In addition, since the adaptation process cannot be formalized, learning effects may also be manifest in persistent unobserved heterogeneity in firms' outsourcing and contracting capabilities that impact performance.

In this study, we draw on theories of cooperation and coordination to argue that learning effects and unobserved firm-level outsourcing and contracting capabilities may be important determinants of the financial value created by outsourcing initiatives. In particular, the study attempts to answer questions that have received little empirical attention so far in the outsourcing literature: (1) Do firms learn to create value in outsourcing relationships through their prior experience in managing similar strategic alliances and prior association with the provider? What is the magnitude of such learning effects? (2) Which types of outsourcing contracts have a greater likelihood of being characterized by and benefiting from learning effects? (3) Do inter-firm differences in outsourcing and contracting capabilities influence outsourcing performance? In answering these questions, we focus on *relational learning effects* within a dyad that occur through repeated interactions with the provider and *procedural learning effects* across a portfolio of outsourcing initiatives that occur through repeated management of similar alliances.

We use data on the hundred largest outsourcing initiatives (by contract value) announced between 1996 and 2005 to test our theoretical arguments. The data are primarily obtained from International Data Corporation's annual reports on the largest outsourcing contracts signed each year in the sample time period. Company data from COMPUSTAT, SDC Platinum and EXECUCOMP and stock price data from the Center for Research in Security Prices (CRSP) complements contract data. Firms' contract choices are categorized as either *fixed price* or *variable price*. Fixed price contracts involve payment of a fixed price per billing cycle when the outsourced output is indivisible (e.g. software development, closing of financial books) or per transaction per billing cycle when the output comprises a variable number of transactions (e.g. claims processed, calls fielded). Variable price contracts involve payment based on variable factors, often the time and effort expended in task execution. The differential allocation of risks

¹ 70% of the respondents in a 2005 survey by Deloitte Consulting expressed significant dissatisfaction with their outsourcing projects. Similarly, a survey conducted by Bain Consulting found that although 82% of large firms in North America engage in BPO, almost half of the respondents say their outsourcing programs fall short of expectations. According to SAP INFO Solutions, four out of five BPO contracts inked today will need to be renegotiated within two years. Further, 20% of all such contracts will collapse (SMR Intelligence 2006).

and incentives between these two contracts results in the underlying process in fixed (variable) price contracts being characterized by low (high) levels of uncertainty, coordination requirements and strategic importance. This yields greater ambiguity and uncertainty in variable price outsourcing contracts than in fixed price outsourcing contracts.

We find that relational learning effects have a positive impact on the value created in fixed price contracts while both relational and procedural learning effects have a positive impact on the value created in variable price contracts. Thus, our results offer a notable contrast to prior research (Anand and Khanna 2000) which finds no evidence of learning to create value in simpler, more stable strategic alliances. There are two reasons for this outcome. First, prior research has focused on announcement period wealth effects in assessing value creation. We argue that given the significant information acquisition and learning costs associated with valuation of learning effects, financial markets are slow to price these effects. This is evidenced by the insignificant impact of relational learning on announcement period effects and its significant impact on long-term abnormal stock returns in fixed price outsourcing contracts. Second, prior research does not make the distinction between relational and procedural learning effects. However, this distinction is particularly pertinent to the outsourcing context since the underlying task, risks, incentives and challenges in coordination of division of labor are different in fixed price contracts than in variable price contracts. Thus, ex ante contract design and ex post adaptation in each of these contracts require different firm capabilities and learning. The observed performance effect of relational and procedural learning is robust to unobserved differences in firm-level outsourcing and contracting capabilities.

In the next section, we review related literature to develop our theoretical arguments. Subsequently, we describe our data sources, present our empirical analyses and assess the supportive evidence for our hypotheses. The study concludes with a discussion of implications of results to theory and practice.

Theory and Hypotheses

Neo-institutional economic theories view outsourcing relationships as incomplete contracts so that performance heterogeneity is a function of alignment of incentives that engenders cooperative behavior required for ex post adaptation (e.g., Lacity and Willcocks 1998). An alternative view of outsourcing relationships is that of complex work systems that require coordination of division of labor between the outsourcing firm and the provider. In this case, ex post adaptation is a function of alignment of actions between participant firms that occurs through the mutual exchange of information (Gulati et al.2005, Mani et al.2008).

In this study, we argue relational and procedural learning enhance cooperative behavior and coordination of actions between the outsourcing firm and the provider. Relational learning refers to the development of a relationship specific memory through information sharing between the outsourcing firm and the provider (Chang and Gotcher 2008, Shalter and Naver 1996). Such memory changes the range or likelihood of potential relationship specific behavior and thus, has an important impact on outsourcing performance. In particular, learning about the provider helps the outsourcing firm lower the costs of contracting in multiple ways. Memory or knowledge of the provider's behavior and actions helps the firm better predict appropriation concerns and specify contingent actions, rights and responsibilities (Gulati and Singh 1998). This is consistent with research (Mayer and Argyres 2004) which finds that firms, through repeated interactions with the provider, learn how to work together, including how to contract with each other. Further, when relational learning is an outcome of relational capital between the outsourcing firm and provider, it indicates trust between the firms that mitigates concerns of moral hazard and privately favorable distribution of surplus (Chang and Gotcher 2008; Balakrishnan and Koza 1993). Finally, greater competence in transacting with each other that accompanies relational learning helps build greater domain consensus between the outsourcing firm and provider and reduce information processing costs. Therefore, firms can better coordinate behavior and interdependencies to achieve an integrated response to changes in their environment (Levine and White 1961; Gulati et al. 2005). For these reasons, we hypothesize:

Hypothesis 1a: The stronger the relational learning, the greater is the value created by outsourcing.

While relational learning refers to learning that occurs within a dyad about a specific provider, procedural learning refers to experiential learning that occurs across a portfolio of similar relationships about the process of outsourcing. Thus, in terms of Anand and Khanna (2000), the focus in procedural learning is on "learning to learn" from alliances. Experiential learning acquired through repeated exposure to similar alliances allows for wider specification of contingencies and responses thereof, and enhances ex post adaptation by facilitating interpretation and response to unforeseen contingencies. Better knowledge of outsourcing procedures through experience also

helps the outsourcing firm identify appropriate relational processes and technologies that enhance its information processing capabilities to better coordinate actions with the provider. Given the influence of procedural learning on cooperation and coordination, we hypothesize:

Hypothesis 1b: The stronger the procedural learning, the greater is the value created by outsourcing.

The importance of the above relational and procedural learning effects increases with the complexity and ambiguity of the outsourcing context. If the outsourced task was simple and unambiguous, its ownership, control, coordination and ex post adaptation requirements could be perfectly specified through a relatively complete contract with little scope for learning. Consequently, we expect that learning effects would have varying impact across different types of outsourcing contracts that differ in terms of risks, incentives, and complexity of the task environment.

Outsourcing contracts are one of two dominant types - *fixed price* or *variable price*. Fixed price contracts involve payment of a fixed price either per billing cycle when the outsourced output is indivisible (e.g., software development) or per transaction per billing cycle when the output comprises a variable number of transactions (e.g., claims processed, calls fielded). Variable price contracts, also known as time and materials contracts or cost plus contracts, involve payment based on variable factors, often the time and effort expended in task execution. Fixed price contracts are more complete than variable price contracts, since compensation is independent of future contingencies and is not revised ex post subject to the provider's cost experience.

Studies in economics have long emphasized the potentially deleterious effects of contractual incompleteness including investment distortions, costly bargaining and private favorable distribution of ex post surplus, and coordination failures in division of labor. However, in contrast to the assumption of exogenously imposed contractual incompleteness assumed by these studies, more recent research in economics finds that firms self-select a contractual form to minimize economic tradeoffs between ex ante provision of incentives and ex post renegotiation of contractual specifications (Bajari and Tadelis 2001), ex ante contractual specification of the outsourced task and ex post inefficiencies of costly bargaining and privately favorable redistribution of surplus (Crocker and Reynolds 1993), or contractual completeness and coordination failures (Yang 2000). Fixed price contracts provide stronger incentives for cost reduction and are relatively more complete than variable price contracts. Thus, they result in fewer efficiency losses from privately favorable distribution of surplus or coordination failures in networks of division of labor. However, the costs of contracting and ex post renegotiation of the contracted task in the presence of information asymmetry are greater in more complete fixed price contracts. As a consequence, when the outsourced task and relational environments are characterized by greater complexity and uncertainty, variable price contracts accompanied by lower levels of completeness in task specification (and hence, a higher probability that adaptations are needed) are preferred to fixed price contracts accompanied by high levels of completeness in task specification (and hence, a lower probability that adaptations are needed). These differences between fixed and variable price contracts are enumerated in Table 1 below.

Table 1: A Comparison of Fixed Price and Variable Price Outsourcing Contracts

Parameter	Fixed Price	Variable Price
Contract price	Fixed price that is based on process output and independent of input costs	Variable price that is dependent on input resources or cost experience of the provider
Contractual dimensions negotiated ex ante	<ul style="list-style-type: none"> • Price per billing cycle OR • Price per transaction per billing cycle 	Target resource expend per billing cycle
Ex post renegotiation costs	Costly ex post price revisions based on the cost experience of the provider	Low costs of renegotiation of final resource expend per billing cycle.
Compensation for cost overruns in execution of the outsourced process	Provider not compensated for cost overruns	<ul style="list-style-type: none"> • Provider compensated for cost overruns • Efficiency losses to the user firm due to: <ul style="list-style-type: none"> ◊ Information asymmetry and moral hazard ◊ Costly bargaining and privately favorable redistribution of

		surplus
Ex ante costs of contract design	More	Less
Incentives for quality	Less	More
Incentives for cost reduction	More	Less
Likelihood of coordination failures	Less	More

These differences between fixed and variable price contracts suggest that the latter is characterized by greater complexity and ambiguity of contingencies facing the outsourcing firm. Thus, learning effects will be correlated with the choice of outsourcing contract. Relational learning helps the user firm anticipate and plan for contingencies in the task and relationship, build trust to better manage the risks of cost overruns and private distribution of ex post surplus. Procedural learning helps the user firm better assess the cost experience of the provider and engage in adequate information processing that reduces cost overruns in the task environment. We hypothesize:

Hypothesis 2a: Performance effects of relational learning are stronger in contingent variable price outsourcing contracts than in simpler fixed price contracts.

Hypothesis 2b: Performance effects of procedural learning are stronger in contingent variable price outsourcing contracts than in simpler fixed price contracts.

In contrast to *performance information* such as earnings or sales estimates that is described in accounting statements, information on relational and procedural learning reflects *intangible* information on future cash flows. The finance literature describes the difference between *tangible* and *intangible* performance information as the difference between measures of past performance that is described in a firm's accounting statements and less defined information about future performance that is orthogonal to past performance (Daniel and Titman 2001). Intangible information on firm performance provides ambiguous signals to the market relative to tangible information rendering it difficult to precisely incorporate the information in the stock price of the firm. Daniel and Titman (2001) argue that this is because of the overestimation bias associated with low probability and uncertain events. On the other hand, Eberhart et al. (2001), who find that markets are slow to respond to unanticipated increases in the R&D expenditure of firms, argue that long-term returns to such information events are a consequence of important *information acquisition costs* and *information learning costs* that accompany these events. Information acquisition and learning costs are salient to the interpretation of outsourcing decisions as well. For instance, in order to price learning effects, the market must first learn what, whether and how learning attributes contribute to efficiency gains from outsourcing, acquire information on the learning attributes of the outsourcing firm and the dyad, and finally, evaluate the acquired information relative to normative choices.

When information is very inexpensive, or when informed traders get precise information, then the market price will reveal most of the informed traders' information (Stiglitz 1980). However, prices cannot perfectly reflect costly information, "*since if it did, those who spent resources to obtain it would receive no compensation*" (Stiglitz 1980). Thus, we expect that information asymmetries introduced by acquisition and learning costs will be persistent and take a long time to be corrected by arbitrage forces. This engenders an insignificant association of learning effects with announcement period returns and a significant association with abnormal performance over a long horizon following the implementation of the outsourcing contract. We hypothesize:

Hypothesis 3a: The market is slow to price relational learning effects.

Hypothesis 3b: The market is slow to price procedural learning effects.

Data Collection

Our empirical analysis is based on the 100 largest outsourcing initiatives implemented between 1996 and 2005. The largest outsourcing contracts have important advantages over a similar random sample. First, the firm-level economic impact of outsourcing is more likely to be detected when the contract value is large. The average lifetime contract value in our sample is \$922 million. The aggregate contract value of \$83 billion represents approximately 18 percent of the total outsourcing contract value for the sample period. Second, our focus on large deals reduces the probability of confounding events; firms are unlikely to sign as large contracts immediately around the outsourcing agreement. Our approach to sample selection follows prior research in financial economics (e.g., Healy, Palepu and Ruback 1992) that examines the performance impact of managerial decisions such as mergers or acquisitions.

The data set draws on multiple sources. Information on the 100 largest outsourcing initiatives and their governing contracts is obtained from International Data Corporation's (IDC) services contracts database. IDC tracks outsourcing contracts signed around the world with the database comprising more than 14,000 service contracts. As outsourcing began to gain momentum and contract value began to increase, IDC began to offer a detailed look at the top 100 outsourcing contracts each year, ranked by total contract value. This data dates back to 1996, and is the primary input to this study. IDC data on the top 100 outsourcing contracts signed each year includes contract value, length, announcement and signing date, geography, industry, outsourcing type, and a detailed description of the service provided. We use Lexis-Nexis and the Dow Jones News Retrieval Service to verify and supplement IDC information on announcement and signing dates. We use the Center for Research on Security Prices (CRSP) files to compute abnormal stock returns, and the Compustat Basic and Research files to assess firm characteristics, develop operating performance measures and estimate insider trading activity.

We begin with a sample of 1000 outsourcing contracts spanning the period 1996-2005. This initial sample comprises public, private and government contracts signed in nearly thirty countries. Our final sample comprises the 100 largest outsourcing contracts that satisfy two requirements. First, the firm must be publicly traded on a major United States stock exchange. Second, information on the contract used to govern the outsourcing initiative must be available. The sample of 100 contracts includes 66 firms.

Empirical Analysis

Measurement of Variables

Long-Term (Event-Time) Abnormal Stock Returns: We use two main methods for estimating post-event risk adjusted returns – characteristic based matching approach, also known as the event-time portfolio approach, and the Jensen's alpha approach, also known as the calendar-time portfolio approach. Mitchell and Stafford (2000) describe event time buy-and-hold abnormal return (BHAR) as "*the average multi-year return from a strategy of investing in all firms that complete an event and selling at the end of a pre-specified holding period versus a comparable strategy using otherwise similar nonevent firms*". Thus, the BHAR for stock i over holding period T is:

$$BHAR_{i,T} = BHR_{i,T} - BHR_{m,T}, \quad (1)$$

where $BHR_{i,T}$ is the buy-and-hold return of the sample firm and $BHR_{m,T}$ is the buy-and-hold return of the matching control firm over the same period. Here, the buy-and-hold return for holding period T beginning time a through time b is:

$$BHR_{i,T} = \left[\prod_{t=a}^b (1 + r_{it}) - 1 \right], \quad (2)$$

where r_{it} is the return for firm i in month t ; in this study, period a is the month after the contract effective month and period b is the earlier of the firm's delisting date, the end of the three year period following the contract effective date or December 31, 2006.

Following Barber and Lyon (1997), we consider an industry-, size- and book-to-market matched sample as a benchmark of returns post implementation of the outsourcing contract. We begin with a group of firms in the same two-digit SIC code as the sample that do not engage in a strategically significant outsourcing initiative as of the beginning of the contract effective year. From this initial screen, a matched firm is defined as the firm that has the lowest absolute value of the joint difference in size (equity capitalization) and book-to-market ratio (equity capitalization divided by book value of equity).

Announcement Period Returns and Wealth Effects: Daily abnormal returns are estimated as:

$$\hat{\varepsilon}_{it} = r_{it} - \hat{r}_{it},$$

where $\hat{\varepsilon}_{it}$ are firm specific abnormal returns. Here, r_{it} denotes the daily returns for firm i on day t while \hat{r}_{it} are the predicted daily returns. Following prior research on strategic alliances (e.g. McGahan and Villalonga 2003), we estimate the following market model:

$$r_{it} = \alpha_i + \beta_i r_{mt} + \varepsilon_{it},$$

where r_{mt} denotes the corresponding daily returns to the value weighted S&P 500. An estimation period of 150 days [-170,-21] prior to the announcement date is used to estimate the market model. Significance of the returns is based on the market model standardized residual method with Scholes-Williams (1977) betas. The estimates from this model are then used to predict daily returns for each firm i over a 14 day period [-10,+3] surrounding the announcement of the outsourcing initiative.

Announcement period wealth effects or the dollar change in wealth are computed by multiplying each user firm's market value of equity by its announcement period abnormal return and then averaging the product across the user firms in the sample.

Contract Choice: IDC classifies outsourcing contracts as one of fixed price or transactional, time and materials, or combination. Fixed price contracts involve the payment of a fixed fee negotiated ex ante per billing cycle or per transaction (e.g., calls fielded, claims processed) with little or no price adjustments. The former is used more in the case of information technology outsourcing and custom application development engagements while the latter is used more when business processes are outsourced. Time and materials contracts involve payment based on time and materials used during the billing cycle. Combination contracts have a combination of variable and fixed pricing components. For instance, in a custom application development project, the outsourcing firm may negotiate a fixed price contract during the assessment of project requirements and shift to a variable price contract such as time and materials during the actual development phase. In this study, we do not consider equity arrangements such as joint ventures, the outsourcing firm's wholly owned captive operation, or the establishment of a venture by a consortia of vendors. We refer to the set of combination and time and materials contracts as variable price contracts².

Learning Effects: Relational learning is inferred from the presence of prior cooperative association between the outsourcing firm and the provider. Prior association between the firms is indicated by the bid type, which is one of competitive, incumbent or sole sourced. Incumbent bidding implies that the outsourcing firm has an existing relationship with the provider. Competitive bidding suggests the absence of prior association between the firms. A sole-sourced contract means that the provider is the only provider of the outsourced function. The outsourcing firm may enter into sole-source negotiations with an incumbent in which case the bid type is recorded as incumbent. Procedural learning is estimated as the number of strategic alliances inked by the outsourcing firm prior to implementation of the outsourcing contract within the time window of our data.

Explanatory variables: Our analyses control for task and firm attributes that may influence contract choice and abnormal returns. Task attributes considered in our analyses include outsourcing type and coordination requirements. Outsourcing initiatives in the sample are classified as Information Systems (IS) Outsourcing, Business Process Outsourcing (BPO) or Processing Services, and Application, Network and Desktop Management. In the case of IS outsourcing services the service provider takes ownership of and responsibility for managing all or large part of a client's IS infrastructure and operations, often involving customized, one-to-one engagements. If only the network and desktop environment are outsourced, IDC captures the spending in the network management services and desktop management services category. Likewise, if only the application environment is outsourced, IDC captures the spending in the applications outsourcing category. Applications outsourcing is a service wherein responsibility for deployment, management, and enhancement of a packaged or customized software application is externalized to the provider. Applications outsourcers also include application service providers (ASPs). ASPs

² Managers in the outsourcing firm noted that combination contracts largely start as time and materials compensation and progress to fixed price compensation after the provider has acquired a more sound understanding of the outsourced task requirements. Thus, in the three year period following the implementation of the contract, we group combination contracts with time and materials contracts.

deploy, host, manage, and rent access to an application from a centrally managed facility. Network management services involve the outsourcing of the operations of a specific segment or entire network communication system of a company. The network operations provided as part of a larger IS outsourcing contract are not captured in this category. Desktop management captures contracts for which several desktop services are outsourced to the same supplier. Processing services involve outsourcing business activities with performance metrics tied to the efficiency of high-volume service capabilities. BPO involves outsourcing business processes or functional areas (such as logistics or HR), with performance metrics tied to the strategic business value of services provided and to customer satisfaction. Business value is recognized through results such as new business opportunities, revenue generation and business transformation. We estimate anticipated coordination based on the strategic rationale for outsourcing the given business function that ranges from reduction of costs to speed to market to business transformation.

Firm attributes considered in our analysis include uncertainty in the business environment, size and book-to-market. Uncertainty is estimated as the variance in the outsourcing firm's return on assets (RoA) over the three years prior to the contract effective year. RoA is defined as the ratio of operating income to total assets. Size refers to the market value of equity of the outsourcing firm while the book to market ratio is the ratio of book value of equity to market value of equity of the outsourcing firm.

Methodology

Outsourcing firms self-select the choice of outsourcing contract. Thus, it is likely that unobserved firm-, transaction- or relationship-level features that simultaneously influence contract choice and abnormal returns result in biased, inconsistent estimates. To account for possibly endogenous choices of the contract, we employ a switching regression model (Heckman 1978; Lee et al. 1980) to examine support for each of the hypotheses. The first stage relationship of our Heckman two stage model estimates a model of contract choice as a function of several variables that shift the relative costs and benefits of variable price contracts:

$$P(Y_{it} = 1) = \Phi(\beta'X_i),$$

where Y_{it} represents the contract choice for firm i in date t , X_i is a vector of learning attributes, relationship, transaction and firm attributes that determine contract choice, β is a vector of estimated coefficients for these characteristics, and $\Phi(\cdot)$ is the standard normal cdf.

The contracting decision is only observed for firms that engage in an economically significant outsourcing initiative. Thus, we also estimate a Heckman probit model of contract choice that controls for firm capabilities and unobserved heterogeneity that impact the decision to outsource and also likely influence the contracting decision. However, the estimated correlation between the errors of the outsourcing and contract choice equations, ρ , is statistically insignificant, suggesting that the probit estimation does not require controlling for sample selection effects. Thus, we estimate separately the models of outsourcing and contract choices to obtain correction factors for self selection into the outsourcing and contracting decisions respectively.

The second stage of the Heckman model estimates the effect of learning effects and the above controls on abnormal returns in both contracts. Petersen (2006), in his simulation of analytical methods in corporate finance, finds that when both a firm and time effect are present in the data, standard errors clustered on both dimensions are unbiased and produce correctly sized confidence intervals. The fixed and random effect specifications also produce unbiased standard errors but only when the firm effect is permanent. Thus, we estimate the following model for each of fixed and variable price contracts:

$$BHAR_{ic} = \alpha X_{ic} + \beta Z_{ic} + \varepsilon_{ic},$$

where $BHAR_{ic}$ refers to the three year BHAR following the implementation of contract c , X_{ic} is a vector of learning effects for outsourcing contract c , and Z_{ic} is a vector of transactional and relational attributes that characterize contract c . Given potential firm and time effects in the data, we cluster standard errors on both firm and year of implementation of the outsourcing contract.

To test Hypotheses 1a and 1b, we check whether prior cooperative association and outsourcing experience have a significant impact on abnormal returns and wealth effects. However, tests of Hypotheses 1a and 1b assume equivalence of learning effects across outsourcing contracts. For Hypothesis 2a and 2b, we analyze whether the association between learning effects and financial value varies across fixed price and variable price outsourcing contracts. Finally, to test Hypothesis 3a and 3b, we check whether the prior cooperative association and prior

experience have a significant positive association with long-term BHAR but an insignificant association with announcement period returns and wealth effects.

Results

Summary Statistics: Panel A of Table 2 lists the distribution of our sample across primary SIC codes. The distribution indicates some clustering; to address potential bias arising from industry clusters, we control for industry effects in our empirical analysis. Also included is the sample distribution across outsourcing types. IS outsourcing contracts constitute 53 percent of the sample, BPO and processing services comprise 27 percent, and application, network and desktop management contracts comprise 20 percent of the sample. The relatively higher number of IS outsourcing contracts is consistent with the greater maturity of this segment of the outsourcing market.

Panel B of Table 2 lists some of the characteristics of the sample outsourcing firm and contract. As of the beginning of the contract implementation year, the mean (median) market value of equity of our sample firms is \$37.3 (\$23.8) billion. The mean (median) market to book ratio is 3.27 (2.71). This suggests that the sample is skewed towards large, high market to book firms. We control for these effects in our analysis.

On average, the IS outsourcing contract in our sample is valued at \$1.1 billion, the BPO contract is valued at \$703 million and the application, network and desktop management contract is valued at \$747 million. Gartner's analysis of IT outsourcing contracts over a period of fourteen years found that as of 2003, the average annual value of an outsourcing contract was \$47 million. A comparison with this estimate emphasizes the strategic import of our sample contracts.

Table 2: Sample Characteristics of Outsourcing Firms and Announcements, 1996 – 2005

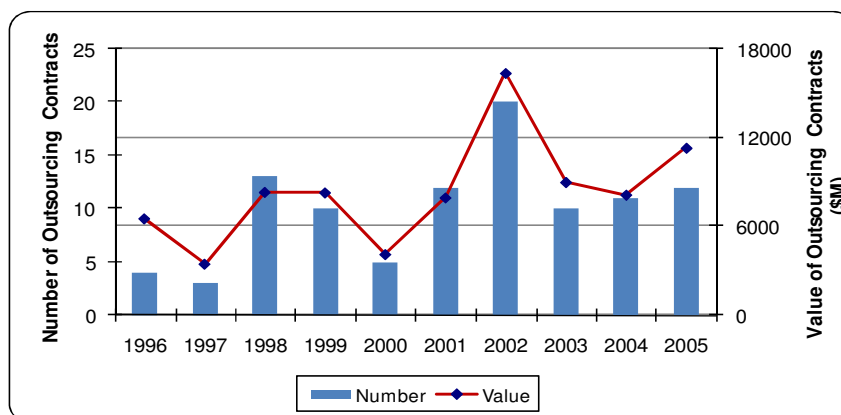
Panel A: Distribution of sample firms across primary SIC codes									
SIC	Sector	IS Outsourcing		BPO and Processing Services		Application, Network and Desktop Management		All Deals	
		Number	% of all deals	Number	% of all deals	Number	% of all deals	Number	% of all deals
0	Agriculture, Forestry, and Fishing	0	0%	0	0%	0	0%	0	100%
1	Mining and Construction	0	0%	0	0%	1	100%	1	100%
2	Manufacturing	10	56%	5	28%	3	17%	18	100%
3	Manufacturing	16	55%	8	28%	5	17%	29	100%
4	Transportation, Communications, Electric, Gas, and Sanitary Services	10	53%	4	21%	5	26%	19	100%
5	Wholesale and Retail Trade	3	60%	2	40%	0	0%	5	100%
6	Finance, Insurance, and Real Estate	10	43%	8	35%	5	22%	23	100%
7	Lodging and Entertainment	4	80%	0	0%	1	20%	5	100%
8	Services	0	0%	0	0%	0	0%	0	100%
9	Public Administration	0	0%	0	0%	0	0%	0	100%
	All Sectors	53	53%	27	27%	20	20%	100	100%

Panel B: Sample Characteristics of Outsourcing Initiatives			
Outsourcing Firm Characteristics			
	N	Mean	Median
Market Value of Equity (\$M)	100	37,331	23,802
Market to Book Ratio	100	3.27	2.71

Tobin's Q	100	0.18	0.09
Contract Characteristics			
Contract Value – All Deals (\$M)	100	901.34	563
Contract Value – IS Outsourcing (\$M)	53	1,055.91	632.63
Contract Value – BPO and Processing Services (\$M)	27	703.35	517.10
Contract Value – Application, Network and Desktop Management (\$M)	20	775.94	440.00
Contract Value – Fixed Price	40	930.59	518.58
Contract Value – Variable Price	60	882.18	607.21
% of Annual Operating Expenses	100	1.02	0.04
Contract Length (months)	100	93	84

Figure 1 describes the number and value of the sample outsourcing contracts over time. More than 40 percent of the outsourcing contracts in our sample were signed in the period 2001-2003. Total contract value for the period 2001-2005 accounted for more than 50 percent of the aggregate contract value for the sample period.

Figure 2: Number and Value of Sample Contracts across Time



Learning Effects and Abnormal Returns: Table 3 summarizes the results of the short- and long-term event analyses. The three year buy-and-hold abnormal returns (reported in Panel A) are calculated following the implementation of the outsourcing contract while announcement period returns (reported in Panel B) and wealth effects (reported in Panel C) are estimated relative to the day of announcement of the outsourcing contract. As preliminary evidence of procedural and relational learning effects, we report results of event analyses for the lowest and highest 30 percent of firms ordered by outsourcing experience as well as for firms that shared a prior cooperative association with their provider and those that did not.

The difference in the three year BHAR between the lowest and highest 30 percent of firms ordered by outsourcing experience is 36.2 percent ($p < 0.05$). The corresponding estimate for the average announcement period abnormal returns is nearly zero. Similarly, the difference in the three year BHAR between firms that shared prior cooperative association with their providers and those that did not is 36.4 percent ($p < 0.05$) while the corresponding difference in announcement period returns is an insignificant 4.6 percent.

Anand and Khanna (2000) note that since announcement period returns reflect the effect of firm size, value creation is better estimated by wealth effects surrounding the announcement. The mean value created in the lowest (highest) 30 percent of firms ordered by experience is \$-373.53 (237.91) million, with the median value being \$-60.91 (-183.08) million. Similarly, the mean value created for firms that share (do not share) a prior cooperative association with their provider is \$142.70 (-1384.94) million. These results provide preliminary evidence that learning effects impact the value created in outsourcing relationships; however, the market is slow to price these learning effects.

Table 3: Abnormal Returns and Wealth Effects by Prior Association and Experience

Panel A: Announcement Period Returns (%)

	Mean	Median	S.D.	Maximum	Minimum
Prior Association	-0.037***	-0.037***	0.062	-0.228	0.049
No Prior Association	0.009	-0.007	0.072	-0.103	0.215
Experience – Lowest 30 percent	0.004	-0.012	0.073	-0.103	0.208
Experience – Highest 30 percent	0.004	-0.008	0.071	-0.097	0.215

Panel B: Wealth Effects (\$million)

	Mean	Median	S.D.	Maximum	Minimum
Prior Association	-1384.94***	-391.55	2456.09	-8246.85	1535.07
No Prior Association	142.70	-47.12	2832.32	-9706.97	11591.37
Experience – Lowest Quartile	-373.53	-60.91	2529.26	-9706.97	4195.48
Experience – Highest Quartile	237.91	-183.08	3452.89	-5616.66	11591.37

Panel C: Three Year Buy and Hold Abnormal Returns (%)

	Mean	Median	S.D.	Maximum	Minimum
Prior Association	0.218***	0.304***	0.553	-1.000	1.024
No Prior Association	-0.146	-0.089	0.901	-4.687	2.350
Experience – Lowest Quartile	-0.204**	-0.126	0.789	-2.412	0.960
Experience – Highest Quartile	0.158**	0.038	0.653	-1.000	2.350

Table 4 reports results for the first stage probit model of contract choice that is used to formulate the inverse Mill's ratio for the second stage switching regressions. We find that uncertainty in business requirements, anticipated levels of coordination and outsourcing type that reflects the maturity of the outsourced task are positively associated with choice of variable price contracts. The results are consistent with prior research on contract choice and emphasize the greater complexity and ambiguity of the task environment in variable price contracts. Such complexity and ambiguity render it costly and difficult to specify a precise division of labor and responsibilities through more complete fixed price contracts since contingencies are hypothetical or necessitate systematic allocation of resources to identify diverse action-outcome contingencies, and incorporate paths that are best aligned with the objectives of the outsourcing initiative.

Further, we find that learning effects also have a significant impact on contract choice. Our results suggest that as firms learn about potential contingencies and hazards, either through prior cooperative association with the provider or prior experience in managing similar alliances, they apply such learning to ex ante anticipate and incorporate more contingencies and responses thereof in more complete contracts. This is consistent with the finding that experiential learning helps firms to effectively use contracts to facilitate adaptation to disturbances as well as craft agreements that better safeguard vulnerable assets (Argyres 2004).

Table 4: Model of Contract Choice

	Probit Analysis
Learning Attributes	
Experience	-0.281** (0.134)
Prior Association	-0.369** (0.161)
Process Attributes	
Type	0.536*** (0.171)
Coordination Requirements	0.448** (0.182)
Firm Attributes	
Uncertainty	0.398** (0.167)
Size	-1.657

	(1.484)
Book to market	0.045 (0.157)
Constant	0.346 (0.234)
Log likelihood	-45.23
Pseudo R-Square	0.28

*p<0.01, **p<0.05, ***p<0.01

Table 5 reports results for second stage regressions of abnormal returns and wealth effects. Models I, II and III examine the impact of learning effects on the three year BHAR following the implementation of the outsourcing contract, 12 day announcement period returns, and wealth effects respectively. The coefficients of prior experience and prior association are positive and significant in Model I, thereby, providing support for *Hypotheses 1a* and *1b*. An interesting result for Models II and III is that the coefficient of prior association shares a significant negative association with announcement period returns and wealth effects. Thus, the market was inefficient in its estimation of learning effects, thereby supporting *Hypotheses 3a* and *3b*.

Table 5: Model of Financial Value

	Model I	Model II	Model III
	Three year buy-and-hold abnormal returns	CAR(-10,1)	Wealth Effects
Learning Attributes			
Experience	0.225* (0.118)	-0.116 (0.183)	0.086 (0.152)
Prior Association	0.210* (0.120)	-0.277*** (0.096)	-0.152* (0.081)
Process Attributes			
Type	-0.037 (0.077)	0.149 (0.131)	0.165** (0.078)
Coordination Requirements	-0.506** (0.204)	0.055 (0.181)	0.068 (0.053)
Firm Attributes			
Uncertainty	-0.258** (0.114)	0.041 (0.189)	-0.055 (0.104)
Size		-0.658 (0.875)	-2.325*** (0.329)
Book to market		-0.155 (0.158)	0.252 (0.167)
Unobserved Heterogeneity			
Contract	-0.317* (0.161)	0.143 (0.218)	-0.138 (0.133)
Outsourcing	0.472 (0.291)	-0.284 (0.287)	0.057 (0.180)
Adjusted R-Square	0.36 (81)	0.12(78)	0.19(78)

*p<0.01, **p<0.05, ***p<0.01

The learning effects reported in Table 5 are estimated to be equivalent across both contract types. Table 6 reports results of a switching regression to assess the impact of learning on abnormal returns and wealth effects in the two contracts. The results of Model I support *Hypotheses 2a* and *2b*. Procedural learning has an insignificant impact on abnormal returns to fixed price contracts. Relational learning has a significant impact on abnormal returns to fixed price contracts but the magnitude of such impact is greater in the case of variable price contracts. The difference

between the coefficients of prior association for fixed and variable price contracts is 0.366 ($p < 0.01$). Prior experience has an insignificant impact on wealth effects, supporting *Hypothesis 3a*. We find that prior association has a significant negative impact on wealth effects created around the announcement of fixed price outsourcing contracts. The reversal of the direction of this impact in the long-term provides further support for *Hypothesis 3b*.

The coefficients for self-selection of the contracting and outsourcing decisions are significant in all models, indicating that unobserved heterogeneity that impacts self-selection also impacts performance. While the omitted variables used to correct for self selection of the outsourcing and contracting decisions may be interpreted as inter-firm differences in contracting and outsourcing capabilities, the finance literature views these variables as an estimate of the private information underlying the self-selected decisions (Li and Prabhala 2007). Thus, testing their significance is a test of whether private information that impacts the outsourcing and contracting decisions also explains returns to fixed and variable price contracts.

Table 6: Model of Financial Value across Fixed Price and Variable Price Contracts

	Model I		Model II		Model III	
	Three year buy-and-hold abnormal returns		CAR(-10,1)		Wealth Effects	
	Fixed Price	Variable Price	Fixed Price	Variable Price	Fixed Price	Variable Price
Learning Attributes						
Experience	0.082 (0.103)	0.328*** (0.115)	0.338* (0.171)	-0.177 (0.146)	0.373 (0.247)	0.040 (0.109)
Prior Association	0.259*** (0.085)	0.625* (0.321)	-0.482 (0.460)	0.130 (0.098)	-0.674* (0.350)	-0.092 (0.423)
Process Attributes						
Type	-0.278 (0.212)	-0.274 (0.223)	0.317 (0.452)	-0.151 (0.284)	0.980*** (0.334)	-0.049 (0.325)
Coordination Requirements	-0.346 (0.210)	-0.854** (0.326)	0.167 (0.444)	-0.370 (0.319)	0.565 (0.380)	-0.019 (0.274)
Firm Attributes						
Uncertainty	-0.632** (0.232)	-0.316** (0.146)	0.629 (0.551)	-0.248 (0.222)	0.927** (0.339)	-0.252* (0.143)
Size			1.177 (0.765)	-1.766 (1.231)	-2.456*** (0.807)	-1.820* (0.974)
Book to market			0.308 (0.341)	-0.370* (0.196)	0.425 (0.268)	-0.381 (0.289)
Unobserved Heterogeneity						
Contract	-0.800** (0.390)	-1.076** (0.492)	0.589 (1.447)	-1.064* (0.592)	1.663* (0.959)	-0.649 (0.906)
Outsourcing	-0.539** (0.233)	1.007* (0.569)	0.618* (0.303)	-2.011* (1.025)	1.194** (0.480)	-1.362 (1.379)
Adjusted R-Square	0.23(34)	0.47(47)	0.31(34)	0.23(44)	0.53(34)	0.18(44)

* $p < 0.01$, ** $p < 0.05$, *** $p < 0.01$

To further investigate the magnitude of the impact of learning effects on abnormal returns, we partition our sample along prior association with the provider and prior outsourcing experience to examine differences in the BHAR. Table 7 reports abnormal returns to the contracts across the lowest and highest 30 percent of values of prior outsourcing experience relative to matched firms that did not engage in an economically significant outsourcing initiative. We also report equivalent returns to contracts characterized by prior association between the outsourcing firm and provider and those that do not involve a prior association between the firms. The results are further affirmation of *Hypotheses 2a* and *2b*. The difference in abnormal returns between the lowest and highest 30 percent of firms ordered by prior experience is 3.6 percent in fixed price contracts and 66.1 percent in variable price contracts. Similarly, the difference in abnormal returns between outsourcing firms that shared a prior association with their provider and those that did not is 5.7 percent in fixed price contracts and 51.4 percent in variable price contracts. Table 7 also reports BHAR for the three year period preceding the announcement of the outsourcing

contract to examine whether our results are influenced by past stock market performance. We find that the difference in returns between contracts as well as for each of the above sub-segments is not influenced by pre-announcement period abnormal returns.

Table 7: Comparison of returns across portfolios formed by experience and prior association

	Fixed Price		Variable Price	
	Lowest third	Highest third	Lowest third	Highest third
Experience	12.9%***	16.5%***	-49.3%***	16.8%***
Prior Association	15.0%***	20.7%***	-26.8%***	24.6%***
Pre-announcement BHAR	-12.2%		-8.3%	

*p<0.01, **p<0.05, ***p<0.01

Conclusion

Our study examines the impact of learning acquired through prior experience in managing outsourcing relationships and prior association with the provider on value created in strategic outsourcing relationships. We find strong evidence that firms learn to create value with increased relational and procedural learning and the magnitude of these learning effects is greater in complex variable price contracts than in fixed price contracts. Our study represents an early effort in establishing empirical evidence for the role of learning effects in managing outsourcing relationships. The magnitude of these effects emphasizes that the valuation of outsourcing relationships must consider dynamic, cross-relationship benefits of prior strategic alliances and association with the provider.

However, our data does not distinguish between certain reasons underlying learning effects. For instance, we cannot distinguish to what extent relational learning acquired through prior association with the provider occurs because firms get better at predicting provider behavior and appropriation concerns versus better at transacting with the provider to reduce coordination costs. Similarly, we cannot distinguish whether procedural learning acquired through prior experience in managing similar strategic alliances helps firms create value because they improve in screening providers or because they improve in interfacing with a range of providers. Future research could examine the relative role of these factors underlying learning effects in creating value as well as their antecedents.

What do the hypotheses portend for future abnormal returns? We do not expect the relationship between learning effects and abnormal returns to persist once the market has fully incorporated information on prior experience and association with the provider into the price of the outsourcing firm. However, learning effects is representative of a broader class of information that represents intangible information on future cash flows. The long-term price reaction to such information is relatively unexamined in financial research. Yet, as indicated by our results, such information may represent important firm characteristics that explain significant variance in stock returns and correlate with price scaled variables such as the book to market ratio that has historically explained returns. Future research could examine whether cross-sectional variation in common stock returns can be better explained by the quality of underlying management choices rather than sensitivity to the Fama and French (1993) factors. This, in turn, has important implications for portfolio analysis and design and performance measurement.

References

- Anand, B., and T. Khanna, 2000, Do Firms Learn to Create Value? The Case of Alliances, *Strategic Management Journal*, 21(3), 295-315.
- Bajari, P. and S. Tadelis, 2001, Incentives versus Transaction Costs: A Theory of Procurement Contracts, *The RAND Journal of Economics*, 32(3), 387-407
- Barber, Brad, and John Lyon, 1997, Detecting long-run abnormal stock returns: The empirical power and specification of test statistics, *Journal of Financial Economics* 54, 341–372
- Chang, K. and D.F. Gotcher. 2008. Relationship learning and dyadic knowledge creation in international subcontracting relationships: the supplier’s perspective. *International Journal of Technology Mgmt.* 41(1/2): 55-74.

Crocker, K.J. and K.J. Reynolds, 1993, The Efficiency of Incomplete Contracts: An Empirical Analysis of Air Force Engine Procurement, *The RAND Journal of Economics*, 24(1), 126-46

Daniel, Kent and Titman, Sheridan. 2006. Market Reactions to Tangible and Intangible Information. *Journal of Finance*. 61(1), 1605-1643

Dibbern, J., Goles, T., Hirschheim, R., and Jayatilaka, B. 2004. Information systems outsourcing: a survey and analysis of the literature. *Communications of the ACM*. 35(4):6 – 102

Eberhart, A.C., W.F. Maxwell and A.R. Siddique, 2004, An Examination of Long-Term Abnormal Stock Returns and Operating Performance Following R&D Increases. *Journal of Finance*. 59(2), 623-650

Learning effects in outsourcing(Note: Leave this header as is [blank] during the review process)

Grossman, S.J. and J.E. Stiglitz. 1980. On the Impossibility of Informationally Efficient Markets. *American Economic Review*. 393-408.

Gulati, R., Lawrence, P.R. and P. Puranam. 2005. Adaptation in Vertical Relationships: Beyond Incentive Conflict. *Strategic Management Journal*. 26:415-440.

Gulati, R. and H. Singh. 1998. The Architecture of Cooperation: Managing Coordination Costs and Appropriation Concerns in Strategic Alliances. *Administrative Science Quarterly*. 43:781-814.

Heckman, J. 1979. Sample selection bias as a specification error. *Econometrica*. 47(1): 153-161.

Lacity, M.C. and L.P. Willcocks. 1998. An empirical investigation of information technology sourcing practices: Lessons from experience. *MIS Quarterly*. 22: 363–408.

Lee, L. Maddala, G. and R. Trost. 1980. Asymptotic covariance matrices of two-stage probit and two-stage tobit methods for simultaneous equation models with selectivity. *Econometrica*. 48: 491–503.

Li, K. and N.R. Prabhala. 2007. Self-Selection Models in Corporate Finance, In B. Espen Eckbo (Eds), *Handbook of Corporate Finance: Empirical Corporate Finance*: 42-47, Elsevier

Linder, J.C. 2004. Transformational Outsourcing. *Sloan Management Review*. 45(2): 52-58.

M. A. Petersen. 2005. Estimating standard errors in finance panel data sets: Comparing approaches. *NBER Working Papers 11280*, National Bureau of Economic Research, Inc.

Mani, D., A. Barua, and A. Whinston. 2008. An Empirical Analysis of the Impact of Information Capabilities Design on Business Process Outsourcing Performance. University of Texas at Austin working paper.

Mayer, K.J. and N.S. Argyres. 2004. Learning to Contract: Evidence from the Personal Computer Industry. *Organization Science*. 14(4):394-410.

Mitchell, Mark, and Erik Stafford, 2000, Managerial decisions and long-term stock price performance, *Journal of Business* 73, 287–320

Rouse, A.C. and B.J. Corbitt. 2006. Business Process Outsourcing: The Hysteresis Effect and Other Lessons. In R.Hirschheim, A. Heinzl and J. Dibbern (Eds), *Information Systems Outsourcing: Enduring Themes. New Perspectives and Global Challenges*: 583-602. Springer. Sinha, K.K. and A. Van de Ven. 2005. Designing Work Within and Between Organizations. *Organization Science*. 16(4):389-408.

Slalter, S.F. and Naver, J.C. 1996. Competitive strategy in the market-focused business. *Journal of Market Focused Management*. 1(1): pp.159–174.

Williamson, E. O. 1991. Comparative Economic Organizations: The Analysis of Discrete Structural Alternatives. *Administrative Science Quarterly*. 36: 269-296.

Yang, X., 2000, *Economics: New Classical versus Neoclassical Frameworks* (Wiley, John & Sons, NJ)