IT Outsourcing Contracts and Performance Measurement

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Abstract

Companies that outsource IT services usually focus on achieving multiple objectives and outsourcing contracts typically specify a variety of metrics to measure and reward (or penalize) vendor performance. The specific types of performance metrics included in a contract strongly affect its incentive content and ultimately its outcome. One specific challenge is the measurement of performance when an outsourcing arrangement has a mix of objectives, some that are highly measurable and others that are not. Recent advances in contract theory suggest that the design of incentives for a given objective is affected by the characteristics of other objectives. However, there is little empirical work that demonstrates how relevant these "multi-task" concerns are in real-world contracts. We apply contract theory to examine how objectives and incentives are related in IT outsourcing contracts that include multiple objectives with varying measurement costs. In our context, contracts generally share the objective of reducing IT costs but vary in the importance of increasing IT quality. We establish empirical results about performance measurement in IT outsourcing contracts that are consistent with recent theoretical propositions. We find that the use of strong direct incentives for a given measurable objective is negatively correlated with the presence of less-measurable objectives in the contract. We show that outsourcing contracts that emphasize goals with high measurement costs employ more performance metrics than initiatives whose objectives have a lower measurement-cost profile. Surprisingly, as the number of performance metrics increase, satisfactory outcomes decrease, which we explain within a multi-task theory framework. Overall, our results provide empirical support for multi-task principal-agent theory and important guidance in designing outsourcing contracts for complex IT services.

IT Outsourcing Contracts and Performance Measurement

Companies have increasingly sourced many of their information systems (IS) activities from external service providers rather than delivering them internally as was their practice. Executives at these firms typically cite a variety of reasons for outsourcing IT services, from improving the delivery of information systems services by reducing costs or enhancing service quality to increasing business performance by better aligning IT strategy with business goals and facilitating a focus on their core competencies (DiRomualdo and Gurbaxani, 1998). As the scope of objectives has grown, so has the size of the IS outsourcing industry. The Gartner Group estimated that revenues in 2007 for this industry in the United States would be $224 billion and predicted an annual growth rate of 7-8% for the following 5 years (Young, 2007). However, the results of these sourcing arrangements have been mixed (Dibbern et al., 2004, Weakland and Tumpowsky, 2006).

The successful outsourcing of IT services in firms is hampered by the lack of guidance on how to design IT outsourcing contracts to encourage and reward good vendor performance, especially in arrangements with multiple objectives (Gurbaxani 2007, Economist 2007). Classical theories of the firm such as transaction-cost economics (Williamson 1982, Klein et al 1984) or incomplete contracts (Grossman and Hart 1986, Hart and Moore, 1990) have generally been helpful in explaining the broader tradeoff between integration and non-integration but not the choice of performance incentives in bilateral contracts. Without a more comprehensive understanding of the factors involved in designing these contracts, the full economic benefits of outsourcing will not be realized.

Intuitively, the characteristics of an IT outsourcing contract (and in particular performance measurement) should be tailored to the intended goals. For example, if a firm's strategic

1

objective for outsourcing its IT operations is to reduce costs, we would expect the related contract to include metrics associated with IT costs. However, IT outsourcing often involves objectives that are either poorly defined or subject to a large amount of variation that is outside the vendor's control. How can a firm provide incentives to its outsourcing vendor for goals such as improving IT quality or enhancing the strategic impact of IT on the firm? Clearly, vendors will be reluctant to agree to contracts in which their performance is tied directly to objectives that are inherently hard to measure or subject to uncontrollable factors that can influence the outcome (not the least of which being the actions of the client itself). As a consequence, contracts that involve poorly-specified goals, such as improving IT quality, should be less performance-contingent than contracts whose intended goals are more directly measurable, such as reducing IT costs (Grossman and Hart, 1996). In general, we would expect heterogeneity in the characteristics of objectives to be systematically related to heterogeneity in the form and degree of performance measurement.

These predictions of classical principal-agent theory appear to be incompatible with many of the contractual arrangements observed in practice, both generally and in IT outsourcing (Garen, 1994, Rao, 1971, Lacity and Willcocks, 1998). Not only are intangible, hard-to-measure goals often included in pay-for-performance contracts, the performance metrics used in these contracts frequently offer little incentive provision and are only partially related to the objective under consideration. Moreover, actual IT outsourcing contracts seldom include only a single objective, measurable or not typically focusing on IT cost reduction, raising the quality of IT services, and in some cases, on business performance improvement (Marriott and Da Rold, 2009). In reality, most contracts entail a variety of both tangible and intangible goals, some of which are measurable and some of which are not (Davies et al, 2006). Classical principal-agent theory

would suggest that performance metrics should be assigned only to these contract objectives that are measurable, while leaving the other objectives in the contract unchecked. Instead, many contracts include a plethora of performance metrics, not just for easily measured objectives like IT costs but even for hard-to-measure objectives like IT services quality (ACS, 2009, DiRomualdo and Gurbaxani, 1998, Gurbaxani, 2007). While the use of numerous metrics can focus vendor effort on the multiple objectives for an IT outsourcing arrangement, the difficulty of developing good measures for some intangible objectives like IT service quality may result in performance metrics that do not reflect the essence of the client objectives.[1]

Recent refinements to the classical principal-agent models seek to address these problems by taking into account the broader set of objectives that a contract seeks to achieve. The key point in these multi-task theories is that incentive contracts serve as mechanisms to not only induce effort and allocate risk but also to direct the effort allocation among different tasks competing for the vendor's time (Holmstrom and Milgrom, 1992). Neglecting this angle of performance incentives can have serious unintended consequences (Kerr, 1975). For example, piece-rate systems that exclusively reward measurable output can give rise to the perverse effect of workers reducing or even eliminating effort on hard-to-measure aspects of performance such as quality (Seiler, 1984). To counter this, the theory claims, it may be optimal to refrain from providing strong incentives for one type of activity not because good objective performance measures for these tasks do not exist but because incentives for competing tasks cannot be efficiently provided. What Steven Kerr (1975) calls the "Folly of Rewarding A While Hoping for B" may be a consequence of the asymmetric measurement costs among different activities in multi-task settings.

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[1] Vendor executives (Murthy, 2007) often describe the seeming paradox of exceeding the requirements of large numbers of service level agreements in outsourcing relationships but leaving clients less than satisfied.

Despite the ubiquity of multi-task environments in the world of business, empirical studies of performance incentives and their sensitivity to the dimensionality of the task space are rare. Most of the evidence is largely anecdotal, relying on case studies or indirect support to suggest the importance of calibrating incentives in contractual arrangements (Kerr, 1975; Fast and Berg, 1975). When empirical tests are conducted, they typically examine specific issues such as executive compensation and the composition of corporate remuneration, and focus on the tradeoff between risk sharing and incentives in employment contracts. The issue of how to induce appropriate effort allocation in inter-firm contracts that include multiple, conflicting and often ill-defined goals has remained mostly unexplored.

We are not aware of any research on these issues in the IT outsourcing context, even though the relevance to IT outsourcing contracts is clear. Indeed, IT outsourcing contracts often involve multiple objectives with asymmetric measurement costs. For example, objectives associated with the IT function have different characteristics and measurement costs than those related to business processes or to the business as a whole. If incentive problems arising from multiple tasks are indeed important in determining incentive type and incentive strength, they should be particularly relevant to these types of contracts. As a consequence, these contracts provide a rich domain in which to study how multiple objectives can affect performance incentives.

In this paper, we examine the objectives and performance metrics in 55 IT outsourcing contracts. A majority of these contracts specify reducing IT costs as a primary goal, though with slightly different emphasis, but exhibit significant variation with respect to the importance of improving IT quality. We present a descriptive account of the contractual forms used in these outsourcing arrangements and their relationship to the characteristics of the objectives (IT cost and quality) to which they apply. We model the IT outsourcing contract as a simple principal-

agent contract in which the agent is the contractor who chooses how much effort and service level to expend on the outsourced IT services. The outsourcing firm can affect the contractor's choice of effort through performance-contingent metrics that target various aspects of performance.

We first show how different types of objectives affect the choice of performance metrics. Specifically, we characterize contracts by their objectives and examine the conditions under which specific performance metrics will be used in IT outsourcing contracts that include multiple goals. We find that incentive strength (i.e, the explicit use of metrics to monitor and reward performance) for a given objective decreases with the presence of other, less measurable objectives that are competing for the vendor's attention. Moreover, outsourcing initiatives that emphasize goals with high measurement costs employ more performance metrics than initiatives whose objectives have a lower measurement-cost profile. We uncover indirect evidence that the use of additional performance metrics reduces the effort distortion that unbalanced incentives would create in these contracts but we show that these effects remain economically important. Satisfaction on hard-to-measure goals for IT outsourcing decreases when the client includes multiple performance metrics, highlighting the higher marginal cost of monitoring multi-task contracts. Altogether, these results suggest that performance incentives are sensitive to both the characteristics of the IT outsourcing objectives that they directly influence and to the attributes of other desired but unrelated outcomes.

This research has significant implications for managers considering outsourcing. In the presence of multiple objectives with asymmetric measurement costs, managers can choose to reduce the scope of the outsourcing arrangement in the hope of limiting objectives and asymmetric measurement problems, which may often be unrealistic. Alternatively, they can

choose to measure and reward what is easily measurable and hope for good outcomes on other metrics,[2] focus less on measurement altogether, or measure and reward all objectives using imperfect measures. None of these solutions is universally better, and decisions about what type of objectives and metrics to include in an outsourcing contract must carefully consider the costs of monitoring specific objectives within the broader context of the other objectives in the contract. We hope that our results shed light on the implications of these choices.

This paper is structured as follows. In section 2, we review the relevant literature on incentive design as well as prior research on IT outsourcing contracts. In section 3, we develop our model and generate testable hypotheses. We present the data collection methodology and summarize the data in section 4. The results of our analysis are in Section 5. We discuss our results in Section 6. Section 7 concludes.

2. Theory and Literature Review

A large literature exists on the relationship between incentive design, choice of actions and the distortions associated with improper incentives. Lazear (2000) examined the productivity impact of a change in incentives (from fixed pay to incentive pay) on output and effort at a manufacturing company and finds that incentive pay leads to higher productivity, a higher-qualified workforce and higher profits. In the context of government services, Cragg (1997) finds evidence of moral hazard in training programs (the Job Training Partnership Act) in which providers responded to government incentives that rewarded placement of trainees by engaging in cream-skimming and enrolling higher-ability individuals (with a higher likelihood of placement). Chevalier and Ellison (1997) explored the risk-taking behavior of mutual funds

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[2] The Xerox-EDS outsourcing arrangement provides a good example of the shortcoming of this approach (Callaway, 1996). Xerox specified detailed performance metrics for many objectives, but did not do so for some less tangible but important goals. Some years later, Xerox felt that the vendor had under-invested in the tasks that would have achieved these goals.

managers whose ultimate goal, maximizing the inflow of investments, differs from consumers'
objectives of maximizing risk-adjusted expected returns. As expected, these incongruent goals
lead to distorted actions in the form of increasing or decreasing the riskiness of the fund based on
year-to-date performance, whether or not doing so maximizes returns. Similarly, Oyer (1998)
demonstrated that sales quotas and fiscal year ends induced effort variation of salespeople over
the year, with peak effort just before the end of the year and a slump in sales afterward. All of
these studies highlight the critical link between incentives and contractual outcomes, and the
important costs and distortions associated with setting up the wrong incentives.

A smaller number of studies have concerned themselves with the source of these distortions
and in particular the balance between risk and incentives that underpins many of the theoretical
models in contract theory. In the context of IT outsourcing, the vendor faces multiple risks
outside its control, such as technological uncertainty, employee turnover, and many unforeseen
contingencies. Protecting a vendor from these risks typically involves a payment guarantee
(fixed price) that is independent of performance. The undesirable effect of such protection is to
reduce incentives to devote high effort. However, whether dealing with managerial
compensation (Garen, 1994; Oyer and Shaefer, 2001), sharecropping (Allen and Lueck, 1995) or
franchising (Lafontaine, 1992), the evidence of such a tradeoff between risk and incentives is
inconclusive (Prendergast, 2002). In fact, the data often suggest a positive relationship between
uncertainty and incentives rather than the theoretical negative tradeoff.

A further limitation in this literature is that none of these papers directly considers the
allocation of effort among different tasks. In the presence of multiple tasks, effort allocation
considerations may preclude the use of performance incentives. When firms need to encourage
provision of effort towards many activities, the availability of good performance measures for

one activity may be affected by whether (good) measures are also available to control effort on competing activities. Therefore, even though the characteristics of a metric and the objectives it targets remain important determinants of whether or not this metric should be used, incentive provision should also depend on the overall set of tasks in which the agent engages and their characteristics. In contrast to these prior studies on incentives, we explicitly account for multi-task concerns both in our theoretical framework and empirical analysis.

The practical relevance of these multi-task problems in setting up incentive systems and their prevalence in real contracts have so far not been demonstrated in empirical studies. The most direct test is provided by Brickley and Zimmerman (2001) who examined changes in faculty teaching quality at a business school after career and promotion decisions were tied explicitly to teaching as well as research. They found patterns consistent with reallocation of faculty effort to teaching and away from research but the study is restricted in its scope. On a broader level, there exists some limited indirect evidence of the role of asymmetric monitoring costs in determining industry structure. Anderson and Schmittlein (1984) show that, in the electronics industry, the likelihood of a firm employing an in-house sales force increases with the difficulty of monitoring some aspects of performance. Presumably, the more difficult it is to monitor these aspects of performance, the more difficult it is to write effective incentive contracts and the more likely the sales force is to be employed in-house. Shepard (1993) considers the contract choices of gasoline refiners and gasoline station managers for different types of service offerings at gasoline stations and relates these choices to the degree to which effort is observable. In general, the difficulty in directly observing performance-contingent contracts restricts most previous work to issues such as the allocation of control rights (the ownership structure and vertical restraints), ignoring the characteristics of the performance

measures used in these contracts. To our knowledge, there is no direct empirical evidence of how the characteristics of contracts (objectives and performance measures) combine in an economically coherent system to provide appropriate incentives. How prevalent are multi-task problems in real-world contracts and can specific contractual arrangements mitigate them? One of the contributions of this paper is to use micro-data on actual contracts to investigate these questions. We show that providing incentives on some objectives affect the level of incentives for other objectives, that including multiple metrics in a contract can help control multi-task problems but that measurement issues are costly to the principal.

In the information systems literature, most studies have approached the outsourcing of IS services from a transaction cost perspective (see Dibbern et al, 2004, for an excellent review of the IS outsourcing literature). In this view, the sourcing of IT services is characterized by significant transaction costs (Lacity and Hirschheim, 1993, Alpar and Saharia, 1995; Grover et al. 1996; Nam et al. 1996; Ang and Cummings, 1997, Ang and Straub, 1998), driven by the considerable uncertainty in both demand characteristics and technology supply trends (Kern and Willcocks, 2001, Wholey et al. 2001) and the need to make transaction-specific investments to support the outsourcing relationship (Grover et al. 1996). Outsourcing vendors usually make significant investments in capital assets such as equipment and structures, and in firm-specific human capital to provide IT services to a client. Given the inherent complexity of contracts dealing with the sourcing of IS services, it is then argued that in the presence of asset specificity and uncertainty, IS outsourcing contracts are costly to write, in a transaction-cost sense, and will necessarily be incomplete (Kern and Willcocks, 2001). This can give rise frequently to situations where the likelihood of post-contractual opportunistic behavior increases (Ang and Cummings, 1997, Clemons et al. 2000, Saunders et al. 1997).

We are aware of only a handful of studies that examine the existence and role of contractual features. Kern and Willcocks (2001) focus on understanding the purposes of a contract beyond its legal nature, and in particular, on the management control dimensions that both parties aim to enforce. They specify seven categories of contractual issues that facilitate management control of the outsourcing relationship. These include service description and exchanges, service enforcement and monitoring, financial exchanges, financial control and monitoring, key vendor personnel, dispute resolution, and change control and management. Gurbaxani (2007) studies the use of contractual clauses in ten large multi-year outsourcing deals focusing on how specific clauses are used to mitigate the risks of opportunism face by both parties. Two studies (Susarla et al, 2009,- Chen and Bharadwaj, 2009) analyze SEC filings by companies on material IT outsourcing arrangements to relate a variety of service characteristics to specific contract features. Susarla et al (2009) look at the scope and complexity of the task and the duration and extensiveness of the contract. Chen and Bharadwaj (2009) examine asset specificity, process interdependence and prior interaction and relate these features to contract characteristics associated with monitoring, property rights protection, and dispute resolution. None of these studies focus on how performance measurement issues, particularly in a multitask setting, influence contract design.

In addition, a few papers have examined discrete service contracts in the context of externally sourced software development projects. In contrast with the studies referenced above, these studies examine single projects where multi-task issues are less important but not absent. Ang and Beath (1993) examine the role of contractual elements that are essentially hierarchical control mechanisms in contracts for discrete software development projects. These include features such as authority relations, incentive systems, standard operating procedures, pricing

systems and dispute resolution mechanisms. They find empirical support for their proposition that the use of hierarchical elements will vary with transaction characteristics. In particular, hierarchical elements of contracts are seen to be important in facilitating the governance of outsourced activities. Gopal et al. (2003) examine the determinants of contract structure – fixed price or time and materials – and its impact on vendor profitability in the context of discrete offshore software development contracts. Specifically, they find that transaction characteristics such as higher requirement uncertainty, larger projects and potential resource shortages which increase riskiness of a project are more likely to lead to time and material contracts. This result indicates that vendors are sensitive to the riskiness associated with the outsourcing task, and is reflected in contract design. Similarly, Kalnins and Mayer (2004) find that uncertainty, measurement issues and prior relationship between parties influence the type of contract selected, and conclude that time and material contracts are preferred when it is difficult to estimate costs ex ante or difficult to measure quality ex post. In a study of the Indian software industry, Banerjee and Duflo (2000) find that vendor reputation determines contractual outcomes, wherein ex ante pricing provisions vary with vendor firm characteristics, plausibly associated with reputation.

To summarize, the results from the IS literature indicate the importance of the appropriate relationship between task characteristics and incentive design in single task settings, and that incomplete contracts including a lack of specificity in performance measurement can encourage opportunistic behavior resulting in poor contractual performance. Research has also suggested the use of hierarchical controls to address measurement issues. However, there is a need for research in the IT outsourcing context that examines performance measurement in multitask settings with heterogeneous objectives. In particular, we do not know whether real-world

contracts are indeed significantly affected by multi-task concerns and the availability of performance metrics, and, if they are, how these problems are addressed in the structure of the contract. Our intention in this research is to use variations in the types of objectives (specifically the importance of quality improvement as a goal of IT outsourcing relative to the goal of IT cost reduction) and in the number of performance metrics to test predictions consistent with multi-task agency theory, adding to the small empirical literature on this subject. We also aim to provide useful descriptive accounts of performance measurement and characteristics of the objectives in these contracts and use our theoretical and empirical findings to suggest prescriptive guidance for the design of IT outsourcing contracts.

3. A model of incentives for multi-objective outsourcing contracts

We begin with a multi-task principal-agent model of incentives (Holmstrom and Milgrom, 1991; Holmstrom and Milgrom, 1994) in which effort is multidimensional and incentives are provided for a noisy measure of output through performance metrics. We focus on the case where effort is two-dimensional, for example when the principal cares about cost-reducing and quality-enhancing activities. In this case, multi-task problems are rooted in the twofold nature of providing incentives to reduce costs without affecting quality. This dualism is relevant to a wide variety of contractual arrangements, including IT outsourcing contracts. We examine the relative use of various performance metrics, in contrast with most of the previous literature which focuses on whether or not performance incentives are used in a contract. We use the model to generate predictions about the optimal incentive contract chosen by the principal for different sets of objectives. Intuitively, we expect the association between performance measures and objectives to be moderated both by the characteristics of the objectives and the metrics but also

by the presence or absence of additional objectives and their characteristics. The model

identifies the conditions and direction of this effect.

3.1 The model

Formally, an agent (an outsourcing vendor) exerts effort that influences the objective function of

a principal (the firm that is outsourcing IT). Objectives for outsourcing IT activities are as

diverse as reducing IT costs, reducing business costs, improving business process performance or

customer satisfaction (DiRomualdo and Gurbaxani, 1998). Effort by the outsourcing vendor is

multi-dimensional and is represented by a vector *e*. In this paper, we focus on two types of

objectives and effort: *e₁* and *e₂* are cost-reducing and quality-enhancing activities associated with

the objectives of reducing IT costs and improving IT service quality respectively. In addition to

the two types of effort that directly influence the objective function of the principal, the vendor

can also engage in activities *t* that do not benefit the client but may affect the signals

(performance metrics) on which payment is contingent. The objective function of the client is a

function of the effort exerted on both objectives, weighted by the relative importance the client

attaches to each objective. Formally, the objective function takes the form of

$$B(e) = e_1 + \gamma e_2 \qquad (1)$$

where γ represents the relative importance of quality-enhancing activities versus cost-reducing

ones in the client's objective function ($\gamma \geq 0$).

The principal cannot observe effort directly and uses instead a series of observable signals as

performance measures. Each performance measure P_k is of the form:

$$P_k = e_l + \varepsilon_k \ , \ l \in \{1,2\} \qquad (2)$$

13

where ε is noise, composed of a random disturbance vector with mean zero and variance-covariance matrix Σ. If the activities t influence the performance metrics, ε will be a function of t as well ($\varepsilon_k = t + v_k$). Let σ_i be the variance of ε_i and σ_{ik} the covariance between ε_i and ε_k. The principal offers a linear combination of the performance metrics to the agent under the form of αP in which the individual components of α are weights on the performance metrics. When writing the incentive contract the principal maximizes:

$$\max_{\alpha} B(e) - \alpha P - \beta \qquad (3)$$

subject to the agent choosing the effort level e that maximizes his expected utility

$$E(U(\beta + \alpha P(e) - C(e))) \qquad (4)$$

where β is a transfer to the agent that satisfies his participation constraint, and $C(e)$ is the cost of effort. We specify a cost function in which efforts towards reducing costs and improving quality are strategic substitutes ($\frac{\partial^2 C}{\partial e_1 \partial e_2} > 0$). The higher the effort exerted to reduce costs, the more costly it becomes to improve quality. Alternatively, improving quality without increasing costs is hard. The cost function also includes the activities t that do not benefit the client but may affect the performance metrics (an example would be the type of "influence" activities described in Milgrom and Roberts, 1996). We first assume that the marginal cost of these activities is independent of the other activities ($\frac{\partial^2 C}{\partial e_k \partial t} = 0$). In this case, the solution to (3) does not depend on t.

For an agent with constant absolute risk-aversion and coefficient of risk aversion r, the certainty equivalent is:

$$\beta + \alpha P(e) - C(e) - \frac{1}{2} r \alpha' \Sigma \alpha \qquad (5)$$

In deciding how to set α, the principal is solving the total certainty equivalent of:

$$e_1 + \gamma e_2 - C(e) - \frac{1}{2} r\alpha' \Sigma \alpha \qquad (6)$$

subject to the vendor choosing the effort level e that maximizes $\alpha P(e) - C(e)$.

We now present empirical implications of the model that we use in the next section to test hypotheses on the cross-sectional variation in incentive strength for various characteristics of the incentives and the objectives.

3.2 Competing Objectives and Performance Measurement

We are first interested in performing direct empirical tests of multi-task agency theory. Consider the case where each objective is measured by a single metric, P_k, the metrics are uncorrelated ($\sigma_{ik} = 0$) and quality is very difficult to measure ($\sigma_2 = \infty$). In this case (Holmstrom and Milgrom, 1991),

$$\alpha_1 = \frac{1 - \gamma(C_{12}/C_{22})}{1 + r\sigma_1(C_{11} - C_{12}^2/C_{22})} \qquad (8)$$

where subscripts on C denote partial derivatives. Then,

$$\frac{\partial \alpha_1}{\partial \gamma} = \frac{-(C_{12}/C_{22})}{1 + r\sigma_1(C_{11} - C_{12}^2/C_{22})} < 0 \qquad (9a)$$

$$\frac{\partial \alpha_1}{\partial C_{12} \partial \gamma} = \frac{-(1 + r\sigma_1(C_{11} - C_{12}^2/C_{22})) - 2rC_{12}^2\sigma_1}{C_{22}(1 + r\sigma_1(C_{11} - C_{12}^2/C_{22}))^2} < 0 \qquad (9b)$$

if the two types of effort are strategic substitutes and C_{22} is large enough relative to C_{12}.

These comparative statics show that the strength of the incentive placed on the first metric decreases the more important the second objective. Even though a good unbiased performance measure exists for reducing costs (the first objective), the client will shy away from using this metric intensively in the contract for fear of distorting effort away from the second objective (quality). The more important quality is to the client, the less likely she is to use cost-metrics when the substitution between the two tasks in the vendor's private cost of effort is high. Notice that this effect is a function of the interdependency of the tasks in the cost function of the agent (Equation 9b). If the tasks are technologically independent, the likelihood of using cost-metrics will not change. This leads us to our first proposition:

Proposition 1: The likelihood of explicitly measuring the achievement of lower IT costs in an IT Outsourcing contract is inversely related to the importance of quality in the contract.

3.3 Multiple performance metrics

We next examine the relationship between objective type and the number of metrics in the contract. An objective is difficult to measure when the available metrics for this objective can be "gamed" by the agent or in general, when other actions, unrelated to the objective, shift the value of the metric. As an example, quality can be assessed based on the time it takes for the vendor to fulfill a request, but the vendor can use shortcuts to speed up the process (which increases the value of the metric) even though doing so hurts overall quality. An alternative metric, perhaps based on end-user satisfaction, can be used, even though it risks encouraging the vendor to serve the narrow needs of the users whose satisfaction is monitored, at the expense of company-wide quality. Quality is hard to measure because the available metrics are more easily distorted by the

agent than cost metrics. The key insight is that the agent can engage in outside activities that do not benefit the client but affect the signal on which the agent is evaluated. We show that multiple metrics can be used in a contract to influence achievement of hard-to-measure objectives.

Suppose that the signal associated with effort e_2 takes the form of

$$P_2 = e_2 + \varepsilon_2 \quad (10)$$

and that an additional metric exists:

$$P_2^{'} = e_2 + t + v_2^{'} \quad (11)$$

where t is an outside activity that does not benefit the client. Without loss of generality, we can rewrite the two metrics as:

$$P_2 = e_2 + \varepsilon_2 \quad (12)$$

$$P_3 = t + \varepsilon_3 \quad (13)$$

with incentive weights α_2 and α_3 on P_2 and P_3 respectively (the principal can always redefine a new set of performance metrics that are linear combinations of P_2 and P'_2 and use them as performance metrics). To simplify the exposition we make the following assumptions: the error terms between the different metrics are stochastically independent, the activities e_1 and t are technologically independent (the cross-partials are zero) and C_{33} is zero. An example of such a cost function is $C(e_1, e_2, t) = e_1 e_2 + e_2 t + K(e_1, e_2, t)$ where the second-order derivatives of K are all zero. As costs are reduced, enhancing quality becomes relatively more difficult, and incremental quality improvement is more costly as quality improves. Note that activities t do not enter the principal's objective and influence the use of performance metrics only through the agent's private cost. Given the structure of the agent's cost structure and the performance metrics, α satisfies (Holmstrom and Milgrom, 1994) :

$$\alpha = \begin{pmatrix} 1 + r\sigma_1 C_{11} & r\sigma_2 C_{12} & 0 \\ r\sigma_1 C_{12} & 1 + r\sigma_2 C_{22} & r\sigma_3 C_{23} \\ 0 & r\sigma_2 C_{23} & 1 \end{pmatrix}^{-1} \begin{pmatrix} 1 \\ \gamma \\ 0 \end{pmatrix} \qquad (14)$$

Define $D = (1 + r\sigma_1 C_{11})(1 + r\sigma_2 C_{22}) - (1 + r\sigma_1 C_{11})(r^2 \sigma_2 \sigma_3 C_{23}^2) - (r^2 \sigma_2 \sigma_1 C_{12}^2)$

Then (14) leads to:

$$\alpha_1 = \frac{1 + r\sigma_2 C_{22} - r^2 \sigma_2 \sigma_3 C_{23} - \gamma(r\sigma_2 C_{12})}{D}$$

$$\alpha_2 = \frac{-r\sigma_1 C_{12} + \gamma(1 + r\sigma_1 C_{11})}{D} \qquad (15)$$

$$\alpha_3 = \frac{r^2 \sigma_1 \sigma_2 C_{12} C_{23} - \gamma(1 + r\sigma_1 C_{11})(r\sigma_2 C_{23})}{D}$$

It is readily seen that α_3 will be zero if $C_{23} = 0$. If the private cost of e_2 to the agent is not influenced by whether or not the agent engages in wasteful activities, there will be no need to use additional incentives. Objectives that are heavily influenced by these activities will be associated with multiple performance metrics. The following proposition summarizes this finding.

Proposition 2: Controlling for the number (importance) of objectives, IT outsourcing contracts that include hard-to-measure objectives will make use of relatively more metrics than contracts with only measurable objectives.

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Proposition 2 shows that in this model, multiple metrics are used even though they do not reduce the overall noise (risk) in the contract, or measure the intended objective more accurately (the variances of the metrics do not change). Instead, they provide additional degrees of freedom in the measurement system to try and control unobserved vendor's actions that affect signals. Therefore, even if an objective is hard to measure and adding metrics will not improve

measurement of that objective, Proposition 2 shows that it may still be optimal to increase

performance measurement to control some of the private actions of the vendor.

3.4 Multiple performance metrics and measurement of cost-based objectives

The above discussion suggests that multiple performance metrics, when available, help

improve the measurability of certain types of objectives by reducing opportunistic behavior even

when the additional signals are not more informative (i.e., $\sigma_1 = \sigma_2$). On the other hand,

Proposition 1 implied that poor measurement of effort e_2 reduces the incentives placed on e_1.

Accordingly, the improved measurement of quality achieved through multiple metrics should

lead to higher use of cost-metrics to monitor and reward cost-based objectives, since the

downside of over-emphasizing cost over quality is reduced when quality is better monitored

through multiple metrics. This intuition can be formally derived as follows. In our model of

outside activities, we have established that

$$\alpha_1 = \frac{1 + r\sigma_2 C_{22} - r^2 \sigma_2 \sigma_3 C_{23} - \gamma(r\sigma_2 C_{12})}{D} \qquad (16)$$

Therefore:

$$\frac{\partial \alpha_1}{\partial \sigma_3 \partial \gamma} < 0 \qquad (17)$$

which shows that an increase in metrics to measure quality (through better monitoring of outside

activities) lowers the negative effect of quality on the use of cost metrics to monitor cost-based

objectives and therefore, increases the use of cost-based incentives.

Proposition 3: The likelihood of measuring the achievement of lower IT costs explicitly in an IT

Outsourcing contract increases with the number of metrics used to measure quality.

3.4 Multi-task Agency Effects and Outcomes

As the models above demonstrate, contracts with multiple objectives must balance the need to provide incentives for each task with the constraints these incentives place on other tasks. We showed that using multiple metrics for hard-to-measure objectives encourages the agent to limit effort on wasteful activities. But while doing so improves the general performance of the contract (performance on all desirable objectives), it should also lead to decreased performance on the metrics used to measure these objectives individually, since performance on these metrics benefits from wasteful activities. For example, if quality of the IT service depends both on the speed of service and attention to detail, performance on each of these individually will be higher if only one metric is used to measure the objective than if two metrics are used. The agent may take short-cuts to improve response time leading to levels of performance (as measured by speed) that are higher than when additional metrics are included. If a principal expects performance in contracts that include both metrics to be no less than the sum of individually-achieved performances, satisfaction will decrease with the number of metrics. We can also show this formally by noting that the expected benefits that the principal derives from task e_2 are γe_2 and that the marginal benefit of an increase in the number of metrics (an increase in the measurability of outside tasks) is:

$$\frac{\partial e_2}{\partial \sigma_3} = \frac{\partial e_2}{\partial \alpha_2}\frac{\partial \alpha_2}{\partial \sigma_3} > 0 \quad (18)$$

As the number of performance metrics increase (σ_3 decreases) satisfaction from objective e_2 decreases.   This observation leads to our fourth proposition:

Proposition 4: The use of metrics in IT outsourcing contracts to mitigate multi-task agency problems may lead to lower goal achievement for individual objectives (even as overall performance improves).

4. The Data

In this paper, consistent with the definition in the literature (Lacity and Hirscheim, 1993, Grover et al. 1996) and leading market research firms such as the Gartner Group (Gartner Dataquest 2003), we define an IS outsourcing arrangement as a long-term contractual arrangement in which one or more service providers are assigned the responsibility of managing all or part of a client's IS infrastructure and operations. We examine the relationships between incentive strength and contractual objectives in a data set of IT outsourcing contracts gathered through a survey of 42 firms in 2005. The sample consists of firms that have outsourced IT services and includes data on the contracted work, the objectives, the performance metrics used in the contract and the degree to which the outsourcing relationship was successful.

We began with a dataset on outsourcing arrangements that one of the authors has been compiling for the last decade. This was merged with two additional databases provided by leading market research firms that listed all outsourcing deals in North America and Europe in the 1993-2004 timeframe. From this merged database, we selected those client firms that had outsourced for at least one year, resulting in 291 firms. These firms were distributed across every industry category. We sent a letter to the highest ranking IT executive at each of these firms by e-mail when an address was available, or by overnight mail. We also provided a copy of a managerial paper on outsourcing written by one of the authors to each of these firms. Each mail survey was followed by telephone calls administered by an external survey research firm.

Forty two executives agreed to participate in the study, resulting in a response rate of 14%.

Given the subject of the survey and the associated confidentiality requirements, this is an

excellent response rate.[3] In most cases, the survey was conducted over the telephone. We

believe that this is perhaps the most comprehensive dataset collected in academia on the details

of IT outsourcing contracts.

4.1 Sample Characteristics

Almost half of the firms in the sample were from the services (46%) industries, the rest

being categorized as manufacturing (32 %), pharmaceuticals, biotech and aerospace and energy.

The size of the firms ranged from 1200 employees to almost 200,000 with revenues of between

$700Mm and $27.3Bb. The median number of employees was 32,000 and the median revenue

was 8.9Bb. The majority of the firms in the sample are among the largest firms in the U.S.

economy (as a reference, only Fortune 250 companies had revenue in excess of 8.9Bb in 2005), a

few are large European and Canadian firms. The level of analysis is a contract, and some firms

answered the survey multiple times for different contracts. We have data on 55 contracts.

Sample statistics appear in Table 1.[4]

4.2 Objectives and Metrics

In one set of questions, firms were asked to list the objectives they sought to achieve by

outsourcing an IT service and the performance metrics that were used to measure performance

on the delivery of that service. For some objectives, performance metrics were available that

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[3] To secure responses, we provided additional confidentiality to the client firm by having all surveys conducted externally. Completed surveys were then provided to a specialist who compiled the responses into a database after deleting all identifying information.

directly measured how well this objective had been achieved (for instance, the objective "reduce

IT costs" was directly measurable by the performance metric "reduction in IT costs") while other

goals (such as "improve IT quality") were more difficult to measure (consistent with the

theoretical literature on multi-task problems that has often viewed intangibles such as "quality"

as an example of immeasurable aspects of work, see the examples in Holmstrom and Milgrom,

1994).

4.3 Ranking of Objectives and Outcomes

Respondents were asked to rank the importance of major IT outsourcing objectives in their

outsourcing decisions on a scale of 1 to 5, with 1 being "unimportant" and 5 being "very

important." The objectives that were listed in the survey were drawn from a comprehensive

review of the literature (Kerns and Willcocks, 2001). Table 2 presents sample statistics for the

rank of the different objectives. Although the objectives for outsourcing are many and diverse,

there are three primary objectives for which a vendor's effort is particularly important and can be

influenced with appropriate metrics. These three objectives are "reducing IT costs", "improving

IT service quality" and "improving the speed and responsiveness of IT services." The other

objectives are either the basis for a vendor's selection and are predetermined, or the outcome is

materially affected by the actions of the client as well. In addition, since "improving IT service

quality" and "improving the speed and responsiveness of IT services" are strongly correlated

with each other (.66, p<0.01), we focus in our analysis on the two objectives of "reducing IT

costs" and "improving IT service quality." Most respondents (more than 96%) ranked "reducing

IT costs" as "moderately important" or higher confirming that cost is a preeminent driver of IT

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[4] Five firms with a total of eleven contracts did not provide employee or revenue data and are not represented in
Table 1. They are included in subsequent analyses.

outsourcing. A majority of the respondents ranked improving IT quality as important (45%) or very important (13%), but unlike reducing IT costs, improving IT quality was ranked as unimportant for as many as 16% of the respondents. The related histograms for "Reducing IT costs" and "Improving IT service quality" can be found in Figure 1.

Respondents rated the degree to which different objectives had been achieved versus expectations (on a scale from 1 to 5) with 1 being the lowest expectation-achievement gap and 5 the best. The right-hand side of Table 2 shows summary statistics of this variable for each objective. In general, objectives that were ranked by respondents as having influenced the outsourcing decision "somewhat" or "significantly" were more likely to have been achieved (the correlation is 0.68, p-value≤0.05). On average, a contract can be expected to include about 1.5 objectives as very important (Table 3) and 3.7 objectives as important (ranked as 4). A contract had on average 0.9 objectives that were minor factors in the decision to outsource.

4.4 Main Performance Types

Lastly, respondents indicated which performance metrics were used in the contract. Table 4 includes summary statistics for these metrics. The most frequently used performance metric in the contract was "reductions in IT costs" (65%) followed by metrics targeted at quality, satisfaction and business costs. Within metrics targeted at quality, measuring IT service quality was slightly more common than product/service quality (47% vs. 40%). Similarly, satisfaction could be measured at the end-level (customer), the level of the business unit, or the IT user. Metrics at the level of the business unit ("business unit satisfaction with IT services") were used by 43% of the respondents, whereas 40% and 37% of the respondents measured IT user

satisfaction and end-customer satisfaction, respectively. None of these differences are

statistically significant at standard levels of significance (95%). Finally, business costs were

used as the basis for performance in 40% of the contracts.

5. Analysis and Results

The first proposition, a direct test of the multi-task agency framework, claims that when

hard-to-measure objectives are included in a contract together with objectives for which good

performance measures exist, the likelihood of using these good performance metrics to reward

the measurable objectives decreases. Therefore, the more important "improving IT quality" is in

a contract the less likely it is to include IT-cost metrics to measure the objective of "reducing IT

costs." Our empirical test of this hypothesis estimates the probability of using the metric

"reducing IT costs" as a function of the importance of the objective "reducing IT costs" and the

relative importance of "improving IT quality." The relative importance of IT quality is

calculated as the difference of the ranking assigned to IT quality from the ranking of "reducing

IT costs." Specifically, denoting by p_i the probability of using the metric "reducing IT costs"

and by X_i the set of the two explanatory variables (the rank of the objective "reducing IT costs"

and the relative importance of "improving IT service quality") we can write the standard logit

specification:

$$\log(\frac{p_i}{1 - p_i}) = \alpha + \beta X_i + \varepsilon_i \qquad (19)$$

We anticipate that high relative values of "improving IT quality" will be associated with lower

use of "reducing IT costs" controlling for the importance of "reducing IT costs" in the contract.

Table 5 reports estimates from the logit specification above. The rank of "reducing IT cost"

is positively correlated with using the IT-cost metric. Controlling for the importance of reducing

IT cost, the more important quality is relative to cost in the contract objectives, the less likely it is that the IT cost metric will be used. This result is in line with Proposition 1: when reducing IT costs is ranked as important, the probability of using the IT-cost metric in the contract is high, but the odds of doing so decrease (at the rate of 68%) the greater the relative importance of IT quality. Therefore, performance incentives depend both on the characteristics of the objectives that they directly influence and on the characteristics of other competing less measurable objectives, consistent with the multi-task theory.

To investigate this effect further, we consider whether some objectives are systematically associated with a large number of performance metrics. In particular, and as stated in Proposition 2, objectives for which the available metrics are more easily manipulated (such as quality metrics) should be associated with a higher number of performance metrics if multi-task agency concerns are indeed important. The following equation specifies the relationship between the number of performance measures in a contract and the rank (importance) of "improving IT service quality."

$$Y_i = \alpha + \beta_1 Z_i + \gamma\ N_i + \varepsilon_i \qquad (20)$$

where Y_i is the number of metrics in contract i, Z_i is the difference between the rank of "improving IT service quality" and the mean of the rankings of all the objectives in the contract, and N_i is the mean of the rankings of all the objectives in contract i. OLS (ordinary least squares) estimates are provided in Table 6.

The average rank of the objectives in a contract contributes more than twice its magnitude to the number of performance metrics in the contract. The mean rank controls for the number of objectives that are ranked as important in the contract and for the magnitude of the ranks. Overall, the higher the number of objectives to be achieved the higher the number of

performance metrics in the contract. Contracts that specify the goal of "improving IT service quality" as relatively more important than the average objective in the contract use more performance metrics (almost two additional performance metrics), controlling for the importance of other objectives in the contract (Table 6). This finding is consistent with Proposition 2. Quality is an intangible goal that is complex and imperfectly measured. Contracts with many metrics are less likely to be influenced by actions that do not contribute to the overall objective. When quality is important, multiple performance metrics may serve as a mechanism to blunt the impact of each individual metric and reduce the risk of unintentionally encouraging wasteful activities.

Of course, the specification we use does not account for other rationales for using multiple performance metrics, possibly leading to a misspecification bias. We checked whether the results above are robust to the inclusion of other contract-specific variables, such as the dollar value of the outsourcing deal, the value of the capital assets transferred to the vendor, and the percentage of total IT expenditure outsourced via the contract. We find qualitatively similar results with these specifications. The relationship between quality and the number of metrics used in the contract remains positive and statistically significant in all of these specifications. Another concern is that the number of metrics may be related to the importance of IT quality in a contract not because monitoring this objective requires more metrics but because contracts with more metrics are likely to include on average more objectives, and therefore are also more likely to include the objective of IT quality. Controlling for the importance of other objectives in the contract as we do and adding the contract-specific variables increases the confidence that the results are not driven by this alternative interpretation.

The test of Proposition 3 involves expanding the specification in (19) to include the number of metrics in a contract as an independent variable. Since the importance of quality and the number of metrics in a contract are highly correlated we use the residuals of regression (20) multiplied by the rank of the objective "improving IT quality" as the interaction term between metrics and quality. Notice that the coefficient of this variable will capture the marginal effect of the number of metrics (or more precisely, of the unexpected variation in the number of metrics for this given level of quality) on the likelihood that IT-cost metrics are used, for different levels of IT quality. Table 7 presents the results of this regression. The level of "improving IT quality" is still associated with a smaller chance of using IT-cost metrics, but as the number of metrics increases, the negative effect of quality on the use of IT-cost metrics decreases. Consistent with the predictions of multi-task theory, the strength of the incentives on measurable objectives increases with the measurability of other objectives in the contract.

To further identify the reasons behind the use of multiple performance metrics, we test Proposition 4 with data on goal achievement. We used an econometric specification in which achieved performance on the objective of "improving IT quality" was related to the ex-ante importance of this objective, the number of performance metrics included in the contract and a control for the rank of other objectives in the contract. Results of this regression appear in Table 8. Satisfaction with achieving the objective of improving IT service quality decreases (-0.09) when more metrics are included in the contract. As seen above, when both quality and cost are important objectives, contracts use more performance metrics. Therefore, satisfaction with IT service quality decreases when other objectives (cost) are important, even as the use of multiple performance metrics increases. Taken together, these results are consistent with Proposition 4

and appear to indicate that multi-task agency concerns are economically relevant in IT outsourcing situations and can affect the performance outcomes of these contracts negatively.

6. Discussion

In this paper, we have examined the question of whether multi-task agency problems are prevalent in IT outsourcing contracts and sought to test the theory by examining how real world contracts address multi-task concerns. Specifically, our focus is on cases where clients have performance objectives that are (relatively) directly measurable and other performance objectives that are less so. The theory predicts that the incentives for measurable objectives are decreasing in the importance of the other, less-measurable, objectives but that improving measurement of these other objectives allows for stronger incentives on measurable goals. Our model predicts that multiple metrics can be used to improve measurement of hard-to-measure objectives, but that when metrics are used to mitigate multi-task agency problems, lower goal achievement can result (even as overall performance improves).

The data show that most IT outsourcing arrangements do in fact, have multiple objectives, and that for many objectives, there are no metrics that directly measure achievement of the underlying objective. We directly test the multi-task agency framework by testing whether the use of performance measures for an objective that is directly measurable (reducing IT costs) decreases when additional objectives that are less measurable (quality) are included in the contract. We find this to be the case. We also find that contracts have an increased number of metrics when the goal of improving IT service quality is important to the arrangement (after controlling for the importance of other objectives) and that incentives for reducing IT costs are stronger when measurement of IT quality improves. We further find that performance

29

improvement on the quality dimension decreases with the inclusion of additional metrics suggesting that managers overestimate the potential of performance metrics in addressing multi-task problems.

Our study is not without limitations. First, our model places constraints on the types of metrics available (the error covariance matrix and which outcomes are included) and the structure of the agent's private cost function. While many of these assumptions are standard in the literature, we cannot be certain that they hold in the dataset that we use to test our hypotheses. For instance, an important dimension of measurability in our model is the extent to which unrelated actions affect the performance metrics, in addition to random noise. This modeling choice is intuitively appealing, and helps explain the use of multiple performance metrics, but since the unwanted effort is unobservable, we cannot rule out alternative explanations. Second, we cannot ascertain whether our findings are indicative of causality or correlation, especially since both the type of objectives and the type of metrics in a contract are possibly endogenous decision variables. While we have assembled perhaps the most comprehensive database in academia on the details of IT outsourcing contracts, we have data only on 55 arrangements. Although we believe that the data are highly accurate since the surveys were largely completed in the carefully controlled environment of a telephone interview, the small sample precluded us from examining more elaborate tests of our propositions and robustness checks. The interpretation of each of our statistical estimates is therefore subject to caution, but the combined results taken together offer a strong case for multi-task effects. Casual observation of how outsourcing initiatives are structured also suggests that managers decide how to structure the incentive content of a contract after the objectives have been determined, and that

the availability of certain metrics rarely determine the objectives to be achieved. This makes endogenous determination of both the objectives and the metrics less likely.

We have assumed that reducing cost and improving quality are substitutes at the margin That is, it becomes increasingly harder to reduce costs without decreasing quality at lower cost levels. While we believe this to be the natural case, the cost function can be specified so that cost and quality are complements. That is, improving quality becomes easier at lower levels of cost. In this case, our conclusions would be reversed. In particular, cost-related metrics would be used extensively and exclusively as they would promote effort towards both cost reduction and quality improvement. Our results suggest that this is not the case.

Some data are necessarily subjective and in particular, data on achievement of objectives are subjective and reflect the belief of the respondent. Since this respondent is the highest ranking IT executive in the client firm, we believe that this is a reasonable approach for us to take. Furthermore, the classification of an objective as being relatively measurable is also subjective, though we attempted to minimize subjectivity by examining whether a direct performance metric associated with this goal was used in the contract.

7. Concluding Remarks

This study is one of a very small number of papers that has empirically tested multi-task agency theory, and we do so in the context of IT outsourcing contracts. Our results, while limited by the data, are consistent with the predictions of the theory. For academics, our results represent a significant first step towards testing the theory, and should provide encouragement to other research initiatives aimed at testing the theory implications in other contracting contexts. Moreover, our results demonstrate the real world importance of multi-task agency concerns.

Many contracting contexts display multi-task agency issues, and managers need guidance on developing suitable contracts that address these concerns.

In the IT outsourcing context, these concerns are of substantial importance. Our data show that outsourcing arrangements are characterized by multiple tasks and multiple important objectives. The managerial literature has provided several examples of IT outsourcing arrangements that have failed due to a lack of appropriate performance measurement, especially of objectives that are less directly measurable. The Xerox-EDS outsourcing arrangement (Callaway, 1996) is a case in point where there were many performance metrics overall but the absence of measures on important subjective goals resulted in poor outcomes for these objectives and significant customer dissatisfaction.

Our results show that it is important for managers to consider the totality of objectives for their outsourcing arrangements. When goals that are directly measurable and those that are less measurable are both important to the client firm, the client must take into account the underlying tradeoff. That is, while incorporating more metrics on the more subjective objectives will improve overall measurability of the objective, performance on each of these metrics individually may suffer. Put differently, a client can't have it all!

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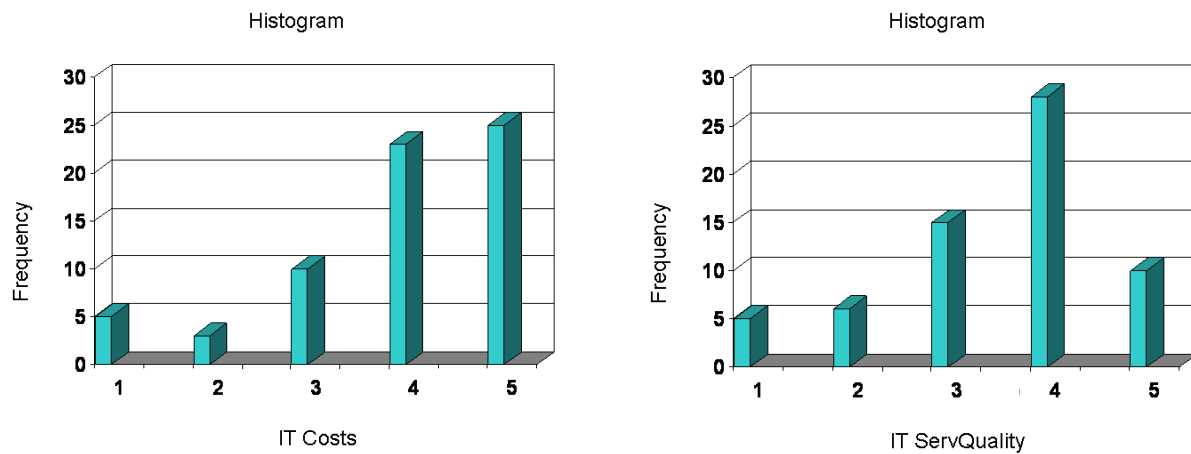| Table 1: Sample Statistics for Selected Variables						
	Mean	**Std Dev**	**N**	**Min**	**Max**	**Median**
Revenue ($ Million)	9,087	6,414	48	700	27,300	8,900
Employees ('000s)	38	39	48	1.2	195	32

Table 1: Sample Statistics

Figure 1: Histograms of Rank of Two Objectives: Improving IT Costs and Improving IT

Service Quality

Objective	Rank in Outsourcing Decision				Degree Achieved vs. Expectations			
	N	Mean	Std.Dev	Median	N	Mean	Std.Dev	Median
Reducing IT Costs	55	4.12	0.98	4	54	3.47	1.32	4
Improving Speed and Responsiveness of IT Activities	54	3.59	0.93	4	51	3.00	0.89	3
Improving IT Service Quality	55	3.48	1.09	4	52	3.16	1.01	3
Facilitating Focus on Core Competencies	55	3.25	1.53	4	49	2.98	1.06	3
Improving Business Process Performance	54	3.36	1.33	4	50	2.87	1.28	3
Allowing Focus on Strategic IT Initiatives	54	3.31	1.30	4	47	3.1	1.07	3
Improving Alignment of IT with the Business	54	3.20	1.41	4	50	3.02	1.28	3
Acquiring Scarce or New IT Skills	54	3.07	1.20	3	50	3.02	1.17	3
Transforming the Internal IT Organization	54	2.83	1.31	3	51	3.02	1.32	3

Table 2: Summary Statistics for Outsourcing Objectives

Variables	N	Mean	Std.Dev	Max	Median
Number of Objectives in Contract that Had a Strong Influence (5) on Decision to Outsource	55	1.52	1.57	6	1
Number of Objectives in Contract that Had a Somewhat Strong Influence (4) on Decision to Outsource	55	3.72	2.36	8	4
Number of Objectives in Contract that Had Some Influence (3) on Decision to Outsource	55	1.97	1.48	5	2
Number of Objectives in Contract that Had a Weak Influence (2) on Decision to Outsource	55	0.90	1.49	6	0
Number of Objectives in Contract that Had No Influence (1) on Decision to Outsource	55	1.79	2.22	8	1

Table 3: Number of Objectives in a Contract at a Given Rank

Performance Metrics	N	Mean	StdDev	Median
Reductions in business costs	55	0.4	0.49	0
Improvement in business unit satisfaction with IT services	55	0.43	0.50	0
Improvement in business productivity	55	0.08	0.30	0
Improvement in product/services quality	55	0.40	0.49	0
Improvement in end customer satisfaction	55	0.37	0.49	0
Improvement in key business process metrics	55	0.17	0.39	0
Reductions in IT costs	55	0.65	0.48	1
Improvement in IT user satisfaction	55	0.40	0.49	0
Improvement in IT productivity	55	0.28	0.46	0
Improvement in IT services quality	55	0.47	0.50	0
Improvement in profits	55	0.03	0.22	0

Table 4: Performance Metrics Summary Statistics

	Reduction in IT Costs Metric	Odds
Table 5: Logistic Regression Parameter Estimates and their Standard Deviations (*=significant at the 90% confidence level). Dependent variable is a dummy variable for whether the performance metrics "Reduction in IT costs" was used or not in the contract		
Constant	-2.40**	-
	(0.22)	
Rank of the objective "Reduction in IT costs"	0.85**	-
	(0.37)	
Relative Rank of IT quality vs cost	-0.38*	0.68
	(0.20)	
Observations	51	
Adjusted R-squared	0.1751	

Table 5: Likelihood of Using the Performance Metric "Reduction in IT costs"

	Number of Performance Metrics
Table 6: OLS Parameter Estimates and their Standard Deviations (**=significant at 95%). The dependent variable is the number of performance metrics used in the contract	
Constant	-4.32**
	(2.19)
N: Mean Rank of All Objectives in Contract	2.05**
	(.59)
X: Difference btw Rank of the Objective "Improving IT Quality" and Mean Rank of All Objectives in Contract (X)	1.73**
	(.69)
Observations	53
Adjusted R-squared	0.3

Table 6: Number of Performance Metrics Used in Contracts with Different Objectives

	Reduction in IT Costs Metric
Table 7: Logistic Regression Parameter Estimates and their Standard Deviations (*=significant at the 90% confidence level). Dependent variable is a dummy variable for whether the performance metrics "Reduction in IT costs" was used or not in the contract. The independent variables include an interaction term between the relative rank of quality and the number of metrics in the contract (the metric "reducing IT cost" is excluded in the count).	
Constant	-2.22**
	(0.29)
Rank of the Objective "Reduction in IT costs"	0.95**
	(0.4)
Relative Rank of IT Quality vs Cost (Q)	-0.41
	(0.25)
Relative Rank of IT quality (Q) * Residuals of Number of Metrics from Previous Regression	0.09*
	(0.05)
Observations	51
Adjusted R-squared	0.21

Table 7: Likelihood of Using the Performance Metric "Reduction in IT costs" As a Funtion

of the Number of Metrics in Contract

Table 8: OLS Regression Parameter Estimates and their Standard Deviations (**=significant at 95% confidence level). Dependent variable is the degree to which "Improving IT Service Quality" was achieved versus expectations.

	Improving IT Service Quality (achieved) (coefficients and standard deviations)
Constant	1.60**
	(0.42)
Difference btw ranking of "Improving IT Service Quality" and ranking of "Reducing IT cost"	0.34**
	(.14)
Number of Metrics	-0.096**
	(0.045)
Median Rank of Objectives	0.53**
	(0.13)
Observations	52
Adjusted R-squared	0.38

Table 8: Degree of Achievement of "Improving IT Service Quality"