Articles

The use of information technology in the provision of HR compensation services and its effect on outsourcing and centralization

Derek Ruth [a,1], Thomas H. Brush [b,*], Wonsang Ryu [b,2]

[a] Brennan School of Business, Dominican University, 7900 West Division Street, River Forest, IL 60305, United States
[b] Strategic Management Area, 403W, State Street, Krannert School of Management, Purdue University, West Lafayette, IN 47907-2056, United States

ABSTRACT

Conventional wisdom suggests information technology (IT) can reduce inter-firm costs, leading to increased outsourcing. However, IT can reduce costs both within and between organizations, making the net influence of IT on outsourcing, and within firm configuration, unclear. Using transaction- and agency-cost approaches, this paper considers the influence of IT on both outsourcing and the within firm choice of decentralization or centralization of HR services. The interdependence of centralization decisions with outsourcing decisions is a novel theoretical and empirical contribution of the paper. Results from a survey of 243 firms indicate that IT facilitates outsourcing. Centralization of service decision making is positively related to outsourcing of the service which suggests that centralization may be a precursor stage or a facilitator of outsourcing. Empirical results also indicate that decision making on a service tends to be more centralized as the service is more standardized and has a higher level of scope economies.

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1. Introduction

The past several years have seen two dramatic trends in the way that many firms do business: a large increase in the outsourcing of HR services to external vendors, and the increasing use of information technology (IT) in service provision (Boudrie, 2012; CedarCrestone, 2012; Mercer Human Resource Consulting, 2003). The primary focus of research in this area has been on the ability of IT to reduce the costs associated with providing services, as well as general firm-to-firm interactions (e.g., Afuah, 2003; Brynjolfsson et al., 1994; United States General Accounting Office, 2003). To the extent that IT changes the costs and the way in which services are provided, this may change the level of outsourcing for a given service (i.e., inter-firm service provision). Considerable research has been done on the use of IT in service provision (e.g., Afuah, 2003; Brynjolfsson et al., 1994; Malone et al., 1987; Metters, 2008; Zenger and Hesterly, 1997); the paper contributes further to this stream by explicitly modeling the effect of IT on outsourcing decisions and empirically testing this effect.

The use of IT to provide services may also allow firms to change the internal configuration of services as an alternative to outsourcing

(Gurbaxani and Whang, 1991). In particular, it may facilitate the centralization or decentralization of services within a firm. A series of surveys by the Corporate Leadership Council revealed that HR managers consider outsourcing and centralization of services to be key decisions affecting service performance and effectiveness (Corporate Leadership Council, 2008a, 2008b). This potential to decrease costs both within and between organizations makes the net effect of IT on organizational boundaries—such as the decision to outsource—unclear (Afuah, 2003; Devaraj et al., 2007; Varian, 2002). Hence the endeavor to model the effect of IT on outsourcing of services becomes potentially intertwined with the analysis of the effect of IT on intra-firm decisions about service provision.

In deciding whether or not to outsource a service, a firm faces a make or buy decision, which is typically the domain of transaction cost economics (TCE) (e.g., Coles and Hesterly, 1998; Leiblein et al., 2002; Lyons, 1995; Williamson, 1985). In the context of service outsourcing, TCE theory holds that, due to the inability of firms to write complete and enforceable contracts, firms are subject to the possibility of opportunistic action by their service vendors. The threat of opportunism is highest in those transactions characterized by high levels of transaction-specific investments known collectively as asset specificity (Williamson, 1985). A potential outsource provider may have to make specific investments in the relationship that may not be recoverable (e.g., training the service provider about firm-specific requirements of service provision), and these investments will require safeguards in the form of

* Corresponding author. Tel.: +1 765 494 4441; fax: +1 765 494 9658.
E-mail addresses: druth@dom.edu (D. Ruth), brusht@purdue.edu (T.H. Brush), ryuw@purdue.edu (W. Ryu).
[1] Tel.: +1 708 524 6810.
[2] Tel.: +1 765 494 4517; fax: +1 765 494 9658.

transaction costs. If the cost of these investments and safeguards rises sufficiently high, it will be too costly for the outsource provider to provide the service, and hence more efficient for the outsourcing firm to continue to provide the service internally (e.g., Coles and Hesterly, 1998; Leiblein et al., 2002; Lyons, 1995; Williamson, 1985).

The paper is concerned with both inter- and intra-firm service provision, but TCE only addresses the inter-firm make-or-buy decision embodied by the decision of a firm to outsource. Since intra-firm service provision in the form of the level of centralization is also being considered, another theory is needed to explain the decision to centralize or decentralize service provision. There is a general assumption that information technology will lead to the decentralization of decision-making in firms, but there has been little work on the determinants of decentralization (Acemoglu et al., 2007), which is one of the key issues that is explored here.

In the same way that transaction costs and asset specificity drive the outsourcing decision, agency theory addresses the way that transactions are organized within the firm (Gurbaxani and Whang, 1991). Gurbaxani and Whang (1991) point out that both transaction costs in inter-firm relationships and agency costs related to the centralization of decision making will, "to a considerable degree, be determined by the costs associated with acquiring, storing, processing, and disseminating information". Kinnie (1987) points out that investment in technology can promote or inhibit centralization of manager's decisions. According to agency theory, if decision-making is delegated to agents by principals, the agents may make decisions that are not aligned with the interests of the principals (Jensen and Meckling, 1976). To the extent that these decisions are not aligned with the preferences of the principals, the organization experiences agency costs (Jensen and Meckling, 1976). In an attempt to insure the alignment with the principals' interests a firm may also incur agency costs when they expend resources to better communicate and enforce the will of the principals and to monitor the behavior of the agents (Jensen and Meckling, 1976). Ceteris paribus, if these agency costs are reduced with IT, more delegation by principals would be seen. In the context of this study, this increased delegation manifests itself in terms of increased levels of decentralized decision making in service provision (Gurbaxani and Whang, 1991; Hitt and Brynjolfsson, 1997; Jensen and Meckling, 1976). Countering this, however, is that the lower costs of information provided by IT may reduce the cost of transferring information from decentralized units back to headquarters, which might facilitate more centralization of decisions. Indeed, per Gurbaxani and Whang (1991), it is an empirical question whether IT reduces information costs more or monitoring costs more and in turn whether the firm minimizes both of these costs with more centralization or more decentralization (Hitt and Brynjolfsson, 1997).

In an empirical investigation of prior theoretical work, researchers (Malone et al., 1987) found that higher levels of IT investment were associated with smaller overall firm size (Brynjolfsson et al., 1994). The authors speculated that this smaller size was due to the outsourcing of services (Ellram et al., 2008). However, other researchers (Varian (2002), and more elaborately, Afuah (2003)), raised the point that efficiencies gained by the use of IT will lower costs both between and within organizations, making the net effect of using IT in service provision on governance choice unclear. Varian (2002) focused on the total cost reductions that may be enabled by IT. Although considerable research has been done on the impact of IT on service performance (Froehle, 2006), less work has looked at the influence of IT on organizational and governance forms. Researchers such as Riordan and Williamson (1985) and Williamson (1985) have long pointed out that inter-firm governance choices between make and buy can involve both production costs and transactions costs. In this paper arguments

are developed for how IT could affect both types of costs and hence outsourcing. On the intra-firm side it is also considered how IT could affect information costs (a form of production cost) and agency costs and hence intra firm choices such as centralization. Discussions are focused sequentially on the influence of transaction and production costs on outsourcing, and then information and agency costs on centralization.

The contributions of this paper are thus twofold. First, this paper suggests the possibility that IT acts as a shift parameter that influences not only the outsourcing decision, but also the way in which these services are provided within the firm via centralization (Ahmadjian and Oxley, 2006; Williamson, 1991). Second, it explores the possibility that organizational form (i.e., centralized versus decentralized service provision) influences governance choice (i.e., outsourcing versus in-house service provision). Put another way, the authors contend that a firm may be able to more efficiently or effectively outsource a service if it changes the way it is provided within the firm via centralization or decentralization; a consideration that is not part of the traditional TCE model. A firm may also be able to capture some or all cost savings that might be achieved via outsourcing by instead modulating the level of centralization. Thus a contribution is made to consider the effect of IT on outsourcing and centralization simultaneously, and empirically investigate these issues together. The authors are not aware of prior scholarly research that does this.

The remainder of the paper is divided into four sections. In Section 2, a theoretical framework is outlined and four sets of hypotheses are developed. Section 3 provides an outline of the empirical methods employed to test the aforementioned hypotheses including sample, survey methodology, model, and econometric methods employed. Section 4 gives the outcome of the statistical analyses. Section 5 includes a discussion of the findings, the study's limitations, and directions for future research.

2. Theory and hypotheses

Evans and Wurster (1997) discuss how the internet fundamentally alters the trade-off between the richness and reach of information. According to their view, the economics of information goods enable a great deal more richness of information to be distributed to many more potential recipients through the web than has been possible through other distribution means. While the information is still costly to collect and develop, it can now be made available at nearly zero marginal cost. Piccoli et al. (2004) track both the suitability of IT for various aspects of service provision as well as map the increasing ability of IT to provide services effectively. The richness of content that can now be economically distributed has enabled electronic forms of interaction such as online interfaces (Shapiro and Varian, 1999). This ease of interaction, particularly of those activities that are very information intensive, has reduced the cost of activities for which the transfer of information is fundamental.

2.1. Outsourcing, transaction costs, and asset specificity

This section is concerned with standard approaches to outsourcing using transaction costs and asset specificity in the first set of hypotheses. The next section then turns to the influence of IT on the extent of outsourcing. For services that are information-intensive, the value of the service may increase with the richness of the information and the timeliness of its delivery. In the past, the effective provision of information-intensive services has required that the service provider be located close to the end user (e.g., the need for face-to-face meetings). Within the TCE framework, this is referred to as site specificity. Advances in IT allow

increased richness of information deliverable in real time at ever decreasing costs, reducing the need for these site specific investments. This raises the possibility of an increase in the amount of outsourcing undertaken by firms and/or a shift in the location of provision of these services within the firm.

Asset-specific investments are those made specifically for the transaction at hand, and which would have a substantially reduced value if the transaction failed and the firm attempted to redeploy these investments elsewhere. In an effort to protect against the possibility of opportunism, firms incur transaction costs, both *ex ante* (to add safeguards up front before the transaction begins) and *ex post* (in an attempt to realign a transaction gone awry) (Williamson, 1985). These transaction costs increase as asset specificity increases, and if asset specificity reaches sufficiently high levels, the transaction costs incurred may overwhelm any potential cost savings that a vendor might be able to generate in the provision of that service due to the existence of economies of scale or scope (Williamson, 1985, 1991). Thus, under circumstances of high asset specificity and correspondingly high transaction costs, a firm would choose to avoid the threat of opportunism and "make" the service internally instead of "buying" from the vendor (Murray and Kotabe, 1999).

Consistent with prior TCE research, we expect the degree of outsourcing to be reduced for HR services characterized by the need for high levels of relationship-specific investments (i.e., high levels of asset specificity). Although this hypothesis is not new relative to existent literature, it is included here as a baseline hypothesis and a basis for parallel comparisons in the next hypothesis concerning the effect of IT on outsourcing.

H1a. *The costs of external organization will increase with asset specificity and it will be negatively related to the degree of outsourcing.*

2.2. IT as a shift parameter in outsourcing

Panel A of Fig. 1 (below, adapted from Picot et al. (1996), pp. 68–71 and Williamson (1991), p. 284) shows the classic relationship between governance costs and asset specificity, shown for both the outsourced and the in-house case. The solid, curved lines in panels A, B, and C represent the base case where IT is not used. IT is assumed here to act as a shift parameter and is noted as a change in the dotted vertical lines from one equilibrium to another in panels B and C. Although IT shifts these curves downward, only a differential shift will result in a net change in governance form (Afuah, 2003; Picot et al., 1996; Varian, 2002). Graphically, the simplest case of these shifts is used in which IT shifts these curves uniformly for all levels of asset specificity. If the influence of IT is symmetric, both curves will be shifted equally (not shown) and there will be no net change in the amount of outsourcing undertaken (same equilibrium as panel A).

If IT has asymmetric effects, one curve will shift downward more than the other, favoring one governance form over the other. In panel B of Fig. 1, outsourcing service vendors reap the biggest cost savings through the use of IT, causing the outsourcing curve to shift downward further than the in-house curve. The net result is an increase in outsourcing. In panel C, however, the intra-firm cost savings are greater than the inter-firm cost savings experienced by outsourcing vendors, leading to lower levels of outsourcing.

High levels of asset specificity and the resultant high levels of transaction costs will deter outsourcing, all else being equal (Williamson, 1985, 1991). Thus, if the use of IT in service provision promotes outsourcing, it must do so by reducing transaction costs and/or reducing the amount of asset specific investments required for a given service. This is approached from the point of view that the transaction costs in a particular governance regime that are
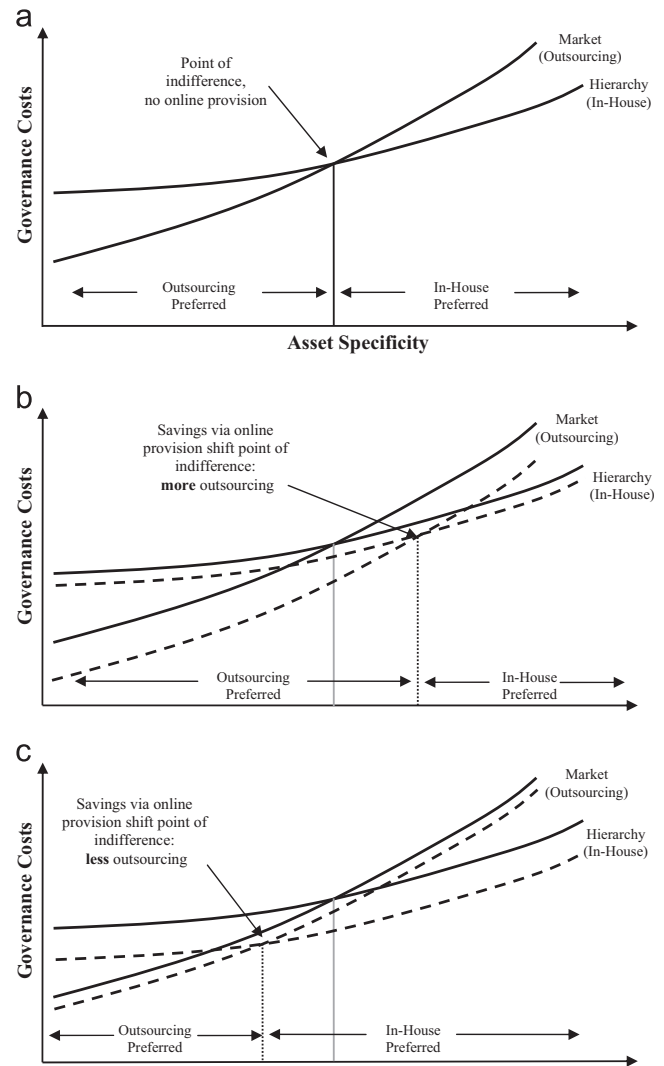

Fig. 1. Market hierarchy equilibrium changes with online provision of services.

associated with a given level of asset specificity are reduced through the use of IT. However, IT may lower the costs of in-house provision more than for outsourcing, or vice versa. Thus, it is discussed how IT could change the transaction costs of in-house versus outsourced services. Picot et al. (1996) point out that IT investments could (a) reduce transaction costs uniformly as fixed costs, (b) reduce transaction costs as variable costs, for example, reductions would be higher for higher levels of asset specificity, or (c) reduce asset specificity directly. In the end, what is of interest and will be measured here is the net influence of these potential reductions (i.e., their influence, or lack thereof, on governance choice).

Since the curves are all upward sloping in Fig. 1, the effect of IT shifting the curve downward is indistinguishable from IT reducing governance costs via a reduction in asset specificity (Type C of Picot et al. (1996)), so both are allowed in the discussion. Transaction costs can be divided into two different categories: ex ante and ex post. Ex ante transaction costs include the costs of drafting, negotiating, and safeguarding agreements (Wallis and North, 1986; Williamson, 1985). Ex post transaction costs include costs associated with maladaptation, haggling, bonding, and the costs of setting up and running dispute resolution mechanisms (Wallis and North, 1986). In the context of this study, maladaptation costs would occur when the services offered by a vendor are poorly provided. In order to re-align the provision of services with

the expectations of the outsourcing firm, the outsourcer and the vendor may incur haggling costs (Wallis and North, 1986; Williamson, 1985). Since these exercises are information-intensive, it is believed that IT may reduce these transaction costs, in turn favoring outsourcing.

So, for a given level of asset specificity, how would IT reduce the transaction costs associated with particular types of asset specificity in HR services? Clearly, the ability to provide services online could dramatically reduce the necessity of co-location of provider and end user. An expert on location who knows details of the organization but also knows and can interact with users could be replaced with online, company-specific guides that duplicate the steps that an on-site provider would go through. Certainly renegotiation and adjusting of contracts by individuals and the costs associated with these adjustments could be reduced. The ability of the outsourcing vendor to provide these services online to a variety of different firms can also allow them to use some common protocols across firms but also have specialized information and databases in them for individual firms.

IT may also ameliorate the governance costs of human asset specificity by making online training available, and also creating interfaces that allow end users to quickly and conveniently set up and maintain service provision. Raising the stakes, prior research has shown that the proper integration of IT can have a significant impact on the implementation of firm initiatives (Frohlich and Dixon, 1999). Internalizing firms may simply invest in trained individuals and this leads to human-specific investments. For service providers, the repetitive use of a given training model across many customer firms may make an investment in online training easier to justify than for a firm that internalizes this training. The one-off nature of this transaction for the internalizing firm might result in either lower quality or higher cost than what could be obtained from an IT oriented outsourcing provider. If a company can provide a service using IT, the marginal cost of adding an additional customer is quite low, not requiring the additional construction of physical or other assets. In addition, the pooling of these demands by outsourcing providers may mean that their cost of providing dedicated asset specificity online may be lower than for the internalizing firm. Temporal specificity requires vendors to make special investments in timing or coordinating the delivery of its service for use by the outsourcing firm. Use of media such as e-mail and on-demand tutorials can help to decouple this specificity and lower the associated governance costs. As well, it is possible that the vendor's user interface could be easier to use and coordinate (due to their superior expertise) and that this too could be a differential advantage for outsourced as opposed in-house provision.

Given the above, it is expected that the ability to provide services with IT may facilitate outsourcing for two reasons. First, a firm's ability to obtain services using IT will mean an increased selection of service vendors from which to obtain services. Second, IT in the provision of services may reduce governance costs associated with one or more types of asset specificity.

H1b. *The use of IT in the provision of a service reduces the cost of external governance of the service more than its internal governance and will be positively related to its degree of outsourcing.*

2.3. Centralization, agency costs, and standardization

In the second set of hypotheses, arguments are developed for how standardization affects centralization and then how the use of IT in service provision could act as a shift parameter in its impact on centralization.

Just as asset specificity can drive the decision to outsource, the ability to standardize a service can allow the centralization of

service provision. As the need to customize a service for each individual location or employee rises, the increasing need to decentralize service provision to better meet the demands of customization is expected (Karakayali et al., 2007; Laroche et al., 2001; Mudambi and Venzin, 2010). Put another way, the firm may not be able to achieve the same quality of service if offered in a centralized manner when the service cannot be standardized. Personnel in a centralized location may not understand the localized or divergent needs of different locations and so would not be as successful in providing the service. Conversely, when the service is highly standardized, centralized provision is possible and expected to be more likely.

H2a. *The cost and quality benefits of standardization can be realized internally and the presence of standardization of services will be positively related to the degree of centralization.*

2.4. IT as a shift parameter in centralization

Gurbaxani and Whang (1991) argues that the location of decision rights in an organization is an equilibrium determined by agency costs and information costs (see Fig. 2 below). Agency or monitoring costs increase as decision rights are decentralized and pushed down in the organizational pyramid, but information costs decrease because of the closer relationship between provider and end user, making the net effect of technology on centralization unclear (Bloomfield and Coombs, 1992). Monitoring costs increase because the goal divergence between principal and agents increases as agents are delegated more authority over decision making. It is generally assumed that these agents have better access to local information which is subject to continuous change and that this delegation has the benefit that the agents may be acting and making decisions on the basis of this better information. However, if the firm wants to reduce the goal incongruence, then these agents have to transmit this information back to the centralized location to make decisions, and the cost increases with the amount of information transmitted.

Since IT can reduce the cost of transferring information back to the central organization, it can make centralization more efficient (Metters, 2008). If this effect dominates the agency cost savings of IT, which will be explained below, then the final equilibrium for x_2 in Fig. 2 would be to the left of x.

H2bi. *Use of IT in the provision of a service will reduce the costs of accessing information by the central unit and be positively related to its degree of centralization (negatively related to decentralization).*

However, IT can also allow management to reduce agency and monitoring costs by allowing such things as online performance evaluation and monitoring checks, decreasing the cost of managing distributed information, which would, in turn, reduce the costs of decentralization (i.e., be negatively related to the degree of
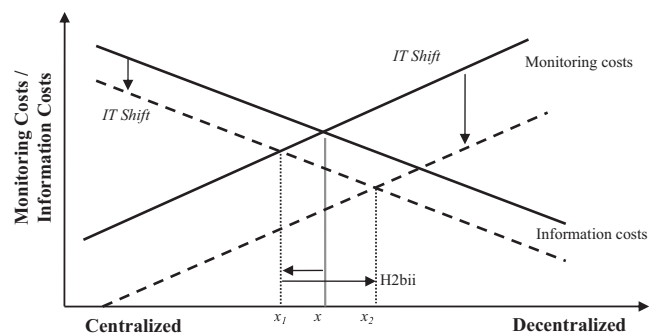
Fig. 2. Centralization and decentralization equilibrium changes with online provision of services (only H2bii is illustrated).

centralization) (Becker, 2001). If the latter effect dominates, this can be seen as a shift down in both curves in Fig. 2, but with a greater shift down in the monitoring cost curve. This corresponds to a net shift to the right in the equilibrium from x to x_2 and towards decentralization (as described in Fig. 2).

H2bii. *Use of IT in service provision will reduce the cost of monitoring distributed services and be negatively related to its degree of centralization (positively related to decentralization).*

Since both H2bi and H2bii have theoretical arguments in their favor, it is an empirical question whether the net effect of the use of IT in service provision will be positive or negative with respect to centralization.

2.5. Production costs: economies of scale and scope in outsourcing and centralization

Scale and scope are drivers of production costs, which directly affect choices in both outsourcing and centralization. From the firm's perspective, the existence of such economies within the firm itself would potentially increase centralization in the provision of those services but reduce outsourcing since outsourcing would require the firm to forgo those benefits. An offsetting explanation could be that service vendors could also capture some of these benefits as well (Metters, 2008). Thus, it is an empirical question whether scale and scope economies are related to outsourcing but both economies are expected to be positively related to centralization. When assets can be shared across multiple services, economies of scope may result in substantial cost savings for a firm. As well, the potential to achieve scale economies may encourage a firm to organize so as to take better advantage of the cost savings. One of the important ways that a firm can organize its transactions is by modulating the level of centralization for each service. The ability to centralize a service will allow a firm to use the same personnel and equipment (e.g., computer and software) to provide more services and take advantage of economies of scope, and to provide services to more employees using fewer resources, taking advantage of economies of scale (Arıkan and Schilling, 2011). In the case of both scope and scale economies, it is expected that centralization will be favored, leading to the following set of hypotheses:

H3a. *Economies of scope of a service with other services within the firm will reduce the cost of providing multiple services together and be positively related to the degree of centralization.*

H3b. *Economies of scale of a service within the firm will reduce the cost of providing more volume in the provision of the service and will be positively related to the degree of centralization.*

According to TCE, the existence of scope and scale economies will tend to favor market forms of governance where supplying firms can adjust their scale and scope upward to take maximal advantage of available economies (Williamson, 1985). The primary output of HR service vendors is HR services and so they have much stronger incentives and ability to adjust their scale in order to maximize the available scale economies (Metters, 2008). On the other hand, if firms need to have a certain number of employees to deal with some non-outsource-able services and prepare for load contingencies, they may need to retain other services to level the load on the HR staff or to take advantage of scale economies inside the firm (Masten, 1993). So it is an empirical question whether the presence of economies of scale and scope within the firm will increase or reduce outsourcing.

2.6. Outsourcing and centralization

Centralization also needs to be considered in trying to understand outsourcing because a firm may be able to capture some or all costs savings that might be achieved via outsourcing by instead modulating the level of centralization. On the other hand, if a firm is able to centralize a service and provide it remotely from a central location within the firm, then it should follow that this same service would be a better candidate for outsourcing than a service which cannot be centralized and is still provided in multiple locations throughout the company. A centralized service already provides more scale and bargaining power vis-à-vis a potential outsource provider. In addition, the variety of different contexts within the company may already have been streamlined or standardized in order to provide the service centrally. It may be easier for an outsource provider to bid on this common service than to try to replicate the differentiated needs of the service if it is still offered in a decentralized fashion. The same logic would suggest that the outsource provider may find it costly to try to differentiate its offering to match the demands of a particular customer. In this respect, a high degree of centralization may tend to coincide with higher levels of outsourcing of the service, all else being equal:

H4. *The cost reductions available for a service with a high degree of centralization will also be available for the same service through outsourcing, so the degree of centralization is positively associated with degree of outsourcing.*

3. Methods

3.1. Data and sample

The data was collected via electronic survey, which was sent to a random sample of 5000 members of the WorldatWork membership (there are more than 20,000 members). Based in Scottsdale, Arizona, WorldatWork is a global association of professionals in benefits and compensation services. The typical WorldatWork member is a manager at a large US company; the association's membership includes most of the Fortune 1000 companies. That potential respondents were from large companies is to be expected, as it is unlikely that small companies would have individuals devoted to such a small subset of HR services.

After pre-testing the survey with survey researchers as well as experts in the field, the survey was sent via e-mail to potential respondents. In voluntarily joining WorldatWork, respondents agreed to be sent occasional surveys as part of their membership. The e-mail notified them of the general content of the survey and provided an internet link that took them to the online survey. As per WorldatWork's policy, only a single notification was sent in order to limit fatigue due to excessive e-mailing. A total of 456 responses were received, giving a 9.1% response rate, quite respectable given the lack of multiple contacts and incentives (Dillman, 2000). The response rate was similar to other surveys undertaken by WorldatWork, which typically range from 8% to 11%.

The first question the respondents were asked to answer when they entered the survey was "[I]s your organization currently either wholly or partially outsourcing some benefits and compensation functions?" and if the answer was no, they were asked to discontinue the survey. Among 456 respondents (i.e., 456 firms) who opened our survey, 213 selected no in the first question and quit the survey while the remaining 243 respondents answered yes and continued. Thus, only firms that were outsourcing at least one benefits and compensation function at the time of the survey were included in the sample of this study.

Table 1
List of respondents who chose each service, as well as mean and standard deviation of outsourcing and centralization variables for each service.

	Number of respondents	Outsourcing		Centralization	
		Mean	Std. dev[n]	Mean	Std. dev[n]
Job analysis	27	1.19	0.62	4.19	1.33
Administration of job evaluations	17	1.41	0.71	4.47	1.01
Compensation surveys	99	2.43	2.02	4.43	1.21
Administration of pay scales and salary structure	54	1.39	1.09	4.37	1.25
Administration of incentive plans	21	1.24	0.77	4.71	0.56
Administration of stock bonus/stock option plans	22	4.36	1.71	4.91	0.30
Administration of sales force incentives	3	1.00	0.00	5.00	0.00
Total	243	2.05	1.77	4.47	1.13

Note: the outsourcing variable ranged from a value of 1 indicating no outsourcing of the service to a value of 6 indicating that the service was 100% outsourced. The centralization variable had five levels, which ranged from a value of 1 indicating decisions were made at individual facilities and plants to a value of 5 where decisions were made at the firm's headquarters.

Each respondent was asked to choose one service, with which they were most familiar, from a list of benefits and compensation services and answer all remaining questions in reference to that service (see Table 1 for the list of services). Therefore, it is possible that the function selected to answer the remaining questions was not the same as the function the firm was outsourcing. Indeed, 69.1% of the functions selected by the respondents were not outsourced at all although all their firms were outsourcing some functions. Thus, the dependent variable (i.e., the degree of outsourcing) ranges from 0 to 5 where 0 means not outsourced at all and 5 means entirely outsourced. Also, the mean value of the degree of outsourcing was just 1.19 as shown in Table 1. One thing to note here is that since there were many observations with zero value for the degree of outsourcing in the sample, the dependent variable was not truncated at zero.

While it is acknowledged that the survey approach has resulted in some selection bias, it is pointed out that the sample is not truncated, and some of the limits of this selection bias are explained. The sample of this study is selected because it only contains the correspondents who had been outsourcing at least one service at the time of the survey. Therefore the results from the sample may not be generalizable to firms who do not outsource a service. Since the 213 firms answered the first question only, unfortunately there is no information on them and thus one cannot use a Heckman correction model to avoid sample selection bias. As explained above, however, the data at least does not have the truncation issue which is common in selected samples.

Despite the potential selection bias introduced by deleting the 213 firms, the decision was made to focus only on the 243 firms who were currently outsourcing at least one service. Above all, the authors conjectured that respondents from those firms who were not outsourcing any service could not give reliable answers to the questionnaires about asset specificity. Although asset specificity—which is the most important determinant in make-or-buy decisions—is not the main concept, it should be controlled thoroughly to justify the effects of other variables such as centralization and IT. Regarding asset specificity, the survey asked how much investment would a vendor have to make to outsource a service, in terms of site specificity, physical asset specificity, human asset specificity, dedicated asset specificity, and temporal specificity (Williamson, 1985). The authors thought that without current hands-on experience of learning about, negotiating with, and hiring vendors, respondents would not be able to answer those questions accurately. Of course, some of the 213 firms might have had some knowledge required to answer those questions if they had decided not to hire vendors after intensive negotiation with them. However, the depth of knowledge obtained by hiring and working with vendors would be likely to be superior to that acquired by mere second-hand experiences.

In summary, a trade-off is seen in the survey design between reliability of responses to certain questions and sample selection bias. In retrospect the authors would like to have descriptive data on firms that dropped out, but the concern at the time, and now, is that their responses to most of the vendor related asset specificity questions would have been suspect or simply non-available.

3.2. Measures

Complete wording of all survey items used in this study can be found in the Appendix. The benefits and compensation services selected for inclusion were chosen with the help of industry experts as those most likely to show variance in the different variables of interest (please see Table 1 for a complete list of services). Table 1 gives a list of the frequency with which each service was chosen by study respondents; it also gives the mean and standard deviation for levels of outsourcing and centralization. Doing so allowed an analysis of a variety of services, exhibiting considerable variance across the characteristics included in the model.

3.2.1. Dependent variables. degree of outsourcing

Departing from most prior governance research—which tends to treat the outsourcing decision as a binary one—the degree of outsourcing was allowed six different levels (please see Appendix for complete wording of all levels). This decision to use a multilevel measure of governance choice was due to the empirical setting. Initial pilot results as well as consultations with industry professionals revealed that few of these services are entirely outsourced. Instead, the outsourcing firm is often responsible for a sizeable portion of the provision of any one service. Allowing for multiple levels of outsourcing allows better control for the degree to which a given service operates as a "market" or "hierarchical" transaction. The measure was developed by building on two previous studies: one that used a three-level response of in-house, joint provision and full outsourcing (Ang and Straub, 1998), and another that asked respondents to give a specific percentage of a service that was outsourced (Murray and Kotabe, 1999).

3.2.2. Degree of centralization

As mentioned earlier, little empirical work has been done on the nature of centralization in service provision (Acemoglu et al., 2007; Froehle, 2006), but at the same time, it is clear that practitioners consider the level of centralization a key decision in service provision (Corporate Leadership Council, 2008a, 2008b). Working with industry experts, a multi-level measure taken to be the level within the organization was developed at which the bulk of decisions were made regarding this service. Services for which decisions were made predominantly at firm headquarters were

considered to be highly centralized, whereas the most decentralized services were the ones where decisions were made at individual locations (please see the Appendix for exact wording of all levels). This measure is derived from a five point measure of plant autonomy in a plant network that examines responsibility for decisions made by (1) "worldwide headquarters" at one extreme and made by (5) "the plant" in the other extreme (Maritan et al., 2004, p. 493).

3.2.3. Independent variables. Asset specificity

Asset specificity was measured as the sum of five survey items modified from previous empirical studies and designed to measure the various dimensions of the construct: site specificity, physical asset specificity, human asset specificity, dedicated asset specificity, and temporal specificity (Ang and Straub, 1998; Erramilli and Rao, 1993; Joshi and Stump, 1999; Williamson, 1985, p. 95; 1991, p. 281–282). Most of these questions focus on the specific investments firms have already made and ask whether vendors will need to make specialized investments to replace or substitute for these investments in order to outsource successfully. It is acknowledged that this ignores possible new specific investments a firm might make to support a vendor but think the focus on vendor investments to accomplish firm specific tasks is the dominant form of specific investment in the service outsourcing context.

A principal component loading of asset specificity was considered instead of the above asset specificity measure calculated by the sum of the five sub-measures. The results were found to be very similar and decided to stick with the summation measure for its simplicity.

3.2.4. Use of IT in service provision

The extent of IT use in the provision of a service was taken from a single item, which measured the importance of electronic or online provision in the delivery of each service as it is provided in the firm's organization.

3.2.5. Economies of scale

Economies of scale were measured as the extent to which unit cost could be reduced by offering the services on a larger scale within the firm (Ang and Straub, 1998).

3.2.6. Economies of scope

Economies of scope were measured as the sum of two items: whether or not cost savings were generated by using the same people and/or software to provide other services within the firm, and whether or not the service in question is improved when administered simultaneously with other services within the firm (Ang and Straub, 1998).

3.2.7. Control variables

In addition to the variables for which hypotheses were generated, frequency, uncertainty and the level of standardization were included as control variables. Both frequency and uncertainty are part of the original transaction cost framework (Williamson, 1985) and were thus included in the models. Access to firm level attributes was limited due to survey respondent firm anonymity and missing data on some questions that were asked, since not all respondents had access to some of the information necessary to answer questions. To reduce the omitted variable bias which the absence of firm-level control variables might cause, IV regression models were used as a robustness check, as will be explained later.

3.3. Data analysis

A recursive (triangular) system with correlated errors was used to test the hypotheses. A system of equations is recursive (rather than simultaneous) if each of the endogenous variables can be determined sequentially. In this paper, standardization (H2a), use of IT in service provision (H2bi and H2bii), and scope and scale economies (H3a and H3b) are predicted to affect centralization; then, centralization is expected to influence outsourcing (H4) together with asset specificity (H1a) and use of IT (H1b). Therefore, the recursive system (below) describes the structure of the hypotheses well:

$$y_1 = \text{Centralization} = a_0 + a_1 * \text{Use of IT} + a_2 * \text{Scope economies}$$
$$+ a_3 * \text{Scale economies} + a_4 * \text{Standardization} + e_1 \quad (1)$$

$$y_2 = \text{Outsourcing} = b_0 + b_1 * \text{Centralization} + b_2 * \text{Use of IT}$$
$$+ b_3 * \text{Scope economies} + b_4 * \text{Scale economies}$$
$$+ b_5 * \text{Asset specificity} + b_6 * \text{Frequency} + b_7 * \text{Uncertainty} + e_2$$
$$(2)$$

In addition, since decisions regarding centralization and outsourcing are made within the same firm, the errors in the centralization equation and the outsourcing equation are likely to be correlated. This correlation between the errors makes the coefficient for centralization biased in ordinary least squares (OLS) estimation; centralization is correlated with e_2 because e_1 influences centralization and e_1 is correlated to e_2. Therefore, the two equations using structural equation models (SEM) with correlated errors was estimated rather than separate OLS models.[3] Fig. 3 depicts the hypothesized path diagram.

One of the other ways which can control for the potential endogeneity in the model is to use instrumental variable (IV) regressions. While the structural equation model with correlated errors may have an advantage over IV regression in efficiency, the latter helps to elucidate the causal relationship between the two main constructs in this study (i.e., centralization and outsourcing) rather than just association (Angrist et al., 1996; Imbens and Angrist, 1994). In addition, the usage of instrumental variables controls for the omitted variable bias which might exist in the models. Since the dependent and independent variables in the model are perceptual and derived from the same respondent, the estimates using the data is susceptible to common method bias (Chang et al., 2010; Kuncel and Tellegen, 2009; Podsakoff et al., 2012; Podsakoff and Organ, 1986). Some recent studies claimed that common method bias can be viewed as a kind of omitted variable bias and can be resolved by instrumental variable (IV) regression (Antonakis et al., 2010; Podsakoff et al., 2012). Therefore, the IV regression model used also helps to mitigate the concern about common method bias in the data. In sum, as a robustness check, an IV regression model was used to do the following: (1) to clarify the causal linkage between centralization and outsourcing, (2) reduce concerns about omitted controls, and (3) avoid potential common method bias in the data.[4]

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[3] Seemingly unrelated regression (SUR) is widely used for better efficiency obtained from considering correlations among errors in different equations. However, SUR cannot be used to estimate the equations because SUR cannot have endogenous regressors (Prucha, 1987).

[4] Because IV regression models resolve the concern for common method bias only in the second stage model, the hypotheses predicting the degree of centralization are still susceptible to common method bias. Thus, the authors also conducted Lindell and Whitney (2001)'s ad hoc estimation of common method variance to test common method bias for those hypotheses. The positive and smallest correlation between centralization and other independent variables, which is that between centralization and scale economies (i.e., 0.060 in Table 2), was used to calculate common method variance. The positive and significant correlation between centralization and standardization remained significant even after controlling for
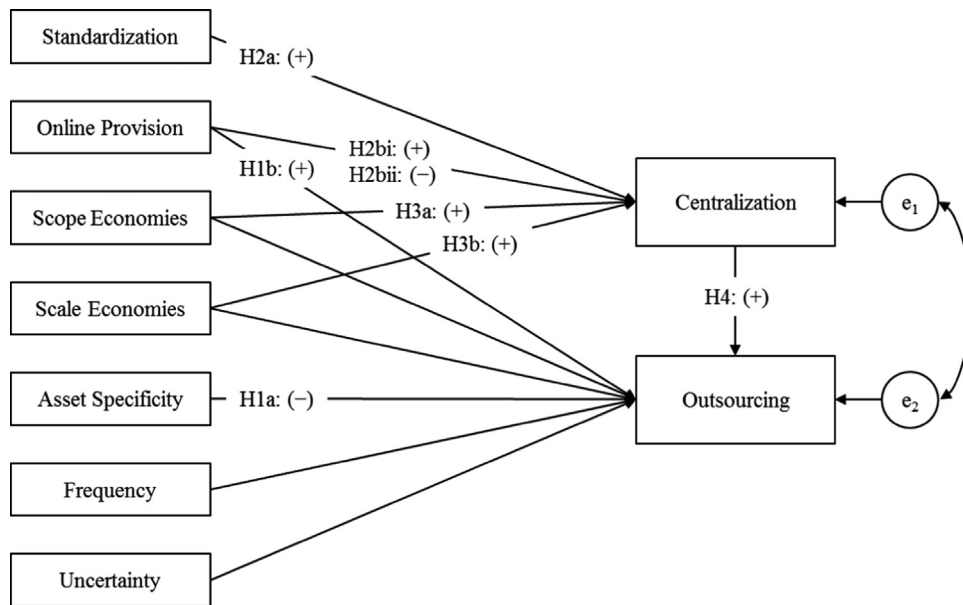
Fig. 3. The path diagram of SEM model.

The instrumental variable used is standardization for different users. A valid instrument in the setting is required to influence outsourcing only through centralization. The relationship between standardization and centralization is already hypothesized in H2a. However, some may argue that standardization directly affects outsourcing (i.e., not through centralization). A service can be standardized for different users in different firms or only within a certain firm. When a service is standardized across firms, say, in an industry, the service can be easily transferable to outsourcing vendors. However, this inter-firm standardization is conceptually identical to the absence of asset specificity. Therefore, when asset specificity and standardization are included in the model simultaneously, standardization represents a service being able to serve different users within the firm without a major change. If intra-firm standardization facilitates outsourcing when inter-firm standardization is controlled, the underlying logic of the facilitating mechanism is that a service which can be centrally managed is a better candidate for outsourcing (i.e., through centralization). Also, the correlation between standardization and asset specificity in our sample is positive and insignificant ($\rho=0.048$, $p=0.454$) which supports that respondents generally evaluated standardization from the intra-firm perspective. If the respondents evaluated standardization from the inter-firm perspective, the correlation between standardization and asset specificity would be negative and likely to be significant.

Lastly, as an additional robustness check, a propensity score matching method to re-confirm the causality from centralization to outsourcing was used. In this method, the services for which headquarters predominantly makes decisions (i.e., centralization=5) are used as the treatment group and all other services (centralization=1, 2, 3, or 4) are used as the control group.[5] In the

first-stage, probit regression is used to estimate the propensity to be treated for each observation. Then, each observation from the treated group is matched to one or multiple observations from the control group based on their propensity scores and the difference in outsourcing is computed for each matched pair. Finally, the average of those differences (i.e., average treatment effect on the treated [ATT]) is computed. Propensity score matching corrects for a non-random assignment of treatment by matching treated units to their most similar control units in the basis of their propensity to be treated. Therefore, the average treatment effect on the treated is regarded as the causational effect of the treatment (for more information, see Cameron and Trivedi, 2005; Cook et al., 2008; Rubin, 2008; Rubin and Thomas, 1996).

4. Results

4.1. Main results

Table 2 shows the correlation matrix and descriptive statistics for the variables used in the models. Table 3 shows the results from the structural equation model (SEM) with correlated errors.

4.1.1. Outsourcing and asset specificity

The traditional relationship of asset specificity deterring outsourcing, H1a, was supported ($\beta=-0.086$, $p=0.010$) as shown in model 2 of Table 3.

4.1.2. IT as shift parameter for outsourcing

Again referring to model 2 of Table 3, it was found that use of IT in service provision had a positive and significant effect on the level of service outsourcing ($\beta=0.212$, $p=0.043$). Thus, Hypothesis 1b was supported.

(*footnote continued*)
the estimated common method bias (see Lindell and Whitney (2001) for the detailed information on the test process). Therefore, it was concluded that the hypotheses regarding centralization were not severely affected by common method bias either.

[5] The observations with value of 5 in centralization account for about 75% of the entire sample. Therefore, including more observations with lower values, say, 3 and 4, in the treatment group could worsen matching performance though the computation of the average treatment effect on the treated (ATT) was restricted to the region of common support. For this reason, only the observations with value of

(*footnote continued*)
5 in centralization were categorized as the treated group. In addition, as will be explained later, this categorization (5 versus 1, 2, 3, or 4) provides an insight into how firms make decisions regarding outsourcing.

Table 2
Correlation matrix and descriptive statistics for dependent and independent variables.

	Variables	Mean	Std. Dev.	1	2	3	4	5	6	7	8
1	Outsourcing	2.05	1.77								
2	Centralization	4.47	1.13	0.131*							
3	Use of IT	3.49	1.14	0.110†	−0.040						
4	Scope economies	6.68	2.14	−0.180**	0.095	0.020					
5	Scale economies	3.29	0.86	−0.118†	0.060	−0.051	−0.026				
6	Asset specificity	13.78	3.54	−0.227**	−0.065	0.014	0.333**	−0.002			
7	Frequency	2.85	1.22	−0.113†	−0.150*	−0.055	−0.011	−0.080	0.257**		
8	Uncertainty	2.98	1.30	−0.036	−0.040	−0.180**	0.034	−0.009	0.199**	0.413**	
9	Standardization	3.52	1.13	0.141*	0.187**	0.183**	−0.063	−0.061	0.048	−0.087	−0.065

Note: Pearson correlation coefficient, $N=243$.

† $p < 0.10$.
* $p < 0.05$.
** $p < 0.01$.

Table 3
Results of (1) structural equation model (SEM) with correlated errors and (2) instrumental variable (IV) regressions.

	SEM		IV regression	
Dependent variable	Model 1 Centralization (Eq. 1)	Model 2 Outsourcing (Eq. 2)	Model 3 Centralization (1st stage)	Model 4 Outsourcing (2nd stage)
Centralization		0.845† (0.498)		0.852† (0.504)
Use of IT	−0.077 (0.063)	0.212* (0.105)	−0.078 (0.064)	0.214* (0.105)
Scope economies	0.059† (0.033)	−0.151* (0.062)	0.074* (0.035)	−0.162* (0.066)
Scale economies	0.093 (0.081)	−0.313* (0.140)	0.082 (0.082)	−0.306* (0.138)
Standardization	0.211** (0.063)		0.208** (0.064)	
Asset Specificity		−0.086* (0.034)	−0.031 (0.022)	−0.066† (0.038)
Frequency		−0.108 (0.099)	−0.106 (0.066)	−0.038 (0.125)
Uncertainty		0.085 (0.092)	0.019 (0.061)	0.072 (0.100)
Constant	3.299** (0.471)	0.813 (2.157)	3.910** (0.552)	0.383 (2.469)
Observation	243		243	243
Log likelihood	−3811.7485			
F-statistic (p-value)			3.010** (0.005)	3.590** (0.001)

Note: standard errors are in parentheses except *F*-statistic.

† $p < 0.10$.
* $p < 0.05$.
** $p < 0.01$; two-tailed tests.

4.1.3. Centralization and standardization

Hypothesis 2a, that standardization is positively related to centralization, received strong support ($\beta=0.211$, $p=0.001$) as shown in model 1 of Table 3. Services that are more standardized are more likely to be centralized.

4.1.4. IT as a shift parameter in centralization

Use of IT in service provision had a negative effect on the level of centralization however the relationship was not significant ($\beta=-0.077$, $p=0.220$) (model 1 of Table 3). Still, the sign of the net effect is of interest (as illustrated in equilibrium at x_2 in Fig. 2). If there is any net effect, use of IT seems to facilitate decentralization, rather than centralization, through reducing the costs of

monitoring remote facilities (Fig. 2), which is consistent with H2bii. While centralization could have been facilitated by the reduced cost to send information from decentralized units back to headquarters, the reduced monitoring costs appear to be greater. The added benefit of decentralization that these reduced monitoring costs allow is that support personnel can be located closer to the specialized knowledge in subunits (Jensen and Meckling, 1995).

4.1.5. Production costs: economies of scope and scale

There are a pair of hypotheses devoted to the relationships between the economies of scope and scale measures and centralization. Model 1 in Table 3 moderately supports Hypothesis 3a since the coefficient for scope economies is positive and significant at 10% level ($\beta=0.059$, $p=0.074$), indicating that scope economies facilitate centralization. However, the coefficient for scale economies is positive as predicted but not significant ($\beta=0.093$, $p=0.253$). Speculation is made on some reasons for this in the Section 5.

4.1.6. Centralization's effect on outsourcing

In model 2 of Table 3, there is a positive and moderately significant relationship between centralization and outsourcing decisions ($\beta=0.845$, $p=0.090$) and thus H4 is moderately supported. Centralization is significant at the 10% level in our SEM model so the authors chose to include the variable to give a better estimate of other parameters. To compare, an ordinary least squares (OLS) model of outsourcing without centralization was estimated. Since the SEM is based on maximum likelihood estimation and the OLS model is based on linear least squares estimation, a simple *F*-test comparison of the model R^2 cannot be done but the significant coefficient on centralization is a strong indication that it is a better model. In addition, use of IT in service provision, a major variable of interest, is not significant anymore in the OLS model while it was significant at 5% level both in SEM and IV regression models. Therefore, this result says that ignoring centralization in investigating the relationship between use of IT in service provision and outsourcing may conceal the true relationship between the two. In other words, the outsourcing decision is different for firms with centralized services than for those with decentralized services. Furthermore, this result shows why it is important to consider centralization and outsourcing together to look at the effect of online provision on outsourcing.

With this result of centralization in our SEM model, however, a causal effect of centralization on outsourcing cannot be strongly argued. Meanwhile, the coefficients for instrumented variables in IV regression models can be more confidently interpreted as implying causality because IV methods obviate extensive controls in a

regression much as a randomized trial does (Angrist and Pischke, 2008). Model 4 in Table 3 (i.e., second-stage IV regression model) shows that the coefficient and p-value for centralization in the outsourcing equation was almost identical to those in the SEM model ($\beta=0.852$, $p=0.091$).[6] Furthermore, propensity score matching, used to check the robustness of the causation from centralization to outsourcing, shows a positive and significant average treatment effect on the treated in Table 4 when the treatment is that most decisions regarding a focal service is predominantly made by head-quarters (ATT$=0.522$, t-statistic$=2.138$).[7] This test means that the outsourcing decision is very different for the fully centralized services compared to the other services that are moderately centralized or decentralized. In sum, the results from IV regression and propensity score matching indicate that centralization causes outsourcing and help to understand the process of that causation.

As another robustness check, a model was estimated with fixed effects for each of the seven services as listed in Table 1. The results found were similar in sign and significance with two exceptions: (1) H1b (i.e., positive association between IT and outsourcing) and (2) H4 (i.e., positive association between cen-tralization and outsourcing) are not significant anymore. The authors are interested in how variations in the independent variables affect centralization and outsourcing across services, not only within services. The relationship between asset specificity and governance choice represent a conceptual linkage that should be robust to cross service comparisons and would also expect the shift terms such as use of IT, scale and scope in those relationships to capture important cross service variability. Working with experts ensured that the collection of benefits and compensation are similar enough to be able to compare decisions across these services. Therefore, the fixed effect models significantly under-represent the model and relationships of interest.

4.2. Further analyses

There is an interesting point which deserves further discussion. In theory development (in 2.5), the effects of scope and scale economies within the firm on outsourcing were left as an empirical question. In model 2 in Table 3, both economies deter outsourcing significantly ($\beta=-0.151$, $p=0.015$ for scope; $\beta=-0.313$, $p=0.025$ for scale). That is, firms generally prefer taking advantage of scope and scale economies internally rather than externally through out-sourcing vendors. To see how these deterring effects change depending on the degree of centralization, sub-sample regression models with outsourcing as a dependent variable were run for 183 firms for which headquarters predominantly makes decis-ions regarding focal services (i.e., centralization$=5$; or highly centralized) and for the other 60 firms (i.e., centralization$=1$, 2, 3, or 4; decentralized or moderately centralized). As represented in Table 5, scale economies showed negative but insignificant coeffi-cients in both sub-sample regressions ($\beta=-0.222$, $p=0.164$ for the 183 firms; $\beta=-0.301$, $p=0.121$ for the other 60 firms). However, the effect of scope economies on outsourcing was negative and sig-nificant only for the 183 highly centralized firms ($\beta=-0.183$, $p=0.016$) in model 1 while it was rather positive though insignif-icant for the other 60 decentralized or moderately centralized firms

($\beta=0.065$, $p=0.305$) in model 2. This result reveals that firms that are highly centralized are less likely to pursue outsourcing because they would have to forgo some economies of scope if they chose to outsource. Other firms that are decentralized or moderately cen-tralized simply do not have scope effects on their outsourcing choice perhaps because if they existed they would have chosen a higher degree of centralization.

Combining the results from propensity score matching and sub-sample regressions provides a clear and detailed picture of firms' decisions to outsource. Propensity score matching shows that highly centralized firms outsource significantly more than other firms. According to the sub-sample regressions, scope economies within the firm deter outsourcing only for highly centralized services, but not for others. Therefore, a typical picture of firms' decision to outsource can be described; firms outsource only highly centralized services when the services do not have internal scope economies (after controlling for high asset specifi-city and uncertainty).

5. Discussion and implications

Recently, there has been an increased emphasis on core compe-tencies and on outsourcing those services that do not contribute to a firm's sustainable competitive advantage (Prahalad and Hamel, 1990; Quinn and Hilmer, 1994). The outsourcing of HR services indicates that the outsourced services are not part of a core competence for all firms. As such, it is possible that service vendors who specialize in these activities could do better than many firms due to available economies of scale and scope (Williamson, 1985), as long as the additional transaction costs do not exceed these advantages (Williamson, 1985). The increasing ability to provide services using IT and at low cost may contribute further to this trend (Afuah, 2003; Gurbaxani and Whang, 1991; Varian, 2002).

With this paper, several important contributions have been made. First, the authors explicitly model and empirically capture the influence of the use of IT on governance choice for supple-mentary services. The results indicate that the ability to provide services using IT promotes the outsourcing of benefits and compensation services. The notion that IT can influence the governance choice of outsourcing is, while often assumed to be the case, not often modeled explicitly from a transaction costs perspective. The theoretical interactions and determinants are relatively unexplored and worthy of further research. The second contribution is to highlight that the use of IT in service provision could also directly affect the way that services are provided within a firm; it is an empirical question whether it could lead to either centralize or decentralize services (Fig. 2). But while IT appears to facilitate the decentralization of services rather than centraliza-tion, this effect is not significant (Table 3). The third contribution is to show that other drivers such as economies of scope and standardization influence a move to centralization, and in turn shape the outsourcing choice through the greater likelihood that is found for centralized services to be outsourced. Finally, the out-sourcing decision looks quite different for services with the high-est level of centralization compared to services with all other levels of centralization.

Varian (2002) considers that IT could either increase outsour-cing or reduce outsourcing if it enables activities that could be done internally more effectively. In this study, the direct effect of IT is to increase outsourcing. Perhaps many large firms have oppor-tunities to centralize to achieve economies of scope and by doing so reduce the additional benefit of outsourcing. This relationship between centralization and outsourcing is explored. Services that tend to be centralized are also services that tend to have a high

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[6] The results from the under-identification test (Anderson canonical correla-tion$=10.536$, $p=0.0012$) and weak instrument test (Cragg-Donald Wald F statistic$=10.651 > 10$, conditional likelihood ratio (CLR) test (Moreira, 2003), $p=0.0724$) supported the validity of the instrument. Andrews et al. (2006) showed that the CLR test outperforms the conventional Anderson–Rubin (AR) test. The CLR result was implemented in "condivreg" command in STATA.
[7] The reported ATT was estimated with the kernel matching method and the standard errors were calculated using bootstrapping. Other matching methods were used such as nearest neighbor, radius, stratification, and Mahalanobis metric matching methods. However, the result did not change significantly.

Table 4
Results of propensity score matching.

	Treated	Control	Difference	S.E	*t*-Statistic
ATT	2.197	1.675	0.522	0.244	2.138*

Note: The treated group consists of services for which headquarters predominantly makes decisions (i.e., centralization=5) while the control group consists of all the other services (i.e., centralization=1, 2, 3, or 4).
†$p < 0.10$; *$p < 0.05$; ** $p < 0.01$; two-tailed tests.

Table 5
Results of sub-sample regression models.

	Outsourcing	
Sub-sample Dependent variable	Model 1 Centralization=5	Model 2 Centralization < 5
Use of IT	0.209†	0.090
	(0.119)	(0.139)
Scope economies	−0.183*	0.065
	(0.075)	(0.063)
Scale economies	−0.222	−0.301
	(0.159)	(0.191)
Asset specificity	−0.087†	−0.039
	(0.048)	(0.049)
Frequency	−0.148	−0.118
	(0.127)	(0.129)
Uncertainty	0.178†	−0.254†
	(0.106)	(0.132)
Constant	4.537**	3.561**
	(1.087)	(1.184)
Observation	183	60
R^2	0.128	0.187

Note: standard errors are in parentheses.

† $p < 0.10$.
* $p < 0.05$.
** $p < 0.01$; two-tailed tests.

degree of outsourcing. Thus, the ability to provide a service from a central location also coincides with the tendency to outsource it.

The finding that economies of scope are negatively related to outsourcing may be counterintuitive to some. This could be due to the nature of HR services; because almost all firms have some amount of in-house HR staff doing other functions (which probably would not be successfully outsourced), the existence of scope economies may drive the internalization of some services that would otherwise be outsourced as a sort of "load leveling" activity (Masten,1993; Masten et al., 1991). In this survey, firms were asked whether there were ongoing economies of scale and scope in a service, and they naturally may have been responding simply from the perspective of potential economies of scale and scope within their company. In this way, the presence of scale and scope economies (in the firm) would reduce outsourcing. The effect of scale was considered to be an empirical question since it would be less related to the load leveling argument, but the effect of scope economies is also somewhat different in that its statistically significant effect on centralization can be tracked and one can then argue that the increased centralization could also be achieving economies of scope in addition to the direct reduction of outsourcing by economies of scope. This same link between scale economies and centralization is not present so it cannot be suggested that scale works through centralization to affect outsourcing. Perhaps if the firms were asked if they think their potential outsource providers would have economies of scale in providing the service, as well as the focal firms, there could have

been better control for this different perspective on the cost structure of the service.

From a managerial perspective, the observed positive relationship between centralization and outsourcing may have significant consequences. There are a number of reasons why this could be occurring and speculation is made on processes that would be consistent with this finding. For example, a firm may find that centralization of a service first, and then outsourcing later, may be a more efficient way of outsourcing than outsourcing directly from a decentralized configuration. This implies a multistep model, which the snapshot in time survey method is unable to confirm. Other explanations of why firms would rather centralize first and then outsource include: (1) to avoid double agency costs (one with decentralized unit and the other with outsourcing vendors) and (2) to increase bargaining power against outsourcing vendors. Indeed, the propensity score test and sub-sample regression throws further light on this possibility (Tables 4 and 5). Since the outsourcing decision is quite different for services that are at the highest level of centralization, they are constrained from outsourcing by economies of scope and asset specificity while the services at moderate and low centralization are not (Table 5). In other words, the firms have probably centralized services with economies of scope to the highest degree possible to achieve economies of scope but the asset specificity of these services or load leveling issues advantages within the firm prevents them from outsourcing.

The findings are important in that few if any studies of service outsourcing consider the issue of centralization or, more generally, what is happening within the firm in the configuration of a service when assessing the outsourcing decision. Both Varian (2002) and Afuah (2003) implicitly recognized the importance of this issue when questioning whether use of IT in service provision would necessarily lead to greater outsourcing. In considering centralization, this paper attempts to suggest the possibility that IT can have an important effect on internal delivery of services that must be identified and controlled before assessing a greater or lesser propensity for outsourcing. Thus while others have discussed the effects of IT on outsourcing or IT on centralization, the impact of this study is to theoretically integrate the outsourcing and centralization decision using both transaction cost and agency cost perspectives and to empirically estimate the relative effects of the theoretical drivers of IT on outsourcing and centralization decisions.

This study has limitations that restrict the ability to generalize the findings beyond the current sample, but at the same time could be improved upon in future studies. Although constraints of the empirical setting did not allow this, the response rate could have been improved by implementing multiple contacts or reminders to participate in the study (Dillman, 2000). Even with a higher response rate, it is unclear how this would have affected the results. Ideally, the authors would have liked to include more firm-level controls in the models, but privacy concerns did not allow for the collection of this information. As well, since the sample was limited to firms that were engaging in some level of outsourcing of their services, it cannot be generalized to firms that have not engaged in outsourcing some of their benefits and compensation functions. The authors argued that these firms would not have been able to answer questions about the specialized investment by vendors without this experience. The authors implicitly preferred efficiency in response to the questions over the potential selection bias that might result. Nonetheless, it is still believed that the findings regarding the interaction between outsourcing and centralization may be meaningful for firms that are considering outsourcing, as well as those currently outsourcing. For the focal service the respondent considered, it may not have been outsourcing that service, and thus is still making a choice between outsourcing and not outsourcing.

A possibly fruitful area of future research would be to consider intra-firm influences of IT in more depth. Here, only centralization was considered. There may be other possible organizational changes to services as a result of the use of IT. For example, services may become more self-serve in nature rather than managed. The level of customizability may be increased as well. Also, the ability of a firm's employees to successfully make these changes may depend heavily on the level of computer savvy of the typical employee for a given firm. All of these issues bear further inquiry.

Appendix. Survey items

Unless indicated otherwise by parentheses, scales for the items listed were 5 point Likert agreement scales with the following options: Strongly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, strongly agree.

Dependent variables

Outsourcing

1. Please indicate the answer that best describes how this service is currently provided in your organization. (Not outsourced at all, only a small fraction of the service is outsourced, less than half but more than a small fraction of the service is outsourced, about half of the service is outsourced, more than half but not all of the service is outsourced, the service is entirely [100%] outsourced.)

Centralization

2. Which of the following best represents how most decisions are made regarding the service you selected above? (Predominantly made by individual facilities or plants, jointly made among different groups of multiple facilities or plants, jointly made by headquarters and individual facilities or plants, jointly made by headquarters and different groups of multiple facilities or plants, predominantly made by headquarters.)

Independent variables

IT

3. For this question, please indicate the importance of electronic or IT in the delivery of each service as it is provided in your organization. (Not important, somewhat important, important, very important, extremely important.)

Scope economies

4. We achieve cost savings on this service by using the same people and/or software that we use on other services.

5. The quality of this service is improved when we administer it simultaneously with other services.

Scale economies

6. If we used this service on a larger scale, the increased volume would make the cost of providing this service... (Much lower, somewhat lower, about the same, somewhat higher, much higher.)

Asset specificity

In order to outsource this service, a vendor had to (or would have to) make considerable investments in physical assets such as computer hardware and software designed specifically for our organization.

7. In order to outsource this service, a vendor had to (or would have to) make considerable investments in developing or learning business processes that are designed specifically for our organization.

8. In order to outsource this service, a vendor had to (or would have to) make considerable investments in training employees specifically to provide this service to our organization.

9. In order to provide this service to our organization in a cost efficient and quality manner, a vendor had to (or would have to) have offices and/or personnel located near our organization.

10. If an HR manager in our organization moved to our location from another location, they would have to undergo considerable training in order to provide this service.

11. Timely delivery of this service is crucial to its perceived quality by my organization.

Frequency

12. The desired characteristics of this service are frequently changed or modified.

Uncertainty

13. There tend to be significant and unexpected fluctuations in demand for this service.

Standardization

14. Compared to other compensation services, the provision of this service is highly standardized from user to user.

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