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VALUE CREATION, COMPETITION, AND PERFORMANCE IN BUYER-SUPPLIER RELATIONSHIPS

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The value-based approach to strategy argues that a firm's ability to capture value depends on the extent of its added value. In this paper, I empirically test the link between added value and value capture using a longitudinal dataset of United Kingdom law firm performance, capabilities, and client relationships. In this setting, competitors relevant for defining a firm's added value are those that share a client with the firm. Further, within a client relationship, value creation, and hence added value, can be decomposed in two parts: product-line capability and client-specific scope economies. I find that added value, measured at the level of each buyer-supplier relationship, is a driver of relationship stability and supplier profitability. This suggests that suppliers with similar capabilities might enjoy different economic returns depending on the composition of their set of relevant competitors. These findings shed light on the conditions under which firms can appropriate returns from their capabilities. They indicate that concepts from cooperative games can be fruitfully applied to empirical studies of firm performance and to the elaboration of insights from the resource-based view of the firm. Copyright © 2010 John Wiley & Sons, Ltd.

INTRODUCTION

Recent research has used formal modeling techniques to study how value creation and competition interact to shape firm performance (Brandenburger and Stuart, 1996, 2007; Lippman and Rumelt, 2003; MacDonald and Ryall, 2004). Brandenburger and Stuart (1996) posited that the concept of added value, the increase in total value creation when a firm is added to a strategic interaction, can be used to gauge ability to capture value. Subsequently, studies applied to specific issues

have used these formal methods to analyze the role of demand in pursuing sustainable advantage (Adner and Zemsky, 2006), the choice between generalist and specialist strategies (Chatain and Zemsky, 2007), and the role of central network positions in value capture (Ryall and Sorenson, 2007).

This line of inquiry presents an opportunity to elaborate contributions from the resource-based view of the firm (RBV). Empirical studies in the RBV tradition have shown capabilities to matter to firm performance (e.g., Helfat, 1997; Henderson and Cockburn, 1994; Miller and Shamsie, 1996), and the contexts in which and mechanisms whereby capabilities create value have begun to be investigated (e.g., Ethiraj *et al.*, 2005). Yet one question has scarcely been addressed: how does competition in the product market influence the relationship between capabilities and product

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market performance? I argue that the value-based approach is ideally suited to explore the intersection of capability heterogeneity and competition in the product market.

Extant research in the RBV suggests that competition matters to value capture. Competition among stakeholders, for example, shapes the distribution of the value captured by a firm (Blyler and Coff, 2003; Coff, 1999), and competition in factor markets determines the gains that accrue to resource owners (Barney, 1986). But in product markets, in which value is created and captured before being redistributed to stakeholders and resource owners, empirical studies in the RBV tradition have rarely accounted explicitly for competition.

This is due in part to the reliance of theoretical treatments of the RBV on a Ricardian model of market competition whereby firms with superior capabilities (irrespective of the cost of acquisition or development) are able to capture value in the product market in the face of competition (Peteraf and Barney, 2003). This way of modeling competition is conceptually powerful and parsimonious, reducing the need to explicitly model competition in the product market, and thereby enabling the theory to focus on other, more distinctive aspects. But it is also somewhat restrictive, presuming the market to clear at a unique price (adjusted for quality), and implying that all suppliers face precisely the same competitive pressure.

The value-based approach provides a holistic treatment of how the blending of competition and capability heterogeneity generates performance differentials. It retains one of the fundamental insights of the RBV, that capability heterogeneity is a root cause of performance differentials in the product market, while giving the opportunity to work outside the domain of the Ricardian model of market competition and to expand the applicability of capability-based analysis of competitive outcomes.

In this paper, I use the value-based framework to examine the competitive implications of the existence of highly client-specific value creation. Client-specific value creation results when, for instance, the knowledge a supplier acquires about a client is instrumental to delivering a service to or customizing a product for that client, but is not useful for serving other clients. I show that when the client-specific component of total value creation is high relative to other, non-client-specific components, the set of relevant competitors can be dramatically reduced. We can thus trace the

competitive pressures faced by a supplier to the small number of competitors with a high level of client-specific value creation ability. It is to these suppliers that a buyer is more likely to threaten to turn to when trying to negotiate better terms with an existing supplier.

My analyses being based on a formal framework, I develop empirical hypotheses about the drivers of supplier performance. I argue that if client-specific value creation is important, the set of relevant competitors can be defined with reference to buyers' existing supplier relationships. The hypotheses focus on two dimensions of value creation, expertise advantage and client-specific economies of scope, and their link to value capture under competition. The concept of added value is used to relate value creation and value capture. The use of a formal framework supports a tight connection between extant theoretical developments in the value-based literature and the empirical application. The empirical analysis uses fine-grained data on law firm expertise, client base, and performance in the United Kingdom corporate legal market.

I find that new client needs are much more likely to be fulfilled by law firms that are already providing other legal services to that client. This suggests that client-specific knowledge is a large component of value creation. I analyze the determinants of two dependent variables linked to value capture: client relationship stability and law firm profitability. I find that a law firm's level of expertise relative to the set of competitors sharing the same client is significantly related to the stability of the client relationship. Moreover, the absolute level of law firm expertise (i.e., expertise level vis-à-vis all competitors) is not related to relationship stability. I also find that client relationship stability depends both on a law firm's client-specific scope and on competitors' client-specific scope. The analysis of law firm profitability reveals similar patterns. This suggests that a supplier's value capture varies with its added value, measured by its level of expertise and client-specific scope relative to a well-defined set of competitors.

The paper aims to make the following contributions. First, it aims to contribute to our understanding of the relationship between industry structure and firm performance. The paper explores the competitive implications of the existence of high levels of client-specific, relative to non-client-specific, value creation. In the presence of client-specific value creation, competition in a market can be less

intense than might be suggested by the number of competitors. Even in the presence of a large number of competitors, effective competition for the opportunity to serve a given buyer might originate from a small set of relevant competitors, which implies that the advantage associated with a firm's capabilities should be evaluated in relation only to relevant competitors, not necessarily to the overall best competitors in the market.

Second, these findings speak to the literatures that link firm capabilities to performance. The findings suggest that an accurate understanding of the relationship between superior capabilities and performance may need to rely in some cases on a fine-grained understanding of competition in the product market. Defining the set of relevant competitors can thus be key to understanding how capabilities affect performance. The RBV uses a Ricardian setup to model competition in the product market (Peteraf and Barney, 2003). This setup assumes that all suppliers can compete equally for all buyers. In this study, however, suppliers cannot compete equally for all buyers in the market because of the large value created by client-specific knowledge. The implication is that similar capabilities among suppliers in the same market might generate different economic returns, contrary to what a Ricardian model of product market competition would suggest. Differences in the sets of relevant competitors across firms can thus be a source of performance heterogeneity within a market in addition to firm-level differences in capabilities. This may, in turn, provide suppliers with different incentives for developing their capabilities.

Moreover, considering a client relationship as a resource in the RBV sense, that is, as a hard-to-imitate or acquire enhancement to value creation, does not fully account for the changes that such relationship create in the competitive landscape. To be sure, a supplier's client relationship and the accompanying client-specific knowledge give it an advantage over competitors without such relationships. But the existence of the relationship is changing the competitive landscape for those competitors that have a relationship with the client. Their value capture is now affected by the focal supplier's capabilities. This competitive pressure only concerns a subset of all competitors in the market and thus cannot be conceptualized within the frame of the RBV because of its assumption of Ricardian competition.

Third, the paper speaks as well to the formal literature on value creation and value capture by proposing a way to translate its insights into an empirical study. The value-based approach has the advantage of jointly considering the effects of firm heterogeneity and competition on performance. This study suggests that this theory can be used successfully to generate empirical predictions, buttressing the relevance of the value-based approach for theory development in the strategy research field.

Fourth, recent empirical (Siggelkow, 2003) and theoretical (Chatain and Zemsky, 2007) work has suggested the importance of client-specific knowledge and client-specific economies of scope to supplier performance.¹ This paper extends these ideas to show how high client-specific knowledge can influence the structure of within-market competition by making it highly localized. This paper also contributes to the existing literature on the performance implications of buyer-supplier relationships (e.g., Levinthal and Fichman, 1988; Martin, Swaminathan, and Mitchell, 1998) and provides further empirical evidence of the importance of client-specific economies of scope to value creation.

The rest of the paper is organized as follows. I introduce a formal model of value creation by suppliers of highly customized products or services and use the model to derive empirical hypotheses. I then test these hypotheses using data from the United Kingdom corporate legal market. The paper concludes with a discussion of the results.

A FRAMEWORK FOR VALUE CREATION AND VALUE CAPTURE IN BUYER-SUPPLIER RELATIONSHIPS

The literature on value-based strategies has been focused on developing theory using formal modeling rather than translating the logic from the models into empirical applications. In this section, I use a formal framework to bridge the gap between theoretical concepts from the value-based approach

¹ Economies of scope are usually understood to lower production costs, irrespective of the identity of the client (Panzar and Willig, 1981; Teece, 1980). Client-specific economies of scope, in contrast, refer to increases in value creation due to higher willingness to pay or lower costs, or both, thanks to the bundling of different products or services.

and the data that can be used in an empirical analysis. Developing such a framework before formulating empirical hypotheses has two benefits, (1) it necessitates the use of a formal language similar to that used in the theoretical literature, which facilitates building on existing work (using, for example, notation similar to that used in Chatain and Zemsky [2007]), thereby tightening the link between theory and empirical application, and (2) it clarifies the additional assumptions needed to move from the theoretical model to the empirical application and associated boundary conditions, which is more easily accomplished via a formal framework than verbal argument. Thus, the focus of the formal framework in this paper is not on the development of a full-fledged theory, but rather on bridging extant formal theory and applied empirical work.

I rely on the concept of added value advanced by Brandenburger and Stuart (1996) to conceptually combine value creation, competition, and value capture. Added value in a competitive interaction is the amount of value creation that would be lost should a given player withdraw. It also represents the maximum amount of value a player can capture, and is a good indicator of the competition a firm faces. Intuitively, the existence of alternative (i.e., substitute) players will tend to diminish and scarcity of alternative players will tend to enhance the ability to capture value. The concept of added value is a straightforward way to articulate this idea.

For empirical applications, two ingredients are needed to compute proxies of a supplier's added value, (1) an estimate of its ability to create value, and (2) the set of relevant competitors and their ability to create value. I review the components of value creation in buyer-supplier relationships and then incorporate these elements into a model of value creation that I use to delineate, on the basis of criteria determined by the formal analysis, the set of competitors that matter to determining added value.

Components of value creation in buyer-supplier relationships

The three components of interest in value creation in buyer-supplier relationships are service or product line capability, client-specific knowledge, and client-specific economies of scope. Product line capability is the baseline ability of a supplier of

services or products to deliver value to a customer absent client-specific knowledge and client-specific economies of scope. It represents a supplier's level of general capability. Client-specific knowledge augments product line capability by enabling suppliers to tailor products or services to a buyer's particular needs and idiosyncrasies. Suppliers can increase this knowledge by using publicly available information, but direct interaction with the buyer provides a unique channel of acquisition. Direct interaction is relevant for acquiring an understanding of confidential, or simply unadvertised, aspects of a client's business. In the context of legal advice, this might include knowledge of the details of important contracts with third parties, and in a manufacturing context, knowledge of distinctive production operations. Also relevant to project execution is practical knowledge that can guide interaction with a buyer's staff. Another enabler of the creation of additional value for buyers is the provision of 'one-stop-shopping,' which affords suppliers two benefits: (1) client-specific knowledge acquired through work in one area can be shared across other areas, and (2) managing multiple projects for the same buyer presents an opportunity to create value through coordination.

I term the cost savings and additional benefits that accrue to providing services to the same buyer in different areas 'client-specific scope economies' (Chatain and Zemsky, 2007). Client-specific economies of scope differ from economies of scope as usually construed (Panzar and Willig, 1981) in that they arise only when different products are made for, or services are delivered to, the same buyer. Production-side economies of scope, in contrast, arise when different goods are produced by the same supplier regardless of whether they are sold to the same buyer. Client-specific scope economies are akin to the demand-side economies of scope analyzed in Siggelkow's (2003) study of mutual fund performance. The definition I use, which follows Chatain and Zemsky (2007), is broader than Siggelkow's (2003) in admitting the possibility of benefits to the relationship beyond the sharing of shopping costs (Klemperer, 1992), that is, the costs of using more than one supplier.

Value creation and added value

In this section, I present a simple model that draws on Chatain and Zemsky's (2007) model of value

capture in buyer-supplier relationships. I eschew an examination of a fully dynamic model in which agents consider the intertemporal implications of their decisions in favor of a simpler model that is consistent with the idea that agents are engaged in optimizing, albeit myopic, behavior (Levinthal, 2008).² The value created by supplier i for buyer j in the set of areas A_{ij} can be broken down into the three elements mentioned above, the value created by (1) service or product line capability (E), (2) client-specific knowledge (R), and (3) the coordination of different services, which is a function of the set of areas ($C(A_{ij})$). To this I add an extra term v_{ij} , which represents a shock to value creation that is idiosyncratic to the area and buyer-supplier relationship. I assume it to have a mean of zero and to be identically and independently distributed. The term v_{ij} allows for unobserved heterogeneity in a client's preferences around a mean given by the observed elements of value creation (E , R , and C). In this manner, deviations of client tastes from a market consensus given by E , R , and C can be modeled.

The value created by supplier i for buyer j is thus, with a denoting a legal area:

$$V_{ij} = \sum_{a \in A_{ij}} (E_{ia} + R_{ija} + C(A_{ij}) + v_{ija})$$

To calculate the added value of supplier i , we need to compare its value creation ability to that of the best available alternative supplier. Denoting by $-i$ the set of suppliers that are not supplier I gives:

$$AV_{ij} = \max(0, V_{ij} - \max_{-i} V_{-ij})$$

In other words, the added value of supplier i in its relationship with buyer j is the difference between its value creation and the value creation ability of the next best alternative if the difference

² I leave aside in this paper the very interesting question of possible collusion among suppliers. Collusive behavior could be facilitated by repeated interaction between suppliers over time across common clients in a mechanism similar to that of multimarket contacts (Gimeno and Woo, 1996b). Formally incorporating these aspects in the formal framework would substantially complicate the analysis. Unreported empirical analyses yielded ambiguous results regarding the impact of multimarket contacts on value capture but also showed that the other empirical results were robust to their inclusion in the analysis. I thank an anonymous referee for pointing to this potential extension that warrants further study.

is greater than zero, and equal to zero otherwise. A supplier has positive added value only if it can create more value than any of the available alternative suppliers. It can also be readily seen that added value weakly increases in the value created by the supplier, and weakly decreases with the maximum value created by competitors.

Set of relevant competitors

We can build on this formalization to refine the set of relevant competitors, defined as the set of competitors that can affect a supplier's added value. Narrowing this set can enable sharper predictions of the impact of competition on value capture. I use the client-specific knowledge element of knowledge creation to characterize the set of relevant competitors.

It is reasonable to assume current suppliers to be more knowledgeable than other suppliers about a client. Assuming, for simplicity, that firms in a buyer's current supplier base can create an excess ΔR in value on top of a baseline R that is shared by all suppliers, we have the following proposition³ (all proofs are provided in Appendix 2):

Proposition 1: Denote as S^R the suppliers currently serving client j that are not the focal supplier, and as S^N the suppliers not currently serving the client. One can check whether a supplier serving the client has strictly positive added value by considering only suppliers that currently have a relationship with the client if and only if:

$$\Delta R > \max_{l \in S^N} (E_l + C_{lj}) - \max_{k \in S^R} (E_k + C_{kj}).$$

This proposition implies that if current suppliers are much more knowledgeable than outside suppliers about a client, restricting attention to inside suppliers is enough to evaluate a supplier's added value. Simply put, if ΔR is sufficiently high, one need not worry about suppliers not currently serving the buyer. This gives the intuitive corollary to Proposition 1.

Corollary 2: There exists a threshold, T , such that if $\Delta R > T$ one need only consider suppliers

³ Throughout this development, I distinguish between propositions and corollaries, derived within the formal framework, and empirical hypotheses, which will be tested on the data.

with a current relationship to check whether a supplier has strictly positive added value in its relationship with a buyer.

We need a test to evaluate the strength of ΔR relative to the other components of value creation. Such a test can be devised by considering the situation of a buyer who needs to fulfill a new need and can choose between suppliers currently supplying it other services or new suppliers. Under the assumption that the buyer is keeping its existing suppliers, one can show:⁴

Proposition 3: The higher ΔR , the more likely a buyer will use a supplier from its current supplier base over a supplier outside this base when new needs arise.

Proposition 3 is crucial for testing the extent to which the set of relevant competitors can be restricted to suppliers currently serving the buyer. To gauge the effect of incumbent suppliers' resulting advantage in value creation, we need to examine a situation in which a buyer can choose between incumbent suppliers and suppliers with which it has not previously worked, a clear case being the fulfillment of a new need. If client-specific knowledge is higher for incumbents, then, holding other observable characteristics relevant to value creation such as expertise and client-specific scope, current suppliers should be disproportionately likely to be chosen over outsiders, which suggests the following empirical hypothesis:

Empirical Hypothesis 1: Incumbent suppliers have a higher probability to be selected to fulfill new needs, controlling for other factors that influence value creation.

If this hypothesis holds, and the magnitude of the effect is high, it will make sense to approximate the true set of potential competitors with the set of suppliers that currently serve a given client.

⁴ Underlying this proposition is the idea that, holding the other supplier relationships constant, the supplier that maximizes value creation in the new area is also maximizing value capture for itself and for the buyer. Hence studying *absolute* levels of value creation is enough to understand the probability of relationship creation. When we analyze variations in value capture later in this section, we will look at *relative* levels of value creation because the amount of value captured depends both on the value created by the focal firm and on the value created by the next best alternative.

Added value and value capture

I assume assumptions (A1), (A2), and (A3)—formal definitions are provided in Appendix 1—detailed in Chatain and Zemsky (2007: 554) and Stuart (2004) to hold. These assumptions state, respectively, that buyers and suppliers are members of distinct sets, there are no externalities in consumption or production, and a supplier's added value does not increase when other suppliers are added to the game. The implication that the value a supplier creates for a buyer is independent of what other buyers and suppliers are doing rules out capacity constraints. The value a supplier creates for a buyer is also independent of the number of buyers with which the supplier is dealing. From (A2) (no externalities), it is immediately clear that a supplier's added value across all buyers is equal to the sum of its added value for each buyer. That is, $AV_i = \sum_j AV_{ij}$.

Under (A1) and (A2), the following proposition can be demonstrated (Lemma 1 in Stuart, 2004; Proposition 1 in Chatain and Zemsky, 2007).

Proposition 4: Assume that (A1) and (A2) hold. Then:

- (i) *The core exists.*
- (ii) *The allocation of value received by a supplier belongs to the core if and only if the allocation is in $[0, AV_{ij}]$.*

This result is important because (1) it ensures the existence of the core of the cooperative game,⁵ which means that players can always share the value they create together in a way that makes it unprofitable for any group of players to leave the grand coalition, and (2) it implies that a supplier's profit is a direct function of its added value.

Going further, we can apply Brandenburger and Stuart's (2007) biform game framework to relate core allocation to expected profits. Under assumptions (A1) and (A2), the relationship between the added value of supplier i with buyer j (AV_{ij}) and the supplier's expected value capture in this relationship (Π_{ij}) is linear (Chatain and Zemsky, 2007). It depends on the supplier's subjective assessment of its ability to bargain, denoted by the

⁵ Note that, in general, the core is not guaranteed to exist (Myerson, 1991: 429).

parameter α_i , so:

$$\Pi_{ij} = \alpha_i AV_{ij}$$

With assumption (A3), it is possible to further interpret α_i as a supplier bargaining power index. Moreover, the following corollary can be demonstrated (Corollary 1 in Chatain and Zemsky, 2007):

Corollary 5: Consider a biform game in which suppliers are denoted by i and buyers by j . With $\alpha_i = \alpha$ for all i 's and $\alpha_j = (1 - \alpha)$ for all j 's, the expected profits are as follow:

$$\Pi_i = \alpha_i AV_i$$

$$\Pi_j = AV_j - \alpha_i \sum_i AV_{ij}$$

To link the expected value captured and actual profit in period t in an econometric model, it is useful to specify a supplier-specific fixed effect μ_i and error term ε that accounts for other unobserved factors, and allow the added value and error term to vary over time. Thus:

$$\Pi_{ijt} = \alpha_i AV_{ijt} + \mu_i + \varepsilon_{ijt}$$

Implications for buyer-supplier relationship stability

I now extend the model to formulate propositions related to the stability of buyer-supplier relationships. Being able to predict relationship termination is useful when it is not possible to directly observe value capture at the level of the relationship, as factors that affect value capture might also affect tie termination. This can be accomplished by amending the initial model to account for a form of optimizing, albeit myopic, behavior on the part of the supplier. Specifically, I assume that the supplier terminates at the end of period t when its profit from the relationship drops below a threshold (normalized to zero) that represents an unmodeled opportunity cost for the resources the supplier devotes to providing the product or service.

Proposition 6: The higher a supplier's added value, the less likely the buyer-supplier relationship is to be terminated.

According to the theory, a relative capability advantage (over the other suppliers that belong

to a buyer's supplier base) should affect a supplier's ability to sustain a profitable relationship independent of the absolute level of the supplier's capability. In other words, relationship termination can be explained in terms of whether a supplier enjoys an advantage over the set of relevant competitors (in this paper, competitors that work for the same client), controlling for the position of the supplier in the broader market.

A buyer-supplier relationship in which either party is unable to capture sufficient value relative to alternative suppliers is more likely to be terminated, the logic being that a supplier that does not capture enough value from a relationship is less likely to expend additional effort or relinquish value to satisfy the client. Conversely, a client might terminate a relationship with a supplier that is unwilling to relinquish sufficient value relative to competitors. This suggests the following hypothesis.

Empirical Hypothesis 2: Controlling for absolute capability level, relationships of suppliers with a capability advantage over the set of relevant competitors are less likely to be terminated.

The same reasoning gives rise to hypotheses about the effect on relationship termination of two other components of added value, the client-specific scope of the focal supplier and of competitors.

Empirical Hypothesis 3: The more areas in which a supplier works for a client, the less likely the relationship is to be terminated.

Empirical Hypothesis 4: The larger the maximum number of areas in which a single competitor is supplying services to a buyer, the more likely the focal buyer's relationship is to be terminated.

Implications for supplier performance

Finally, taking advantage of (A2), it is possible to make a clear statement about how drivers of profitability at the level of the buyer translate into aggregated supplier profits.

Proposition 7: Profitability at the supplier level is positively related to the weighted average

of added value measured at the dyadic buyer-supplier level.

The logic for aggregation is the following: if factors that enhance value capture in a single relationship become more prevalent in a supplier's client base, overall supplier profitability should increase to the extent that there are no externalities between the individual buyer-supplier relationships.⁶ Conversely, if these factors become less prevalent in a supplier's client base, overall supplier profitability should decrease. We can first express this with a hypothesis about relative capability advantage:

Empirical Hypothesis 5: Controlling for absolute capability level, the greater a supplier's relative capability advantage across its client base, the higher the supplier's overall profitability.

One can apply the same reasoning to the effect of client-specific economies of scope on profitability.

Empirical Hypothesis 6: The more lines of service a supplier sells to clients, the higher the supplier's overall profitability.

Empirical Hypothesis 7: The more lines of service a supplier's competitors sell to the supplier's clients, the lower the supplier's overall profitability.

In summary, I have developed a model of value creation in buyer-supplier relationships that suggests that the set of potential competitors that determines a supplier's added value can, under some circumstances, be restricted to the set of suppliers that currently serve the same buyer. From the model, one can infer an empirical test for the strength of client-specific knowledge and performance implications for suppliers relative to relationship termination and overall profitability. This model, and the empirical hypotheses that are derived from it, are combining features that are standard in value-based applications (e.g., the role of expertise) and others that are more specific to this context, especially value from client-specific knowledge and client-specific scope economies.

⁶ In the formal framework, such externalities are ruled out by assumption A2.

The benefits from using the model extend beyond the tight link beyond theory and empirics. Most importantly, the analysis of the model brings to the fore that client-specific knowledge has a qualitatively different impact on value capture than other sources of value creation. For instance, differences in levels of expertise between two firms only matters for performance if both firms have a sufficiently high level of client-specific knowledge. Without the analysis of this model, it would have been tempting to enter product-line expertise and client relationships as two separate variables in a regression analysis of supplier performance although differences in product-line expertise matter only if a relationship exists in the first place. The more complex interplay between the variables suggested by the model would not have been considered. Another example derives from the value-based approach insistence on paying attention at how much value creates the best available alternative available to a player. This suggests constructing variables with the maximum expertise and scope across competitors rather than, for instance, looking at the average across competitors. One virtue of the model is thus to provide a clear structure that empirical analysis can lean upon, suggesting in some cases how to compute theoretically relevant independent variables.

The value of the model also manifests itself in the systematic consideration of competitors' value creation as a factor affecting value capture. For instance, competitors' client-specific scope is treated symmetrically with a firm's own scope as far as value capture is concerned. An analysis derived exclusively from verbal theory may have only looked at the focal firm's scope and levels of expertise without explicitly measuring competitors' capabilities.

Finally, laying out the model allowed uncovering the many ancillary assumptions that need to be made to lead to the hypotheses, which is typically less transparent with purely verbal theorizing. For instance, that assumption (A2) matters for both linking added value to value appropriation and for aggregating supplier profits across buyers is not intuitive. Extending the model to include relationship termination shows that adding behaviorally sensible assumptions about buyer decision making conserves the insights from the basic value-based framework. All this contributes to making explicit the boundary conditions of the theory, which is

valuable in addition to the content of the empirical hypotheses.

DATA OVERVIEW

Empirical setting and levels of analysis

The theory is tested with the United Kingdom legal market using data on client-law firm relationships and law firm profitability for the period 2002–2005. Suppliers are drawn from the list of the 100 largest United Kingdom, and 30 largest London offices of major U.S. corporate law firms included in the annual survey conducted by industry monthly *Legal Business*. Buyers are among the United Kingdom's large, publicly traded corporations (the top 250 largest market capitalizations) as surveyed by Chambers and Partners in *Client Report*. The data thus includes the major players on two sides of a large business-to-business market of high value services, and, being longitudinal, makes it possible to control, as necessary, for time-invariant, unobserved heterogeneity.

The setting is an appropriate one in which to test the theory because buyer-supplier relationships matter to the players involved. Services can be customized to, and depend on knowing, the buyers, not just the business, and buyers and suppliers alike are knowledgeable about the services. Articles in trade publications and interviews with actors of the market suggest that buyers are willing and able to negotiate the fees they pay their lawyers, and their general counsels are usually lawyers, sometimes with previous experience in law firms. Suppliers take great care to nurture and manage their relationships with buyers, and buyers, in turn, to manage their supplier base so as to avoid excessive dependence on a single supplier.

A major empirical matter is to find appropriate proxies for the value capture construct that is central to the theory. Ideal data would include the profitability of each buyer-supplier relationship, but collecting such fine-grained, highly confidential data across so many players (more than a hundred suppliers) was impractical. The longitudinal nature of the data, however, enables the study of tie termination as an alternative dependent variable that, as argued above in the formal framework, is related to relationship profitability. The theory also has implications for the overall profitability of each supplier, which is by definition the sum of the profitability of each client

relationship. Overall supplier profitability figures being available, analysis is also conducted at this level, and the results triangulated with those of the relationship-level analyses.

Analyses are conducted at three levels. The first, and finest, level of analysis is supplier-buyer-area. Consider, for example, a datum that records that the law firm Addleshaw Goddard supplies British Airways with advice on employment law. At this level of analysis, I examine whether buyers exhibit a preference for hiring current suppliers when new needs arise. This gives an indication of the strength of buyer-supplier relationships, which, in turn, provides a test for the relevance of focusing on competition and added value among suppliers that currently have a relationship with a buyer.

The second level of analysis is the entire supplier-buyer relationship; for example, Addleshaw Goddard working for British Airways across several areas. Here, I analyze the determinants of relationship termination, which, as argued above, can be interpreted as a proxy for insufficient value capture.

The third level of analysis is the supplier and its overall profitability. Aggregation from profitability at the relationship level to profitability at the supplier level is key to this analysis. The data being longitudinal, it is possible to relate variation over time in a supplier's competitive position across its relationships to its ability to capture value for its shareholders. In the corporate legal market, a law firm that sees an increase in the proportion of relationships in which it has an advantage relative to relevant competitors should, as a whole, be more profitable and its partners capture more value.

Data sources and main features

I now present the characteristics of the data that are common to all levels of analysis.

Buyer-supplier relationships. Annual surveys conducted by *Chambers Client Report*, an industry trade magazine published quarterly and targeted at general counsels, is the source of data on relationships. The survey queries general counsels of firms included among the top 250 largest market capitalizations in the London Stock Exchange about their main legal advisers and the legal areas in which they are used. The response rate exceeds 90 percent, and the set of firms represents in excess of

80 percent of the total market capitalization of the London Stock Exchange.

Supplier expertise—absolute. To assess the level of expertise of law firms in all legal areas, I use ratings provided in Chambers and Partners (the publisher of *Chambers Client Report*) annual guides *Chambers UK: A Client's Guide to the UK Legal Profession*. The guide covers more than 60 areas of law divided into subcategories, and lists recommended corporate law firms in as many as six tiers, within each of which firms are deemed to be of comparable expertise level.⁷ This expertise level can be construed as a measure of the market consensus regarding a supplier's expertise.⁸ Without further transformation, this information represents, by comparing it to that of the best supplier in the market irrespective of whether both suppliers have relationships with the same buyers, a supplier's *absolute* level of expertise. Rankings from the immediate preceding year are used throughout this paper so that they reflect the same information that was available to the players at the moment of the interaction and alleviate issues of reverse causality.

Supplier expertise—relative to that of the set of relevant competitors. I also constructed measures of supplier expertise relative to that possessed by the competitors that comprise the narrower set that constitutes a credible threat given current relationships. I argue below that in this market the value of client-specific knowledge acquired from past interactions is so high that the set of relevant competitors can be approximated by the set of suppliers that currently serves the buyer.

Client-specific scope. A supplier's ability to reap client-specific scope economies can be approximated by the extent of the scope of the activities it performs for a given client. In practice, this can be measured by counting the number of areas in

which a supplier is providing services to a client, or by a dummy variable that indicates whether a supplier is selling services to a client in more than one area.

Client-specific scope of competitors. The extent of client-specific economies of scope generated by competitors, which matters to the extent that it provides a client with strong alternatives, is measured as the maximum number of areas in which a given competitor is selling services to a given client.

Other control variables. I also account for other important drivers of performance. In most analyses, I control for supplier size (headcount, number of clients in the Financial Times Stock Exchange [FTSE] 250) and geographical scope (in London and in the English provinces).

SELECTION OF SUPPLIERS FOR NEW AREAS OF WORK

The first set of empirical analyses examines the determinants of buyers' choice of supplier when new needs arise. Suppliers that currently serve a buyer's other needs would be more likely to be chosen if being part of the supplier base provides an advantage for value creation.

Dataset construction and variables

The main source of data is the aforementioned Chambers and Partners *Client Report* annual surveys, which match observations of buyers to suppliers at the level of area of legal expertise. I compare the areas of legal advice buyers list from year to year over four years of observation, identifying when a buyer first procured services in an area of legal expertise not previously required as well as the supplier selected to fill this new need. The unit of analysis is the client-area-supplier. For each instance, I created a risk set consisting of all potential suppliers for which I had a minimum of firm-level information (i.e., size and scope). The annual survey having been conducted each year from 2002 to 2005, I was able to construct risk sets for the years 2003 to 2005. The sample comprises 38,293 yearly spells and 1,806 new area creation events.

⁷ The rankings reflect, according to Chambers and Partners Web site (<http://www.chambersandpartners.com/Rankings-Explained>), the law firm's 'technical legal ability, professional conduct, client service, commercial astuteness, diligence, commitment, and other qualities most valued by the client.' (accessed 19 April 2010).

⁸ Individual client may differ from this consensus and the formal framework incorporates this possibility by introducing an error term of mean zero in the value creation function. In the empirical analysis, deviations from the consensus are captured in the error term of the regressions.

Buyer choice of supplier for newly needed area (dependent variable). The dependent variable was coded 1 for the supplier selected by a buyer to fill a new need, and 0 otherwise.

Supplier worked for buyer in the previous year. The main independent variable of interest is a dummy variable coded 1 for suppliers that worked for the buyer during the previous year, and 0 otherwise.

Expertise in the area of interest. I controlled for absolute level of expertise in the area of interest by transforming the Chambers and Partners guide ranking into a continuous variable that takes a value of 1 if the supplier is in the top level and 0 if the supplier is not ranked. I also created a dummy variable to account for the case of a supplier not being ranked.

Client-specific scope. The theory suggests that, because it might be affected by adding a new area, the level of client-specific scope economies matters to the choice of supplier.

Competitor scope. I included the maximum number of areas in which services were sold by a single competitor to capture the potential influence of competitor entrenchment on the selection process.

Other control variables. I controlled for supplier size (measured as headcount), supplier scope (measured as the number of areas in which a ranking is given in the Chambers and Partners guide), number of clients in the FTSE 250, and whether a client had changed its general counsel. I also included year dummies.

Methods and results

The dependent variable being categorical (1 for being selected, 0 for not being selected), I used a logistic regression. To address the possibility of heteroskedasticity and autocorrelation among observations pertaining to the same supplier, robust standard errors, clustered by supplier, were estimated (Froot, 1989; Rogers, 1993; White, 1980).⁹

⁹ Other methods used as robustness checks included a fixed-effect (conditional) logit with groups defined at the supplier level to control for time-invariant unobserved supplier-level heterogeneity, and a rare event logit (King and Zeng, 2001),

Summary statistics and pairwise correlations are presented in Table 1, results of the regression analysis in Table 2. Model 1 of Table 2 presents the regression results with only the controls and the variables for level of expertise. Models 2 and 3 introduce separately the scope variables and dummy for already being a supplier. Model 4 is the full model. The table shows the client-specific scope of a firm and its competitors to significantly affect the probability of selection. The dummy for suppliers already in the supplier base has a positive sign and is highly significant ($p < 0.001$). As expected, the variable for expertise level also has a positive and highly significant sign. Hypothesis 1, that suppliers with a current relationship and higher expertise levels are more likely to be selected, is thus supported. Other, unreported regressions that include a dummy for whether the general counsel has been changed and supplier-level measures of capability yield similar results.

To get a sense of the magnitude of these effects, I computed the marginal effects for selected variables at their median value. The results of these calculations are reported in Table 3, panel A. The baseline probability of selection is 0.0079; being in the client's supplier base adds 0.2544 to this. By comparison, an extra standard deviation in expertise level adds only 0.0052 to the probability of selection. Panel B presents predicted probability of selection under various scenarios. For instance, a median insider has a probability selection of 0.3464. These analyses suggest that suppliers that belong to a buyer's current supplier base are much more likely than outsiders to be selected to fill needs for new services, controlling for other relevant factors such as current levels of general expertise and client-specific scope economies.

The results are suggestive about how to think about competition in this market and how it affects value capture. There are two sources of competition for suppliers already in the supplier base. The most direct competition is from other suppliers that currently have a relationship with the buyer, less direct competition from other suppliers, a theme further developed in the remainder of the empirical analysis. Variables relevant to competition are computed with respect to two reference groups, that of the whole market (consisting of

there being few creation events relative to the size of the risk set. Both methods yielded results similar to those presented in the text.

Table 1. Descriptive statistics and correlations for analysis of new area selection

	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) Area selected	0.03	0.18	1.00														
(2) Expertise in area	0.60	0.26	0.12	1.00													
(3) Not ranked in area	0.03	0.16	-0.02	-0.37	1.00												
(4) Leverage ratio	6.04	2.38	0.05	0.09	-0.02	1.00											
(5) Headcount of supplier	666.4	718.6	0.13	0.25	-0.06	0.26	1.00										
(6) No. areas London	12.53	11.22	0.11	0.07	-0.05	-0.06	0.70	1.00									
(7) No. areas provinces	9.43	11.18	0.05	0.27	-0.04	0.36	0.08	-0.37	1.00								
(8) At least one client in FTSE 250	0.88	0.33	0.07	0.14	-0.03	0.06	0.26	0.32	0.13	1.00							
(9) No. clients in FTSE 250	12.59	14.79	0.17	0.26	-0.07	0.18	0.81	0.68	0.11	0.31	1.00						
(10) Year 2003	0.37	0.48	0.02	0.03	-0.01	0.05	0.02	0.01	0.05	0.06	-0.02	1.00					
(11) Year 2004	0.40	0.49	0.00	-0.10	0.07	0.06	-0.01	-0.05	-0.01	-0.06	-0.02	-0.62	1.00				
(12) Year 2005	0.23	0.42	-0.01	0.08	-0.07	-0.12	-0.02	0.05	-0.05	0.01	0.04	-0.42	-0.45	1.00			
(13) Supplier worked for buyer the previous year	0.05	0.21	0.48	0.08	-0.02	0.04	0.20	0.17	0.04	0.08	0.26	0.00	0.02	-0.02	1.00		
(14) No. areas sold to client by focal supplier	0.07	0.36	0.43	0.07	-0.01	0.05	0.16	0.14	0.04	0.07	0.23	-0.02	0.02	0.00	0.88	1.00	
(15) Max. no. areas sold by competitor	1.42	1.33	-0.06	-0.03	0.01	-0.01	0.00	0.00	-0.02	-0.02	0.00	-0.27	0.22	0.05	0.07	0.09	1

Table 2. Analysis of new area selection

Model Method	(1) Logit	(2) Logit	(3) Logit	(4) Logit
Control variables				
Not ranked in area	0.401 [0.387]	0.244 [0.511]	0.494 [0.413]	0.322 [0.483]
Leverage ratio	0.042 [0.026]	0.036 [0.029]	0.060* [0.031]	0.064* [0.033]
Headcount of supplier	-0.000*** [0.000]	-0.000*** [0.000]	-0.000*** [0.000]	-0.000*** [0.000]
No. areas London	0.041*** [0.010]	0.038*** [0.010]	0.035*** [0.011]	0.038*** [0.012]
No. areas provinces	0.024*** [0.007]	0.021*** [0.007]	0.018** [0.008]	0.019** [0.008]
At least one client in FTSE 250	2.358*** [0.481]	2.156** [0.486]	2.177*** [0.494]	2.076*** [0.495]
No. clients in FTSE 250	0.035*** [0.006]	0.015*** [0.005]	0.009 [0.008]	0.007 [0.008]
Year 2003	-8.391*** [0.543]	-7.852*** [0.559]	-8.670*** [0.556]	-8.139*** [0.569]
Year 2004	-8.506*** [0.535]	-7.683*** [0.571]	-8.887*** [0.554]	-7.873*** [0.584]
Year 2005	-8.835*** [0.552]	-8.217*** [0.582]	-8.933*** [0.571]	-8.110*** [0.581]
Variables of interest				
Not ranked in area	0.401 [0.387]	0.244 [0.511]	0.494 [0.413]	0.322 [0.483]
Expertise in area	2.156*** [0.328]	2.442*** [0.342]	2.453*** [0.349]	2.482*** [0.354]
No. areas sold to client by focal supplier		2.255*** [0.256]		0.460** [0.218]
Max. no. areas sold by competitor		-0.918*** [0.132]		-0.983*** [0.099]
Supplier worked for buyer the previous year [H1]			3.532*** [0.196]	3.804*** [0.238]
Observations	38293	38293	38293	38293
Log pseudolikelihood	-5038	-3856	-3815	-3468

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; two-tailed tests.
Robust standard errors, clustered by supplier, in brackets.

all competitors), and that of the current supplier base (consisting only of competitors that currently serve the client). Subsequent empirical analyses apply this logic at the level of the buyer-supplier relationship, and of the supplier by considering its portfolio of client relationships.

TERMINATION OF BUYER-SUPPLIER RELATIONSHIPS

The second set of empirical analyses focuses on the determinants of relationship termination. The level of analysis is the relationship between supplier and

buyer. The theoretical argument for examining this dependent variable is that relationships that create less value relative to the others in which a supplier is engaged are more vulnerable to pressures from competitors and therefore are more likely to be terminated. The key to this analysis is to introduce explanatory variables that account for the focal firm's level of value creation relative to that of firms in the set of relevant competitors. Based on the analysis in the previous section, I define the set of relevant competitors as those with which a buyer is currently working.

Table 3. Marginal effects for selection of supplier

Panel A: Marginal effects for selected variables

Predicted probability of selection at median values		0.0079
Variable	Change in variable	Change in predicted probability
In previous year's supplier base	Zero to one (dummy)	0.2544
Expertise level	One s.d. around median	0.0052
Client-specific scope	One s.d. around median	0.0013
Competitor client-specific scope	One s.d. around median	-0.0109

Note: All other variables are held at their median. Calculations are based on estimates of Model 4 in Table 2.

Panel B: Predicted probabilities of selection in selected scenarios

Scenario	Predicted probability of selection
Median outsider	0.0076
Most competent outsider (maximum expertise level)	0.0213
Median insider	0.3464
Least competent insider (minimum client-specific scope and expertise level)	0.1733

Dataset construction and variables

I used the *Chambers Client Report* surveys to identify in which years buyer-supplier relationships were terminated. I constructed 1,878 yearly spells with 219 termination events. Terminations are observed in 2003, 2004, and 2005. For each spell, I created the following variables.

Relationship termination (dependent variable).

The dependent variable was coded 0 if a relationship was still observed the following year, and 1 if it was not.

Number of areas with superior expertise relative to the set of competitors. The variable is a count of the number of areas in which a focal supplier's level of expertise is strictly superior to that of any supplier belonging to the set of relevant competitors. This is to reflect the idea that these competitors are construed to be alternatives by the client.

Client-specific scope. This is a count of the number of areas in which the focal supplier serves the buyer.

Competitors' client-specific scope. This is the maximum client-specific scope among competitors of the focal firm that serve the buyer.

Control variables. The most important control variable is the average expertise rating within the areas a supplier sells to a client. This rating, which compares the focal supplier to all other suppliers in the market, measures the supplier's expertise relative to that of the widest set of competitors including those outside the set of relevant competitors. Variables for leverage and organizational size and scope are also included, as in the analysis in the previous section. Table 4 presents the correlations and summary statistics for all variables.

Methods and results

Relationships termination being observed annually, a discrete-time transition model (Cameron and Trivedi, 2005: 602) is appropriate. I first estimate a logistic model, allowing for a nonparametric baseline hazard by using a different intercept for each year, and use robust standard errors (Froot, 1989; Rogers, 1993; White, 1980) that are clustered at the supplier level to correct for possible heteroskedasticity and autocorrelation.¹⁰

¹⁰ Because there may be unobserved heterogeneity, making some relationships intrinsically more or less stable, I also estimated a gamma-distributed discrete time proportional hazard model (Meyer, 1990) (unreported) which produced results comparable to those given by the discrete time logit. I also used a conditional logit (unreported), with groups constituted with observations belonging to a similar firm, again showing very similar results.

Table 4. Descriptive statistics and correlations for analysis of relationship termination

	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) Client tie termination	0.11	0.32	1.00													
(2) Average expertise within relationship areas	1.67	1.03	-0.04	1.00												
(3) Leverage	6.01	2.17	0.03	-0.38	1.00											
(4) Headcount	1140.2	911.9	-0.05	0.00	0.18	1.00										
(5) No. areas in London	20.37	12.07	-0.10	0.36	-0.05	0.68	1.00									
(6) No. areas outside London	7.22	11.18	0.08	-0.66	0.38	-0.12	-0.54	1.00								
(7) No. clients in FTSE 250	26.36	18.31	-0.12	-0.01	0.07	0.69	0.67	-0.15	1.00							
(8) Year 2002	0.28	0.45	0.05	-0.11	0.06	0.02	0.03	-0.02	-0.04	1.00						
(9) Year 2003	0.35	0.48	-0.05	0.01	0.04	0.03	-0.01	-0.02	0.03	-0.46	1.00					
(10) Year 2004	0.37	0.48	0.00	0.09	-0.10	-0.06	-0.01	0.03	0.01	-0.48	-0.56	1.00				
(11) Left-censored	0.34	0.48	0.06	-0.09	0.05	0.02	0.01	-0.02	-0.06	0.86	-0.33	-0.47	1.00			
(12) No. areas with superior expertise in competitor set	0.77	0.96	-0.12	-0.21	0.07	0.16	0.05	0.14	0.22	-0.02	-0.03	0.05	-0.01	1.00		
(13) Client-specific scope (no. areas)	1.62	0.95	-0.12	-0.04	0.03	-0.01	-0.01	0.03	0.03	-0.13	0.00	0.11	-0.12	0.57	1.00	
(14) Competitor client-spec. scope (max. no. areas)	2.10	1.13	0.02	0.01	-0.06	-0.03	-0.04	0.01	-0.03	-0.19	-0.01	0.19	-0.21	0.06	0.27	1.00

Table 5. Determinants of relationship termination

Model	(1) Discrete logit	(2) Discrete logit	(3) Discrete logit	(4) Discrete logit	(5) Discrete logit
Control variables					
Avg. expertise	0.051 [0.096]	-0.011 [0.103]	0.035 [0.096]	0.055 [0.097]	0.004 [0.101]
Leverage	0.006 [0.042]	-0.007 [0.043]	0.013 [0.041]	0.007 [0.042]	0.004 [0.042]
Headcount	0.000** [0.000]	0.000*** [0.000]	0.000** [0.000]	0.000** [0.000]	0.000** [0.000]
No. areas in London	-0.005 [0.012]	-0.008 [0.012]	-0.006 [0.012]	-0.005 [0.012]	-0.006 [0.012]
No. areas outside London	0.019* [0.010]	0.022** [0.010]	0.018* [0.010]	0.020* [0.010]	0.021** [0.010]
No. clients in FTSE 250	-0.032*** [0.007]	-0.028*** [0.008]	-0.032*** [0.007]	-0.032*** [0.007]	-0.028*** [0.008]
Year 2002	-2.122*** [0.450]	-1.811*** [0.462]	-1.406*** [0.475]	-2.309*** [0.474]	-1.665*** [0.495]
Year 2003	-2.187*** [0.369]	-1.850*** [0.386]	-1.412*** [0.393]	-2.373*** [0.391]	-1.680*** [0.416]
Year 2004	-1.811*** [0.361]	-1.450*** [0.377]	-1.009** [0.396]	-2.017*** [0.404]	-1.304*** [0.432]
Left-censored	0.501* [0.282]	0.568** [0.285]	0.481* [0.283]	0.532* [0.283]	0.585** [0.288]
Variables of Interest					
No. areas with superior expertise in competitor set [H2]		-0.532*** [0.101]			-0.384*** [0.124]
Client-specific scope (no. areas) [H3]			-0.546*** [0.113]		-0.438*** [0.129]
Competitor client-spec. scope (max. no. areas) [H4]				0.074 [0.064]	0.139** [0.065]
Observations	1878	1878	1878	1878	1878
Log pseudolikelihood	-649.4	-636.0	-635.5	-648.8	-628.6

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; two-tailed tests.
Robust standard errors, clustered by supplier, in brackets.

Results of the analysis that relates added value and cross-selling to relationship termination are presented in Table 5.

Model 1 includes only control variables. Among the most notable result related to control variables is that number of clients is negatively and significantly ($p < 0.01$) related to relationship termination, which suggests that firms that have many relationships are particularly good at maintaining them. In Models 2 to 4, in which the dependent variables of interest are introduced individually, the coefficients all show the expected signs. The coefficients for both number of areas with superior expertise relative to competitor set and client-specific scope are negative and highly significant in Models 2 and 3, respectively. Maximum scope of competitors has the expected positive sign, but is

not significant in Model 4. In Model 5, which treats all variables of interest, the variables for number of areas with superior expertise in the competitor set and client-specific scope remain negative and significant ($p < 0.01$), and the coefficient on local competitor scope increases, becoming positive and significant ($p < 0.05$). Thus Hypotheses 2, 3, and 4 are supported.

To make sense of these estimates, their economic as well as statistical significance needs to be considered. The marginal effects of the theoretical variables on the predicted probability of relationship termination are shown in Table 6, panel A. The baseline yearly probability of termination, holding variables at the median, is 0.063. This suggests a relatively high level of stability

Table 6. Marginal Effects and Economic Significance

Panel A: Marginal Effects on Probability of Relationship Termination

Baseline for Dependent Variable: Predicted Probability of Relationship Termination, Holding All Variables at the Median	0.063
Variable	Change in Predicted Probability (Change of One S.D. around Median)
No. Areas with Superior Expertise in Competitor Set	-0.021
Client-specific Scope (No. Areas)	-0.023
Competitor Client-spec. Scope (Max. No. Areas)	0.009

Note: All other variables are held at their median. Calculations are based on estimates of Model 5 in Table 5.

Panel B: Marginal Effects on Profits per Equity Partner

Baseline for Dependent Variable : Mean Profit per Equity Partner ('000 GBP, 2005)	397.4
Variable	Change in PEP, as Variable Changes by One Standard Deviation
Expertise Advantage in Relevant Competitor Set	10.44
Client-specific Scope	8.90
Competitors' Client-specific Scope	-8.45

consistent with the earlier finding that clients prefer to use existing suppliers to fill new needs.

A change in the number of areas with an advantage in expertise from half a standard deviation below the median to half a standard deviation above the median, a reduction equal to one-third of the baseline probability, reduces the probability of termination by -0.021 points. The impact of a change in the number of areas sold is of the same order (-0.023). Conversely, an increase of one standard deviation in the maximum number of areas sold by competitors increases the probability of termination by 0.009 points.

Overall, the results show that variables that measure competition within the defined set of relevant competitors (i.e., those that work with the same buyer), namely, expertise and client-specific economies of scope, are both statistically and economically significant for predicting relationship termination. Variables that are not defined with regard to the set of relevant competitors performed less well in predicting tie termination. Absolute expertise, for example, does not seem to be linked to relationship termination, although we found earlier that it was related to supplier selection. In the next section, instead of individual buyer-supplier relationships we examine portfolios of

such relationships and how their characteristics affect buyer profitability.

SUPPLIER PROFITABILITY

In this section, evidence is presented at the supplier level that is consistent with the theory and findings on relationship termination. Results consistent with different dependent variables at different levels of analysis improve confidence in the empirical findings, and in this empirical setting the dependent variable closest to the construct of value capture (partner profit) is observed only at the supplier level. We thus trade a purer measure of the dependent variable for a more aggregated set of independent variables.

Dataset construction and variables

The data sources are law firms operating in the United Kingdom legal market in 2002–2005, and for supplier profitability, the British weeklies *Legal Business* and *The Lawyer*. According to Proposition 6, supplier profits vary with the weighted average of a supplier's added value with respect to each client. In this empirical analysis, I weight clients by the log of their assets, and give equal weight to each area for which a client buys services.

Profit per equity partner (dependent variable).

Because the law firms in the sample are organized as partnerships and distribute their profits (receipts from clients minus costs, including staff and associates' salaries) among equity partners, the dependent variable is the profit per equity partner (PEP). PEP is the analogue of return on equity in the context of a professional firm (Maister, 1993).¹¹ Moreover, law firms are managed by their owners, and PEP, rather than total sales or profit, is the figure owner-managers want to maximize (Müller and Wärneryd, 2001). Being, thus, the commonly employed measure of profitability within the United Kingdom and United States legal industries, PEP has been used as a dependent variable in a number of academic studies of the performance of law firms in the United States market (e.g., Kor and Leblebici, 2005), and is taken for granted by legal scholars to be the appropriate measure of profitability (e.g., Gilson and Mnookin, 1989; Samuelson and Jaffe, 1990; Henderson, 2006).¹² The variable is expressed here in thousand British pounds, and nominal monetary figures were translated into their year 2005 equivalents.

Supplier expertise relative to the set of relevant competitors. This variable aggregates the position of a supplier relative to the set of relevant competitors for each of its buyers. I computed for each supplier the proportion of areas of service provided to a buyer in which the supplier had an advantage (defined as a strictly higher capability ranking) relative to suppliers in the relevant set of competitors. In accordance to the formal framework, the next step was to weight each buyer proportional to the natural logarithm of its assets as a proxy for the amount of business the buyer represented. The final measure can take values between 0 (no superior expertise in any area of service for

any given client relative to the relevant set of competitors) and 1.¹³

Client-specific scope. For each law firm I calculated the proportion of clients for which it provided services in more than one area of law. This variable takes the value 0 if the law firm was not listed by a single client in the *Chambers Client Report* survey, and 1 otherwise.

Competitor's client-specific scope. For each law firm I calculated for the proportion of clients for which at least one supplier in the set of relevant competitors provided services in more than one area of law. This variable takes the value 0 if the law firm was not listed by a single client in the *Chambers Client Report* survey, and 1 otherwise.

I also used the following control variables in the analysis.

Supplier expertise (absolute). I controlled for effects due to variation in a firm's overall level of expertise, as distinct from variation in competitive pressure at the client level, by including a series of variables equal to the firm's average ratings in the six areas of legal expertise most mentioned by clients in the *Chambers Client Report* survey, specifically, corporate finance, property, litigation, employment, banking, and capital markets. The rankings were reversed to facilitate interpretation: higher figures correspond to higher levels of expertise.

Other control variables. Finally, I controlled, as in the previous empirical analyses, for leverage ratio, firm size, firm scope, and number of clients in the FTSE 250.

Methods and results

The 453 firm-year observations from 128 firms over four years yield an average of 3.54 observations per firm. With cross-sectional and longitudinal data, panel regression techniques can be used. I used a fixed effect regression¹⁴ with corrections for time invariant unobserved heterogeneity,

¹¹ According to Maister (1993: 31), "Profit per partner" should be viewed as the professional firm equivalent of "return on equity." The time and efforts of the partners (who have a claim on the profits of the firm) can be seen as the firm's equity investment (. . .). The total assets employed in the business are the sum of the (partner) equity investment, and the nonpartner staff, whose salaries are comparable to assets financed by debt, at a fixed interest rate.'

¹² It is possible to use firm profit instead of PEP as a dependent variable and obtain results comparable to those shown in this section. However, heteroskedasticity becomes a more pressing issue as the absolute firm profits vary with firm size, which is very widely distributed, and would require a more specific econometric treatment.

¹³ Conducting the analyses with equal weight applied to each area yielded similar results.

¹⁴ A Hausman test indicated that firm effects were likely to be correlated with the other regressors. A fixed effect estimator is consistent in this case.

and, to account for heteroskedasticity and within-group autocorrelation, robust estimates of the standard errors (White, 1980) clustered by firm (Froot, 1989; Rogers, 1993).¹⁵

Table 7 presents the descriptive statistics and correlation matrix. Inspection of Table 7 showed some variables to be highly correlated. I checked for the presence of multicollinearity and found that it was not likely to be a problem in this dataset.

Results of the regressions that analyze law firm profitability are presented in Table 8. I first ran regressions that included only control variables (Model 1), and then introduced the variables of interest sequentially before putting them together in Model 4. The variable for expertise advantage within the set of relevant competitors, introduced in Model 2, has the expected positive coefficient, but is not significant. The variable for client-specific scope, introduced in Model 3, has a positive sign and is statistically significant ($p < 0.01$). The variable that represents competitors' cross-selling has the expected negative coefficient, but the p -value does not cross the five percent threshold ($p = 0.128$).

In Model 4, which brings all the variables of interest together, the signs of the coefficient estimates are unchanged, but their absolute values increase and their significance is improved. The expertise added value variable becomes significant ($p = 0.06$) and the client-specific scope variable remains significant and below the one percent threshold ($p < 0.01$). Moreover, the significance of the variable related to competitors' client-specific scope remains below the 10 percent level ($p = 0.088$). The improved significance in this model of all three variables could be due to the combination of a positive correlation among themselves and opposites signs in the regression. For instance, the absence of the competitor cross-selling variable may result in underestimating the absolute value of other two variables. In sum, Hypothesis 6 is strongly supported, as are Hypotheses 5 and 7, albeit more weakly.

To make better sense of these results, it is useful to consider the economic significance of the estimated coefficients. Panel B of Table 6 shows the marginal effect calculations. Changes of one

standard deviation in the theoretical variables are linked to changes in the value of the profit per equity partner of between $-8,450$ GBP (Great Britain pound sterling) and $+10,440$ GBP. These are not trivial sums, although one must keep in mind that the baseline profit per equity partner is $395,000$ GBP.

Overall, these results are consistent with the theory and in line with the results of the analysis of relationship termination. The analysis at the supplier level is, however, subject to a number of limitations. First and foremost is the potential for measurement error arising from information being aggregated from lower to higher levels of analyses. It is well known that measurement errors tend to reduce the absolute value of coefficients (Hausman, 2001). Moreover, the sample is relatively small, which limits the statistical power of the analysis given the use of fixed effects. But because the theory is fundamentally about value capture, it is reassuring to find a consistent pattern when the dependent variable measures value capture (as profit per partner) directly, in contrast to variables such as relationship termination that are related to, but distinct from, value capture.

DISCUSSION

The empirical analyses suggest that, in this setting, suppliers that do not currently provide services to a buyer are at a severe disadvantage with respect to doing business with that buyer. This has implications for competition among suppliers. A supplier's most relevant competitors are those with which it shares a buyer. A competitor with average expertise that currently provides services to a common buyer represents a greater threat than a highly competent competitor not currently providing services to the buyer. The reason is that a buyer's threat to create a relationship with a new supplier is not very credible, considering that this supplier will have to incur significant set up and learning costs.

A sharply delineated set of relevant competitors has implications for our understanding of competitive outcomes. The empirical analyses of both relationship termination and supplier profitability suggest that expertise advantage relative to the set of relevant competitors matters more to value capture than expertise advantage relative to all competitors in the market. Keeping everything else constant, a

¹⁵ An alternative estimation (unreported) with panel corrected standard errors to account for potential autocorrelation, and including fixed effects, produced coefficients of similar signs and comparable magnitude but with narrower standard errors.

Table 7. Descriptive statistics and correlations of analysis of profit per equity partner

	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) Profit per equity partner	397.4	247.5	1.00															
(2) Leverage	5.6	2.64	0.08	1.00														
(3) Headcount	368.0	512.6	0.22	0.17	1.00													
(4) No. clients in FTSE 250	6.35	11.1	0.33	0.09	0.81	1.00												
(5) At least one client in FTSE 250	0.74	0.44	0.09	0.02	0.25	0.34	1.00											
(6) No. of areas of law practiced in London	9.01	10.1	0.28	-0.02	0.73	0.75	0.32	1.00										
(7) No. of areas of law practiced outside London	6.23	8.54	-0.36	0.24	0.05	0.06	0.16	-0.21	1.00									
(8) Corp. finance	0.43	0.36	0.06	0.11	0.45	0.54	0.44	0.34	0.41	1.00								
(9) Property	0.41	0.36	-0.09	0.11	0.44	0.47	0.37	0.3	0.47	0.72	1.00							
(10) Litigation	0.41	0.35	-0.14	0.08	0.44	0.45	0.38	0.26	0.55	0.71	0.77	1.00						
(11) Employment	0.33	0.35	-0.11	0.10	0.36	0.4	0.29	0.29	0.36	0.58	0.58	0.64	1.00					
(12) Banking	0.29	0.35	0.06	0.09	0.45	0.46	0.35	0.28	0.38	0.73	0.6	0.62	0.56	1.00				
(13) Capital markets	0.08	0.2	0.56	-0.03	0.66	0.61	0.12	0.53	-0.27	0.25	0.13	0.14	0.13	0.29	1.00			
(14) Added value form expertise	0.23	0.32	-0.03	0.03	0.35	0.46	0.43	0.21	0.34	0.63	0.55	0.58	0.49	0.62	0.15	1.00		
(15) Gross selling	0.09	0.18	0.02	-0.01	0.10	0.13	0.3	0.09	0.05	0.20	0.18	0.14	0.17	0.21	0.03	0.19	1.00	
(16) Competitors cross selling	0.27	0.33	0.09	-0.06	0.04	0.08	0.49	0.09	0.09	0.16	0.06	0.14	0.16	0.12	0.07	0.19	0.19	1.00

Table 8. Analysis of Supplier Profitability

Model Method	(1) Fixed Effects	(2) Fixed Effects	(3) Fixed Effects	(4) Fixed Effects	(5) Fixed Effects
Control Variables					
Leverage	8.327 [5.660]	8.437 [5.645]	8.352 [5.665]	8.541 [5.664]	8.816 [5.643]
Headcount	0.001 [0.081]	0.000 [0.080]	0.003 [0.081]	0.002 [0.081]	0.004 [0.078]
No. Clients in FTSE 250	-2.322 [1.867]	-2.403 [1.878]	-2.035 [1.945]	-2.434 [1.841]	-2.245 [1.950]
At Least One Client in FTSE 250	-23.883 [27.183]	-26.787 [28.208]	-26.343 [27.145]	-13.768 [25.796]	-20.884 [26.892]
No. of Areas of Law Practiced in London	1.797 [1.910]	1.890 [1.911]	1.802 [1.899]	1.969 [1.866]	2.179 [1.842]
No. of Areas of Law Practiced outside London	1.517 [3.548]	1.563 [3.548]	1.792 [3.585]	1.677 [3.512]	2.131 [3.562]
Corp. Finance	19.833 [26.321]	19.614 [26.631]	15.190 [26.131]	15.998 [25.984]	9.226 [25.732]
Property	34.593 [30.737]	33.410 [30.929]	37.389 [31.052]	28.371 [30.161]	28.675 [30.842]
Litigation	18.974 [23.119]	17.297 [23.257]	20.750 [23.196]	11.981 [23.585]	9.956 [23.671]
Employment	38.607** [16.785]	38.243** [16.518]	39.603** [16.895]	38.551** [16.722]	39.090** [16.410]
Banking	3.007 [32.900]	2.998 [33.288]	-2.638 [32.954]	7.694 [33.253]	1.335 [33.479]
Capital Markets	65.189 [113.560]	63.607 [114.074]	68.119 [113.044]	68.324 [111.782]	69.419 [111.318]
Theoretical Variables					
Expertise Advantage in Relevant Competitor Set [H5]		17.240 [16.473]			32.920* [17.216]
Client-specific Scope [H6]			38.742*** [14.275]		48.294*** [15.703]
Competitors' Client-specific Scope [H7]				-22.654 [14.801]	-26.007* [15.105]
Firm Effects	YES	YES	YES	YES	YES
Year Effects	YES	YES	YES	YES	YES
Observations	453	453	453	453	453
R-squared (Total)	0.97	0.97	0.97	0.97	0.97
Number of Firms	128	128	128	128	128

Robust standard errors, clustered by suppliers, in brackets
 ***p < 0.01, **p < 0.05, *p < 0.1; two-tailed tests

moderately expert supplier competing directly with weak suppliers is better off than a highly expert supplier competing directly with similarly expert suppliers.

In the same vein, the analyses suggest that drivers of value creation that pertain to the level of the client relationship matter for value capture. Broader client-specific scope facilitates a focal supplier's value capture, but negatively affects competitors' ability to capture value. Buyers can use the higher value creation that attends a supplier's broader client-specific scope as a threat when negotiating with other suppliers.

These findings speak to theories of competitive advantage. The RBV has relied on the concept of Ricardian rent to explain the link between heterogeneity in value creation and heterogeneity in value capture (Peteraf and Barney, 2003). The findings reported in this paper suggest that defining the set of relevant competitors is crucial to accurately mapping value creation to value capture. An important implication is that returns to resources and capabilities might differ within the same market. If sets of relevant competitors are small and sticky, returns from similar resources and capabilities might be quite different in the face of different sets of competitors. This is consistent with models that suggest that frictions in the product market, such as strong client relationships, matter for understanding investments in capabilities and the origin of firm heterogeneity (Chatain and Zemsky, 2009). More generally, this suggests that to understand the returns from capabilities and resources, it might sometimes be necessary to account explicitly for heterogeneity in competition in addition to heterogeneity in capabilities. From a structure-conduct-performance perspective (Porter, 1980), the market studied in this paper presented a puzzle in that it combines low concentration and what seems to be high profitability. Here the puzzle is solved by recognizing that instead of a large market with many buyers and suppliers, there are large numbers of smaller competitive arenas isolated by significant barriers to entry.

The theory and operationalization in this paper were driven by concepts from value-based strategies (Brandenburger and Stuart, 1996, 2007), most notably the concept of added value. The paper speaks to this stream of research by being an example of how applied models in this line of work (e.g., Chatain and Zemsky, 2007; Ryall and

Sorenson, 2007) can be adapted and used to provide insights into the design of empirical work (see also, for instance, Adegbesan and Higgins, 2009). The applicability of these methods can, hence, be broadened to include models geared to help refine empirical work as well as models that have purely theoretical objectives. This seems especially promising in relationship to the RBV. The detailed understanding of firm heterogeneity from the RBV can be combined with the fine-grained analysis of competition to be found in the cooperative game theory models proposed by the value-based approach.

These findings are also of interest to research concerned with buyer-supplier relationships, as they suggest that a supplier's ability to capture value from relationships depends not only on its own characteristics (e.g., level of expertise) but also on how its clients exploit competition (Baker, 1990), as by choosing suppliers based not only on their intrinsic competencies but also on the competition they provide to others. This represents one of many ways in which relationships with buyers influence performance, a question of great interest to strategy scholars (e.g., Dyer and Singh, 1998; Levinthal and Fichman, 1988; Martin *et al.*, 1998; Mitchell and Singh, 1996).

This study also has relevance for social network studies. The situation of a buyer playing different suppliers against one another and an agent benefiting from being positioned in a structural hole (Burt, 1992) are analogous. Like brokers in a structural hole, buyers with access to other suppliers offering superior alternatives gain an advantage over a single supplier. This mechanism closely resembles the control benefits that emanate from structural holes; here, the *tertius gaudens* is the buyer that plays one supplier against another, very much in the same vein as in Simmel's original formulation of the concept (Simmel, 1950: 156). This study also emphasizes a related but different aspect. In this paper, the individual characteristics (value creation ability, generic and client-specific) of the nodes of the network matter for determining the extent of the benefits that accrue to a central position. For a buyer, the value of a tie to a supplier can depend on the characteristics of the focal supplier and other suppliers. However, the theory presented in the paper does not rely on the benefits that structural holes may provide in terms of superior access to diverse information sources as also emphasized by Burt (1992). Moreover,

the paper examines a two-mode network (buyers and suppliers) that precludes direct ties among agents of the same category, which, by assumption, creates structural holes. The study reported in the paper also highlights the role of relationship multiplexity, that is, the existence of multiple ties between actors (Gimeno and Woo, 1996a), of which client-specific scope is an instance, as relationships between buyers and suppliers can span multiple areas. Finally, this paper examines a form of power dependence among actors within the same industry in a way that is related to studies of power dependence across industries (e.g., Piskorski and Casciaro, 2006).

How generalizable are these findings beyond the United Kingdom corporate legal market? The question of how value is shared between buyers and suppliers is not specific to law firms, but concerns virtually all business-to-business markets. Similarly, although client-specific economies of scope are especially salient in professional service markets, they feature equally in some industrial business-to-business markets. These considerations suggest that the results of this research apply well beyond the confines of the United Kingdom corporate legal market.

A number of assumptions made in this work could be relaxed in future research. This line of inquiry could be pursued, for example, in connection with exploration of the process by which buyers and suppliers are matched. Recent research in this area suggests interesting directions. Anand and Galetovic (2006) argue that high value clients connect with highly skilled suppliers of services to create strong relationships, whereas lower value clients and suppliers engage in a transactional market. Further work could explicitly account for the endogeneity of the matching between buyers and suppliers.

In conclusion, this research provides evidence that competition affects the outcome of value sharing between buyers and suppliers of legal services in the United Kingdom. It shows that both firm capabilities, in the guise of legal expertise and client-specific scope economies and competition within a set of relevant suppliers, are among the factors that make client-supplier relationships more or less valuable to suppliers. The findings have implications for our understanding of competition in vertical relationships, and also provide evidence that concepts from formal models of strategy can be successfully applied in empirical studies.

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APPENDIX 1: MODEL ASSUMPTIONS

Per cooperative game theory terminology (see, for instance, Myerson [1991]), the characteristic function v maps sets of players to the value they can create together. This function is assumed to be super modular, that is, adding players cannot reduce the value created.

Assumption 1 (A1):

The set of players N can be split into two, nonempty, disjoint sets S and B , such that

$$v(S) = 0 \text{ and } v(B) = 0.$$

Assumption 2 (A2):

$$v(N) = \sum_{j \in B} v(\{j\} \cup S)$$

Assumption 2 states that the ability of suppliers to create surplus with a given buyer is independent of the surplus created with other buyers.

Assumption 3 (A3):

If $s' \subset s \subseteq S$ then $AV_i(\{j, s\}) \leq AV_i(\{j, s'\})$
for all $i \in s'$ and $j \in B$.

Assumption 3 means that adding suppliers cannot increase the added value of any supplier.

APPENDIX 2: PROOFS

Proof of Proposition 1: The focal supplier’s added value is determined by the next best alternative available to the client. This alternative is either the best supplier with a current relationship, excluding the focal supplier, or the best supplier without a current relationship. It is the best supplier with a current relationship rather than a supplier without a relationship if and only if:

$$\max_{k \in S^R} (E_k + C_{kj} + \Delta R) > \max_{l \in S^N} (E_l + C_{lj})$$

This is equivalent to the condition:

$$\Delta R > \max_{l \in S^N} (E_l + C_{lj}) - \max_{k \in S^R} (E_k + C_{kj})$$

Proof of Corollary 2: Define $T = \max_{l \in S^N} (E_l + C_{lj}) - \max_{k \in S^R} (E_k + C_{kj})$. By Proposition 1, if $\Delta R > T$,

then the next best alternative to the focal supplier belongs to S^R . Hence, the added value of a supplier is entirely determined by the value creation of suppliers belonging to S^R .

Proof of Proposition 3: Assume that firms in the buyer’s current supplier base can create an excess ΔR in value on top of a baseline R that is shared by all suppliers, and identical across areas.

Holding the current supplier base constant, suppliers with higher added value are more likely to agree to work in a new area because they can expect to capture more value. Conversely, a buyer will prefer to work with a supplier with the highest added value because the value appropriated by the buyer is equal to the value created by the next best supplier plus a share of the supplier’s added value. Moreover, in this situation, choosing a supplier with the highest added value is equivalent to choosing a supplier with the highest value creation.

Denote $V_{ij}(b)$ the incremental value created by a supplier when area b is added to its portfolio of activities. We have $V_{ij}(b) = (E_{ib} + R + 1_{i \in S_j^c} \cdot \Delta R + \Delta C_{ijb} + v_{ijb})$, where ΔC_{ijb} is equal to $C(A_{ij} \cup \{b\}) - C(A_{ij})$, the increment in client-specific scope economies due to the addition of area b to the supplier’s current portfolio A_{ij} and $1_{i \in S_j^c}$ equal to one when i is part the set S_j^c of current suppliers of client j and zero otherwise. The probability that supplier i creates the highest amount of value in area b for supplier j is:

$$\begin{aligned} & \Pr(V_{ij}(b) > V_{kj}(b), \forall k \neq i) \\ &= \Pr(E_{ib} + R + 1_{i \in S_j^c} \cdot \Delta R + \Delta C_{ijb} \\ & \quad + v_{ijb} > E_{kb} + R + 1_{k \in S_j^c} \cdot \Delta R + \Delta C_{kjb} \\ & \quad + v_{kjb}, \forall k \neq i) \\ &= \Pr(v_{kjb} - v_{ijb} < E_{ib} - E_{kb} + \Delta C_{ijb} \\ & \quad - \Delta C_{kjb} + 1_{i \in S_j^c} \cdot \Delta R - 1_{k \in S_j^c} \\ & \quad \cdot \Delta R, \forall k \neq i) \end{aligned}$$

This probability is increasing in $1_{i \in S_j^c} \cdot \Delta R$. Thus, belonging to S_j^c increases the probability of creating the largest amount of value for the seller, which is the probability of being selected.

Proof of Proposition 4: See Stuart (2004, Lemma 1) or Chatain and Zemsky (2007, Proposition 1).

Proof of Corollary 5: See Chatain and Zemsky (2007, Corollary 1).

Proof of Proposition 6: Assume that supplier i has an alternative opportunity that allows the capture of the amount OP_i of value should it terminate the relationship. Denote G the cumulative distribution function of the ε_{ijt} . Supplier i stays in the current relationship as long as:

$$\Pr(\Pi_{ijt} > OP_i) = 1 - G(OP_i - \alpha_i AV_{ijt} - \mu_{ij})$$

As G is monotone increasing, this probability is monotone decreasing in AV_{ijt} .

Proof of Proposition 7: Denote as B_{it} the set of buyers that use supplier i in period t , and w_{jt} the size of the engagement for each supplier. A simple accounting identity relates client-level actual profitability Π_{ijt} to supplier total profitability Π_{it} :

$$\Pi_{it} = \sum_{j \in B_{it}} w_{jt} \Pi_{ijt}$$

To express this identity in terms of added value, we need to be able to decompose a supplier's added value into the added value calculated at each buyer level. Assumption (A2) allows us to do this because it implies that added values determined at the client level are independent from each other. Therefore:

$$\begin{aligned} \Pi_{it} &= \sum_{j \in B_{it}} w_{jt} \Pi_{ijt} \\ &= \sum_{j \in B_{it}} w_{jt} [\alpha AV_{ijt} + \mu_{ij} + \varepsilon_{ijt}] \\ &= \sum_{j \in B_{it}} \alpha w_{jt} AV_{ijt} + \sum_j \mu_{ij} + \sum_j w_{jt} \varepsilon_{ijt} \end{aligned}$$

This implies that the profits of supplier i vary with $\sum_{j \in B_{it}} \alpha w_{jt} AV_{ijt}$.