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## Strategic Assets as Determinants of Equity Share Contributions in Joint Ventures: a Collateral-Based Theory of Financial Contracts

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# Strategic Assets as Determinants of Equity Share Contributions in Joint Ventures: a Collateral-Based Theory of Financial Contracts*

**Manchester Metropolitan University Business School Working Paper 06-04**

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## ABSTRACT

Prior research over several decades has catalogued many factors underlying firm's equity participation in joint ventures. This analysis empirically investigates whether agency problems associated with monitoring specialized activities influence the negotiated distribution of equity between collaborating partners at the inception of an equity joint venture (EJV). The proposed framework modifies a financial contracting perspective based upon agency theory and draws on existing theories of EJVs; namely, transaction cost economics, bargaining power and resource-based theory. The central contention is that a primary determinant of the division of equity capital is the requirement for each contracting partner to guarantee its subsequent value-enhancing productive activities that jointly determine the future success of the EJV. Specifically, it is argued that the inherent characteristics of the expertise and/or nature of the strategic assets that a firm contributes to an inter-firm EJV may make it difficult for that firm to guarantee (*ex ante*) its productive contribution during the negotiation stage. Results from a sample of 194 UK-based EJVs support the view that owners of strategic assets whose potential contribution to the success of the EJV are the most difficult to measure *ex ante* will negotiate a higher share of equity capital, thereby, partially, guaranteeing their actions.

Keywords: equity joint ventures, strategic assets, financial contracting, equity capital, collateral, monitoring.

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## 1. Introduction

Within agency theory an important debate has recently emerged on the primary determinants of a firm's alliance decisions. Whilst some commentators emphasize the importance of variables at the transaction level of analysis (Oxley 1997; Dyer and Singh 1998; Koza and Lewin 1998), others point to the neglect of firm-level theories in the collaborative strategy literature (Eisenhardt and Schoonhoven 1996; Dutta and Weiss 1997; Ramanathan *et al.* 1997). The latter maintain that the uncertainty surrounding co-operation among partners (Child and Rodrigues 2004) should be a primary area for analysis. Ramanathan *et al.* (1997) are forceful advocates of the need for greater theoretical pluralism in the existing EJV literature. In particular, they make the case for the use of agency theory and other related perspectives that are able to identify firm-level factors that may have an impact on joint venture formation, but that have been overlooked in the extant literature.

There is also a substantial amount of research devoted to theories of EJVs based on transaction cost economics, bargaining power and resource-based theory (Lecraw 1984; Gomes-Casseres 1988, 1989, 1990; Blodgett 1991; Hennart 1991; Gary and Yan 1992; Pan 1996; Brouthers and Bamossy 1997; Chadee and Qiu 2001). Given this substantial research base, the specific purpose of this paper is to offer a rationale for the empirical analysis of agency hazards that arise from difficulties in measuring the value-adding activities of partners and equity participation within the context of joint ventures. In this vein, as the EJV partners usually contribute complementary tangible and intangible assets to the collaboration, they, in effect, become agents for each other in ensuring its viability (Child and Rodrigues 2003). However, the mutual threat of opportunistic behaviour arising from environmental uncertainty, the principals' monitoring costs, self interest and any inconsistencies in, or conflicts over, the EJV's goals will create agency problems (Eisenhardt 1989; Bergen *et al.* 1992; Stump and Heide 1996; Reuer and Miller 1997). This paper maintains that the perceived problems that are associated with

opportunism will influence the governance arrangements in EJVs. In short, these problems will be reflected in the initial contractual specifications of the partners' shares of equity capital.

The approach developed in this analysis contributes to recent debates in the strategy and finance literature (Lane *et al.* 1998, 1999; Amihud and Lev 1999; Denis *et al.* 1999) in relation to the explanatory power and appropriate domain of agency theory. Moreover, while prior empirical studies apply agency theory to corporate strategy or investigate corporate diversification in general, and/or acquisitions as a particular form of external corporate development, such research does not examine the specific role of strategic assets or the contractual provisions governing the EJV relationship that help to guarantee the value-enhancing productive activities of partner firms.

The theoretical links between agency problems that are created by difficulties in monitoring the actions of the owners of such specialized resources, and the negotiated equity contribution of partners to an EJV are considered. Barzel and Suen's (1992) and Fama's (1980) definition of a 'firm' is extended to an EJV. That is an EJV comprises the set of contracts whose variability is contractually guaranteed by equity capital, weighing each contract by the share of its variability that is assumed by the equity capital. The EJV, therefore, incorporates a nexus of outcome guarantees. This definition enables a distinction to be drawn between equity ownership and control of EJV. Barzel and Suen, (1992, 1997) and Grossman and Hart (1986) maintain that, when analysing inter-firm collaboration, such as an EJV, the greater the difficulty in measuring one firm's contribution to the value of output with respect to the other, the greater the opportunity for the former to engage in opportunistic behaviour. In order to maximize the value of such collaborations, financial contracting theory demonstrates that, as a firm's inclination, to affect the outcome rises, such a firm should be contractually allocated more of the variability of the joint action (Hart 1995). The term inclination indicates a firm's actions given its assets, skill and most importantly, the contractual constraints it faces. In this context, bearing outcome

variability is analogous to having a claim to the equity residual, and is tantamount to a firm guaranteeing its own actions.

This paper examines whether agency theory can be applied as a firm-level perspective to help explain the negotiated division of equity capital between partners in EJVs. The central contention here is that a primary determinant of the division of equity capital is the requirement for each contracting partner to guarantee its subsequent value-enhancing productive activities that collectively determine the future returns to the EJV. Specifically, it is argued that the inherent characteristics of the expertise and/or nature of the strategic assets that a firm contributes to an inter-firm EJV will often make it difficult for that firm to guarantee *ex ante* its future productive contribution during the negotiation stage. The EJV's commitment to co-own the venture in accordance with the negotiated equity share provides a mechanism for distributing residuals when complex *ex ante* contractual agreements cannot be written to specify or enforce a division of returns accurately reflecting a firm's value-enhancing contribution (Teece 1992). Thus, negotiating equity shares can be interpreted as a mechanism that provides a contractual manifestation of the EJV partners' arrangement for mitigating opportunism. The proposed framework is tested empirically, and corroborated by analysing a sample of 194 partner firms from EJVs located in the UK. However, it should be noted that the theoretical foundations in this paper could apply equally to domestic EJVs.

The remainder of this paper is structured as follows. Section 2 outlines why both the strategic resources of the firms and their position in the value chain would have an effect on equity participation shares of the EJV partners and specifies the hypotheses. Section 3 discusses the empirical proxies used to measure the extent of strategic asset contribution and the other firm-level factors that may influence the equity contribution of an EJV partner. Section 4 sets out methodology, data source and sample. The empirical results are discussed in Section 5, and Section 6 concludes.

## 2. The Determinant of Equity Contribution

*2.1 Strategic Assets and Equity Guarantees*

Resource-based theory stresses the importance of the unique and inimitable characteristic of assets (resources, skills, relationships and investment) as the primary sources of a firm's competitive advantage (Lippman and Rumelt 1982; Montgomery and Wernerfelt 1988; Prahalad and Hamel 1990; Barney 1991; Rumelt 1991; Peteraf 1993; Tsang 2000; Luo 2002). Assets specifically tailored to the firm's strategy and technology can reduce costs, improve quality and enable the firm to differentiate its products and services from those of its competitors. These specific assets, especially intangible assets, such as R&D, brand names and other reputational investments, are difficult for outsiders to measure and evaluate. It is well documented that these assets are also less 'redeployable' to other uses than general purpose assets, and secondary markets for such assets may not value them as much as the original firm, and may not even exist (Williamson 1975, 1985; Klein *et al.* 1978).

Resources may also be valuable as they arise from complex and ambiguous processes that are difficult, even for insiders, to identify. Moreover, these so-called opaque resources are also difficult to manage because the input they provide is only partially controllable and verifiable. Opaque assets are a class of productive assets that due either to their nature or to the owning firm's actions, possess a value that cannot be easily measured as a result of relevant information not being communicated or difficulty in outsiders imitating their contribution (Vicente-Lorente 2001). Therefore, it is not only the valuation of these assets that creates measurement costs to a potential EJV partner of such a firm, but also the transferability/transparency of such assets. Asset specificity and/or opacity are important because of their impact on the efficiency of alternative governance structures and the threat of opportunism. Opportunism occurs because firms may have difficulty writing complete contracts or evaluating the performance of partner resources (Williamson 1991)**.** Transaction cost economics (TCE) maintains that contractual incompleteness exposes parties who invest in

relationship-specific assets to potential opportunism (Williamson 1975, 1985, 1995; Klein *et al.* 1978; Grossman and Hart 1986; Hart and Moore 1990). If circumstances change, their trading partners may try to expropriate the rents accruing to the specific assets. One way to safeguard those rents is through integration, whereby partners merge and eliminate adversarial interests. Less extreme options include reciprocal buying arrangements in which each party agrees to a mutual exchange of 'hostages' and initiating shared ownership agreements such as EJVs. TCE argues that firms may resort to equity-based agreements in order to economize on transactions costs when there is non-negligible risk of opportunism (Hennart 1988; Kogut 1988; Williamson 1991). Accordingly, authors inspired by TCE contend that equity-based institutional forms are more suited to complex alliances (that is, those that link together several partners and/or have broad scope in terms of their product, technology, or activity) and for alliances that have a technological component. With respect to this latter category of alliances, equity modes are alleged to allow firms to deal more effectively with contractual and appropriability hazards inherent in the development, transfer, and exploitation of technological knowledge, due to the incentive alignment properties of shared ownership (the superior monitoring and control mechanisms). Previous empirical studies generally lend support to such a perspective (Pisano *et al.* 1988; Pisano 1989; Osborne and Baughn 1990; Gulati 1995; Garcia Canal 1996; Oxley 1997; Gulati and Singh 1998; Oxley 1999). This paper complements those studies by focussing upon the costs of monitoring the input contribution of EJV partners in the presence of strategic assets. This is then used as a basis for predicting their respective equity contributions.

From the above, it is reasonable to infer that if the measurement of the value of a strategic asset in a particular use is problematic, providers of such assets in the EJV may become residual claimants to the value of the activity to guarantee their actions. This equity capital guarantee will then serve as a partial inducement to the EJV partner to undertake an alliance. Moreover, the analysis predicts that an efficient EJV contractual format will allocate a relatively smaller equity share to that partner (i) whose assets are less strategic in nature, or (ii) can more

easily and cost-effectively guarantee its productive contribution to the value of EJV, owing to the fact its asset contribution is more tangible and easily measurable.

*2.2 Location in the Value Chain, Measurement and Contracting*

Another consideration relevant to the contractual relationship is the position of the partners in the value chain. One of the central and most investigated proposition in TCE concerns a class of adaptation problems resulting from the potential for hold-up in vertical relationships (Shelanski and Klein 1995; Masten 2002; David and Han 2004). When procurement must be supported by dedicated (relationship-specific) investments, the anticipated costs of the transaction increase. This is because dedicated investments by one partner create scope for the other to renegotiate the contract opportunistically when circumstances change. By organizing such transactions under common ownership, muted incentives, enhanced monitoring, and the threat of sanctions can limit opportunistic behaviour and can facilitate co-operative adaptation (Williamson 1985).

Baker *et al.*'s (2002) analysis of relational contracting shows how and why vertical relational contracts within firms differ from those between firms (non-integration). They argue that the downstream party would like the upstream firm to undertake actions that improve the value of the good in the downstream production process, and focus on two classes of actions: those that are unobservable (moral hazard) and those that are observable, but not verifiable (non-contractibility). In such a setting, relational contracts can encourage value-enhancing actions: the downstream party can promise to pay the upstream party a 'bonus' if the latter produces a good of high quality. As this promise is based on non-contractible outcomes, it provides incentives to the upstream party only if it is self-enforcing (that is, the short-run value of reneging must be less than the long-run value of the relationship). Given conflicting incentives (resource and bargaining position)**,** Baker *et al*. (2002) argue that asset ownership affects the partners'

temptation to renege on a contract, and hence affects the best relational contract the partners can sustain.

Under integration, if the downstream party reneges on the bonus, they still own the good. But under non-integration, if the downstream party reneges on the bonus, they cannot use the good without buying it for at least its value in its alternative use. Non-integration will give the upstream party more resources if the downstream party reneges on the promised bonus. But non-integration has a drawback: it creates an incentive for the upstream party to increase the value of the good in its alternative use, in order to improve their bargaining position with the downstream party. The underlying point is that the upstream party can be incentivized more easily than the downstream party via contracts or *ex-post* measurement. It is argued here that this phenomenon also has implications for the contractual relationship between partners in a vertical EJV. The downstream party performs second and, therefore, is better positioned to measure the output quality of upstream party which is performing first. Therefore, the downstream partner would be expected to provide a larger share of equity capital, as it must guarantee its own actions.

The central proposition here maintains that the extent to which each partner is required to provide equity capital-related guarantees at the contractual formation stage of an EJV will be determined by both the strategic nature of their asset contribution and their location in the value chain. This generates the complementary sets of testable hypotheses, outlined below.

*H1a. A partner firm in an EJV will have a larger share of the equity capital, as the relative specificity and/or opacity (strategic nature) of the assets contributed by that firm increases.*

*H1b. Given a firm's strategic asset contribution to a vertical EJV in relation to that of its partner, a firm will have a larger share of the equity capital if it is downstream than if it is upstream.*

*H2a. A partner firm in an EJV is more likely to contribute a smaller share of the equity capital, as the tangibility (collateral value) of that partner's assets increases.*

*H2b. A downstream partner firm in a vertical EJV is more likely to contribute a larger share of the equity capital for a given degree of tangibility of that partner's assets in relation to the assets of the upstream partner firm.*

## 3. The Empirical Measurement of Strategic Assets

Testing the hypotheses outlined above requires the construction of proxies for an EJV partner's strategic assets that are amenable to data analysis. Drawing on previous studies, this paper initially proxies the specificity and/or opacity of assets using two variables; namely the ratio of R&D expenses to total sales (RDS) and the ratio of cost of sales to total sales (SES). Previous studies use R&D intensity as a proxy for intangible assets which are assumed to be more strategic in nature than tangible assets (Bradley *et al.* 1984; Titman and Wessels 1988; Balakrishnan and Fox 1993; Vicente-Lorente 2001). The ratio of advertising expenses to net sales has also been used as a proxy for firm-specific assets (Titman and Wessels, 1988; Bradley *et al.* 1984). Titman and Wessels (1988) also include the quit rate, and the percentage of the industry's total work force that voluntarily left their jobs in the sample years. However, it has not been possible to obtain data for advertising expenses or quit rates for all the firms in the sample. As the hypotheses predict an increased probability of an enhanced equity contribution as the specificity and/or opacity of the assets contributed by a partner increases, a positive sign on these variables in the ensuing multinomial logit regressions is expected. This reflects the maintained hypothesis; namely, that equity serves as a performance guarantee when a partner's productive efforts cannot be measured easily. It is, however, noted that employing the variable SES in the regressions as a proxy for strategic assets generates no statistically significant results.

Therefore, the estimates are not reported. (They can, however, be obtained from the corresponding author on request.)

Among the measures used to proxy specific human capital (SHC), employee turnover and tenure have often been previously employed in the literature (Titman 1984; Titman and Wessels 1988). Tenure is discarded because an aggregate measure of human capital per firm is needed. The turnover per employee is calculated as the ratio of total sales to the total number of employees. This proxy is used as a measure of the productive efficiency of the firm, with more productive firms postulated to have more specific human capital. Once again a positive relationship with equity share is expected as it captures another difficult to measure strategic asset and, therefore, increases the likelihood of a larger equity contribution.

The proxies for the tangibility of assets incorporate the results of Balakrishnan and Fox (1993), Titman and Wessels (1988). Much empirical research on capital structure considers that tangible assets serve as collateral, enabling their owner firms to obtain better credit conditions from lenders. In addition, the extent of tangible assets appears to be negatively related to liquidation costs (Alderson and Betker 1996). The analysis incorporates two indicators for the collateral value attribute (Bradley *et al.* 1984; Titman and Wessels 1988; Harris and Raviv 1991; Rajan and Zingales 1995). These are the ratio of fixed assets to total assets (TAS) and the ratio of gross plant and equipment to total assets (GPQ). In calculating the variable GPQ, the inventory cost is omitted from the estimation due to the unavailability of relevant data for firms in the sample. The expected sign for these variables is negative, indicating an inverse relationship between the tangibility of assets and the extent of equity contribution.

In addition, the debt/equity ratio of the firm relative to its respective industry average is considered. Debt/equity ratios for an industry are obtained, given its four-digit SIC code, from the industry review section of Investor Reuters Database. (In the few instances where there was no exact industry match on the database for the firm's four-digit SIC code, the most suitable substitute was used. This took into account, first, the three-digit SIC code and, if there was still

no match, the two-digit SIC code.) The importance of this industry ratio for the analysis is that it is necessary to control for the influence of variation in the technical dependence on strategic assets for firms across different industries as a determinant of EJV equity shares. The debt/equity ratio for the firms is calculated using the accounting definition; namely, the ratio of the book value of total debt to the book value of total debt plus the market value of equity. The expected sign for this variable in the regressions is negative suggesting highly leveraged partner firms are also likely to contribute less of the equity capital in EJVs. This follows the high levels of debt in the capital structure of the firm suggest use of collateral to obtain lower premium to service the debt and to reduce the cost of borrowing.

To control for the measurement impacts and opportunistic potential of a firm's relative position in the value chain, a distinction is drawn in the empirical work between horizontal and vertical EJV. If EJV partners are in different lines of business, making complementary inputs (vertical) to the venture, it is contended above that it is easier, relatively, to incentivize the upstream firm through contractual provisions and post-production measurement of their contribution to value added. This reduces the necessity for upstream partner firms to provide an equity-capital guarantee. For empirical implementation, the upstream/downstream distinction for vertical EJVs is achieved by grouping the firms into their respective industries given their four-digit SIC codes, and comparing the second digit of their respective codes. If that code differs (is identical) the EJV is designated to be a vertical (horizontal) EJV. For example an EJV between a UK firm with an SIC code of 4813 'telephone communications' and a foreign firm with SIC code of 4911 'electric services' is considered to be a vertical EJV. However, an EJV between a UK firm with a SIC code of 3674 'semiconductors and related devices' and a foreign with a SIC code of 3661 'communication equipment' is an example of a horizontal EJV. In order to test hypotheses 1b and 2b, the dummy variable UPS is constructed. The set of EJV partners forming vertical relationships is considered, and, on the basis of the SIC codes of each partner, it is possible to determine which partner performs first in the chain of production. A dummy variable

UPS is then allocated, designated 1 for downstream partners and 0 otherwise. The predicted sign for this variable is positive indicating that downstream partner is likely to contribute a larger share of the equity capital, *ceteris paribus*. Overall, it is both the location of a partner in a vertical EJV, as well as their asset characteristics that determines the level of equity contribution by that partner.

### *3.1 Other Factors Influencing the Equity Contribution*

This section outlines the controls – that is, other firm-level factors that may influence equity shares – that are used in this study to avoid unwarranted attribution of equity share determinants to strategic assets. With reference to the financial economics literature, a number of potential firm-level drivers are specified that are highlighted in this literature as important determinants of capital structure and the mode of financing. These factors, their expected sign, and the empirical measures used here, which have been determined on the basis of the referenced prior literature, are:

- Dependency on external finance, EXFN, (+). The literature specifies technological reasons why some industries depend more on external financing than others. EXFN is defined as the ratio of capital expenditure minus cash flow from operations to capital expenditure (Rajan and Zingales 1998). Note that this definition includes changes in the non-financial components of net working capital as part of funds from operations. In fact, in certain businesses these represent major sources (or uses) of funds that help a firm avoid (or force it to tap) external sources of funds.
- Non-debt tax shields, NDTX, (-). Non-debt tax shields are associated with capital equipment and depreciation and are a potential indicator of non-strategic resources. NDTX is measured by the ratio of depreciation to total assets (DeAngelo and Masulis 1980; Titman and Wessels 1988).

- Future growth potential, GRT, (+). Growth options are capital assets that add value to a firm, but can not be easily collateralized. As firms generally engage in R&D to generate future investment and growth options, the ratio of R&D to net sales also serves as an indicator of growth potential. GRT is proxied by the ratio of capital expenditure to total assets (Bhandari 1983; Titman and Wessels 1988; Fama and French 1992; Rajan and Zingales 1995).
- Firm size, LSAL, (-). Size considerations mainly impact smaller firms and leverage ratios appear to be (inversely) related to firm size. LSAL is defined as the natural logarithm of sales (Warner 1977; Ang *et al.* 1982; Titman and Wessels 1988).
- Earnings Variability, CHOI, (+). A firm's optimal debt level is a decreasing function of the variability of its earnings. CHOI is measured as the percentage change in operating income between the pre-EJV and the year EJV is formed (Barton and Gordon 1988; Titman and Wessels 1988; Balakrishnan and Fox 1993).
- Profitability, PRF, (+). 'Pecking order theory' (Myers and Majluf 1984) predicts that profitability will be negatively related to leverage because of the advantages associated with internal financing. PRF is measured by the ratio of operating income to net sales (Barton and Gordon, 1988; Titman and Wessels, 1988; Harris and Raviv, 1991).

## 4. Methodology and Sample Description

### *4.1 Specification of the Model*

The negotiated level of equity contribution between partners in an EJV is determined at the EJV's formation. As such, the dependent variable assumes only a single value for each EJV partner in the sample, so the determinants of the observed negotiated equity shares are estimated using cross-sectional, multinomial logistic regressions. Logistic regression is a standard and commonly observed estimation method utilized in studies of ownership strategies (Gomes-Casseres 1990; Hennart 1991). The definition of the dependent variable follows the studies by

Hu and Chen (1993) and Pan (1996). Minority and majority equity contributions are distinguished through the use of a categorical dependent variable, with EJV partners with less than 50 per cent, and more than 50 per cent, equity shares categorized as minority and majority contributors, respectively. Those EJVs where partners each contribute 50 per cent equity are categorized as equal contributors. On the basis of this classification, the dependent variable is a multinomial categorical discrete dummy variable, which assumes a value of 0 for minority, 1 for equal, and 2 for majority contributors, respectively. We proceed by estimating the following multinomial logit model:

$U_{ji} = \square$ `$z_{it} + \square_{it}$ and for j=1, 2,…, J:

$$\Pr(Y = 0) = \frac{1}{1 + \sum_{K=1}^{J} e^{\beta`_k x_i}} \qquad \Pr(Y = j) = \frac{e^{\beta`_k x_i}}{1 + \sum_{K=1}^{J} e^{\beta`_k x_k}}$$

Specifically, $U_{ji}$ is the level of equity contribution j contracted to EJV partner firm i at JV formation time t. β is the vector of logistic regression coefficients and $z_{it}$ the vector of firm-specific characteristics and controls relevant to EJV partner firm i at time t. The first term Pr (Y = 0) refers to the probability of the dependent variable taking the value of 0, reflecting a negotiated equity contribution less than 50 per cent. This case is the benchmark case for the multinomial logistic regressions. The second term, Pr (Y = j) captures the (log odds of the) probabilities of the dependent variable either taking a value of 1 indicating a 50 per cent equity contribution (Y = 1), or 2 signalling an equity contribution of more than 50 per cent (Y = 2), respectively. Multinomial logit uses maximum likelihood procedures to estimate such polytomous dependent variables. Note, the groups formed by the categories of a polytomous dependent variable are not independent. Multinomial logit handles dependency by estimating the models for all outcomes simultaneously except for one category which is left to serve as the baseline reference.

$$\textit{Equity contribution}_{ji} = \alpha + \beta_1 RDS_{i,t-1} + \beta_2 SES_{i,t-1} + \beta_3 SHC_{i,t-1} + \beta_4 TAS_{i,t-1} + \beta_5 GPQ_{i,t-1} + \beta_6 INDB_{i,t-1} + \beta_7 GRT_{i,t-1} + \beta_8 CHOI_{i,t-1} + \beta_9 PRF_{i,t-1} + \beta_{10} EXFN_{i,t-1} + \beta_{11} NDTX_{i,t-1} + \beta_{12} LSAL_{i,t-1} + \beta_{13} UPS + \beta_{14} IND + \beta_{15} NAT + \beta_{16} YER + \varepsilon i$$

All variables are defined previously and measured in the accounting year immediately prior to EJV formation. A one-year lag is used for a partner firm's characteristics, because using known information, the partner firm's characteristics prior to EJV formation is more appropriate in explaining each partner's equity contribution than variables relating to the year when the EJV is formed. The coefficients are estimated using the logistic procedures specified in Limdep, version 8.

### *4.2 Sources of Data and Sample Description*

The data sample used in this paper draws on EJVs established by two partner firms in the UK during 1995-2000. One of the partners is always a non-UK firm so international equity joint ventures are analysed exclusively. The final sample incorporates 194 EJV partnerships. The analysis only considers UK-based EJVs as this enables us to control for the fact that a partner's negotiated equity contribution may be constrained by the regulatory and jurisdictional requirements of the country in which the EJV is located. Public announcements of EJVs are obtained using the SDC Platinum JV/Alliances database provided by Thomson Financial. This database is the industry standard for information on joint ventures/alliances, M&A, repurchases and more on a worldwide basis. Accounting and financial data for each partner is extracted from Thomson Datastream. For the analysis, dummy variables are used to control for the partner's industry on the basis of their four-digit SIC codes. After aggregating any sectors including fewer

than four firms, the following seven usable industry sectors are obtained: 1. electric, gas and sanitary services; 2. communications; 3. industrial and commercial machinery and computer equipment; 4. chemicals and allied products; 5. primary metal Industries; 6. petroleum refining and related Industries; 7. oil and gas extraction. The services, finance, insurance, and real estate industry, and wholesale and retail trade sectors were omitted from the analysis either because no financial data on, for example, R&D expenses were available during the sample period or because of the specific nature of their activities.

The non-UK partners are distinguished on the basis of their respective region of origin using dummy variables. Within the sample, three regional categories can be drawn up: European, North American, and Asian. Of these, 33 per cent are North American partner firms, 43 per cent Asian partner firms, and 24 per cent European partner firms. Summary diagnostic statistics for the sample of firms used here are provided in Exhibit 1. The skewness of some of the variables in the sample suggests the use of a log transformation to mitigate this effect. Table 1 provides Pearson correlation coefficients for the sample, which guide the specification of the regressions. It should be noted that the regression results reported in the following tables do not include the estimated coefficient estimates for the year and regional dummies. Although empirical estimations that incorporate both year and regional dummies are conducted, these variables are never significant either individually or jointly (based upon a Wald test), so the results are not reported; they are, however, available from the corresponding author on request.

**Table 1 Pearson Correlation Matrix**

| | $RDS_{t-1}$ | $SES_{t-1}$ | $GRT_{t-1}$ | $PRF_{t-1}$ | $NDTX_{t-1}$ | $LSAL_{t-1}$ | $GHOI_{t-1}$ | $GPQ_{t-1}$ | $SHC_{t-1}$ | $EXFN_{t-1}$ | $TAS_{t-1}$ | $INDB_{t-1}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $RDS_{t-1}$ | 1 | | | | | | | | | | | |
| $SES_{t-1}$ | -0.430 | 1 | | | | | | | | | | |
| | (0.000) | | | | | | | | | | | |
| $GRT_{t-1}$ | -0.113 | 0.176 | 1 | | | | | | | | | |
| | (0.187) | (0.075) | | | | | | | | | | |
| $PRF_{t-1}$ | 0.055 | 0.304 | 0.056 | 1 | | | | | | | | |
| | (0.501) | (0.020) | (0.506) | | | | | | | | | |
| $NDTX_{t-1}$ | 0.021 | 0.095 | 0.293 | 0.091 | 1 | | | | | | | |
| | (0.796) | (0.314) | (0.013) | (0.256) | | | | | | | | |
| $LSAL_{t-1}$ | 0.213 | 0.279 | -0.105 | 0.324 | 0.184 | 1 | | | | | | |
| | (0.008) | (0.003) | (0.212) | (0.010) | (0.021) | | | | | | | |
| $GHOI_{t-1}$ | 0.062 | -0.018 | -0.203 | -0.076 | -0.141 | 0.089 | 1 | | | | | |
| | (0.453) | (0.853) | (0.015) | (0.345) | (0.077) | (0.272) | | | | | | |
| $GPQ_{t-1}$ | 0.081 | 0.083 | 0.117 | 0.111 | 0.557 | 0.289 | 0.022 | 1 | | | | |
| | (0.366) | (0.429) | (0.187) | (0.207) | (0.003) | (0.021) | (0.802) | | | | | |
| $SHC_{t-1}$ | -0.030 | 0.239 | 0.021 | 0.102 | 0.104 | 0.311 | -0.017 | -0.207 | 1 | | | |
| | (0.714) | (0.011) | (0.807) | (0.213) | (0.201) | (0.023) | (0.834) | (0.017) | | | | |
| $EXFN_{t-1}$ | 0.068 | -0.036 | -0.009 | -0.322 | -0.021 | -0.460 | 0.181 | -0.058 | -0.077 | 1 | | |
| | (0.434) | (0.723) | (0.914) | (0.056) | (0.804) | (0.003) | (0.032) | (0.517) | (0.364) | | | |
| $TAS_{t-1}$ | -0.218 | 0.131 | 0.297 | 0.207 | 0.264 | 0.257 | -0.154 | 0.331 | 0.093 | -0.108 | 1 | |
| | (0.007) | (0.163) | (0.041) | (0.009) | (0.023) | (0.001) | (0.052) | (0.020) | (0.251) | (0.201) | | |
| $INDB_{t-1}$ | 0.120 | -0.014 | -0.061 | 0.070 | 0.044 | 0.186 | -0.043 | -0.223 | 0.092 | -0.137 | -0.143 | 1 |
| | (0.145) | (0.879) | (0.469) | (0.388) | (0.573) | (0.020) | (0.593) | (0.009) | (0.264) | (0.106) | (0.069) | |

Notes: The p-values are given in parentheses. All variables are defined in the text and measured at the end of the pre-EJV year.

## 5. Discussion of the Empirical Results

Tables 2 and 3 present the results of the multinomial logistic regressions predicting the probabilities of the level of equity contribution in the sample of EJV partners. Table 3 augments the results of Table 2 by controlling for a partner's location in the production chain (upstream/downstream) in cases where a vertical EJV is identified. Overall, the findings can be interpreted as follows. Partners owning strategic assets are more likely to contribute 50 per cent or more of the equity capital in EJVs. Consistent with hypothesis 1a, Table 2 shows that the variable RDS (R&D intensity) as a measure of strategic assets is correctly signed and generally significant at the 10 per cent and 5 per cent levels when predicting the probability of a partner's equity contribution being equal to or greater than 50 per cent. Support is also found for the importance of the specific human capital (SHC), which is another measure of strategic assets. This variable is also significant at the 1 per cent to 10 per cent levels in predicting a 50 per cent or more equity contribution in Table 3 (which controls for value chain location). However, in specification 2 of Table 2, the SHC variable is only significant when predicting the probability of the equity contribution being at least 50 per cent. These results support the findings of previous empirical research (Bradley *et al.* 1984; Baysinger and Hoskisson 1989; Balakrishnan and Fox 1993; Hosskisson *et al.* 1994) that R&D intensity and specific human capital are appropriate proxies for strategic assets.

**Table 2 Results of the Multinomial Logit Regressions Using Measures of Strategic Assets**

| ***Specification*** | | | ***1*** | | | **2** |
|---|---|---|---|---|---|---|
| | ***Ex.sign*** | **Log(Py=1/Py=0)** | E***x.sign*** | **Log(Py=2/Py=0)** | **Log(Py=1/Py=0)** | **Log(Py=2/Py=0)** |
| Constant | | -96.619 | | -34.789 | -72.498 | -49.814 |
| | | **(0.312)** | | **(0.580)** | **(0.243)** | **(0.387)** |
| RDS | + | 20.677 | + | 12.996 | 18.779 | 56.231 |
| | | ***(0.058)** | | **(0.267)** | ***(0.088)** | ****(0.032)** |
| SHC | + | 0.543 | + | 1.117 | 1.091 | 0.398 |
| | | **(0.522)** | | ***(0.065)** | ***(0.077)** | **(0.449)** |
| TAS | - | -1.258 | - | -2.895 | -3.792 | -0.595 |
| | | ***(0.088)** | | ***(0.077)** | ****(0.012)** | **(0.286)** |
| GPQ | - | | - | | -4.969 | -5.529 |
| | | | | | ****(0.026)** | ****(0.017)** |
| INDB | - | -0.915 | - | -0.261 | -0.823 | -3.537 |
| | | **(0.154)** | | **(0.494)** | **(0.217)** | ***(0.089)** |
| NDTX | - | -4.59 | - | -44.468 | | |
| | | **(0.768)** | | ****(0.048)** | | |
| CHOI | + | -1.252 | + | -0.007 | -0.686 | -0.103 |
| | | **(0.507)** | | **(0.997)** | **(0.821)** | **(0.966)** |
| GRT | + | 32.003 | + | 46.51 | 31.486 | 38.693 |
| | | **(0.124)** | | ****(0.024)** | ***(0.057)** | ****(0.019)** |
| PRF | + | 84.016 | + | 349.180 | 7.851 | 17.935 |
| | | **(0.367)** | | ***(0.086)** | **(0.847)** | **(0.512)** |
| EXFN | + | | + | | 14.974 | 10.234 |
| | | | | | **(0.262)** | **(0.404)** |
| LSAL | - | -3.114 | - | -0.078 | | |
| | | **(0.391)** | | **(0.975)** | | |
| Industry dummies | | Yes | | | Yes | |
| *Log likelihood function* | | -57.362 | | | -64.391 | |
| *Restricted log likelihood* | | -87.237 | | | -93.123 | |
| *Chi-squared (df)* | | 59.749 (28) | | | 57.466 (28) | |
| *p-value of Chi-squared* | | 0.008 | | | 0.004 | |
| Predicted | | 68% | | | 67% | |
| Naïve model | | 43% | | | 42% | |
| McFadden's $R^2$ | | 0.342 | | | 0.309 | |

Notes: P values given in parentheses
* denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

In relation to the tangibility of assets, consistent with hypothesis 2a, the coefficient signs on TAS, GPQ and INDB are overwhelmingly negative as expected, and often significant at either the 5 per cent or 10 per cent level in all regressions predicting the effect of a decreasing likelihood of a 50 per cent or more equity contribution. Collectively, these results confirm the proposed negative relationship between asset tangibility (measured in terms of a partner firm's ratio of fixed assets to total assets, ratio of depreciation to total assets and ratio of a firm's

leverage to its industry average, respectively) and the extent of a partner's relative equity contribution to an EJV. These results also corroborate the view that physical assets are less specific than intangible assets (Titman and Wessels 1988; Chatterjee and Wernerfelt 1991; Harris and Raviv 1991; Rajan and Zingales 1995). Collectively, the results support the proposition that the greater the contribution in terms of strategic assets by a partner firm to an EJV, the higher the likelihood of a larger equity share being contracted to that partner. Finally, in relation to hypotheses 1b and 2b, the coefficient of the UPS variable is positive and significant at the 5 per cent level in Table 3. This provides some support for the contention embedded in hypotheses 1b and 2b that enhanced difficulties in measuring the value-added contribution of the downstream partner in the value chain increases the probability of a relatively increased equity contribution to the EJV and *vice versa*. The respective location of partners in vertical EJVs as well as their assets characteristics determine the level of their equity contribution. This result also complements Baker *et al*.'s (2002) finding that larger equity ownership by the downstream partner can remove the temptation to renege on a rationally negotiated contract.

**Table 3 Result of the Multinomial Logit Regressions Using Measures of Strategic Assets and Controlling for a Partner's Position in the Value Chain**

| | | | ***3*** | | | **4** |
|---|---|---|---|---|---|---|
| ***Specification*** | ***Ex.sign*** | **Log(Py=1/Py=0)** | ***Ex.sign*** | **Log(Py=2/Py=0)** | **Log(Py=1/Py=0)** | **Log(Py=2/Py=0)** |
| Constant | | -144.616 | | -133.336 | -306.669 | 520.733 |
| | | **(0.758)** | | **(0.493)** | **(0.308)** | **(0.588)** |
| RDS | + | 20.23 | + | 3.761 | 109.139 | 153.483 |
| | | ***(0.079)** | | **(0.722)** | ***(0.089)** | ****(0.021)** |
| SHC | + | 2.197 | + | 3.846 | 0.123 | 1.186 |
| | | ****(0.032)** | | *****(0.002)** | **(0.788)** | ****(0.023)** |
| TAS | - | -3.384 | - | -4.989 | -0.532 | -2.253 |
| | | ***(0.086)** | | ****(0.042)** | **(0.409)** | ****(0.026)** |
| GPQ | - | | - | | (-0.471) | (-4.612) |
| | | | | | **(0.797)** | ****(0.021)** |
| INDB | - | -0.973 | - | -0.47 | -1.645 | -3.266 |
| | | **(0.375)** | | **(0.619)** | **(0.173)** | ***(0.078)** |
| NDTX | - | 2.659 | - | -14.221 | | |
| | | **(0.855)** | | **(0.240)** | | |
| GHOI | + | -2.924 | + | -0.585 | -1.851 | -2.286 |
| | | **(0.338)** | | **(0.781)** | **(0.459)** | **(0.318)** |
| GRT | + | 10.818 | + | 4.727 | 27.312 | 30.788 |
| | | **(0.270)** | | **(0.511)** | ***(0.059)** | ****(0.034)** |
| PRF | + | 32.526 | + | 64.703 | 175.63 | 128.312 |
| | | **(0.548)** | | **(0.245)** | ***(0.053)** | ****(0.035)** |
| EXFN | + | 3.601 | + | 7.531 | | |
| | | **(0.724)** | | **(0.477)** | | |
| LSAL | - | | - | | -2.034 | -1.321 |
| | | | | | **(0.416)** | **(0.560)** |
| UPS | + | 1.276 | + | 1.106 | 2.898 | 2.631 |
| | | **(0.359)** | | **(0.858)** | ****(0.041)** | ****(0.044)** |
| Industry dummies | | Yes | | | Yes | |
| *Log likelihood function* | | -48.334 | | | -43.054 | |
| *Restricted log likelihood* | | -75.893 | | | -69.954 | |
| *Chi-squared(df)* | | 53.843(30) | | | 53.763(30) | |
| *p-value of Chi-squared* | | 0.009 | | | 0.017 | |
| Predicted | | 73% | | | 70% | |
| Naïve model | | 43% | | | 42% | |
| McFadden's $R^2$ | | 0.363 | | | 0.385 | |

Notes: P values given in parentheses
* denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

With respect to the control variables in Tables 2 and 3, the coefficient signs on both the growth and profitability variables (GRT and PRF) are generally both positive and statistically significant (at the 10 per cent and 5 per cent levels) signalling a probability of the equity contribution by the respective partner being 50 per cent or more, although the significance of the PRF variable is removed in Table 2. The GRT variable enables a comparative analysis of the

effects of tangible (fixed assets) and other intangible investment (R&D intensity) on equity contribution. The significance of the variable PRF also provides additional evidence supporting the importance of transaction costs with regard to the preferred level of equity ownership (Gomes-Casseres 1989; Hennart 1991; Nakamura and Yeung 1994). The non-debt tax shield (NDTX) variable is significant at the 5 per cent level in Table 2 specification 1; the coefficient is, as expected, negative. This result supports the perspective that the non-debt tax shields associated with capital equipment and depreciation (an indicator of non-strategic resources) would suggest an inverse relationship between an EJV partner firm's level of non-debt tax shields and its equity contribution to an EJV. Nevertheless, other empirical findings on the effect of non-debt tax shield are mixed and even contradictory (Harris and Raviv 1991).

With respect to other control variables, the dependency on external financing (EXFN) is positively signed, which is in line with expectations; however, it is not significant. The signs for both the variability of earning and partner firm size (CHOI and LSAL) variables are as expected. However, neither of these variables is ever significant. One possible explanation for these results is that these factors can be considered industrial features and, therefore, are captured by their corresponding industry group dummies. In all multinomial logit regressions, the industry dummy variables (not reported) are significant at the 10 per cent level for the major industry groups: electric, gas and sanitary services; communications; chemical and allied products. Overall, the multinomial logit regression specifications displayed in the tables are significant (at either the 1 per cent or 5 per cent level) according to the model Chi-squared statistic. The percentage of correctly predicted outcomes ranges from 67 per cent to 73 per cent. (The percentage of correctly predicted estimators in the naïve model is always around 40 per cent.) On the basis of the McFadden's $R^2$, the most preferred regression specification is specification 4 in Table 3.

## 6. Conclusion

The central conclusion of this study is that the contractual arrangements governing a partner firm's equity share in an EJV appears sensitive to the presence of agency hazards arising from the costs of monitoring specialized resources. It is argued that the inherent characteristics of the expertise and/or nature of the strategic assets that a firm contributes to an inter-firm EJV will often make it difficult for that firm to guarantee *ex ante* its future productive contribution during the negotiation stage. By choosing to collaborate through an EJV, each party effectively receives a subsequent financial return that is proportional to its ownership share of the venture's equity capital. The findings support the hypothesis that EJV partners owning strategic assets whose potential contribution to the success of the venture is the most difficult to measure *ex ante* will negotiate a higher share of equity capital. This equity share serves to partially guarantee their actions. The core finding is robust to a number of specifications relating to both the definition of strategic assets and other determinants of monitoring costs, such as the location of the partners in the value chain and other firm-level control variables. Agency costs appear to influence the magnitude of the contracted equity share in EJVs. A distinctive perspective to the contractual specifications governing EJV formation is, thereby, offered.

This set of findings is relevant for EJV research along several dimensions. First, it indicates the salience of strategic assets as determinants of contractual structures in the EJV literature (Eisenhardt and Schoonhoven 1996; Dutta and Weiss 1997). As complementary research continues to explore the motives and determinants of equity participation in EJVs drawing upon perspectives from TCE and the bargaining literature (Gomes-Casseres 1989; 1990; Hennart 1991; Nakamura and Yeung 1994; Brouthers and Bamossy 1997) the present findings demonstrate the value of giving attention to firm-level antecedents from other theoretical perspectives (Ramanathan *et al.* 1997). Second, this study contributes to the broader debate on the explanatory power and appropriate domain of agency theory (Aminhud and Lev 1981, 1999; Denis *et al.* 1999; Lane *et al*. 1998, 1999) by providing empirical evidence

indicating that agency problems arising from costly measurement of specialized activities influence the ownership patterns in EJVs. Reuer and Ragozzino (2006) also find that agency hazards appear to influence investment in EJVs after accounting for the nature of firms' resources. Third, the finding that agency problems influence financial contracting arrangements complements prior conceptual research on equity ownership in EJV. These rationales have been largely positive and seen as being the least costly solution to the separation of ownership and control. They consider firms' equity participation in joint ventures to be determined by reasons such as competitive intensity, contractual duration, cultural distance, local partner state ownership, and country risk (Pan 1996; Chadee and Qiu 2001). The present perspective structured around agency theory, measurement costs and the cost of monitoring specialized activities, offers a distinct and enhanced view of the division of equity capital in EJVs.

The findings here are consistent with those from other studies (see, for instance, Barzel and Suen (1992); Grossman and Hart (1986); Hart and Moore (1990) that invoke agency hazards in collaborative production to argue that ownership is endogenous rather than exogenous. In these models the allocation of residual rights of control affects prior investments in specific assets, and relative inefficiencies in investments determine ownership rights. The results also complement arguments (Eswaran and Kotwal 1985; Barzel and Suen 1992; 1997) that stress that under share contracts, such as joint ventures, rather than constraining agency hazard through monitoring, the partial residual claim given to each partner serves to economize on monitoring. Once it is recognized that the relative use of monitoring costs and residual claimancy to constrain agency hazards are determined endogenously, the implications of productivity differences and relative monitoring costs for contractual choice can be more readily obtained. However, the organizational implications of these principles remain incompletely explored. This paper contributes to that literature by extending these principles to an analysis of the negotiated equity contribution in EJVs.

The findings and limitations of the present study point to a number of new avenues for EJV research. Future studies might examine the relationship between agency theory and institutional concepts such as national cultural differences. Although the results of this study are also applicable to domestic joint ventures, it can be argued that there is scope for a comparative study between international and domestic joint ventures that allows for a multi-level analysis. This may provide additional insights into the implications of agency hazards and the relative importance of firm-level effects in the development and evolution of the EJV literature.

The design and implementation of a resource-based strategy affects a firm's financial decisions in relation to its contribution to an EJV. A substantial amount of research, including this study, has now analysed the implications of partner-specific resources and residual claimancy for EJVs (Blodgett 1991; Gary and Yan 1992; Mjoen and Tallman 1997). However, considerably less is known about the compatibility of such contracting policy within the overall financial policy of a global firm. Future studies might also consider the extent to which the present analysis of strategic resources, equity shares and overall control has implications for the performance of EJVs. Finally, this study places significant emphasis upon the importance of financial contracting theories as explanations for the organizational forms adopted in international business which should be further explored.

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