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ABSTRACT

Ownership and Control in Joint Ventures: Theory and Evidence*

Joint ventures, a particularly popular form of corporate cooperation, exhibit ownership patterns that are concentrated at 50-50 or '50 plus one share' equity allocations for a wide variety of parent firms. In this Paper, we argue that private control benefits create a discontinuity in contribution incentives around equal shareholdings that explains these two cluster points. Using data from US joint ventures, we empirically analyse the determinants of their ownership allocations and find that, consistent with our predictions, parents with similar contribution costs or a high potential for private benefits extraction prefer equal shareholdings and joint control. Similarly, parent-level spillovers make 50-50 ownership more attractive to the detriment of one-sided control while complementarities in parent contributions have the opposite effect. We also find evidence that contingent ownership arrangements such as explicit options and buyout or termination mechanisms serve to mitigate regime-specific contractual inefficiencies.

JEL Classification: D23, G32 and L14

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1 Introduction

Hardly a day goes by without the announcement of a major strategic alliance between businesses, in which firms are willing to grant each other some access to their assets. This sharing of control over resources raises questions of governance, the appropriation of benefits and how firms assert property rights over common assets. To provide a formal and empirical perspective on these issues, we focus on joint ventures, whose ownership and control arrangements are particularly well documented because the partners incorporate their cooperation in an independent, jointly owned company.[1]

Joint ventures exhibit the following intriguing ownership pattern: the vast majority allocate equal or almost equal equity stakes to the parent firms.[2] Large-sample data (Table 1 in Appendix C) indicate that about two thirds of two-parent joint ventures have 50-50 equity allocations, while up to 12% show 50.1% or 51% majority stakes ("50 plus one share"). This clustering of shareholdings is all the more surprising that typical determinants of ownership such as parent attributes or incentives would seem to call for unequal share allocations, especially in such a large and diverse cross-section of firms. Indeed, it has been argued that differences in resource costs (Belleflamme and Bloch, 2000), private information (Darrough and Stoughton, 1989), or incentive requirements (Bhattacharyya and Lafontaine, 1995 and Chemla, Habib and Ljungqvist, 2001) all imply optimal asymmetric ownership structures.

But this outcome appears to be at variance with the empirical evidence (see Table 5): even parent firms that are dissimilar in size, industry, national origin, etc. show a preference for 50-50 shareholdings. Furthermore, the prevailing rules governing joint ventures do not seem to favor equal shareholdings because disagreement between 50-50 owners might result in legal deadlock, forced termination, arbitration or court proceedings, and, ultimately, significant value losses.

To motivate our subsequent empirical analysis, we first specify a simple model in which two parent firms contribute noncontractible resources to a jointly owned, but independent corporate entity in an effort to exploit asset complementarities ("synergies"). Ownership not only provides incentives for resource contributions, but also confers private control benefits, which are socially costly, on majority shareholders. Since parent contributions are noncontractible, the parties face

[1] Corporate partnerships are very different from private ones in which tradeoffs between risk sharing and incentives are central (see, e.g., Lang and Gordon, 1995). See Johnson and Houston (2000) who do not find evidence for the former in joint ventures.

[2] The management literature has long recognized this fact: see, e.g., Bleeke and Ernst (1991).

a trade-off between investment incentives and control benefits extraction in their choice of optimal ownership allocations.

Our formal analysis predicts that the three observed control regimes - joint control (50-50), 50 plus one share, and outright majority control - coexist in equilibrium and can each be optimal for a wide range of firms. In particular, we characterize optimal ownership arrangements in terms of parent costs and joint venture attributes and the net impact of control on value creation. It emerges that relatively small social costs arising from the exercise of control rights suffice to make equal or almost equal shareholdings optimal for quite heterogeneous parent firms, providing an explanation for the two observed cluster points around 50-50 ownership.

We next study the cross-sectional determinants of joint venture ownership on the basis of these predictions. Using various measures for the scope of complementarity between parent resources, we first establish that, indeed, our model provides a useful benchmark for the empirical analysis of joint ventures. As a consequence, parent wealth gains allow us to recover and estimate a key model parameter that measures relative contribution costs and determines ownership allocations together with the costs and benefits of control. Although the latter are typically unobservable, we attempt to capture their effect through several variables that are proxies for the scope of value diversion.

The estimation of various discrete choice models provides strong evidence in favor of our model predictions. Not only are our proxies for parent similarity and value diversion statistically highly significant, they also exhibit the exact marginal effects predicted by our analysis across the three ownership regimes. Parent firms are more likely to adopt 50-50 ownership allocations when the potential for value diversion or parent-level synergy gains is high, or when their resource costs are not too dissimilar. Conversely, one-sided control arrangements are more frequent when parents are more dissimilar, the extraction of control benefits and scope for spillovers less likely, and joint venture-level synergies are more important.

The presence of parent-level spillovers increases the frequency of 50-50 ownership but decreases it for outright-majority control. By contrast, joint venture-level complementarities in parent resources have the opposite effect. To better distinguish between the consequences of spillovers and control rents, we next include measures for the extraction of private benefits by the dominant partner in our specifications. The higher is the potential for such private benefits, the more likely are partners to choose 50-50 to the detriment of one-sided control.

We also analyze the role of contingent ownership in joint-venture design that can mitigate incentive or contracting problems. We find that such arrangements, especially buyout and sellout provisions to complete contracts, generate significantly higher abnormal returns for shareholders of both parent firms. In line with legal arguments, the marginal effects of explicit options are consistent with the protection of minority shareholders while those of buyout and liquidation activity suggest that they are devices to resolve disagreement between venturers.

Our main contribution, however, is to show that relatively small distortions in incentives arising from control rights suffice to explain the optimal clustering of ownership in joint ventures around equal shareholdings. To our knowledge, the observed prevalence of 50-50 and 50 plus one share equity allocations has not been addressed from a formal or empirical perspective, yet. Our paper attempts to fill this void all the more that prior theoretical work has mainly focused on asymmetric control and return rights in joint ventures, while empirical studies have concentrated on announcement effects for parent shareholders.

McConnell and Nantell (1985) and Lummer and McConnell (1990) were the first to analyze the reaction of parents' stock prices to joint-venture announcements. Their findings were subsequently confirmed by Mohanram and Nanda (1998) and Johnson and Houston (2000), who find that vertical joint ventures with greater potential for complementarities generate higher announcement returns for parents. In strategic alliances without equity components, Chan *et al.* (1997) find announcement effects that are also consistent with trade-offs between synergies and control costs.

The growing empirical literature on corporate cooperation documents many features of our analytic framework. Elfenbein and Lerner (2003) report that the division of ownership and control rights in internet portal alliances is consistent with predictions derived from incomplete contracts. Similarly, Robinson and Stuart (2001) find significant empirical evidence for contractual incompleteness in biotech strategic alliances and joint ventures that equity participations serve to overcome. Allen and Phillips (2000) also highlight the importance of equity-based incentives by showing that corporate share block purchases create significantly higher abnormal returns in the presence of strategic alliances including joint ventures.

Our paper is also related to the literature on governance and incentives in corporate alliances. Baker, Gibbons and Murphy (2002b) consider the optimality of various organizational forms for corporate cooperation in the presence of spillovers and costly rent seeking by partners while Rey and Tirole (2001) show that the alignment or divergence of parent objectives and governance issues determine such choices, too. Questions of ownership and control have also come to the forefront in the large literature on international alliances as recent work by Desai, Hines and Foley (2002) on the optimality of international joint ventures shows.

The paper proceeds as follows. Section 2 discusses joint-venture ownership and the ambient legal environment. Section 3 presents a simple model of ownership and control in joint ventures that we characterize in Section 4 to motivate our subsequent empirical analysis. In Section 5, we describe our data and methodology while Section 6 reports our empirical findings. Section 7 explores the role of contingent ownership in joint ventures. The last section discusses our results and concludes. All proofs and tables are relegated to the Appendix.

2 Ownership and Contracting in Joint Ventures

Our data on two-parent joint ventures (about 80% of all recorded transactions) show that the prevalence of equal ownership stakes (50-50) and 50 plus one share equity allocations (*50-plus*) extends to US joint ventures with publicly quoted parents and a similarly selected sample of joint ventures active in the European Union (see Table 1 in Appendix C). Since corporate announcements and the management literature (Hennart, 1988 or Bleeke and Ernst, 1991) emphasize the importance of complementarities between the parties' resources that are typically heterogeneous, this clustering begs the question why symmetric shareholdings should be optimal for such a large and diverse cross-section of joint ventures and partners (see also Table 5).[3]

Furthermore, the ambient legal rules that govern joint ventures in the US do not seem to favor equal shareholdings. In 49 of the states, joint ventures fall under the *Uniform Partnership Act* and the *Revised Uniform Partnership Act*. "Disagreement among the partners" is resolved in all jurisdictions by majority vote, strict in most. In such cases, the court will let the parties vote their shares and decide according to the respective equity weights.[4] Hence, disagreement in 50-50 joint ventures might become intractable and lead to permanent deadlock.

To avoid the economic costs of deadlock or lengthy court battles, the parties typically resort to

[3]Studying 668 worldwide alliances, Veugelers and Kesteloot (1996) also report that 50% of the joint ventures between two asymmetric parents exhibit 50-50 share allocations.

[4]UPA §18(h); see also the decision in National Biscuit v. Stroud, 106 S.E.2d 692 (1959) which articulates the strict majority rule in corporate partnerships such as joint ventures.

governance provisions such as escalation procedures and arbitration clauses to resolve disagreement on key decisions ("Matters Requiring Consent"). Mechanisms include appointing a tie-breaking, independent member to the Board or Management Committee, forced mediation or arbitration, automatic termination of the joint venture,[5] and buyout or sellout provisions ("shoot out" procedures) akin to options. Hewitt (2001) analyzes in detail the legal and contractual merits of each procedure to overcome deadlock.

However, it is often impossible to specify a clear, complete and enforceable mechanism to break the impasse in all contingencies as, for instance, the deadlock in the 50-50 joint venture between NBN Broadcasting and Sheridan Broadcasting Networks highlights. When the dissenting partner tried to invoke the deadlock provision (appointing a fifth, independent member to the Management Committee), the other venturer sought a declaratory judgement in State Court that the contentious issue (opening a new office) "relates to budgeting, accounting and finance ... and therefore was not subject to the deadlock voting provision," only to be charged in the ensuing Federal law suit with the intention "to usurp exclusive control" through "transactions conducted allegedly in breach of the [joint venture] Agreement."[6]

The recourse to law suits to resolve disagreement is widespread because many jurisdictions allow referral of contractual disputes to courts despite explicit privately specified mechanisms for the resolution of conflict (see Campbell and Reuer, 2001). Since control rights are interpreted by US courts in the narrow equity share sense, the legal environment seems to favor a clear allocation of control rights, not 50-50 shareholdings. However, this view neglects the fact that equal ownership allocations and the threat of value-destroying deadlock can serve as a commitment device not to extract private benefits. Hewitt *et al.* (2001) observe that "a joint venture with the potential for deadlock deliberately built into the structure [such as 50-50 share allocations] is, in fact, itself, the best way of encouraging the parties to reach agreement ... The dire consequences of an insoluble deadlock on the ongoing business (to the detriment of both parties) will generally ensure that a sensible compromise is reached."

[5]For instance the Agreement between Pearson plc and MarketWatch.com, Inc. stipulates that "[i]f a deadlock arises because the Board fails to agree on any of the Reserved Matters or any other management matter requiring its decision" either parent can give a deadlock notice placing the joint venture into liquidation within 30 days. Chemla *et al.* (2001) describe other common mechanisms to overcome deadlock such as "shoot out" (buy or sell) or "Russian Roulette" (one party names a price, the other one the transaction type: buy or sell at this price) provisions.

[6]See the decision in NBN Broadcasting, Inc. v. Sheridan Broadcasting Networks, 105 F.3d 72 (1997).

Majority control, while avoiding the costs of disagreement, might give rise to abuses by the dominant partner that are often hard to verify for an outside party such as a court or arbitration panel.[7] As fiduciary duty provisions extend only limited protection to the minority partner,[8] venturers rely on contractual devices rooted in governance provisions. They typically include veto rights, supermajority rules including unanimity and consent requirements for specific issues, or, in the case of international joint ventures, dual classes of shares that do not seem widespread in the US. Even in the UK where they do exist (Campbell and Reuer, 2001), Hewitt *et al.* (2001) observe that a "minority shareholder in a UK company cannot block ordinary resolutions, which will be decided by majority vote" and recommend veto clauses and put options as useful devices to protect the interests of a minority partner.

As the preceding quote shows, contingent ownership arrangements such as buyout or sellout provisions often seem to offer better alternatives to avoid costly court proceedings, inefficient deadlock and, more generally, the consequences of contractual incompleteness. Several joint ventures in our sample split initial ownership 1-99 or even 0-100 but grant the minority shareholder the option to fully or partially buy out the majority owner. Similarly, in case of deadlock over major matters, the non-dissenting parent often has the option to buyout or sellout to the blocking partner. Section 7 analyzes the relationship between contingent ownership and control allocation in greater detail.

3 Model and Preliminary Analysis

In preparation of the subsequent empirical analysis, we present a simple model of ownership and control of joint ventures. Two risk-neutral firms A and B form a joint venture (JV for short) by contributing resources $I_i, i = A, B$ to a jointly owned corporate entity at non-verifiable cost $c_i(I_i) = \frac{c_i}{2}I_i^2$. These contributions might take the form of tangible assets such as funds, plant or machinery ("investments"), or intangible ones such as human, technology or marketing resources ("effort"). Since the joint venture's rationale are complementarities in assets and expertise ("synergies"),[9] we

[7] See Campbell and Reuer (2001) and the decision in Saudi Basic Industries v. Exxonmobil, 94 F. Supp. 2d 378 (2002) for an example.

[8] See the decision in Meinhard v. Salmon, 154 N.E. 545 (1928).

[9] The Purpose sections and Preambles of JV agreements often stress the complementary nature of the parents' contributions and the resulting synergies. For example, Chevron and Phillips Petroleum explicitly state in their joint venture agreement that they combine their "chemicals businesses in order to realize synergies and increase the efficiency and profitability of such businesses." We also present empirical evidence in Section 6.1 that supports our choice of strong complementarity in resource contributions as a useful analytic benchmark for joint ventures.

adopt the familiar Leontief specification $V(I_A, I_B) = \min\{I_A, I_B\}$ for its value creation process.[10] Synergy effects also presuppose that the partners' inputs I_A and I_B be nonhomogeneous so that, without loss of generality, A contributes the more valuable resource and, hence, $c_A > c_B$.

We take the parties' contributions to be noncontractible in the sense that contractual provisions in their regard are difficult to verify or enforce. This assumption captures the often very specialized or intangible nature of the contributions, whose quality or value might be hard to assess by the partner, let alone an outside party such as a court of law. Hence, contracts can only be written on verifiable output, not individual contributions I_i so that the parties need to receive appropriate incentives through their control and return rights.

Following established American legal practice, we assume that 50% ownership plus one share suffices for effective control which is particularly valuable because it confers private benefits. The controlling parent is able to appropriate a fraction δ of the joint venture's gross value V which we think of as residual control benefits. They come at the expense of diminishing the terminal value by a fraction $d > \delta$ through, e.g., the erosion of synergy gains or competition by the dominant parent, so that the remainder of the company has only a value of $(1-d)V$.[11] In case of 50-50 ownership, neither control costs nor benefits accrue because the threat of deadlock and ensuing legal action suffices to deter private benefits extraction. Letting parent A's equity stake be γ so that B's is $1-\gamma$, the joint venture's net value W_A to firm A as a function of ownership becomes

$$W_A = \begin{cases} [\delta + \gamma(1-d)]\, V(I_A, I_B) - c_A \frac{I_A^2}{2} & \text{for } \gamma > \frac{1}{2} \\ \frac{1}{2} V(I_A, I_B) - c_A \frac{I_A^2}{2} & \text{for } \gamma = \frac{1}{2} \\ \gamma(1-d) V(I_A, I_B) - c_A \frac{I_A^2}{2} & \text{for } \gamma < \frac{1}{2} \end{cases} \tag{1}$$

and similarly for parent B's net value W_B.

In the absence of private control costs and benefits, i.e., $\delta = d = 0$, the optimal ownership shares are given by[12]

$$\gamma^* = \frac{c_A}{c_A + c_B}, \; 1 - \gamma^* = \frac{c_B}{c_A + c_B} \tag{2}$$

[10] Our specification is equivalent to a non-symmetric Leontief value creation process of the form $V(I_A, I_B) = \min\{aI_A, bI_B\}$ for $a, b > 0$ that just amounts to a rescaling of the cost parameters c_i.

[11] Taking control benefits and costs to be linear in joint venture value V is for ease of exposition only. Our results hold as long as private control benefits and joint venture value net of control costs are both non-decreasing in V.

[12] The parents maximize the JV's net value $W(I_A, I_B) = \min\{I_A, I_B\} - \frac{c_A}{2} I_A^2 - \frac{c_B}{2} I_B^2$ by choice of shares γ_i subject to $\gamma_i \in \arg\max W_i, i = A, B$ and the efficiency condition $I_A = I_B$ to insure that none of the two inputs is wasted.

and are typically asymmetric except for the case of identical parent cost attributes, i.e., $c_A = c_B$. In principle, there is no reason to expect that the optimal equity stakes in Equation (2) lead to the first-best value of the joint venture. Joint production typically suffers from an externality problem between the partners, first analyzed by Holmström (1982). However, the strong complementarity of the Leontief specification eliminates such free-riding as a simple comparison with the joint venture's first-best value $W^* = \frac{1}{2}\frac{1}{c_A+c_B}$ shows. This result, first established by Legros and Matthews (1993), provides a theoretical justification for the popularity (and optimality) of all-equity joint ventures as an organizational choice for strategic alliances.

Since A's first-best share γ^* also provides an intuitive measure of relative resource cost, we retain it for the subsequent analysis to gauge the degree of parent homogeneity.

4 Optimal Ownership Allocations

In theory, nothing precludes the parties from allocating control rights separately from return rights by specifying governance provisions that require unanimity, including supermajorities or the obligation to obtain the minority partner's consent on key decisions. In practice, such arrangements could not possibly foresee all future contingencies so that clauses to protect minority shareholders or to break deadlocks are unlikely to work in all possible states of nature, i.e., are incomplete.

As Campbell and Reuer (2001) point out, it might even be in the partners' interest to leave contracts (optimally) incomplete.[13] Particularly in performance clauses, a long and detailed enumeration of duties and obligations of the partners limits the joint venture's (managerial) flexibility and the resulting list could be construed as exhaustive by the parties or a court, further complicating JV operations and conflict resolution. Instead, the venturers will often refer to general, more vague duties to maintain flexibility and simplicity. Hence, the default provisions in the *Uniform Partnership Acts* come into play in case of disagreement and intertwine return and control rights.

As a consequence of contractual incompleteness, an increase in return rights beyond 50% leads to an increase in residual control rights so that parents cannot effectively separate the allocation of income and voting rights. Let superscripts k denote control regimes. Under our cost convention $c_A > c_B$, the first-best ownership allocation in Equation (2) seems to suggest that parent A should

[13]Elfenbein and Lerner (2001) or Robinson and Stuart (2001) provide empirical evidence consistent with significant contractual incompleteness including effort provision in the context of corporate cooperation.

have outright majority control ($k = A$) for optimal investment incentives. Maximizing the parents' net total return in Equation (1) by choice of contribution I_i, i.e., $\max_{I_i} W_i^A$, $i = A, B$, yields the parties' incentive compatible resource contributions for $\gamma > \frac{1}{2}$:

$$I_A = \frac{\delta + \gamma\,(1-d)}{c_A},\ I_B = \frac{(1-\gamma)(1-d)}{c_B}. \tag{3}$$

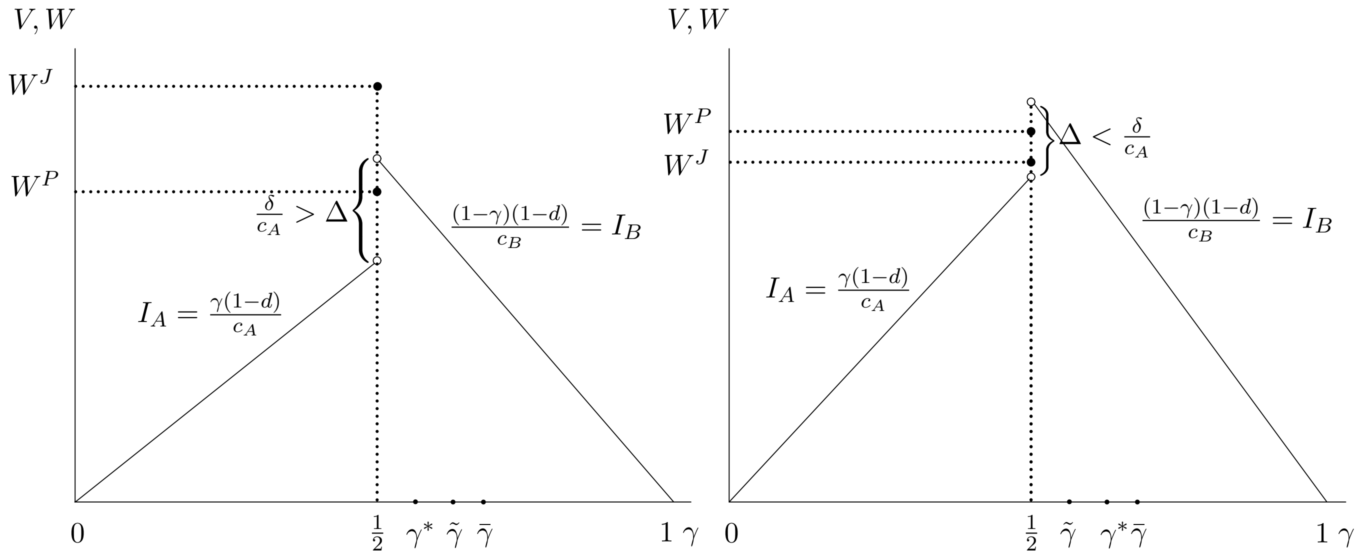
The preceding expressions reveal that granting control to one party (A) hurts the investment incentives of the other (B). The optimal distribution of return and control rights now depends on the partner whose contribution determines, at the margin, the output of the joint venture.

We take each parent in turn and let first A's contribution constrain the JV's value. In this case, it is in both parties' interest to adjust equity stakes so that the investment incentives in Equation (3) are equalized yielding the following optimal shareholdings (see Appendix A):

$$\gamma^A = \gamma^* - \frac{\delta}{(1-d)}(1-\gamma^*) \text{ and } 1-\gamma^A = \frac{1-d+\delta}{1-d}(1-\gamma^*). \tag{4}$$

The preceding expressions show that the presence of control rights distorts the allocation of ownership and, hence, investment incentives. The parties gross up B's stake and decrease A's by the relative value of control to provide second-best efficient contribution incentives. Under control by A, the net value of the stakes to parent i are $W_i^A = (1-d+\delta)^2\, W_i^*$ which is simply their first-best value adjusted for the net social cost of control $d - \delta$. The incentive gains from granting control to firm A more than compensate the minority shareholder for its costs. Without control benefits and costs, we obtain first-best shareholdings in Equation (3) with corresponding investments, which, incidentally, proves the absence of free-riding in our setting (se also Legros and Matthews, 1993).

In the other case, control by firm A hurts B's incentives to a point where the latter's contribution becomes the constraining factor in value creation. It is now impossible to fine-tune the distribution of return and control rights so that both firms face identical investment incentives. The incentive effect of control by A ($\frac{\delta}{c_A}$ in Equation (3)) alone is larger than the difference in contribution incentives (Δ in Figure 1). Raising B's stake would decrease A's below 50%, thereby granting B control. But then, it is A's contribution that would limit the joint venture's value by the resource



(a) 50-50: Joint Control

(b) 50-plus: One-sided Control

Figure 1: Ownership Allocations with Symmetric Income Rights: 50-50 vs. 50-plus

cost convention $c_A > c_B$. We show in Appendix A that the threshold

$$\bar{\gamma} = \frac{(1-d)/2+\delta}{1-d+\delta} > \frac{1}{2} \tag{5}$$

defines a critical region $\left(\frac{1}{2}, \bar{\gamma}\right)$ for our parent homogeneity measure $\gamma^* = \frac{c_A}{c_A+c_B}$ around 50-50 shareholdings, in which it is impossible to equalize investment incentives through ownership allocations (see Figure 1).

The relative magnitudes of resource costs γ^* and the net social cost of control $d-\delta$ now determine the optimal choice of 50-50 (indexed by $k = J$) or 50-plus ownership arrangements ($k = P$).[14] To this end, we compare the joint venture's net value W^k under both regimes because its output V is maximized at $\gamma = \frac{1}{2}$. Figure 1(a) illustrates the intuition behind 50-50 equity allocations that not only avoid the net social cost of control $d-\delta$, but also the discontinuity in contribution incentives. Hence, minor frictions stemming from control rights suffice to make joint control optimal so that firms prefer 50-50 ownership if the net social costs of control are significant in comparison to relative resource costs γ^*.

If relative costs γ^* are close to the threshold $\bar{\gamma}$ and net social control costs $d-\delta$ not too important,

[14]Granting control to firm B is never optimal by our cost convention $c_A > c_B$.

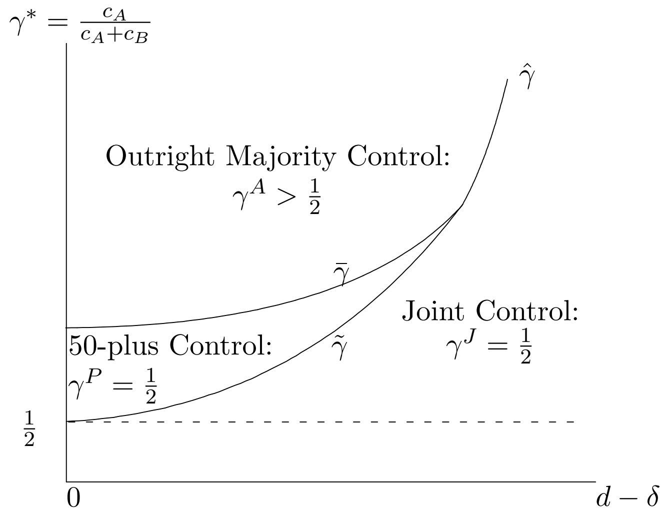


Figure 2: Ownership and Control

the need for incentives for the party contributing the more valuable resource (firm A) outweighs any efficiency loss from one-sided control. In this case, 50-plus ownership that combines equal return rights with control by parent A becomes optimal (see Figure 1(b)). One-sided control serves to optimally re-equilibrate investment incentives when the ventureres are mildly heterogeneous, i.e., when relative costs are above a second threshold $\tilde{\gamma}$ separating 50-50 and 50-plus allocations. This regime disappears for large net control costs because the overriding parent concern becomes either the large efficiency losses from majority control or the need to equalize contribution incentives.

We relegate the complete characterization of optimal ownership arrangements in joint ventures and the derivation of the relevant thresholds $\tilde{\gamma}$ for 50-50 and $\bar{\gamma}$ for 50-plus allocations to Appendix A. Figure 2 depicts our main results and testable implications that follow from the fact that optimal ownership arrangements vary with parent homogeneity γ^* and net control costs $d - \delta$. From a cross-sectional perspective, a wide set of parameters can generate the observed ownership patterns. In particular, very different, possibly industry-specific combinations of parent attributes and net control costs give rise to the same optimal share allocation, which can account for the optimal clustering of ownership around 50-50. The key insight is that control rights associated with majority ownership may lead to efficiency losses that equal shareholdings avoid.

The higher the net social cost of control, the more dissimilar the parties can be under 50-50 equity stakes in terms of cost attributes, which might explain our finding that dissimilar parents are as likely to form 50-50 joint ventures as their more homogenous peers (see Table 5 in Appendix C).

Conversely, smaller net control costs imply that one-sided control allocations become more likely given parent attributes. As the parents become more heterogeneous, the optimal return allocation changes from 50-50 to asymmetric cash flow rights and outright majority control.

Joint ventures often give rise to parent-level spillovers such as learning and transfer of expertise or technology in addition to gains from resource complementarities realized at the joint-venture level. To incorporate such effects into our model, suppose that the size of spillovers is a function of the joint venture's success so that an additional fraction $s_i \geq 0, i = A, B$ of its gross value V accrues directly to each partner. For simplicity, spillovers do not incur any additional costs.[15]

It is straightforward to show that the optimality of ownership arrangements in the presence of spillovers and control benefits depends on their relative size. Replicating the preceding analysis, we find that spillover effects increase the likelihood of ownership allocations around 50-50 while decreasing outright majority control for

$$s^* := \frac{s_A}{s_A + s_B} \geq \frac{(1-d)/2 + \delta}{1 - d + \delta} = \bar{\gamma} > \frac{1}{2} \tag{6}$$

which is completely analogous to Equation (5). For $s^* < \bar{\gamma}$, the reverse is true because the existence of synergy gains at the parent level partially compensates the minority partner, who enjoys high spillovers s_B relative to s_A, for control-related losses. Regardless of their respective sizes, the existence of parent-specific synergies increases the likelihood of 50-50 ownership relative to the 50-plus regime.

Finally note that nothing in our specification precludes control benefits δ to outweigh costs d, i.e., $\delta > d$, so that one-sided control becomes socially desirable, for instance through more efficient decision making. In this situation, Appendix A implies that 50-plus ownership eventually displaces the 50-50 regime.

5 Data Description and Methodology

This section describes the data and methodology we use to relate our theoretical results to the cross-sectional analysis of ownership determinants.

[15] As for control costs and benefits, we only require spillover effects to be monotonic in joint venture value V.

5.1 Data Description

We start with a sample of all US joint ventures announced between January 1985 and 2000 in the Joint Ventures and Strategic Alliances database of Thomson Financial Securities Data (TFSD).[16] If parents announce other joint ventures during the event window, we only include the first one. For joint ventures with at least one publicly traded parent we match venturers with stock price and other financial information from the FactSet database family, whenever available. To improve the data quality, we verify and correct these data points with information obtained by electronically searching news wires around announcement dates. In case of conflicts, we delete the questionable observations which leaves a total of 1,248 joint venture announcements with 1,545 parent companies.

Given our focus on two-parent joint ventures, our main sample consists of joint ventures whose parents are both publicly traded companies with full data availability (297 joint ventures with 594 parent observations) from which we exclude 22 contaminated observations for which at least one parent had other news reported around the joint venture announcement. From Table 2 we see that the sample represents a broad cross-section of industries. Most joint ventures involve parents in Transportation, Communications, Gas, Electricity, Manufacturing, Wholesale Trade, and Services. Table 3 indicates that, in line with our our focus on US joint ventures, 67.85% of parents are American firms, followed by Japanese (17.85%), German (3.03%) and British (2.36%) ones.

Parent-firm characteristics vary quite substantially (see Table 4). On average, parent firms tend to be large in terms of market value ($7.18b), assets ($13b), sales ($11.7b) and number of employees (96,189) which, in light of our focus on publicly traded companies, is hardly surprising. However, a wide range of firms is represented: the largest parent counts 813,000 employees (GM in 1988), the smallest one 34 (Cyanotech in 1994). Table 4 also indicates no obvious size effects as the parents' economic attributes do not seem to systematically vary with ownership stakes. Table 5 further explores parent similarity on the basis of partner characteristics. It suggests that parents, on average, are dissimilar but, at the same time, both similar and dissimilar venturers are more likely to choose 50-50 ownership allocations than one-sided control.

[16]TFSD define a joint venture as "... a cooperative business activity, formed by two or more separate organizations for strategic purpose(s), which creates an *independent business entity*, and allocates ownership, operational responsibilities, and financial risks and rewards to each member, while preserving each member's separate identity/autonomy" (our emphasis).

5.2 Methodology

Recall that optimal ownership arrangements depend on the relative resource costs γ^* (see Figure 2) that can also be thought of as a measure of parent similarity. To establish a direct link between our model predictions and cross-sectional evidence, we can use observable wealth gains by parent shareholders in response to joint-venture announcements to recover this unobservable cost parameter for a given control regime k. Appendix B shows that we can estimate the relative costs $\widehat{\gamma}^*(k)$ for control regimes $k = A, J, P$ as

$$\begin{aligned} k = A: \ \widehat{\gamma}^*(A) &= \frac{w_A(\tau_1,\tau_2)}{w_A(\tau_1,\tau_2) + w_B(\tau_1,\tau_2)} \\ k = J: \ \widehat{\gamma}^*(J) &= \frac{w_A(\tau_1,\tau_2)}{3w_A(\tau_1,\tau_2) - w_B(\tau_1,\tau_2)} \\ k = P: \ \widehat{\gamma}^*(P;z) &= \frac{(2+z)\,w_B(\tau_1,\tau_2) - w_A(\tau_1,\tau_2)}{(3+z)\,w_B(\tau_1,\tau_2) - w_A(\tau_1,\tau_2)}, \ z = \frac{4\delta}{1-d} > 0 \end{aligned} \tag{7}$$

where $w_i(\tau_1,\tau_2)$ denotes abnormal wealth gains over the event window (τ_1,τ_2). Furthermore, the relative size of observed wealth gains and ownership stakes unambiguously identify parents as A or B in each joint venture.

Under the assumption of informationally efficient markets, cumulative abnormal wealth created by joint venture announcements $w_i, i = A, B$ should correspond to parent i's expected payoff W_i. To recover relative costs $\widehat{\gamma}^*(k)$ from parent wealth gains, we calculate the latter as

$$w_i(\tau_1,\tau_2) = \widehat{CAR}_i(\tau_1,\tau_2) \cdot K_{i-21} \tag{8}$$

where K_{i-21} is firm i's market capitalization on the eve of the event period and $\widehat{CAR}_i(\tau_1,\tau_2)$ its cumulative abnormal return over the event window (τ_1,τ_2) estimated by standard methods.[17]

The first panel in Table 6 summarizes our event study results in terms of cumulative abnormal returns whose means range from 0.860% for a two-day event window to 1.141% for a five day one and are highly significant (P values of 0.0000).[18] These abnormal returns translate into wealth

[17] Working with cumulative wealth instead of abnormal returns has the additional benefits that we can easily aggregate wealth effects and avoid size related biases.

[18] Our findings are broadly in line with the results of earlier studies of joint venture announcement effects such as McConnell and Nantell (1985), Mohanram and Nanda (1998), and Johnson and Houston (2001), and non-equity strategic alliances excluding joint ventures (see Chan *et al.*, 1996)

gains for shareholders of parent firms that average between \$45 to \$60 million (Table 6, second panel). Normalizing wealth gains by ownership stakes and averaging them according to shareholdings, our results suggest that 50-50 joint ventures create among the most wealth for their parents' shareholders over a two-day window (Table 6: third panel). Furthermore, normalized wealth gains tend to be, on average, larger for the majority than the minority parent which is consistent with our assumption that majority owners derive additional benefits from control. Since we have only six observations for joint ventures with majority stakes between 51% and 60%, one outlier causes the large negative average wealth realization.

6 Empirical Evidence

Before we summarize our empirical findings, we verify that the estimation of the relative cost parameter $\widehat{\gamma}^*(k)$ in Equation (7) is consistent with our model. Figure 2 suggests a simple test: regardless of control costs or benefits, the parent homogeneity measure γ^* should be larger for joint ventures with outright majority control than for 50-50 ones. Table 7 (first panel) reports the results of a one-sided t-test of this prediction for various subsamples with different outlier corrections.[19] Since the P value of the relevant test statistic is close to 0 for all subsamples, we decisively reject the null hypothesis that γ^* is invariant and conclude that partner attributes in majority-controlled joint ventures are more heterogeneous than in 50-50 ones. We also find that we cannot reject the hypothesis $\gamma^*(J) = \frac{1}{2}$, which is again consistent with our model (see Table 7, second panel).

6.1 Complementarities and Spillovers

To determine whether strong complementarities in contributions are an appropriate benchmark for our analysis, we first investigate whether our data exhibits a sufficient degree of absence of input substitutability as required by our Leontief value-creation specification.[20] We measure the degree of input substitutability as the *overlap* in production technology and expertise between parents. Following Fan and Lang (2000), we define and calculate overlap as the correlation of intermediate inputs and outputs of parents from the commodity flows of their respective industries

[19] Essentially, we control for joint ventures in which both parent wealth gains are very small (or different in sign) so that the relative cost measure $\widehat{\gamma}^*(k)$ becomes very large and falls significantly outside the required interval $(0, 1)$.

[20] The Leontief production function's elasticity of substitution between inputs (parent contributions) is zero.

(see Table 8 for details). The lower the correlations, the less alike are the parents in their input and output dimension so that their technologies, expertise, and production factors are more likely to be complements with correspondingly higher scope for JV-level synergies.

Table 8 shows that the sample mean of the *average* input and output correlations between parents is 0.20. A one-sided test reveals that we cannot reject the hypothesis that the average correlation is zero (P value of 0.2614). Since absence of overlap in parent technologies and expertise in either production dimension is sufficient for strong synergy effects, the *minimum* of the input and output correlations is an even better indicator of complementarity. In this case, we find a sample mean of only 0.14 identifying 80% of JVs as complementary (overlap smaller than mean). Hence, we accept the hypothesis of no production-technology overlap that should correspond to the presence of strong complementarities as embodied by the Leontief specification.

As a further test, we build on definitions of joint-venture type by TFSD to classify our sample into JVs requiring resource complementarities (manufacturing with or without one-sided technology contributions, marketing or distribution, exclusive supply or Original Equipment Manufacturing, exploration, etc.) on the basis of announced business model and objective (see Table 8 for details). Overall, more than 73% of our observations exhibit significant scope for joint venture-level complementarities, which is in line with our earlier results.

Finally, the authors and their research assistants independently classified parent contributions and expertise as complements, substitutes, or indeterminate from extensive information on the joint ventures and their parents.[21] In particular, we collected descriptions of the intent, business model, and focus of the joint venture, and the parent resources and contributions from news wires (Dow Jones Interactive, Business and PR Wires), Lexis/Nexis, and TFSD. Table 8 reveals that parent contributions overwhelmingly appear to be complements (82.18%) rather than substitutes (10.18%) and that, once again, the pattern is consistent across ownership allocations.

Taken together, our findings suggest that parents exhibit very little overlap in production and that their resources appear to be complements rather than substitutes in up to 82% of the joint ventures (Table 8). This high potential for strong resource complementarities between parents validates our analytic approach and the Leontief specification. As a result, we can proceed as

[21] Subjective classification schemes have also been used by Johnson and Houston (2001) in the context of vertical vs. horizontal joint ventures, or Hellmann and Puri (2000) in their classification of startups as innovators or imitators.

in Equation (7) to recover estimates of γ^* from parent wealth gains without fear of inducing endogeneity problems due to misspecification in the cross-sectional analysis.

In preparation for the latter, we also try to distinguish between JV-level synergy effects stemming from resource complementarities $V(I_A, I_B)$ and parent-level ones through spillovers $s_i V(I_A, I_B)$. Using again TFSD's classification of joint-venture type, we record whether our joint ventures are conducive to spillovers in expertise (R&D, technology sharing or transfer, licensing).[22] We then translate joint-venture categories into indices for complementarities ($COMP$) and spillovers ($SPILL$; see Table 8 for details). Consistent with our theoretical results, Table 8 shows that 50-50 joint ventures offer, on average, less scope for complementarities but more spillover potential.

6.2 Determinants of Ownership Allocation

In light of our three distinct control regimes, it seems natural to specify a discrete choice model of joint venture ownership. It is well known that such specifications arise from latent variables, in our case the JV value under optimal ownership given the attributes of the parents (relative costs, spillover effects, control costs and benefits) and joint venture (scope for complementarity). Hence, we let the probability that joint venture j adopts a particular control regime $k = A, J, P$ be governed by

$$\Pr\{REGIME_j = k\} = \Lambda\left(\beta_{1k}\widehat{\gamma}^*(k;z)_j + \beta_{2k}LEV_j + \sum_{l=3}^{6}\beta_{lk}RELpvp_j^l + \sum_m \beta_{mk}x_j^m\right) \quad (9)$$

where Λ is the logistic distribution function, $\widehat{\gamma}^*(k;z)$ corresponds to our parent homogeneity measure $\widehat{\gamma}^*(k)$ defined in Equation (7), LEV is a binary variable indicating leverage of the JV, and x^m a set of joint venture and parent attributes. The $RELpvp^l$ are sets of binary variables that classify parents and joint ventures in terms of their relatedness by two-digit Standard Industry Classification (SIC) codes (related if they share the same two-digit code) and national origin (headquarters in the same country) to control for industry and country effects (see Table 9 for details).

[22]Our binary classification roughly corresponds to the most commonly given managerial motives for joint ventures reported in McConnell and Nantell (1985). The three most commonly cited rationales for joint ventures are (in decreasing order of frequency) "To Acquire Skills and Technical Know How" (parent-level spillover), "To Acquire Distribution Facilities" presumably for own production (JV-level complementarity), and "To Acquire Production Facilities" presumably for own distribution (JV-level complementarity); "R&D" and "Licensing" are 6 and 10, respectively.

We estimate the multinomial discrete choice model in Equation (9) by Full-Information Maximum Likelihood. Since the likelihood of observing the 50-plus regime ($k = P$) also depends on the parameter z, we conduct a grid search over z to maximize the log-likelihood function in the subsequent estimation. We use our noncontaminated two-parent sample (275 observations) but exclude 8 outliers, whose wealth effects are so close to 0 that our estimate of relative costs $\widehat{\gamma}^* (k; z)$ falls outside the interval $(-5, 5)$.

Our theoretical results (see Figure 2) suggest that more heterogeneous parents (high relative costs γ^*) should be less likely to adopt 50-50 ownership and joint control, but more likely to opt for one-sided control $(k = P, A)$. Both specifications reported in Table 9 show that the marginal effects of the parent homogeneity measure $\widehat{\gamma}^* (k; z)$ correspond exactly to this prediction. The highly significant negative marginal effect of $\widehat{\gamma}^* (k; z)$ in the joint control equation means that the likelihood of observing 50-50 ownership decreases in γ^*, i.e., more heterogeneous parents are less likely to choose joint control. At the same time, the equally significant positive marginal effects of $\widehat{\gamma}^* (k; z)$ in the 50-plus and outright majority regime equation indicate that more dissimilar parents are more likely to adopt one-sided control.

Industry and nationality effects confirm these findings. When parents are from the same (sub)industries as measured by SIC-code relatedness ($SICaaa$: all three entities in the same industry; $SICaca$: parents from the same industry, JV in a different one) or national origin ($NATaaa$: all US entities), the likelihood of adopting 50-50 ownership increases, while the likelihood of choosing 50-plus or outright majority regimes decreases.

Figure 2 also implies that joint ventures with larger potential for value diversion are more likely to opt for 50-50 ownership and less frequently for one-sided control. As a first pass at this issue, we again look for evidence in the industry and nationality effects. In particular, the relatedness variables $SICaab$ and $NATaab$ (unrelated parents, one parent related to the JV) identify joint ventures with potential for value diversion because a parent in the same sector as the JV (or located in the US) might have an advantage in appropriating noncontractible benefits as an industry insider. Hence, we would expect $SICaab$ or $NATaab$ to exhibit positive marginal effects for 50-50 joint ventures and negative ones for those with 50-plus or outright majority control.

We find that a parent in the same industry as the JV raises the likelihood of 50-50 shareholdings and joint control and lowers it for 50-plus and outright majority control. Not only does $SICaab$

exhibit the predicted marginal effects on ownership choice, the variable is also highly significant across all three ownership regimes. Furthermore, the results could not possibly be due to complementarity effects because they would require the opposite sign pattern: negative for 50-50 and positive for one-sided control. Specification 2 including national-relatedness variables confirms this effect.

Our model also implies that the larger the potential for value extraction, the more heterogeneous the parents can be under 50-50 ownership. Using again industry effects as a proxy, we add the interactive variable $\widehat{\gamma}^*(k;z) \cdot SICaab$ to the specification in Equation (9). Table 10 reports marginal effects that are consistent with this prediction. For joint ventures with a parent in the same industry ($SICaab = 1$), partner heterogeneity $\widehat{\gamma}^*(k;z)$ reduces much less the likelihood of adopting 50-50 ownership so that parents tend to be more dissimilar under joint control. Conversely, the likelihood of observing 50-plus increases much less in parent heterogeneity for such joint ventures, which is again in line with the implications depicted in Figure 2.

Since our relatedness variables might pick up other industry and national origin effects in addition to governance-related ones, the next section introduces a set of variables specifically designed to capture spillovers, resource complementarities, and control benefits into the specification. Other parent attributes related to resources (sales, employment) or size (total assets, market capitalization, operating cash flows) are not statistically significant and, therefore, not reported. This result holds whether we include the variables in addition to relative costs $\widehat{\gamma}^*(k;z)$ or instead of the latter.

Our estimations reveal a further interesting marginal effect related to the leverage of joint ventures. While 65% or our 297 two-parent samples are all-equity, about 35% of our observations carry a significant amount of debt. We find that the presence of debt increases the likelihood of adopting 50-50 ownership but decreases it for 50-plus and majority controlled joint ventures (Tables 9 and 10). US GAAP might offer an explanation for this finding. Parents holding majority stakes have to fully consolidate the joint venture and recognize its liability on their balance sheets in case they guarantee the debt. Unfortunately, our data does not distinguish between guaranteed and nonguaranteed debt so that we cannot further analyze such debt-related effects.

6.3 Synergy Effects and Control Benefits

We next investigate the respective roles of JV-level synergies (complementarities in contributions) and parent-level ones (spillovers in expertise) in the choice of ownership arrangements. Recall our model prediction that higher spillover potential increases the likelihood of joint control (50-50) and decreases the occurrence of outright majority control (see Equation (6) or Appendix A). Similarly, we argued earlier that parents trade off JV-level complementarities with the net social costs of control when deciding between one-sided or joint control. Hence, we would expect that one-sided control arrangements become more likely the greater the scope for complementarities. To distinguish the effects of spillovers from those of resource complementarities, we include the indices $SPILL$ and $COMP$, summarized and described in Table 8, in our discrete choice model of ownership in Equation (9).

The results in Table 11 (Specification 1) exactly exhibit the conjectured effects for spillovers and complementarities. The higher the scope for parent-level synergies ($SPILL$), the more likely are the parties to adopt 50-50 ownership arrangements while greater JV-level synergy effects ($COMP$) tend to decrease the likelihood of joint control. Conversely, higher spillover potential decreases the likelihood of outright majority control ($k = A$) while more scope for JV-level complementarities increases it. The lack of statistical significance of the spillover and complementarity variables in the 50-plus regime is probably due to the smaller number of observations and insufficient variation in the indices relative to the other two regimes. Repeating the analysis with the national-origin control variables confirms the earlier results (Table 11, Specification 2).

Comparing Specification 1 in Tables 9 and 11, respectively, we see that the inclusion of the spillover and complementarities variables markedly affects the size of industry effects. As the spillover variable attempts to measure intangible and, most likely, noncontractible benefits at the parent level, it might also proxy for control benefits. However, when we interact the spillover variable with the relatedness dummy for a parent in the same industry as the joint venture, the resulting variable $SPILL \cdot SICaab$ is insignificant in any specification across all three regimes (results not reported). Hence, we next construct a direct proxy for control benefits and costs in terms of parents' production technology and expertise for inclusion in our estimations.

To this end, we introduce the variable $DOVER$ that measures the difference in parent-JV technology overlap relative to their own production overlap. We first calculate the average of the intermediate input and output correlations between the industries of parent i and joint venture j in complete analogy with the overlap measure for parents (see Table 8 for explanations). Next, we sort parents into A or B in light of their respective wealth gains as described in Appendix B, and compute their difference in overlap with the joint venture. The proxy for control benefit potential is then simply this difference normalized by the parents' *Average Production Overlap* described and tabulated in Table 8, i.e., $DOVER_j = \frac{OVER_{Aj} - OVER_{Bj}}{OVER_{AB}}$.

The intuition behind $DOVER$ as a gauge for value-extraction potential and associated costs is straightforward. The more parent A shares technology and expertise with the joint venture relative to parent B (high differential production-function overlap $OVER_{Aj} - OVER_{Bj}$), the more opportunity for value diversion the dominant venturer has. However, if both parents themselves significantly overlap (high $OVER_{AB}$) the scope of such activities (e.g., through easier monitoring and threat of legal action) or their cost to the joint venture and the partner (e.g., through spillover gains) might decrease. As before, we expect the likelihood of 50-50 ownership to rise in $DOVER$ while one-sided control should be less frequent.

The results in Table 12 (Specification 1) bear out these predictions. Our proxy for control benefits and costs has a small positive effect on the probability of observing joint control and a negative effect of similar magnitude on the likelihood of outright majority control. $DOVER$ is statistically insignificant in the 50-plus equation which might reflect the fact that complementarity gains ($COMP$) just compensate for one-sided control in this regime. We also see that key explanatory variables such as relative costs $\widehat{\gamma}^*(k;z)$, parent-level spillovers ($SPILL$) and JV-specific complementarities ($COMP$) exhibit little change in terms of sign, magnitude and statistical significance in comparison with Specification 1 in Table 11. We interpret this invariance of marginal effects as evidence that $DOVER$ indeed captures control rather than spillover or complementarity effects. The results are virtually identical if we just use the difference in overlap $OVER_{Aj} - OVER_{Bj}$ instead of $DOVER$ so that we do not report the results.

Since $DOVER$ measures the three-way overlap in production technology between parents and their joint venture, we interact this control proxy with relatedness measures such as $SICaab$ that might capture the impact of control through industry effects. Specification 2 in Table 12 reports the marginal effects when we include $DOVER \cdot SICaab$ in our discrete choice model. We see that

DOVER becomes insignificant in comparison to Specification 1 while the new interactive variable is highly significant except for the 50-plus regime and exhibits precisely the predicted sign pattern. At the same time, the marginal effects of parent-level and JV-level synergies remain virtually the same in magnitude and significance. We take these findings as additional evidence that, indeed, both *DOVER* through parent production-technology effects and *SICaab* through industry effects are good proxies for the consequences of control.

7 Contingent Ownership

In case a partner does not perform its contractual obligations, joint venture agreements often include provisions for the other parent to buy out or sell to the defaulting party.[23] Such provisions are an application of the well-known theoretical result that contingent ownership arrangements can serve to overcome contractual incompleteness because pure equity arrangements may not induce efficient investment between partners in the presence of costly private benefits (Grossman and Hart, 1986). In special circumstances, for instance when the parent contributions differ in time or observability, sellout or buyout provisions can complete contracts (see Nöldeke and Schmidt, 1998 and Chemla *et al.*, 2001).

As we saw earlier, contingent buyout, sellout, and other option-like clauses help to break deadlock in 50-50 joint ventures or matters requiring consent. Similarly, options can safeguard the interests of minority shareholders (Hewitt *et al.*, 2001). Also, joint venture agreements invariably include a right of first refusal or other preemption right in case of one party wishing to sell its stake (Campbell and Reuer, 2001). To investigate the role of contingent ownership in joint-venture contracting, we searched various newswires to collect information on explicit option provisions in the joint venture and to record buyout activity with and without change of control.

Explicit buyout or sellout provisions are not only evidence of the importance of contractual incompleteness, but also signal that the partners are able to define its nature and duration. Table 13 summarizes the occurrence of contingent ownership in our two-parent sample. Buyout activity occurs in about 34% of all joint ventures and dissolution or sales to third parties in about 20%, while about 45% of all joint ventures experience no change in status. The overwhelming majority

[23] See, for instance, the agreement between Pearson plc and MarketWatch.com.

of buyout or termination activity occurs between parents which is in line with the earlier findings in Bleeke and Ernst (1991) that partners tend to buy out each other. Explicitly announced options seem to be concentrated in joint ventures with one-sided control.[24]

The return reaction to the announcement of joint ventures with contingent ownership arrangements seems to indicate that such devices can enhance contractual efficiency. Table 14 shows that mean cumulative abnormal returns in the presence of explicit options are positive, highly significant, and generally higher than for joint ventures with no reported options. A similar picture emerges from an analysis of *ex post* changes in ownership status such as buyouts or sales (Table 14, second panel). One-sided t-tests suggest that joint ventures with subsequent buyout activity create significantly more wealth for parent shareholders. Hence, the market seems to recognize the positive effects of contingent ownership in terms of incentives, overcoming contractual incompleteness, and reduced rent seeking by parents. Conversely, the smaller return reaction for subsequently terminated joint ventures might express investors' doubts about their viability in the first place.

We next investigate the incidence of contingent ownership on the choice of control allocation and estimate two variants of the following specification

$$\Pr\{REGIME_j = k\} = \Lambda\left(\beta_{1k}\widehat{\gamma}^*(k;z)_j + \sum_{l=2}^{L}\beta_{lk}CONT_j^l + \sum_{l=L+1}^{L+4}\beta_{lk}x_j^l + \sum_{l=L+5}^{L+8}\beta_{lk}SICpvp_j^l\right)$$

where the $CONT^l$ are binary variables capturing various aspects of contingent ownership, x_j^l the joint-venture and parent attributes $SPILL$, $COMP$, $DOVER \cdot SICaab$, and LEV, and $SICpvp^l$ our four binary variables for industry-relatedness effects described above.

The first specification in Table 15 includes the binary variables $OPTION$ for the announcement of options and $OWNCHANGE$ for subsequent changes in ownership structure (partial or full buyout, termination, or sale). We see that the presence of options greatly reduces the likelihood of equal ownership but increases it for 50-plus control and, even more, for outright majority ownership. These results are consistent both with an incentives role and a minority-protection function of options in joint ventures. In 50-50 joint ventures, other mechanisms such as "deadlock deliberately built into the structure" might protect each partner and provide incentives for contributions so that

[24] All 65 announced options in our larger sample of at least one publicl parent (1,248 US JVs) confirm that such clauses are concentrated in joint ventures with one-sided control (84.62% of all reported options).

options are less crucial. The marginal effects of a subsequent change in status ($OWNCHANGE$) seem to confirm this interpretation as they increase the likelihood of joint control but decrease it in one-sided control regimes, albeit insignificantly so.

Specification 2 in Table 15 further explores contingent ownership effects by distinguishing between initially announced or subsequently exercised options ($OPTIONEX$) on the one hand, and exercised buyout or sellout provisions ($BUYOUT$ for all buyout activity between parents with the exception of option-induced transactions), as well as terminations ($TERM$). The results confirm the previously identified incentive and minority-protection effects of options and provide further evidence for the role of buyouts as mechanism to force consensus in 50-50 joint ventures. Not only are the marginal effects of $BUYOUT$ significant in both 50-50 and the outright-majority regime, they also change signs in line with our conjecture. The variable $TERM$, possibly capturing automatic termination as a further device to overcome potential deadlocks, exhibits the same sign pattern across regimes but is only significant at about 10% for joint control.

8 Conclusion

In this paper, we argue that the more important concerns about control rights become in the design of joint ventures, the more frequently will parent firms adopt 50-50 ownership. Our central result shows that very different, possibly industry- or firm-specific combinations of parent attributes and costs associated with unilateral control give rise to the optimal clustering of ownership at 50-50 and 50 plus one share equity allocations. The underlying rationale is that control-dependent benefits can lead to distortions in parent incentives that equal ownership stakes avoid. While firms define their boundaries by the need to assert property rights over assets (Hart and Moore, 1990 or Baker, Gibbons and Murphy, 2002a), exclusive ownership of and control over resources proves elusive when more than just one firm requires incentives (Zingales, 2000).

We empirically verify this insight by analyzing the determinants of joint venture ownership. The more potential the dominant parent has to appropriate private control benefits from the joint venture, the less likely one-sided control arrangements become in favor of 50-50 ownership. We interpret these findings as strong empirical support for our contention that small control-induced frictions suffice to generate the observed ownership patterns. Distinguishing parent-level synergies such as spillovers in expertise and technology from costly residual control benefits, we find that the former also enhance the attractiveness of shared control. By contrast, joint venture-level synergies rooted in the complementarity of the partners' contributions favor one-sided control which our empirical findings also bear out.

We also explore the role of contingent ownership arrangements such as options and buyout or termination provisions in overcoming contractual incompleteness, providing incentives, and resolving disagreement between the partners. Our findings are consistent with the view that options serve to protect minority partners in joint ventures with one-sided control and, more generally, provide incentives for resource contribution. Buyout and termination activity seems more associated with resolving conflict between partners and overcoming deadlock in 50-50 joint ventures. However, a full analysis of these effects, including the separation of ownership and control, would require a dynamic analysis of joint-venture contracting which points to several possible extensions of our framework.

Appendix

A Optimal Ownership in Joint Ventures

We establish optimal ownership allocations and the prevalence of 50-50 and 50-plus regimes in function of parents economic attributes in a sequence of results. Let $\gamma_i^k, k = A, J, P$ denote i's ownership stake under outright majority, joint, and 50-plus control, respectively ($\gamma_A^k + \gamma_B^k = 1$), W^k the joint venture's surplus, and W_i^k i's net JV profits. The value of control is $\delta - \gamma d$ because the controlling party obtains a fraction $\delta + \gamma(1-d)$ of the joint venture's value including the private benefits. Hence, control is valuable as long as

$$\delta > \gamma d, \gamma \geq \frac{1}{2} \tag{10}$$

which we, henceforth, assume. Otherwise, the majority owner would not choose to extract control rents because her loss as a shareholder γd would exceed her private benefit δ.

Outright Majority Control $\gamma^A > \frac{1}{2}$. If firm A, contributing the more valuable resource, determines the joint venture's value at the margin, outright majority control by parent A is optimal with the second-best efficient equity stakes given in Equation (4). By assumption, A constrains total output to $V^A(\gamma) = \min\left\{\frac{\delta+\gamma(1-d)}{c_A}, \frac{(1-\gamma)(1-d)}{c_B}\right\} = \frac{\delta+\gamma(1-d)}{c_A}$. Choosing A's stake γ so that investment incentives are equalized, i.e.,

$$\frac{\delta + \gamma(1-d)}{c_A} = \frac{(1-\gamma)(1-d)}{c_B},$$

and solving for γ yields the (second-best) optimal ownership distribution under outright control by A in Equation (4) as $\gamma^A = \frac{(1-d)c_A - \delta c_B}{(1-d)(c_B+c_A)} = \gamma^* - \frac{\delta}{(1-d)}(1-\gamma^*)$.

Existence of Critical Region $\left(\frac{1}{2}, \bar{\gamma}\right)$**.** We have to show that there exists an interval $\left(\frac{1}{2}, \bar{\gamma}\right)$ so that ownership allocations cannot equalize contribution incentives. Let γ^* be sufficiently close to $\frac{1}{2}$ so that control by A would constrain the JV output to $V^A(\gamma) = \min\left\{\frac{\delta+\gamma(1-d)}{c_A}, \frac{(1-\gamma)(1-d)}{c_B}\right\} = \frac{(1-\gamma)(1-d)}{c_B}$ for $\gamma \in \left(\frac{1}{2}, \gamma^*\right)$. Control by A under $c_A > c_B$ is optimal as long as there exists $\gamma \geq \frac{1}{2}$ such that both partners have equal investment incentives, $\frac{\delta+\gamma(1-d)}{c_A} = \frac{(1-\gamma)(1-d)}{c_B}$. But, this is only possible if

$$\frac{\delta + \frac{1}{2}(1-d)}{c_A} \leq \frac{\frac{1}{2}(1-d)}{c_B} \tag{11}$$

that, for $\gamma^* = \frac{c_A}{c_A+c_B}$, now yields the critical threshold $\bar{\gamma} = \frac{(1-d)/2+\delta}{1-d+\delta} > \frac{1}{2}$ in Equation (5). For $\gamma^* \geq \bar{\gamma}$, the (second-best) optimal asymmetric equity stakes γ^A in Equation (4) are feasible while for $\frac{1}{2} < \gamma^* < \bar{\gamma}$ Equation (11) is violated and B indeed contributes less.

Optimality of Joint Control. There exists a threshold $\hat{\gamma} = \frac{1+\sqrt{1-(1-d+\delta)^2}}{2(1-d+\delta)^2} > \frac{1}{2}$ such that for all $\gamma^* \in \left(\frac{1}{2}, \hat{\gamma}\right)$, 50-50 ownership with joint control maximizes value creation in the joint venture. Let γ' denote the equity allocation that would equalize investment incentives if A held all control rights regardless of her equity stake, i.e. $\frac{\delta+\gamma'(1-d)}{c_A} = \frac{(1-\gamma')(1-d)}{c_B}$ for $\gamma' \in (0,1)$. But then we have $W^A(\gamma') > W^A(\gamma)$ for any $\gamma \neq \gamma'$ and, in particular, $W^A(\gamma') > W^A\left(\frac{1}{2}\right) = W^P$, the JV's surplus under 50-plus ownership. Consequently, $W^A(\gamma')$ defines an upper bound for net joint venture surplus under any equity allocation different from joint ownership. Hence, we have to show that $W^J > W^A(\gamma')$ for all $\gamma^* < \hat{\gamma} = \frac{1+\sqrt{1-(1-d+\delta)^2}}{2(1-d+\delta)^2}$.

Consider the JV's net value W for $\gamma = \frac{1}{2}$ and $\gamma = \gamma'$. Since $\gamma = \frac{1}{2}$ implies joint control and parent A makes the smaller contribution by $c_A > c_B$, we have $I_A = I_B = \frac{1}{2c_A}$ so that

$$W^J = \frac{1}{2c_A} - \frac{(c_A + c_B)}{2}\frac{1}{4c_A^2} = \frac{3c_A - c_B}{8c_A^2}. \tag{12}$$

By assumption, contribution incentives are equalized for $\gamma = \gamma'$ so that $\frac{\gamma'(1-d)+\delta}{c_A} = \frac{(1-\gamma')(1-d)}{c_B}$. Solving out for $\gamma' = \frac{(1-d)c_A - \delta c_B}{(1-d)(c_A+c_B)}$, we find $W^A(\gamma')$ as

$$W^A(\gamma') = (1-d+\delta)\frac{\gamma'(1-d)+\delta}{2c_A} = \frac{(1-d+\delta)^2}{2(c_A+c_B)}. \tag{13}$$

For $W^J \geq W^A(\gamma')$ to hold, we require from Equations (12) and (13) with $\gamma^* = \frac{c_A}{(c_A+c_B)}$ and $\frac{c_B}{c_A} = \frac{1-\gamma^*}{\gamma^*}$ that $(1-d+\delta)^2(\gamma^*)^2 - \gamma^* + \frac{1}{4} \leq 0$. Hence, $\hat{\gamma}$ is the root larger than $\frac{1}{2}$ of $(1-d+\delta)^2\hat{\gamma}^2 - \hat{\gamma} + \frac{1}{4} = 0$, yielding the threshold for the optimality of joint control $\hat{\gamma} = \frac{1+\sqrt{1-(1-d+\delta)^2}}{2(1-d+\delta)^2}$ as desired.

Ownership Allocations and Control Regimes. The relative size of thresholds $\hat{\gamma}$ and $\bar{\gamma}$ determines the number of optimal ownership regimes for various combinations of relative costs γ^* and net social costs of control $d-\delta$. For $\hat{\gamma} \geq \bar{\gamma}$ (high net control costs $d-\delta$) only 50-50 and outright majority control (by A) exist as distinct control regimes. By the preceding result, venturers prefer joint control for all $\gamma^* \leq \hat{\gamma}$ and outright majority control, otherwise.

In case of $\hat{\gamma} < \bar{\gamma}$, the preceding result establishes that, for all $\gamma^* > \bar{\gamma}$, outright majority control is optimal and feasible by Equation (5), while 50-50 ownership is preferable for $\gamma^* < \hat{\gamma}$. In the remaining interval $[\hat{\gamma}, \bar{\gamma})$, only 50-50 or 50-plus ownership are feasible by the above arguments leading to the derivation of $\hat{\gamma}$.

To find the threshold $\tilde{\gamma}$ separating 50-50 from 50-plus control, consider

$$G(\gamma^*) := \frac{W^P(\gamma^*)}{W^J(\gamma^*)} = (1-d)\,\frac{4(1-d+\delta)(1-\gamma^*) - (1-d)}{4\gamma^* - 1}\frac{(\gamma^*)^2}{(1-\gamma^*)^2} \tag{14}$$

obtained by dividing $c_A W^J$ (see Equation (12)) into $c_B W^P = (1-d+\delta)\frac{1-d}{2} - \frac{(1-d)^2}{8(1-\gamma^*)}$ and rearranging. Clearly, $G(\gamma^*)$ is continuously differentiable on $[\hat{\gamma}, \bar{\gamma}]$. Furthermore, we have $G(\hat{\gamma}) < 1$, since, by the preceding result, $W^J = W^A(\gamma') > W^P$ if $\gamma^* = \hat{\gamma}$ and, similarly, $G(\bar{\gamma}) > 1$ which can be verified by substituting $\gamma^* = \bar{\gamma}$ into Equation (14). By the Intermediate Value Theorem, there exists a value $\tilde{\gamma} \in (\hat{\gamma}, \bar{\gamma})$ so that $G(\tilde{\gamma}) = 1$ or, equivalently, $W^P(\tilde{\gamma}) = W^J(\tilde{\gamma})$. It is possible to show that $\frac{dG}{d\gamma^*} > 0$ on $[\hat{\gamma}, \bar{\gamma}]$, from which it follows that this threshold $\tilde{\gamma}$ is unique.

Spillovers. Suppose that there exist parent-level synergy gains $s_i V, i = A, B$ that do not incur any additional costs. With such spillovers, the payoffs to parent A (and similarly for B) become

$$W_A = \begin{cases} [\delta + s_A + \gamma(1-d)]\,V(I_A, I_B) - c_A\frac{I_A^2}{2} & \text{for } \gamma > \frac{1}{2} \\ \left[s_A + \frac{1}{2}\right]V(I_A, I_B) - c_A\frac{I_A^2}{2} & \text{for } \gamma = \frac{1}{2} \\ [s_A + \gamma(1-d)]\,V(I_A, I_B) - c_A\frac{I_A^2}{2} & \text{for } \gamma < \frac{1}{2} \end{cases}$$

Calculating the critical region $\left(\frac{1}{2},\bar{\gamma}_s\right)$ with spillovers, we find the corresponding threshold $\bar{\gamma}_s = \frac{(1-d)\frac{1}{2}+\delta+s_A}{1-d+\delta+s_A+s_B}$ from $\frac{\frac{1}{2}(1-d)+\delta+s_A}{c_A} \leq \frac{\frac{1}{2}(1-d)+s_B}{c_B}$. For $\bar{\gamma}_s \geq \bar{\gamma}$, we require $\frac{(1-d)\frac{1}{2}+\delta+s_A}{1-d+\delta+s_A+s_B} \geq \frac{(1-d)/2+\delta}{1-d+\delta}$ which, upon rearranging and letting $s^* = \frac{s_A}{s_A+s_B}$, yields Equation (6). It follows that the higher the relative fraction of spillovers, the more likely becomes joint control and the less likely outright majority control.

B Recovering Relative Costs

Under control by A, the net value of i's equity stake is $W_i^A = (1+\delta-d)^2 W_i^*$ for first-best JV value $W_i^* = \frac{1}{2}\gamma_i^* V^*$ so that $\frac{c_A^A}{c_B^A} = \frac{\gamma_A^*}{\gamma_B^*} = \frac{W_A^A}{W_B^A}$ and, hence, $\gamma^*(A) = \frac{W_A^A}{W_A^A+W_B^A}$. If markets are informationally efficient we can replace W_i^A with $w_i(\tau_1,\tau_2)$ in the expression while preserving the asymptotic distributional properties.

Repeating the preceding argument for joint control, the net values of the equity stakes are $W_A^J = \frac{1}{8}\frac{1}{c_A}$ and $W_B^J = \frac{2c_A-c_B}{8c_A^2}$. Solving for the cost ratio $\frac{c_B^J}{c_A^J} = 2 - \frac{W_B^J}{W_A^J}$, we obtain $\gamma^*(J) = \frac{W_A^J}{3W_A^J - W_B^J}$ so that replacing W_i^J with $w_i(\tau_1,\tau_2)$ again yields the desired result.

For 50-plus control, we have $W_A^P = \frac{(1-d)}{2c_B}\left(\delta + \frac{1}{2}(1-d)\left(1-\frac{c_A}{2c_B}\right)\right)$ and $W_B^P = \frac{(1-d)^2}{8c_B}$. Using $\frac{c_A}{c_B} = \frac{\gamma^*}{1-\gamma^*}$, we obtain

$$\frac{W_A^P}{W_B^P} = \frac{4\delta}{1-d} + 2 - \frac{\gamma^*}{1-\gamma^*}$$

which depends on the social cost term $\frac{4\delta}{1-d}$. Hence, we will parameterize our model to derive a closed form solution independent of the unobservable control costs and benefits. Let $\frac{4\delta}{1-d} = z$ for some parameter $z > 0$ so that $\delta = \frac{1-d}{4}z$. We then have that $\frac{W_A^P}{W_B^P} = z + 2 - \frac{\gamma^*}{1-\gamma^*}$ whence

$$\gamma^*(P) = \frac{(2+z)\,W_B^P - W_A^P}{(3+z)\,W_B^P - W_A^P}$$

which is greater than $\frac{1}{2}$ for $(1+z)\,W_B^P > W_A^P$. We need to verify that the parameter restrictions for δ, d and $\hat{\gamma} < \bar{\gamma}$ hold for some value of z. One condition that insures the existence of three control regimes is $d = \frac{21}{20}\delta, \delta > \frac{1}{8}$ while privately valuable control requires $\delta > \gamma d, \gamma \geq \frac{1}{2}$. However, it is easily verified that $\delta = 20\frac{z}{80+21z}, d = 21\frac{z}{80+21z}$ satisfy not only the three regimes and parameterization conditions but also the restriction for privately valuable control. Note that an estimate of z allows us to infer relative costs of control in the 50-plus regime as $\frac{\delta}{1-d} = \frac{z}{4}$.

The identification of parents as A or B is a simple consequence of the preceding expressions for their wealth gains from the joint venture. For outright control, we have $W_A^A = (1+\delta-d)^2\,\frac{1}{2}\gamma^* V^* > (1+\delta-d)^2\,\frac{1}{2}(1-\gamma^*)\,V^* = W_B^A$ by $\gamma^* > \frac{1}{2}$. Similarly, for joint and 50-plus control we find $W_A^J = \frac{1}{8}\frac{1}{c_A} < \frac{2c_A-c_B}{8c_A^2} = W_B^J$ and $W_A^P > W_B^P$ by $c_A > c_B$, respectively. Replacing model quantities with observed ones again yields the desired result.

C Tables

Table 1: **Ownership Distribution in Two-Parent Joint Ventures**

Majority Stake (in %)	All US JVs Number	All US JVs Percent	1 Public Firm: US Number	1 Public Firm: US Percent	2 Public Firms: US Number	2 Public Firms: US Percent	1 Public Firm: EU Number	1 Public Firm: EU Percent
50-50	1,931	71.04	822	65.86	193	64.98	1,257	62.72
50+ to 51	210	7.73	106	8.49	27	9.09	245	12.23
51+ to 60	192	7.06	107	8.57	30	10.10	151	7.53
60+ to 67	60	2.21	33	5.52	8	2.69	63	3.14
67+ to 75	135	4.90	69	8.84	17	5.72	160	7.98
75+ to 80	100	3.68	55	4.40	9	3.03	56	2.79
80+ to 90	57	2.10	35	2.80	9	3.03	33	1.65
90+ to 100	33	1.21	21	1.68	4	1.35	39	1.95
Total	2,718	100.00	1,248	100.00	297	100.00	2,004	100.00

The table summarizes ownership arrangements by majority stakes for four different samples of joint ventures announced between January 1st, 1985 and 2000 (excluding those involving a state-owned entity). The "All US JVs" sample consists of all two-parent joint ventures incorporated in the US and recorded in the Thomson Financial Securities Data during this period, while "1 Public Firm" and "2 Public Firms" are two subsamples of the former with, respectively, at least one and two publicly traded parents with full financial data availability. We also report the majority stakes for a comparator sample of two-parent European joint ventures with at least one publicly traded parent ("1 Public Firm: EU").

Table 2: **Industry Distribution of US Joint Venture Parents**

SIC Code 1 digit	Industry	At least One Public Parent Number	At least One Public Parent Frequency	Two Public Parents Number	Two Public Parents Frequency
4xxx	Transport., Comm., Gas, Electricity	484	31.33	232	39.06
3xxx	Manufacturing	269	17.41	122	20.54
5xxx	Wholesale Trade	198	12.82	66	11.11
8xxx	Services	173	11.20	62	10.44
7xxx	Finance, Insurance, Real Estate	119	7.70	24	4.04
2xxx	Construction	108	6.99	30	5.05
6xxx	Retail Trade	72	4.66	18	3.03
1xxx	Mining	65	4.21	22	3.70
Others		57	3.69	18	3.03
Total		1,545	100.00	594	100.00

To show that our joint ventures represent a wide cross-section of sectors and are not concentrated in any particular economic segment, this table reports the industry classification of their parents in terms of SIC codes, ordered by frequency. "At least One Public Parent" and "Two Public Parents" refer to our two main samples, i.e., US joint ventures with at least one publicly traded parent, and US joint ventures with two publicly traded parents and full data availability, respectively.

Table 3: **Country Origin of Parents by Headquarter Location**

Country	At least One Public Parent		Two Public Parents	
	Number	Frequency	Number	Frequency
US	1,124	72.75	403	67.85
Japan	214	13.85	106	17.85
UK	45	2.91	14	2.36
Canada	44	2.85	11	1.85
Germany	26	1.68	18	3.03
France	19	1.23	7	1.18
Australia	12	0.78	6	1.01
Others	61	3.95	29	4.88
Total	1,545	100.00	594	100.00

This table reports the number and percentages of parents' headquarter locations (national origin) for our two main samples, i.e., US joint ventures with at least one publicly traded parent, and US joint ventures with two publicly traded parents, ordered by frequency. We define *Country Origin* in terms of actual headquarters rather than country of incorporation.

Table 4: **Parent Attributes in Two-Parent Sample: Averages by Stake**

Equity Stake (in %)	Market Value (in m)	Assets (in m)	Sales (in m)	Op. Cash Flow (in m)	Employees	Inside Ownership (in %)
0 to 20	6,925.82	9,325.23	11,171.03	607.17	12,0784	13.06
20+ to 40	12,034.38	20,323.68	25,112.38	1,069.50	5,2257	18.93
40+ to 49-	4,010.84	8,970.65	8,757.35	807.46	9,0717	8.07
49 to 50-	3,479.06	17,711.28	13,971.93	427.59	2,9147	30.85
50-50	7,081.46	12,452.68	10,449.81	706.42	10,3971	13.20
50+ to 51	6,111.11	14,717.78	9,480.42	543.38	9,8693	12.31
51+ to 60-	3,497.04	2,417.33	2,504.05	243.11	2,3138	2.84
60 to 80-	6,427.70	12,055.28	10,007.32	565.41	10,5201	12.52
80 to 100	6,579.89	8,859.21	10,612.49	576.79	12,0784	13.06
Sample mean	7,164.91	13,065.11	11,723.26	695.06	9,6189	14.29
Maximum	68,741.87	194,881.00	192,548.50	9,627.00	81,3000	82.26
Minimum	1.00	4.67	0.00	-1,303.55	34.0	0.025

This table indicates average parent attributes by ownership stake for the 594 parents in our two-parent sample of US joint ventures. *Market value* is the parent's market capitalization on the eve of the joint venture announcement, and *Assets*, *Sales*, *Op. Cash Flow*, *Employees*, and *Inside Ownership* their total asset value, sales, net operating cash flows, number of employees, and the percentage of equity held by insiders in the quarter of the announcement, respectively. The last three rows indicate the mean, maximum, and minimum of the attributes for the entire two-parent sample.

Table 5: **Two-Parent Joint Venture Ownership Structure by Venturer Similarity**

Parent Attribute	Two-digit SIC		National Origin		Market Value		Total Sales		Employees	
	Sim.	Dissim.	Sim.	Dissim.	Sim.	Dissim.	Sim.	Dissim.	Sim.	Dissim.
Joint ventures	45.1	54.9	44.4	55.6	29.2	70.8	30.0	70.0	13.9	86.1
of which:										
50-50	62.7	66.9	68.9	61.8	77.0	59.8	72.4	61.6	65.5	65.4
50-plus	7.5	11.0	6.8	11.5	5.4	11.2	5.3	11.3	3.4	10.1
Outright majority	29.9	22.1	24.2	26.7	17.6	29.1	22.4	27.1	31.0	24.6
Total	100	100	100	100	100	100	100	100	100	100

This table classifies joint venture parents as *Similar* ("Sim.") in terms of their economic attributes if they belong to the same two-digit SIC code, are from the same country, or fall within 30% of the average of their market value, total sales or number of employees, and *Dissimilar* ("Dissim.") otherwise.

The first line records the percentage of similar and dissimilar parents for all joint ventures regardless of ownership regime so that percentages sum to 100% across each of the five attributes. The remainder of the table records the frequency of *regimes* among the similar and dissimilar parents.

Table 6: **Joint Venture Announcements: Abnormal Returns and Wealth Gains**

	Mean Cumulative Abnormal Returns				
	Obs.	$CAR(-1,0)$	$CAR(-1,1)$	$CAR(-2,2)$	$CAR(-5,5)$
Sample mean	550	0.860%***	0.941%***	1.141%***	0.671%*
(P value)		(0.0000)	(0.0000)	(0.0000)	(0.0968)
$CAR > 0$ (% of obs.)		54.36%	54.00%	52.91%	52.18%
	Non-Normalized Wealth Creation				
	Obs.	$w(-1,0)$	$w(-1,1)$	$w(-2,2)$	$w(-5,5)$
Sample mean	550	56.19**	45.48*	59.84*	-17.87
(P value)		(0.0126)	(0.0997)	(0.0950)	(0.7401)
	Wealth Creation Normalized by Stake				
Equity Stake in %	Obs.	$\frac{w(-1,0)}{\gamma}$	$\frac{w(-1,1)}{\gamma}$	$\frac{w(-2,2)}{\gamma}$	$\frac{w(-5,5)}{\gamma}$
0 to 20	19	-869.25	-2545.80	-1821.72	-3870.96
20+ to 40	47	111.19	187.32	686.89**	-561.30**
40+ to 49-	6	90.69	105.27	18.83	-254.67**
49 to 50-	24	80.69	87.55*	207.10***	196.60***
50-50	358	125.22**	81.67	66.38	-45.28
50+ to 51	24	120.00	119.72	-43.50	-245.62*
51+ to 60-	6	-103.72	75.83	243.97	-62.15
60 to 80-	47	116.47**	199.11***	239.03***	131.54**
80 to 100	19	109.75*	30.26	82.89	220.18***
Sample mean	550	94.03	40.12	99.64	-161.81
(P value)		(0.2270)	(0.3973)	(0.3091)	(0.7049)

The first panel summarizes the stock market reaction to the announcement of joint venture formation in terms of the sample means of cumulative abnormal returns $CAR(\tau_1, \tau_2)$. The second panel shows sample means of raw abnormal wealth gains w_i that we normalize by parent stakes γ_i in the third panel, i.e., $\frac{w_i}{\gamma_i}$. Three joint ventures have equity allocations of 0-100 (with the minority shareholder holding an option to acquire a stake) so that we normalize the respective parents' wealth gains by $\gamma_i \cong 0.01$.

The sample consists of 275 uncontaminated two-parent joint ventures (550 parent firms) that we derive from the full two-parent sample (297 US joint ventures) by excluding 22 joint ventures involving at least one parent firm with a major corporate announcement (M&A activity or rumor, earnings report, etc.) during the event window. Significance levels are as follows: *** denotes statistical significance at 1%, ** significance at 5%, and * significance at 10%.

Table 7: **Model Tests Based on Relative Costs $\gamma^*(k)$**

	Parent Homogeneity: $\widehat{\gamma}^*(k)$		
Sample mean $\overline{\gamma^*}(J)$	0.2803	0.2995	0.2673
Sample mean $\overline{\gamma^*}(A)$	0.6057	0.8164	0.5822
Majority Control vs. 50-50 JVs: $H_0 : \gamma^*(A) = \gamma^*(J)\,,\ H_1 : \gamma^*(A) > \gamma^*(J)$			
Test statistic z	5.7916	3.4279	3.7606
P value: $\Pr\{Z \leq z\,\vert H_0\}$	0.0000	0.0005	0.0002
Model prediction	**Reject H_0 in favor of H_1**		
50-50 JVs: $H_0 : \gamma^*(J) = \frac{1}{2},\ H_1 : \gamma^*(J) \neq \frac{1}{2}$			
Test statistic z	-1.3758	-0.2323	-0.5504
P value: $\Pr\{\vert Z\vert \leq z\,\vert H_0\}$	0.1689	0.8163	0.5821
Model prediction	**Fail to Reject H_0**		
	Sample Selection		
Criterion	$\widehat{\gamma}^*(k) \in (0,1)$	$\widehat{\gamma}^*(k) \in (-1,5)\,, w_i > 0$	$\widehat{\gamma}^*(k) \in (-1,5)$
Observations	194	70	258

The first panel reports the sample means for $\widehat{\gamma}^*(A)$ and $\widehat{\gamma}^*(J)$ recovered from wealth gains as described in Equation (7) for three different samples described in the last panel.

The second panel summarizes the test of our model prediction that parents are less homogeneous in JVs with outright majority control ($k = A$) than in 50-50 JVs ($k = J$) depicted in Figure 2. We conduct the following one-sided hypothesis test, for which we wish to reject the null, in terms of the sample means of $\widehat{\gamma}^*(A)$ and $\widehat{\gamma}^*(J)$:

$$H_0 : \gamma^*(A) = \gamma^*(J)\,,\ H_1 : \gamma^*(A) > \gamma^*(J)$$

In the third panel, we test the model prediction that parents are homogeneous in 50-50 JVs so that we do not want to reject the null

$$H_0 : \gamma^*_A(J) = \frac{1}{2}$$

Based on the non-contaminated two-parent 275 joint venture sample, we conduct each test for three subsamples that differ in their selection criterion (outlier correction) as described in the fourth panel. In the first sample, we restrict $\widehat{\gamma}^*(k)$ to be between 0 and 1 as required by our model, in the second one it takes values in $(-1,5)$ and both parents experience positive wealth gains $w_i > 0$, while in the third subsample $\widehat{\gamma}^*(k)$ is restricted to values between -1 and 5. Having tested and rejected the hypothesis that the variances of $\widehat{\gamma}^*(A)$ and $\widehat{\gamma}^*(J)$ are equal, we use the Smith-Satterthwaite t-test for the equality of means.

Table 8: **Production-Technology Overlap, Complementarities, and Spillovers**

Equity Stake	Obs.	**Prod. Overlap**		**JV Scope Index**		**Authors' Classification (in %)**			
(in %)		Average	Minimum	*COMP*	*SPILL*	Comp.	Subst.	Indet.	Disagree
0 to 20	19	0.1915	0.1626	1.4000	0.9000	92.31	7.69	0.00	0.00
20+ to 40	47	0.1979	0.1353	1.4615	0.9808	83.02	13.21	1.89	1.89
40+ to 49-	6	0.1347	0.0532	1.6667	0.1667	83.33	16.67	0.00	0.00
49 to 50-	24	0.2082	0.1497	1.4167	0.8750	87.50	4.17	0.00	8.33
50-50	358	0.2075	0.1463	1.0426	0.8466	80.45	10.06	6.70	2.79
50+ to 51	24	0.2082	0.1497	1.2083	0.7917	87.50	4.17	0.00	8.33
51+ to 60-	6	0.1347	0.0532	1.1667	0.5000	83.33	16.67	0.00	0.00
60 to 80-	47	0.2157	0.1529	1.4783	0.8696	82.98	12.77	2.13	2.13
80 to 100	19	0.1493	0.1104	1.5263	0.7368	89.47	10.53	0.00	0.00
Sample mean	550	0.2033	0.1432	1.1763	0.8460	82.18	10.18	4.73	2.91
(P value: t-test)		(0.2614)	(0.3230)						
Maximum		1	1	8	6				
Minimum		0	-0.0279	0	0				
Potential for Resource Complementarity: All Two-Parent JVs (297 Obs.)									
		Average	Minimum	*COMP*	*SPILL*	Comp.	Subst.	Indet.	Disagree
		JVs < Mean		JVs > 0	JVs > 0				
Percent		67.35	80.47	73.29	37.67	81.14	10.10	5.39	3.37

Average Production Overlap corresponds to the average of the input and output correlations while *Minimum Production Overlap* corresponds to their minimum as the absence of overlap in either the parent output or input dimension suffices for synergy effects. For parents in industries i and j, we match parent SIC codes with the Bureau of Economic Analysis' "Use Table" published in 1997 that record the intermediate commodity flows between approximately 500 industries, and compute the correlation of their output shares supplied to all other industries, as well as the correlation across their own input requirement coefficients (defined as the fraction of industry k's output required to produce industry l's output). For parents of different national origin, we set the correlations to zero, for parents in the same (sub)industry the correlation is one.

For the *Scope Indices* for *Complementarities* ($COMP$: JV-level synergies) and *Spillovers* ($SPILL$: parent-level synergies), we record whether joint ventures engage in R&D, licensing or cross-licensing, technology or cross-technology transfers, and exclusive licensing (*spillover* potential), or in manufacturing, sales and marketing, exploration, exclusive supply or OEM-value added reselling, etc. (indicative of *complementarities* in resources) on the basis of TFSD's joint venture type definition, their description, and news-wire announcements. Each activity classification gets a 0 or 1 score (except for R&D, cross-licensing and cross-technology transfer with scores of 0 or 2 because of the potential for two-sided spillovers) that we then simply add up across the spillover and complementarities categories with each scope index ranging from 0 to 9.

For the *Authors' Classifications*, the authors and three research assistants independently classified parent expertise or contributions as *complements* ("Comp."), *substitutes* ("Subst."), or *indeterminate* ("Indet.") on the basis of common set of rules and definitions from the parent and joint venture descriptions, news wire articles, and TFSD information. JVs with parents of different national origin counted as complementary. For each parent-stake category, the table indicates the authors' consensus percentage of complements, substitutes, and indeterminate cases as well as the fraction of *disagreements* ("Disagree") in classification so that each line sums to 100%. The last line records the number of non-contaminated joint ventures whose contributions are complements, substitutes, or of indeterminate or disputed nature.

The first panel reports results for our usual sample of 275 non-contaminated two-parent joint ventures incorporated in the US with 550 parent firms. The second panel is based on the full two-parent sample of 297 JVs indicates resource complementarity for each classification method (with the exception of the spillover measure). For the *Production Overlap* categories, the percentages refer to JVs whose parents' production-technology overlap falls below the respective means of the whole sample. For the *Scope Indices*, the percentages represent the fraction of JVs whose $COMP$ or $SPILL$ indices are greater than 0 (i.e., at least some scope for complementarities or spillovers), and *Authors' Classifications* percentages reprise the sample means for all 297 joint ventures.

Table 9: **Determinants of Ownership and Control in Joint Ventures**

Specification	**1**			**2**		
Regime	$k = J$	$k = P$	$k = A$	$k = J$	$k = P$	$k = A$
z		10.6754			10.6790	
$\widehat{\gamma}^*(k;z)$	-0.1506***	0.0662***	0.0844*	-0.1466***	0.0630***	0.0835*
(P value)	(0.0045)	(0.0013)	(0.0808)	(0.0040)	(0.0016)	(0.0697)
LEV	0.3825***	-0.0918***	-0.2907***	0.3865***	-0.1118***	-0.2747***
(P value)	(0.0000)	(0.0048)	(0.0000)	(0.0000)	(0.0005)	(0.0000)
$SICaaa$	0.1366**	-0.1248***	-0.0118			
(P value)	(0.0155)	(0.0004)	(0.8129)			
$SICaca$	0.2265***	-0.0837***	-0.1427*			
(P value)	(0.0066)	(0.0100)	(0.0690)			
$SICaab$	0.2816***	-0.1069***	-0.1746***			
(P value)	(0.0000)	(0.0009)	(0.0012)			
$SICacb$	0.1862***	-0.1046***	-0.0816			
(P value)	(0.0036)	(0.0015)	(0.1610)			
$NATaaa$				0.2359***	-0.1286***	-0.1073**
(P value)				(0.0000)	(0.0001)	(0.0221)
$NATaab$				0.1955***	-0.0939***	-0.1017**
(P value)				(0.0000)	(0.0002)	(0.0140)
$NATbac$				0.2324*	-0.1140**	-0.1184
(P value)				(0.0992)	(0.0656)	(0.3617)
Log-likelihood		-192.33			-196.47	
Pseudo R^2		0.137			0.118	
Log-likelihood Ratio		60.84***			52.53***	
(P value)		(0.0000)			(0.0000)	
Observations		267			267	

This table reports the marginal effects and their P values obtained by evaluating $\frac{\partial \Pr_j}{\partial x_{jk}} = \Lambda'\left(\mathbf{x}'_{jk}\boldsymbol{\beta}_k\right)\beta_k$ at the regressors' sample means for the following specification:

$$\Pr\{REGIME_j = k\} = \Lambda\left(\beta_{1k}\widehat{\gamma}^*(k;z)_j + \beta_{2k}LEV_j + \sum_{l=3}^{6}\beta_{lk}RELpvp_j^l\right)$$

for JVs $j = 1,...,N$ and control regime $k = A, J, P$ where Λ is the logistic distribution function $\Lambda\left(\mathbf{x}'_{jk}\boldsymbol{\beta}_k\right) = \left(1 + e^{-\mathbf{x}'_{jk}\boldsymbol{\beta}_k}\right)^{-1}$, $\widehat{\gamma}^*(k;z)$ our parent similarity variable $\widehat{\gamma}^*(k)$, LEV a binary variable for JV leverage, and $RELpvp^l$ measures JV and parent relatedness in terms of SIC codes ($SICpvp$) or national origin ($NATpvp$).

In the construction of $RELpvp_j^l$, the middle letter refers to JV j's 2 digit SIC code or (invariant) US location, while the outer ones indicate the SIC code or national origin of the parent firms. For example, $a-a-a$ denotes a JV with two parents all in the same industry (completely related) while $a-c-b$ refers to a joint venture with all three entities in different industries (completely unrelated). National origin classification: a signifies a US entity while b, c refer to foreign parents. Our proxies for value diversion and its net social costs are $SICaab$ and $NATaab$.

We estimate the multinomial logit specifications by Full-Information Maximum Likelihood with a grid search over z for the 50-plus regime for our sample of noncontaminated JVs from which we exclude 8 outliers so that $\widehat{\gamma}^*(k;z) \in (-5,5)$. The pseudo-$R^2$ is McFadden's likelihood ratio index $1 - \frac{\log L}{\log L_0}$. In the second specification, we drop the $NATbab$ variable because of insufficient observations in the 50-plus regime ($k = P$). Since coefficient estimates have no obvious economic interpretation we suppress them in the interest of readability. Significance levels: *** denotes significance at 1%, ** significance at 5%, * significance at 10%.

Table 10: **Parent Similarity and Industry Effects**

Specification		**1**			**2**	
Regime	$k = J$	$k = P$	$k = A$	$k = J$	$k = P$	$k = A$
z		10.2560			10.6821	
$\widehat{\gamma}^*(k; z)$	-0.2462***	0.1003***	0.1458**	-0.2321***	0.0801***	0.1520**
(P value)	(0.0021)	(0.0016)	(0.0377)	(0.0011)	(0.0025)	(0.0155)
$\widehat{\gamma}^*(k; z) \cdot SICaab$	0.1783*	-0.0572*	-0.1212	0.1831**	-0.0304	-0.1527*
(P value)	(0.0968)	(0.0993)	(0.2204)	(0.0443)	(0.2510)	(0.0698)
LEV	0.3858***	-0.0853***	-0.3005***	0.3932***	-0.1121***	-0.2810***
(P value)	(0.0000)	(0.0084)	(0.0000)	(0.0000)	(0.0004)	(0.0000)
$SICaaa$	0.1634***	-0.1427***	-0.0207			
(P value)	(0.0059)	(0.0002)	(0.6928)			
$SICaca$	0.2775***	-0.1064***	-0.1711**			
(P value)	(0.0021)	(0.0044)	(0.0400)			
$SICaab$	0.2454***	-0.0890***	-0.1564***			
(P value)	(0.0000)	(0.0042)	(0.0059)			
$SICacb$	0.2343***	-0.1291***	-0.1051*			
(P value)	(0.0009)	(0.0008)	(0.0940)			
$NATaaa$				0.2510***	-0.1313***	-0.1197**
(P value)				(0.0000)	(0.0001)	(0.0110)
$NATaab$				0.1981***	-0.0945***	-0.1036**
(P value)				(0.0000)	(0.0003)	(0.0131)
$NATbac$				0.2723*	-0.1226*	-0.1497
(P value)				(0.0595)	(0.0512)	(0.2572)
Log-likelihood		-190.43			-194.44	
Pseudo R^2		0.154			0.136	
Log-likelihood Ratio		69.49***			56.60***	
(P value)		(0.0000)			(0.0000)	
Observations		268			268	

This table reports the marginal effects and their P values obtained by estimating

$$\Pr\{REGIME_j = k\} = \Lambda\left(\beta_{1k}\widehat{\gamma}^*(k; z)_j + \beta_{2k}\widehat{\gamma}^*(k; z)_j \cdot SICaab_j + \beta_{3k}LEV_j + \sum_{l=4}^{7}\beta_{lk}RELpvp_j^l\right)$$

and evaluating $\frac{\partial \Pr_j}{\partial x_{jk}} = \Lambda'\left(\mathbf{x}'_{jk}\boldsymbol{\beta}_k\right)\beta_k$ at the regressors' sample means. We add the interactive variable $\widehat{\gamma}^*(k; z) \cdot SICaab$ to the general specification in Equation (9) to test the model prediction that parents are more heterogeneous under 50-50 ownership when the potential for value extraction is larger. All other variables remain unchanged, as do the sample selection, outlier correction, and estimation procedures (see Table 9 for further details). Significance levels: *** denotes significance at 1%, ** significance at 5%, * significance at 10%.

Table 11: **Parent-Level and JV-Level Synergies: Spillovers and Complementarities**

Specification		**1**			**2**	
Regime	$k = J$	$k = P$	$k = A$	$k = J$	$k = P$	$k = A$
z		10.6760			10.6822	
$\widehat{\gamma}^*(k; z)$	-0.1424***	0.0665***	0.0800*	-0.1387***	0.0639***	0.0748*
(P value)	(0.0057)	(0.0014)	(0.0874)	(0.0054)	(0.0015)	(0.0968)
$SPILL$	0.0534**	-0.0038	-0.0496**	0.0437*	0.0002	-0.0439*
(P value)	(0.0455)	(0.7420)	(0.0435)	(0.1078)	(0.9847)	(0.0831)
$COMP$	-0.0821**	0.0086	0.0735**	-0.0783**	-0.0054	0.0837***
(P value)	(0.0112)	(0.5235)	(0.0115)	(0.0184)	(0.6826)	(0.0050
LEV	0.3788***	-0.0930***	-0.2858***	0.3824***	-0.1114***	-0.2709***
(P value)	(0.0000)	(0.0061)	(0.0000)	(0.0000)	(0.0006)	(0.0000)
$SICaaa$	0.1990***	-0.1332***	-0.0657			
(P value)	(0.0039)	(0.0010)	(0.2798)			
$SICaca$	0.2802***	-0.0921**	-0.1881**			
(P value)	(0.0018)	(0.0146)	(0.0245)			
$SICaab$	0.3402***	-0.1158***	-0.2243***			
(P value)	(0.0000)	(0.0020)	(0.0004)			
$SICacb$	0.2390***	-0.1129***	-0.1261*			
(P value)	(0.0015)	(0.0034)	(0.0639)			
$NATaaa$				0.2732***	-0.1244***	-0.1488***
(P value)				(0.0000)	(0.0003)	(0.0049)
$NATaab$				0.2745***	-0.0847***	-0.1897***
(P value)				(0.0000)	(0.0049)	(0.0011)
$NATbac$				0.2880**	-0.1044*	-0.1835
(P value)				(0.0509)	(0.0961)	(0.1766)
Log-likelihood		-186.96			-189.59	
Pseudo R^2		0.152			0.14	
Log-likelihood Ratio		67.16***			61.89***	
(P value)		(0.0000)			(0.0000)	
Observations		264			264	

This table reports the marginal effects and their P values for

$$\Pr\{REGIME_j = k\} = \Lambda\left(\beta_{1k}\widehat{\gamma}^*(k;z)_j + \beta_{2k}SPILL_j + \beta_{3k}COMP_j + \beta_{4k}LEV_j + \sum_{l=5}^{8}\beta_{lk}RELpvp_j^l\right)$$

where we added the indices for parent spillover ($SPILL$) and JV complementarity ($COMP$) potential described in Table 8 to the general specification in Equation (9). All other variables and estimation procedures remain unchanged and are described in greater detail in the explanations of Table 9. The sample consists of our 275 non-contaminated two parent joint ventures to which we apply the same outlier correction for $\widehat{\gamma}^*(k;z)$ as before. Since we do not have sufficient information to determine the precise type of all joint ventures, we lose 4 observations due to missing spillover or complementarity indices. Significance levels: *** denotes significance at 1%, ** significance at 5%, * significance at 10%.

Table 12: **Complementarities, Spillovers and Control Benefits**

Specification		**1**			**2**	
Regime	$k=J$	$k=P$	$k=A$	$k=J$	$k=P$	$k=A$
z		10.6750			10.6792	
$\widehat{\gamma}^*(k;z)$	-0.1671***	0.0694***	0.0978**	-0.2251***	0.0805***	0.1446***
(P value)	(0.0020)	(0.0019)	(0.0425)	(0.0002)	(0.0015)	(0.0066)
$DOVER$	0.0172*	-0.0007	-0.0165*	-0.0051	0.0056	-0.0005
(P value)	(0.0962)	(0.8747)	(0.0642)	(0.6242)	(0.4259)	(0.9551)
$DOVER \cdot SICaab$				0.0613***	-0.0113	-0.0500***
(P value)				(0.0017)	(0.2422)	(0.0047)
$SPILL$	0.0552**	-0.0040	-0.0512**	0.0608**	-0.0050	-0.0557**
(P value)	(0.0401)	(0.7303)	(0.0381)	(0.0255)	(0.6701)	(0.0238)
$COMP$	-0.0903***	0.0088	0.0815***	-0.1004***	0.0104	0.0900***
(P value)	(0.0062)	(0.5261)	(0.0059)	(0.0028)	(0.4640)	(0.0025)
LEV	0.3675***	-0.0937***	-0.2739***	0.3729***	-0.0913***	-0.2816***
(P value)	(0.0000)	(0.0073)	(0.0000)	(0.0000)	(0.0094)	(0.0000)
$SICaaa$	0.2122***	-0.1340***	-0.0782	0.2370***	-0.1396***	-0.0974
(P value)	(0.0024)	(0.0013)	(0.2013)	(0.0007)	(0.0011)	(0.1053)
$SICaca$	0.3235***	-0.0939**	-0.2296***	0.3315***	-0.1001**	-0.2314***
(P value)	(0.0005)	(0.0177)	(0.0082)	(0.0003)	(0.0134)	(0.0057)
$SICaab$	0.3705***	-0.1182***	-0.2523***	0.4404***	-0.1251***	-0.3153***
(P value)	(0.0000)	(0.0024)	(0.0001)	(0.0000)	(0.0020)	(0.0000)
$SICacb$	0.2640***	-0.1152***	-0.1488**	0.2918***	-0.1214***	-0.1704**
(P value)	(0.0006)	(0.0042)	(0.0303)	(0.0001)	(0.0033)	(0.0118)
Log-likelihood		-184.72			-178.31	
Pseudo R^2		0.162			0.1915	
Log-likelihood Ratio		71.64***			84.45***	
(P value)		(0.0000)			(0.0000)	
Observations		264			264	

This table reports the marginal effects and their P values for the specification

$$\Pr\{REGIME_j = k\} = \Lambda\left(\beta_{1k}\widehat{\gamma}^*(k;z)_j + \beta_{2k}SPILL_j + \beta_{3k}COMP_j + \beta_{4k}DOVER_j + \beta_{5k}LEV_j + \sum_{l=6}^{9}\beta_{lk}SICpvp_j^l\right)$$

obtained by adding to the model in Table 11 the variable $DOVER_j = \frac{OVER_{Aj} - OVER_{Bj}}{OVER_{AB}}$ where $OVER_{ij}, i = A, B$ is the average horizontal overlap between parent i and the joint venture j, and $OVER_{AB}$ the average horizontal overlap between the parents described and tabulated as *Average Production Overlap* in Table 8, i.e., the averages of the correlations of input and output coefficients for intermediate commodity flows (from the Bureau of Economic Analysis' "Use Table" published in 1997) for each parent and the JV, and between the parents, respectively.

Hence, $DOVER$ measures the difference in horizontal relatedness of the parents to the joint venture in terms of technology and expertise (inputs and outputs correlations as proxies for closeness in terms of the neoclassical production function), normalized by the horizontal relatedness of the parents to each other. We identify parents as A or B according to the procedure described in Appendix B by majority stake (A is the majority shareholder) and wealth gains $w_i(-1,0)$, imposing additional restrictions of our model on the estimation. Specification 2 also includes the interactive term $DOVER \cdot SICaab$ to further explore the combined industry and production technology effects on value-extraction potential by the dominant shareholder.

All other variables and estimation procedures remain unchanged and are described in greater detail in the explanations of Tables 9 and 11. The sample consists of our 275 non-contaminated two parent joint ventures minus 4 observations with missing spillover or complementarity indices, to which we apply the same outlier correction for $\widehat{\gamma}^*(k;z)$ as before. Significance levels: *** denotes significance at 1%, ** significance at 5%, * significance at 10%.

Table 13: **Contingent Ownership Arrangements: Options, Buyouts and Terminations**

Equity Stake	**JVs**	**Partial BO**		**Full BO**		**Sale**		**Termin.**		**Unchanged**		**Options**
(in %)	Obs.	No.	Perc.	No.	Perc.	No.	Perc.	No.	Perc.	No.	Perc.	No.
50-50	193	8	4.15	51	26.42	4	2.07	40	20.73	90	46.63	3
50-plus	28	0	0.00	12	42.86	3	10.71	2	7.14	11	39.29	2
Outright maj.	76	2	2.63	29	38.16	2	2.63	10	13.16	34	44.74	10
JVs	297	10	3.37	92	30.98	8	2.69	52	17.51	135	45.45	15

The table summarizes buyout and termination activity for our full two-parent sample of 297 US joint ventures in terms of respective observations ("No.") and frequencies of occurrence by control regime ("Perc.") for our three control regimes (50-50, 50-plus, outright majority). *Partial Buyout* ("Partial BO") corresponds to one party acquiring an additional stake from its partner, *Full Buyout* ("Full BO") to an acquisition of the partner's entire stake, *Terminated* ("Termin.") to the dissolution of the joint venture, and *Sale* to the sale of 7 joint ventures to third parties and one that became a wholly owned subsidiary when its parents merged. *Unchanged* regroups all joint ventures without any change in ownership status. Since the *Buyout* and *Unchanged* categories include JVs with exercised and non-exercised options, respectively, we list explicitly announced buyout or sellout provisions in addition to the usual preemption rights separately as *Options*. Percentages sum to 100 within each row.

Table 14: **Return Performance of Contingent Ownership**

Sample Mean	Obs.	$CAR\,(-1,0)$	$CAR\,(-1,1)$	$CAR\,(-2,2)$	$CAR\,(-5,5)$
Buyout Options: At-Least One Public Parent					
With options	65	0.866%	0.872%	1.245%	2.739%
Without options	1,480	0.682%	0.671%	0.661%	0.915%
(P value: t-test)		(0.3660)	(0.3800)	(0.2461)	(0.0767)*
Buyout and Liquidation Activity: Two Public Parents					
Unchanged	250	0.603%	0.697%	0.899%	0.171%
Full or partial buyout	194	1.307%	1.323%	1.576%	0.765%
(P value: t-test)		(0.0373)**	(0.0981)*	(0.1403)†	(0.2644)
Sale	12	2.534%	2.373%	5.198%	4.960%
(P value: t-test)		(0.0385)**	(0.1032)†	(0.0064)***	(0.0315)**
Terminated	94	0.370%	0.720%	0.514%	1.291%
(P value: t-test)		(0.2979)	(0.4833)	(0.2910)	(0.1434)†
Options	28	0.826%	0.999%	1.592%	3.386%
(P value: t-test)		(0.3665)	(0.3325)	(0.2521)	(0.0206)**

The first panel summarizes the stock market reaction to joint-venture announcements including explicit buyout or sellout provisions in comparison to all other announcements for our large sample of 1,248 joint ventures with at least one publicly quoted parent (1,545 firms). The last line reports the P values of a one-sided t-test for differences in means between the with options and the without options sample (Smith-Satterthwaite test).

The second panel displays the announcement effects to joint ventures with reported options or that experienced subsequent changes in ownership through complete or partial buyouts by one parent, termination (dissolution), or sale to a third party for our sample of 275 uncontaminated two-parent joint ventures (550 parent firms). The statistical significance of all mean cumulative abnormal returns exceeds 5% except for the *Terminated* category but we do not report individual significance levels to enhance the readability of the table.

The P values again refer to one-sided t-tests that joint ventures experiencing state-contingent changes in ownership realize different announcement returns from those with *Unchanged* ownership structures (Smith-Satterthwaite test). Their statistical significance is indicated as follows: *** denotes significance at 1%, ** significance at 5%, * significance at 10%, † significance at 15%.

Table 15: **Contingent Ownership and Control Allocation**

Specification		**1**			**2**	
Regime	$k = J$	$k = P$	$k = A$	$k = J$	$k = P$	$k = A$
z		10.6796			10.6822	
$\widehat{\gamma}^*(k;z)$	-0.2482***	0.0864***	0.1618***	-0.2474***	0.0859***	0.1614***
(P value)	(0.0001)	(0.0014)	(0.0030)	(0.0001)	(0.0015)	(0.0035)
$OPTION$	-0.6169***	0.1293**	0.4876***			
(P value)	(0.0004)	(0.0383)	(0.0006)			
$OWNCHANGE$	0.1107*	-0.0301	-0.0806			
(P value)	(0.0865)	(0.2864)	(0.1633)			
$OPTIONEX$				-0.2159*	0.0238	0.1921**
(P value)				(0.0520)	(0.6089)	(0.0398)
$BUYOUT$				0.1533**	-0.0363	-0.1170*
(P value)				(0.0257)	(0.2274)	(0.0555)
$TERM$				0.1480†	-0.0416	-0.1064
(P value)				(0.1059)	(0.3421)	(0.1990)
$DOVER \cdot SICaab$	0.0560***	-0.0058	-0.0503***	0.0554***	-0.0057	-0.0497***
(P value)	(0.0010)	(0.4121)	(0.0013)	(0.0007)	(0.4111)	(0.0009)
$SPILL$	0.0631**	-0.0054	-0.0577**	0.0543**	-0.0043	-0.0500**
(P value)	(0.0236)	(0.6523)	(0.0206)	(0.0460)	(0.7222)	(0.0405)
$COMP$	-0.1152***	0.0153	0.0999***	-0.1079***	0.0150	0.0929***
(P value)	(0.0007)	(0.3026)	(0.0008)	(0.0016)	(0.3178)	(0.0020)
LEV	0.3987***	-0.0916**	-0.3071***	0.3742***	-0.0871**	-0.2871***
(P value)	(0.0000)	(0.0122)	(0.0000)	(0.0000)	(0.0161)	(0.0000)
$SICaaa$	0.2465***	-0.1428***	-0.1036*	0.2167***	-0.1354***	-0.0813
(P value)	(0.0009)	(0.0011)	(0.1000)	(0.0031)	(0.0015)	(0.1957)
$SICaca$	0.3014***	-0.0957**	-0.2057**	0.2933***	-0.0916**	-0.2016**
(P value)	(0.0013)	(0.0199)	(0.0152)	(0.0020)	(0.0267)	(0.0193)
$SICaab$	0.4355***	-0.1270***	-0.3086***	0.4150***	-0.1225***	-0.2925***
(P value)	(0.0000)	(0.0019)	(0.0000)	(0.0000)	(0.0023)	(0.0000)
$SICacb$	0.2831***	-0.1209***	-0.1622**	0.2626***	-0.1175***	-0.1451**
(P value)	(0.0003)	(0.0042)	(0.0188)	(0.0008)	(0.0047)	(0.0334)
Log-likelihood		-168.95			-172.45	
Pseudo R^2		0.234			0.218	
Log-likelihood Ratio		103.17***			96.18***	
(P value)		(0.0000)			(0.0000)	
Observations		264			264	

This table reports the marginal effects and their P values for the model

$$\Pr\{REGIME_j = k\} = \Lambda\left(\beta_{1k}\widehat{\gamma}^*(k;z)_j + \sum_{l=2}^{L}\beta_{lk}CONT_j^l + \sum_{l=L+1}^{L+4}\beta_{lk}x_j^l + \sum_{l=L+5}^{L+8}\beta_{lk}SICpvp_j^l\right)$$

where $CONT^l$ are binary variables for contingent ownership arrangements, x^l joint-venture and parent attributes ($SPILL$, $COMP$, $DOVER \cdot SICaab$, and LEV), and $SICpvp^l$ our four binary variables for industry-relatedness effects, all described in the preceding tables. The sample consists of our 275 non-contaminated two parent joint ventures minus 4 observations with missing spillover or complementarity indices, to which we apply our usual outlier correction for $\widehat{\gamma}^*(k;z)$.

In specification 1, $OPTION$ is a binary variable for the announcement of explicit options and $OWNCHANGE$ a binary variable for changes in ownership structure (partial or full buyout, dissolution or sale). Specification 2 further decomposes contingent ownership effects into the binary variables $OPTIONEX$ for initially announced or subsequently exercised options, $BUYOUT$ for all buyout activity between parents with the exception of transactions triggered by explicit options, and $TERM$ for the JV's termination. Significance levels: *** denotes significance at 1%, ** significance at 5%, * significance at 10%, † significance at 15%.

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