When Competition Eclipses Cooperation: An Event History Analysis of Joint Venture Failure

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W hy do so many joint ventures fail? Despite the fact that their success is the exception rather than the rule, the literature on why joint venture performance has been so poor remains fragmentary. We address this issue, adopting a transaction-cost economics perspective and modeling joint ventures as governance structures that blend the advantages and drawbacks of both markets and hierarchies. Using a data base on electronics industry ventures and event history analysis, we identify several predictors of joint venture failure and test for their influences. A key finding is that the presence of competition between joint venture partners outside of the agreement significantly impairs chances for the operation's chance of survival. We also find clear evidence that the failure rate of joint ventures is nonmonotonic, rising to a peak in the middle term and then declining. Finally, we compare and contrast predictors of terminations due to failure to those due to acquisition of the joint venture by one of its partners. Our overall conclusions highlight implications for strategic choice theory-building and the management of joint ventures.
(*Joint Venture Failure; Cooperation between Competitors; Transaction-cost Economics; Event History Analysis; Nonmonotonic Hazard*)

Introduction

A review of the research on joint ventures reveals that the vast majority of work has asked the question, "why do these operations make good strategic sense?" This is not surprising, as the study of the motivation for corporate strategic choices is a cornerstone of business policy research. A substantial literature has materialized, variously attributing causality for joint ventures and other strategic alliances to the political economy of international trade (e.g., Contractor and Lorange 1988), the emergence of new competitive structures (e.g., Child 1987), the impact of advancing technology (e.g., Clark 1989), the value of network organizations (e.g., Miles and Snow 1986), and the superiority of joint ventures as governance structures (Hennart 1988).

What is surprising is the relative lack of research on what would appear to be a crucial follow-up question, "why do so many joint ventures fail?" Several studies, using various samples of joint ventures and other strategic alliances, have set this rate of failure at 7 in 10 (Coopers and Lybrand 1986), 2 in 3 (Auster 1986, Kogut 1989), and 1 in 2 (Harrigan 1988, Porter 1987). Given this equivocal track record, it is odd that considerably more time and effort has been spent exploring the tactical impetus for joint ventures rather than their pitfalls, which apparently are many.

Of course, one reason that so many joint ventures end is that they are meant to—that is, they are designed with a finite goal or set of tasks in mind, with dissolution anticipated thereafter. By contrast, our focus is on ventures without fixed durations. In this context, the end

of the joint venture can be associated with unfavorable or unexpected experiences. What conditions precipitate such failure?

This paper addresses this question. Our first task is to review the sparse but suggestive research on the failure of joint ventures, herein defined as "organizational and legal entit(ies) created when two or more separate groups jointly participate as co-owners of a producing organization (Stuckey 1983 p. 149)." Then, by viewing joint ventures as governance structures, we introduce variables that we expect to influence their failure. This approach highlights the position of joint ventures along a continuum that runs from exchanges that are within organizations to those between organizations. We then test hypothesized predictors of venture failure, using event history methodology and a new data set compiled for this purpose. We conclude by assessing how the results address our research question, as well as whether or not they validate the use of transaction-cost economics as an instrument for explaining, comparing, and contrasting alternative forms of interorganizational governance.

Previous Research

As noted above, several studies have documented the propensity of joint ventures to fail. Franko (1971) studied their instability but took the unusual approach of using the corporation—not the joint venture—as the unit of analysis. He found some support for the idea that the organizational characteristics of the parents influence the frequency with which their ventures fail. Gomez-Casseres (1989) argued that the joint venture is often an intermediate organizational form, in the sense that it is often succeeded by a different arrangement more appropriate to changed conditions. Kogut (1991) theorized and supported the idea that one such governance change, the acquisition of the venture by one of the partners, was associated with unexpectedly high growth and industry concentration.

In a contribution that bears closely on our topic area, Kogut (1989) analyzed the stability of joint ventures in a cross-industry setting. He found that continued viability was enhanced by the presence of concurrent ties among its partners, which facilitated reciprocity. He

also linked instability to several structural conditions that varied by industry. Specifically, changes in industry concentration and increases in growth rates, both measures of volatility, negatively impact joint ventures. The study represented a methodological step forward, as previous analyses did not statistically control for censored data, a problem with several other studies that present data on failure rates (e.g., Beamish 1985, Gomez-Casseres 1987). It also was careful to split all terminations into two groups, separating dissolutions from acquisitions. As we note below, this important distinction had seldom been grasped in prior research.

A recent study by Blodgett (1992) explored the determinants of the renegotiation of international joint venture agreements. The act of renegotiating a prior agreement was associated with unequal ownership shares, prior renegotiations, and the policies of the host country toward such renegotiation. Blodgett's theoretical focus was on what triggered changes in ownership shares, not the ultimate fate of the joint ventures. As with the Kogut (1989) study, her data was from multiple industries, and she used event history methods for analysis.

In our view, the survey of previous work in this area confirms the need for research that would further flesh out the causes of failure but also tie them back to a central organizing theory. We believe that transaction-cost economics can play such a role and could be used to move the strategic management field closer to a comprehensive understanding of joint venture failure. The theory that we develop also reveals and overcomes a secondary shortcoming of the most recent set of event history studies: none of these analyses have parameterized the effect of time (in our case the joint venture's age) on failure rates, using instead the Cox proportional hazards model.[1] Yet as we show below, there are reasons to expect the pattern of failures across this age to conform to a specific, predictable pattern.

In the arguments that follow, our specific focus is on the causes of joint venture *failure*, as opposed to *instability*, which in general includes not only failures, but

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[1] Kogut (1989) provided a profile of hazard rates of joint ventures across time, but did not incorporate time-dependency explicitly in his analysis.

also acquisitions of the operation by one of its partners. Earlier work placed all cases of instability in a negative light, but as noted above, more recent contributions have assumed that such instability may not always represent failure. Our primary goal is building a theory that will allow us to predict when joint ventures are dissolved or spun-off to third parties, both of which clearly represent a strategic setback for the original partners vis-à-vis their initial hopes. By defining failure in these somewhat narrow terms, we avoid the questionable practice of aggregating failures with other terminations that may even represent positive outcomes for the partners.

Transaction-cost Economics and Joint Venture Failure

To examine the failure of joint ventures, we adopt a transaction-cost economics perspective. Much of the transaction-cost economics literature centers on make-or-buy decisions, with the choice of mode influenced by the markets for those goods and the necessary investments in facilities to produce or utilize those goods. For example, consider investments in facilities that cannot readily be re-deployed to other uses, as in the case of plants designed for a particular grade of fuel. Here, the contractual arrangement between the firm and its fuel supplier may come under pressure, as the upstream firm attempts to secure concessions from its customer once that firm has made irreversible downstream investments (Klein et al. 1978). Backward integration is often a response to these potential risks. But in-house ownership of assets (or internal organization) is not always the solution, as the incentive system within a firm may not be powerful enough to elicit lean operations (Eccles and White 1988, Masten et al. 1991, Walker and Poppo 1991). Such make-or-buy comparisons have been well researched, as inquiry into the conditions for profitable vertical integration has been one of the primary thrusts of transaction-cost economics.

The rationale for joint ventures also can be positioned within the transaction-cost economics paradigm (Hennart 1988, 1991; Kogut 1988; Stuckey 1983; Teece 1986). Here, they can be explained as a form of governance that shares the attributes of markets and internal organizations, attempting to avoid or weaken the hazards of

each. Often, joint ventures are found in intermediate markets, where problems with both markets and internal organization make the choice of either suboptimal. For example, if intangible contributions such as know-how are exchanged by both partners, licensing—a more market-like solution—will be problematic (Hennart 1988). Conversely, economic conditions within the stages of production can support joint ventures. For example, if markets for inputs are imperfect and the minimum efficient scale for downstream facilities exceeds the scale for upstream, joint ventures to build and operate the downstream facilities will be favored over one of the upstream suppliers owning a facility whose capacity exceeds that of its inputs (Stuckey 1983). In this case, full integration of both upstream and downstream operations—an internal organization solution—will be problematic, because it would bring too many operations under a single organization. In this case, economic losses would stem from the difficulty of replicating the incentives for efficiency in one firm that would come, without cost penalty, through multi-firm competition in the upstream market, with its smaller minimum efficient scale.

The formation of joint ventures also is aided by their potential to promote reciprocity between partners. As just noted, the relationship struck can be used to bind together complementary assets that represent portions of two organizations' operations. But aside from these gains, joint ventures also can provide partners with mutual safeguards against transaction hazards that might occur in a market setting, because retaliation by one partner against another (for example, by shutting off access to its technologies, assets, or know-how) is relatively simple to execute. Through such mutual forbearance (Buckley and Casson 1988), incentives to act opportunistically can be suppressed, generating efficiency in governing interorganizational partnerships. But despite these theoretical motivations for the formation of joint ventures, transaction-cost economics has yet to be used to study their failure. Here, rather than a make-or-buy decision, the issue might be termed a "sustain-or-fail" choice.

The motivation for our theory of joint venture failures begins with their transaction-cost rationale: a joint venture is an intermediate form of governance that shares

properties of both markets and hierarchies. It therefore is subject to analogous, hybrid forms of transaction hazards attributable to both ends of the governance continuum. And these hazards influence the relationship between and among parties that govern a separate business entity, which we take as our unit of analysis in the arguments that follow.

Joint ventures are designed to meet the goals both of individual firms and of the collective undertaking, and will be successful when the value of collective outcomes exceeds opportunity costs incurred by participants, and when the distribution of both is fair (Jarillo 1988). But once this system of balanced and equitable contributions, benefits, and safeguards is jeopardized, so is the joint venture itself (Porter and Fuller 1985). Incentives to cheat can then be energized, and subsequently, partners may behave opportunistically to attain their own competitive goals, not the collective goals of the venture. We believe that the potential for destabilizing conduct depends on several identifiable variables, and that transaction-cost theory can predict their influence on joint venture failure.

Governance Issues and the Failure of Joint Ventures

We expect joint ventures to have a higher failure rate when their partners are direct competitors. Consider the not-unlikely case where the partners in a joint venture between competitors are both seeking to maximize their share of the home market. Here, these parental goals conflict directly, and the venture can prove dysfunctional and eventually fail (Kogut 1988). Bresser argued that the failure of such joint ventures can stem from the "risk of uncontrolled information disclosure" (Bresser 1988, p. 378) that is appropriated by one partner from another. The sensitivity of this information, and thus its potential to sap cooperative strengths, would be exacerbated in relationships between competitors.

Furthermore, competitors also have a greater *capability* to appropriate know-how under these conditions. That is, appropriability is not just a function of the know-how in question, but also the ability of the partner to identify, appreciate, and then assimilate such assets (Cohen and Levinthal 1990). All these skills, but especially assimilation, are rooted in the ability of a firm to learn, and that learning varies not only with the skills

of the firm, but with the attributes of the technical knowledge under scrutiny. Thus, "learning is cumulative, and learning performance is greatest when the object of learning is related to what is already known (Cohen and Levinthal 1990, p. 131)." From this perspective, the potential for appropriability in a joint venture setting clearly is higher when the partners are direct competitors.

A separate angle on cooperation between competitors emerges if the joint venture is viewed as having cartel-like properties. Cartels, agreements between competitors to act in a unified manner, are known to induce instability; by their nature, they contain potent economic incentives to act opportunistically after an agreement is reached (Bresser and Harl 1986). Analogous incentives can arise when competitors form joint ventures. For example, if marketing information is shared and similar prices for products established for the parents and a joint venture in the product market, the parent may face an incentive to undercut the prices of the joint venture. Thus, while having a joint venture—as compared to an interfirm collusive agreement—provides a greater alignment of the parents' interests, it can still stimulate opportunism. Hence:

HYPOTHESIS 1. *A joint venture between direct competitors is more likely to fail than one in which the partners do not compete.*

Another key factor in joint venture outcomes is the nature of the partners' contributions to the operation. In particular, a key variable is the pattern of interdependence between the partners (Borys and Jemison 1989, Hennart 1988, Stuckey 1983). Two basic forms of interdependence can be identified. In one form, contributions are not integrated, but lie on a sequential path, as when one partner designs a product for the other's manufacture, or when one partner manufactures for the other's distribution. We term these *sequential* joint ventures.

In the other form of interdependence, the partners' contributions represent a pooling of their talents, as when partners jointly manufacture a new good. The market where this new entity operates can be related in a number of ways to its parents' markets. Often, one partner uses the joint venture to expand down the prod-

uct stream, while another uses it to expand upward, and their expertise is blended together in the venture. In another version, one partner might also be using the arrangement to diversify into new areas of activity together with a second partner. But in all cases, manufacturing facilities are jointly built and operated. We refer to these as *integrative* joint ventures.

In neither situation do the interests of the partners necessarily dovetail. In sequential joint ventures, one partner's gain comes at the direct expense of the another. Consider the case of an upstream firm and a downstream firm separated by a gap in a manufacturing stage, which they bridge via a sequential joint venture. In this setting, at both the input and output end of the manufacturing process, troublesome haggling over transfer prices will take place (Hennart 1988). Of course, contractual terms can provide for some of the eventualities, but such agreements will still be subject to opportunistic interpretation, especially if markets are thin at either end of the process (Joskow 1985). This problem also occurs in integrative joint ventures, for hand-offs may take place at what Stuckey (1983) calls "the back door," as when one manufacturing partner is also the contributor of key inputs.

Furthermore, there are operational issues for integrative joint ventures that stem from decision-making loci and routines. While sequential joint ventures need some central decision-making, numerous decisions about operations within the separate stages are likely to be made on a sovereign basis by the partner responsible for that stage's output. But in an integrative joint venture where a greater level of operations are pooled, shared decision-making is likely to be ongoing, especially if organizational complexity is greater (Killing 1988), which seems plausible for an integrative joint venture. And shared decision-making in this setting is likely to be much more comprehensive, encompassing decisions that may reach down to the shop floor. Parents are virtually guaranteed to clash on occasion, as their representatives attempt to maintain operating and reporting consistencies between the joint venture's operations and their own practices, which might differ markedly. It can also be true that broader, more frequent joint decision-making can offer one parent greater opportunities to gradually expose and appropriate the other's key firm-specific assets.

In fact, this constitutes the most serious threat to integrative joint ventures: the chance that important know-how, especially as regards manufacturing processes and technologies, will leak to or be appropriated by a partner and be used to undermine the other's competitive advantages (Hamel et al. 1989). Thus, integrative joint ventures, because they are more likely to bring together assets displaying technological specificity and not separated by stage, carry the greatest risk that a firm will have its specific technological know-how appropriated by its partner (Teece 1986).[2] We believe that while haggling over transfer prices complicates both types of joint ventures, the very significant problem of protecting intangible assets in integrative joint ventures represents the key contractual hazard. Thus,

HYPOTHESIS 2. *Integrative joint ventures will be more likely to fail than sequential joint ventures.*

Given bounded rationality it is impossible to contractually specify every possible contingency involved in managing a cooperative entity (Williamson 1985). In fact, formal contracts often include only minimal sets of obligations. The problem for a joint venture is that the rivalry within it can stimulate opportunistic behavior when the proper course of action—given its organizational charter—is ambiguous. Therefore, viability of a joint venture depends on how well partners observe and respect informal, relational obligations (Killing 1983).

We hypothesize that trust and commitment are affected by each partner's prior experience with interfirm collaboration and multiple ties between partners. Once labelled an opportunist, it becomes difficult for a firm to pursue and maintain interfirm transaction relationships in the future with other firms. Therefore, a firm with experience in interfirm relationships is likely to be considered trustworthy. A firm may also be judged as less opportunistic when it and its partners have other, ongoing, agreements (Parkhe 1993). From another perspective, Kogut (1989) argued that a joint venture is less

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[2] We do not mean to infer that leakage problems are not an issue in sequential joint ventures. For example, an upstream firm may try to obtain customer lists from its downstream partner, which could then be used to assert itself downstream.

likely to fail when partners have simultaneous agreements, but for a less congenial reason: multiple ties can also facilitate retaliatory action by providing several contact points with the offending party. We include a parallel hypothesis here. Thus, we hypothesize that:

HYPOTHESIS 3. *A joint venture formed between firms with experience in interfirm collaboration is less likely to fail.*

HYPOTHESIS 4. *A joint venture whose partners are tied with multiple linkages concurrently is less likely to fail.*

Just as the complexity of management can limit the advantages of internal organization over arm's-length exchange, so too can the difficulty of managing one's stake in a joint venture reduce its governance advantages. Indeed, several authors have argued that the sheer complexity of managing a joint venture can be a significant impediment to success (Beamish 1988, Killing 1988). Communications systems can suffer from attempts to harmonize people, policies, and procedures taken from distinct parent organizations, greatly complicating management from above. And organizational politics are not dormant in joint ventures (Doz 1988). All these variables influence joint venture success and will be manifested on several dimensions.

For example, the numbers of partners to an agreement can affect coordination costs and managerial complexity. This takes place in several ways. First, as the number of participants increases, the chances escalate that there will be ex post disagreements about the original aims and statutes of the contract. Second, more participants increase the transaction costs to monitor contractual terms. Finally, since the number of dyadic relationships between partners increases geometrically with their number, so does the chance that a dysfunctional pairing will undermine the venture. Thus, a straightforward hypothesis is suggested:

HYPOTHESIS 5. *The greater the number of parties in a joint venture, the greater the chance that it will fail.*

The Age Dependence of Joint Venture Failures

The management of joint ventures does not end with the consummation of the partnership, but is an ongoing task. This leads to the issue of predicting the pattern of failures across time. Two previous studies that focussed on joint venture termination (Blodgett 1992, Kogut 1989) used event history methods to analyze the hazard rate of these ventures. While both used explicitly dynamic techniques, neither made predictions about the trajectory of terminations across the age of the joint venture nor estimated its effect. In contrast, we believe that there is reason to expect a specific, nonmonotonic pattern of failure rates across this age.

At the time of completing a joint venture agreement, expectations for success are highest. From this point forward, much information about the venture is released, and learning takes place (Lyles 1987). The balance of power among partners may shift (Bleeke and Ernst 1995, Yan and Gray 1994). Assurances of mutual trust may be confirmed or proven false, as an initial stock of goodwill during this "honeymoon period" is expended. Moreover, information about the ability of individuals and managers in the joint venture to conform to the desires of their superiors becomes clearer. Thus, across time, the joint venture's partners secure the advantages of replacing their a priori speculations about the venture with the knowledge that accompanies their experience. Furthermore, additional information about products and product markets is gained. Perhaps an expected growth in demand does not materialize, or the product envisioned proves fatally flawed. In both cases, the partners may wish to terminate the venture. For these reasons, we would expect that the failure rate of strategic joint ventures would rise with time initially.

However, in the longer run, there are reasons to believe that the failure rate of joint ventures would decline. Certainly, one reason is organizational: the longer the joint venture survives, the more established becomes its organization, momentum, and legitimacy (Freeman et al. 1984). But we also expect that the reservations and fears of the initial years would begin to recede as the joint venture steadies as a stand-alone entity. So, we expect the failure rate to be nonmonotonic, rising in early years, but then declining after a reaching a peak, replicating a shape found by Levinthal and Fichman (1988) in their study of auditor-client relationships, and Russo (1992) in his study of start-up subsidiaries of utility firms. Hence:

HYPOTHESIS 6. *The failure rate of joint ventures will initially rise and then decline with time.*

Empirical Testing

Sample

The data set assembled to test our hypotheses consists of joint ventures in the electronics industry (regardless of the parent's industry) that were launched between 1979 and 1988, that did not have a specified duration, and in which all parents took an equity stake in new physical assets. These dates produced a sample large enough for our purposes while allowing each joint venture the potential to last beyond the average life span, reported as 3.5 years by Harrigan (1988). We also included only those joint ventures without predetermined, voluntary terminations, as they would have biased our results. We made this assessment through a review of the basic terms of the agreement as reported in our data base, with follow-up calls to involved firms when these reports were unclear. Restricting our sample to equity joint ventures, as opposed to the more inclusive group of strategic alliances, offers the advantage of enhanced comparability of agreements, and thus more homogeneity in the sample.[3]

Following the Department of Commerce (1990) definition of equity joint ventures, we limited the sample to agreements wherein each partner contributes at least 10% of the total project equity. We restricted our sample to agreements with at least one United States firm, in order to ensure data availability. Finally, we omitted joint ventures between U.S. firms and firms in communist and formerly communist countries, since their regulatory settings were significantly different from those in developed countries. Our ultimate sample of 204 joint ventures included 155 cross-border agreements and 49 that were between U.S. companies.

We selected equity joint ventures with principal operations in the electronics industry, which according to the Department of Commerce (1990) is the industry best characterized by interfirm collaboration. To delineate this industry, we used product areas listed by the American Electronics Association (1990): computers and peripheral equipment, electronic components and equip-

ment, aircraft parts, and measurement and medical equipment. While one can argue that these are separate industries, there is evidence that broad overlap exists in the capabilities of firms active in the sample and that significant spillover activity occurs. A number of firms were active in joint ventures that were in more than one SIC in our sample, and much of the technology embedded in these ventures displays meaningful similarities. In any case, we control differences across these four product areas in our statistical test.

The initial list of joint ventures was generated using information from the *Cambridge Yearbook on Corporate Mergers, Joint Ventures, and Corporate Policy* (1979–1988), *Mergers and Acquisitions*, and the *Frost and Sullivan Index* (*F&S*) for the United States, International, and Europe. Data on each joint venture were then compiled from the original articles reference in the F&S Index, *The Wall Street Journal*, the *Business Periodicals Index*, and the *New York Times Index*. We examined each partner for five years prior to its first joint venture in the data set until the end of 1992 or termination of its last joint venture. Supplemental data were obtained from company publications, other public sources, and telephone inquiries to top managers in the firms.

We began with 430 candidates, first removing 202 joint ventures for which data on independent variables were missing after archival searches and could not be obtained from partners in the venture, or did not fit our selection criteria in the first place. For an additional 24 joint ventures, either the agreement was never consummated, or archival data and calls to involved firms did not reveal whether or not the joint venture was still active. Thus, the final sample numbered 204 joint ventures.

Operationalization

For the dependent variable we used the duration, or age, of the venture. We discuss below how we incorporated into the analysis whether or not the joint venture had failed by the end of the study period. A joint venture between direct competitors was assumed when the partners had the same four-digit SIC codes in their primary industries, as determined by the F&S Index. For the cases with more than two partners, we compared the two largest equity holders. To determine whether

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[3] For a treatment of strategic alliances that explicitly includes and analyzes a wider range of equity and non-equity agreements, see Pisano et al. (1988).

or not a joint venture was integrative in nature, the initial contractual terms, primary function of the venture, and the nature of the partners' contributions to the operation were reviewed. Where all partners' primary roles were the same, and all partners contribute to a common pool of resources for the joint venture, the variable was coded 1. For others, for example joint ventures wherein one partner manufactures and another markets a product, it was designated a sequential joint venture, and coded 0. If this distinction could not be determined from published sources, the partners were contacted directly.

Experience in interfirm collaboration was proxied by the average number of previous joint ventures per partner in the five years prior to the agreement, a duration consistent with data availability and resource constraints. We used a dichotomous variable for the presence of concurrent ties between partners, coding it 1 if at least two of the partners had other interfirm agreements beyond the focal joint venture, and 0 otherwise. For the number of parties in a joint venture, a simple tally was used.

We included several control variables in our analyses. Although the joint ventures in the sample are in the electronics area, they are situated in several Standard Industrial Classification product areas. In order to control the effect of different product market settings, we inserted dummies for the four main product areas in which these ventures operated.[4]

A control variable of general interest is whether or not the joint venture was international in its membership. Expectations for the effect of this variable are difficult to perceive. On one hand, cross-cultural differences can complicate a joint venture in a number of ways. For example, cultural distances, especially between the United States and some Asian countries, can be wide enough to cause troublesome misunderstandings (Hofstede 1980). On the other hand, it is often argued that the social costs in terms of the loss of repu-

tation associated with a joint venture failure form a significant barrier to exit for firms whose home country embraces the notion of groups and harmony, such as Japan (Hill 1991). So without a priori expectation, we entered a dichotomous variable set equal to 1 if the venture had at least one foreign partner, and 0 otherwise. We also entered a variable to control for whether or not the joint venture included research and development, a unique functional distinction that is often included in the study of joint ventures (Kogut 1989).

Finally, we control for the ownership configuration of the joint venture, a variable of interest in prior research. There is a debate on how inequality should affect failure rates (Geringer and Hebert 1989). On one hand, one can contend that the potential for unexpected difficulties in the piloting of joint ventures is most likely when ownership is equally shared. First, when ownership is characterized by one party with a dominant ownership position, the remaining parties have an a priori notice that the pursuit of their individual interests may be difficult, especially if their partners choose another course of action. Thus, in these situations, the firms can expect at least some ex post strategic choices to diverge from what they themselves would have chosen. In this somewhat paradoxical way, dominant ownership can simplify the control process and help avoid agency problems (Killing 1983). In contrast, exactly equal sharing of ownership provides an important, potentially destabilizing special case of ownership.

On the other hand, dominant control can generate opportunism, by providing incentives to cheat that depend on the inequality of the shares.[5] The effect of share inequality on the incentive to cheat is best explained through example. In a 60–40 joint venture, when the 40-percent partner undersupplies by $1 its inputs to the venture, it enhances its profits by $1, less its share of 40 cents of profit that the joint venture would have earned by using that $1 of input. But for a 90–10 JV, it loses only 10 cents of profit. The net effect is a gain of 60 cents in the first case, and 90 cents in the second. Thus, incentives to cheat are greater the more inequality is dis-

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[4] Specifically, those SIC product areas are 3570 (computers and peripheral equipment), 3600 (electronic components and equipment), 3720 (aircraft parts), and 3800 (measurement and medical equipment). They correspond to designations used by the *Cambridge Yearbook*.

[5] The authors are grateful to an anonymous referee for pointing out this line of reasoning.

Table 1 Failures and Acquisitions by Age

	Age of Joint Venture (Years)									
	1	2	3	4	5	6	7	8	9	10+
Number at Risk	204	197	174	139	110	99	84	78	72	70
Failures	5	13	14	11	4	2	3	2	0	2
Acquisitions	2	10	21	18	7	13	3	4	2	2
Total Terminations	7	23	35	29	11	15	6	6	2	4

played in the venture. Blodgett (1992) provided empirical evidence associating unequal shares with a joint venture instability.

Given these conflicting tendencies, we include ownership share inequality as a control variable without expectation. But we decided to try to improve on the simple dichotomous variable for shared or dominant ownership that had been used previously. So we constructed a continuous measure of inequity using the standard deviation of the percent shares. This variable begins at 0 for equal ownership shares and rises as the relative shares of ownership become increasingly imbalanced.[6]

Method

Event history analysis was used because it is uniquely suited to the study of discrete events occurring across a time series, as well as "right-censored" cases, when no event has occurred by the end of the study period. For each joint venture, an event is registered upon failure.[7]

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[6] The exact formula used is as follows:

$$\text{Inequality} = \sqrt{[(1/(n-1))*(\Sigma_i(P_i - P_m)^2)]}, \quad \text{where}$$

n = Number of partners,
P_i = Percent ownership of partner i, and
P_m = Mean percentage ownership.
Use of the index can be illustrated with the two-party venture. Here, when shares are equal, the inequality measure is zero; it rises linearly as the difference in those shares increases.

[7] There is an unusual advantage to using failure rates in our analysis. Anderson (1990) found that in practice, managers tended to use more traditional profit/loss measures to gauge the performance of alliances, though this may be a poor measure. Dissolutions and sell-offs, on the other hand, are comparatively unambiguous, so our study also sheds some light on determining success factors associated with joint ventures, if success is associated with the absence of failure.

The pattern of terminations across the age of the joint ventures for both failures and acquisition by one of the partners is shown in Table 1.

A key issue is what constitutes failure, as distinct from terminations. For this reason, it was necessary to make decisions about how to handle terminations that did not represent dissolutions. One issue involved handling a small number of terminations that represented the sell-off of the joint venture or its acquisition by one of the partners. Following Porter's (1987) view of a sell-off as a competitive setback, we categorized a small number of sales to third parties as failures. This left the case of joint ventures terminated when one partner acquired the assets of the operation. Because this is sometimes anticipated, we decided to code these as censored outcomes, allowing us to obtain all available information from these cases during prior years when the joint venture was at risk of outright failure. At the same time, no judgment needs to be made about whether or not acquisition by one of the partners represents failure. However, because it is of some interest for the purposes of comparison, we also present regression results for the case where the joint venture is terminated by acquisitions, this time censoring failures.

We used an accelerated time model and maximum likelihood techniques to test our hypotheses. In these models, the duration of the joint venture (T_i) is the dependent variable for individual i, and is log-linearly related to the k independent variables $(X_{k,i})$. Thus,

$$\ln T_i = \mu + \beta_k X_{k,i} + \sigma e_i,$$

where e_i is the disturbance term, μ is an overall intercept term, β_k are the coefficients on the independent variables, and σ represents a scale factor associated with the

underlying distribution. In this model, increases in the independent variables have a multiplicative effect on the duration of the joint venture. Positive coefficients lengthen the duration of the venture; negative coefficients shorten it.

Together, the μ and σ terms describe an underlying distribution of durations that hold when all independent variables are set equal to 0. These durations are thus associated with hazard rates, describing the instantaneous probability of an event occurring at time t. This hazard rate can be used to assess the pattern of failures across time, and hence, Hypothesis 6. The two patterns of interest for our analysis are the LogNormal and Weibull distributions:

LogNormal

$$h(t) = \frac{\exp{-[(\log(t) - \mu)^2/2\sigma^2]}}{((\sqrt{2\pi})\sigma t)[1 - \Phi((\log(t) - \mu)/\sigma)]},$$

Weibull

$$h(t) = (1/\sigma)e^{-(\mu/\sigma)}t^{((1/\sigma)-1)},$$

where Φ is the cumulative distribution function for the normal distribution. We used the SAS package LIFEREG in our analyses.[8]

Hypothesis Testing

Table 2 provides descriptive statistics. The joint ventures in the data set experienced a 27.5% failure rate. This represents a lower frequency than in prior studies, but is probably consistent with the definition we used. Failure also is negatively associated with the age of the joint venture; the longer it persists, the less likely it is to fail. We test whether this simple correlation holds true

[8] A different methodological approach would be to view failure and acquisition as competing risks. Unfortunately, we know of no model that can both accommodate a nonmonotonic hazard function and estimate more than one mode of termination. One approach is to use Tuma's (1980) RATE program, which is explicitly designed to estimates models with competing risks. But the model provides only a second-best way to test for nonmonotonicity, as it permits only monotonic patterns of hazard rates, such as the Weibull. Nonetheless, we estimated a model with our two termination modes, our independent variables, and a linear and nonlinear age term. Results, with minor exceptions, were quite consistent with the results we present.

when we estimate the shape of the hazard rate as a function of joint venture age. Correlations among the independent variables are all relatively low.

A key first step in estimation is to determine the underlying distribution of duration times, which holds if all independent variables were set equal to zero (Kalbfleisch and Prentice 1980). This initial step allows us to test Hypothesis 6, which posits that a nonmonotonic pattern of duration times across time would appear. Specifically, we expect that the propensity for joint ventures to fail will rise to a peak and then decline with time.

In order to test this hypothesis, we compared baseline models based on Weibull and on log-normal distributions. The log-normal distribution, characterized by a pattern of durations that has an inverted U shape, indeed emerged as the best fit, offering a significant improvement over the monotonic Weibull distribution ($\chi^2 = 6.68$, $p < 0.01$).[9] Therefore, an initial conclusion can be made: joint ventures follow a nonmonotonic pattern of failure analogous to that found by Levinthal and Fichman (1988) and Russo (1992), and this pattern persists when other causal variables are added to the model. The estimated hazard rates as a function of the age of the ventures appear in Figure 1.

In Table 3, Model (1) provides the results of analyses conducted to test Hypotheses 1 through 5 for the case of failures. Due to space limitations, we do not list the dummy variables for product areas. None of these were significant, showing that the various product market areas in which the joint ventures were active did not influence outcomes, in and of themselves, and supporting the pooling of joint ventures from nominally different contexts. Joint ventures with an international partner have no effect on failure rates, so either international partners have no effect on failures, or the issue is more complex than we can address in our limited space. The presence of research and development activity within the joint venture is not a significant predictor of failure. Finally, the coefficient for ownership share inequality,

[9] A model based on the Gamma distribution, which adds a third parameter to the hazard rate, was not a statistically significant improvement over the models using the Log-normal distribution.

Table 2   Descriptive Statistics and Correlation Coefficients[a,b]

	Mean ·	Std Dev	Correlation Coefficients								
			1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Joint Venture Failure (1 = Yes)	0.27	0.45									
2. Duration of Venture[c] (Years)	4.48	2.61	−31								
3. Joint Venture Between Direct Competitors (1 = Yes)	0.24	0.43	07	−07							
4. Integrative Joint Venture (1 = Yes)	0.58	0.49	−06	−14	−09						
5. Number of Previous J. Ventures	6.08	6.37	−10	01	−13	14					
6. Concurrent Alliances (1 = Yes)	0.33	0.47	−13	31	−07	01	20				
7. Number of Partners	2.30	1.36	−07	13	13	−05	20	02			
8. International J. Venture (1 = Yes)	0.76	0.43	−01	13	−04	−20	20	08	07		
9. R&D Activity Included in Joint Venture (1 = Yes)	0.13	0.33	00	16	17	11	06	04	12	−16	
10. Ownership Share Inequality	7.10	11.62	−08	04	12	−12	13	08	17	01	06

[a] *N* is total number of alliances, 204. Decimal points have been omitted.

[b] Correlations at or above |14| are significant at the 5% level.

[c] For censored observations, length to end of study period or until acquired by a partner.

so we cannot help to resolve the debate on how that variable affects joint venture failure, except to say that we could not perceive a simple connection here.

Turning to our variables of interest, the results show that when competitors meet in a joint venture, it is significantly more likely to fail, confirming Hypothesis 1. Hypothesis 2 was not supported: we found no relationship between the nature of the interdependencies in the joint venture and failure. Mixed results for the relationships concerning the development of trust and commitment were found. Experience with previous joint ventures does not influence the failure of future endeavors, disconfirming Hypothesis 3. However, the presence of other, concurrent joint ventures between the same partners lead to longer-lived ventures, confirming Kogut's (1989) finding and our Hypothesis 4. Put together, these last two results go beyond Kogut's analysis by indicating that each set of relationships between organizations, in and of itself, imparts its own probability for success on the joint venture formed by its constituent parties. Finally, counter to Hypothesis 5, we found that the more partners in a joint venture, the less likely it was to fail. This was puzzling. As this variable has some correlation with previous experience in joint ventures, it may be

that experience somehow acts indirectly to add value to joint ventures with numerous parties.

Model (2) presents a reanalysis with only acquisitions coded as events, and all other outcomes (including failures) censored. Roughly 40% of the cases were ended by acquisition. We present these results to compare the causes of the two modes of termination, although the reader should keep in mind that our hypotheses refer only to the case of termination through failure. The presence of concurrent relationships between partners is again significant, suggesting that these ties promote longevity in joint ventures, reducing their risk either of failure or acquisition by one of the partners. But with this one exception, the pattern of significance of the independent variables changes drastically from Model (1) to Model (2).

Neither the presence of competition between partners nor the number of partners affect the chance of being acquired. But three variables that did not affect failures did influence the prospects for acquisition. In particular, the pattern of interdependence is highly significant, which suggests that the problems presented by integrative joint ventures are more likely to be dealt with by changing the governance of the operation via acquisition,

Figure 1   Age Dependence of Joint Venture Failures
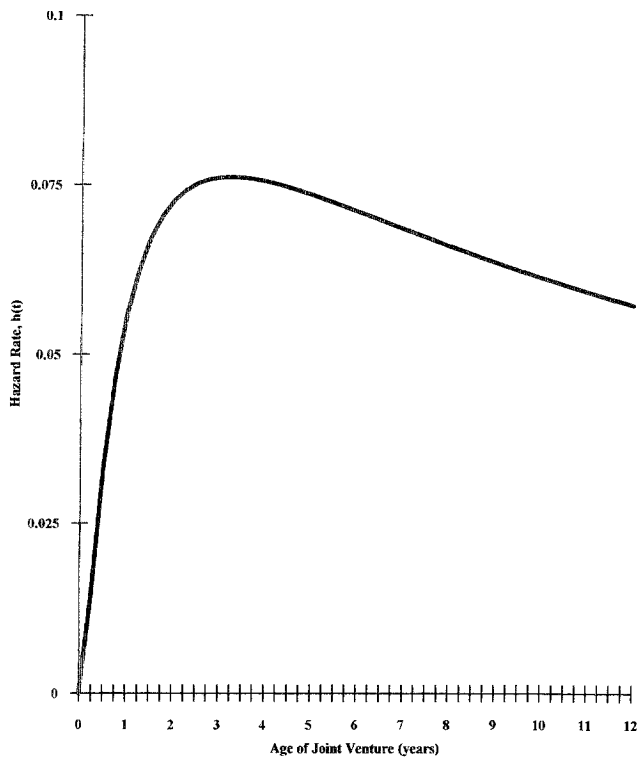
not dissolution. Ventures that included a research and development component were less likely to lead to an acquisition. Finally, greater inequality is linked to a greater chance of acquisition, supporting the findings of Blodgett (1992).[10]

Three results of Model (2) that relate to the variables used to test our hypotheses are worth exploring from a holistic perspective. First, the presence of direct competition between partners does not lead to acquisitions. One suspects that the sale by one partner to the other would be fraught with risk, as long-time employees would change companies, bringing with them years of experience about a direct competitor. And the joint venture's assets, once fully owned, could be put to use without any restraint by the former partner beyond what the

pertinent documents could detail. Mindful of these hazards, explicating final contractual terms for a sale that were acceptable to all parents would be difficult or impossible. Terminating by failure, on the other hand, would avoid these issues almost entirely. Second, integrative joint ventures are more likely to be acquired than sequential joint ventures. We suspect that this result follows from the risks inherent in acquiring operations of the latter type, which by their nature, result in less pooling and less joint decision-making, and hence less knowledge about the assets that might be purchased. Finally, the number of partners does not influence the possibilities for acquisition, most likely because problems in finding an agreement to do so would escalate with the number of parties that must find it acceptable. Termination by failure again would appear to be less difficult to execute.

Table 3   Regression Results—Joint Venture Durations[a,b]

	Failures (1)	Acquisitions (2)
Joint Venture Between Direct Competitors	−0.503** (0.246)	−0.193 (0.165)
Integrative Joint Venture	0.004 (0.222)	−0.516*** (0.143)
Number of Previous Joint Ventures	0.0001 (0.018)	0.001 (0.011)
Concurrent Joint Ventures	0.741*** (0.239)	0.421*** (0.142)
Number of Partners	0.395* (0.204)	0.127 (0.130)
International Joint Venture	0.159 (0.254)	0.154 (0.153)
R&D Activity Included in Joint Venture	0.214 (0.333)	0.484** (0.218)
Ownership Share Inequality	0.006 (0.010)	−0.010* (0.006)
Intercept	1.624** (0.757)	1.846*** (0.459)
Log-normal Scale Factor	1.077*** (0.111)	0.721*** (0.058)
Log Likelihood	−142.60	−143.15

[a] Positive coefficients indicate that increases in independent variable values increase the duration of joint ventures and decrease their hazard rate.

[b] Standard Errors in Parentheses. Significance levels, based on two-tailed tests: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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[10] It is interesting to note that when all terminations are coded as events, additional analysis (not shown) would have masked the differences between failures and acquisitions, because the pattern there was highly similar to the pattern shown in Model (1).

It is of some value to try to bring together Kogut's (1991) results on termination by acquisitions and our own. Kogut tested for an effect of structural variables, including concentration, industry growth, and a measure of unexpected industry growth on acquisitions, as well as any effect of controls for whether the joint venture included R&D, production, and marketing/distribution functions. With respect to the inclusion of research and development as part of the joint venture's mission, our results agree with Kogut's: research and development activities are negatively related to acquisitions, but are unrelated to dissolutions. Kogut found that several other structural and functional variables were significant predictors of acquisitions, but his key finding was that unexpected industry growth triggered buy-outs. We did not replicate Kogut's approach because our study focussed on failures, not acquisitions,[11] and took a different tack by looking not at industry structure or the function of the joint venture, but the relationships between and among its partners. We were able to demonstrate that these relationships, in and of themselves, can be used to predict joint venture failure. Putting the two sets of results together necessarily entails risk, but we speculate that unanticipated growth may well lead to the exercise of explicit options within joint venture agreements. The exercise of these options, having been incorporated into the original joint venture agreement, need not be seen as a negative outcome. But options of a different type, those to act opportunistically, are associated with the variables we described and represent an outcome that is difficult to place in a positive light. Our results indicate that these "implicit" options are more likely to be exercised in integrative joint ventures and those with imbalanced ownership, and less likely when the partners have concurrent ties. The upshot is that Kogut's arguments, based more on industrial organization economics theory, complement our own, based more on transaction-cost economics theory.

[11] Other problems with this replication were the difficulty of obtaining unpublished data from the Department of Commerce and the fact that the SIC system was changed during the years of the study period.

Discussion

The first key finding of the study is that like others who have explicitly compared and contrasted markets and hierarchies (e.g., Hennart 1988, Stuckey 1983, Teece 1986), we find considerable worth in the transaction-cost economic framework. Our efforts here were an attempt to extend the current literature to focus more acutely on the breaking apart of interorganizational governance structures. We find that just as transaction-cost economics can explain why joint ventures are formed, so too can it explain why they fail. Our research demonstrates the validity of this theoretical perspective in a dynamic setting, countering the notion that transaction-cost economics is a static framework.

Secondly, our results indicate that the competitive relationship of the partners' home industries and concurrent agreements both say much about joint venture failure. Of special interest is the finding that cooperating with competitors is risky business. It appears that protecting key specific know-how from one's competitors is difficult indeed, as the incentives to act opportunistically appear to motivate actions that threaten and frequently undermine joint ventures with them. We would posit that these incentives are intensified by the abilities of competitors to recognize and appropriate key technologies and know-how under these conditions.

A review of the regression results suggests a third finding, which, though speculative, is worth developing. Consider the set of variables measuring whether or not partners are competitors, the nature of the interdependencies in the joint venture, and the level of trust among partners. Arguably, these variables parallel those that accompany inter-organizational exchange and change little when placed in the joint venture context. On the other hand, variables such as the number of partners and ownership inequality produce problems more akin to intra-organizational governance, as they represent issues that are similar to managing within an organization, not managing arms-length exchange. We think it is noteworthy that the first set of variables, reflecting inter-organizational issues, was a more powerful predictor in our model. Thus, our results support the notion that while the joint venture, a hybrid form of governance, does indeed fail for reasons that are a hybrid of both arms-length and internal governance, those

hazards corresponding to arms-length contracting appear to be the dominant predictors of failure. So to argue that governance structures (and their hazards) lie on a continuum, running from market-like to fully internal exchange, may be to overstate the case. Rather, the failure of joint ventures appears to be primarily attributable to causes associated with exchange between distinct parties. Put another way, the results suggest that once an exchange is moved away from a fully internal operation, a major transactional threshold has been breached.

The fourth key result is that a substantial honeymoon period attends joint ventures, as the death rate peaks not in the earliest years, but in the intermediate term. Put together with the previous studies finding this phenomenon in other contexts, this model of nonmonotonic failures obtains for arms-length, internal, and, now, intermediate forms of governance.[12] Further research, perhaps with in-depth case studies, could explore which explanation best applies to this tendency: do the partners' high hopes for mutual trust and cooperation gradually wane, or is failure due primarily to a release of information across time about the prospects for the success of the venture, something more consistent with Kogut's (1991) study of the acquisition of joint ventures by one of the partners? In any case, evidence of the liability of newness, associated with the study of small enterprises by population ecologists (e.g., Carroll and Delacroix 1982) is absent in our setting.

Finally, although it was an analytical sidebar and not the main focus of this study, our results demonstrate

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[12] Levinthal (1991) has argued that different patterns of time dependency may emerge as a stochastic result, rather than reflect heterogeneity across organizations. To demonstrate this, he advanced a model that linked mortality to an initial stock of organizational capital, the fitness of the organization to its environment, and the variation of organizational outcomes. But the model does not allow for the variable that captures organization-environment fitness to vary with time. An analogue for our model would be to assume that information about internal aspects of joint venture governance is released at a constant rate, on average. This is a strong assumption, for as Bleeke and Ernst (1995) illustrate, striking revelations about one's partners can and do take place in the middle years of a joint venture. This indicates that it would be valuable to test for the robustness of Levinthal's model by relaxing several of his assumptions.

that within the category of joint venture terminations, there are crucial distinctions. Without question, failures of joint ventures are linked to a different set of causal variables than their acquisitions by one partner or the other. Thus, we propose that conceptual notions that aggregate the two modes of termination, such as "instability," be replaced by a more refined sense of what those particular outcomes signify. Also, when failure is confined to dissolutions and sell-offs, it is substantially less frequent than when defined to include cases of acquisitions by one of the partners. Although the overall rate of terminations is similar to previous studies that tallied all cases of instability, if one looks at narrowly defined failures, the record of joint ventures is somewhat brighter.

A number of topics for future research can be identified. The first follows directly from the previous point, which underscores a troubling definitional question that has eluded consensus even after two decades of research on joint ventures: what constitutes failure? Clearly, comparing and contrasting the various modes of termination is an analytical topic of prime importance. In an ironic parallel between research and practice, managers also appear uncertain of how to evaluate the performance of joint ventures, generally using methods borrowed from the oversight of fully owned subsidiaries (Anderson 1990, Chowdhury 1988). So considerable practical value can flow from research in this area, especially if it could bring together survival data and financial data.

Our finding that the governance of joint ventures has more in common with arms-length exchange than internal management indicates that a review of interorganizational governance structures might be useful in analyzing the joint venture phenomenon. One conceptual tool with potential utility is the relational contract, a method by which the governance of a relationship is left somewhat loose, allowing the parties to adjust their statutes as conditions demand in the future (MacNeil 1978). Although we discuss trust in our theoretical remarks above, a more explicit treatment may be in order; for if the parties to a joint venture trust one another, opportunistic behavior is less likely (Hill 1990, Ring and Van de Ven 1992), and the decision to sustain the joint venture rather than permit failure will predominate. In

any case, future researchers should put some effort into carefully operationalizing trust, as it may well play a key role in the survival of joint ventures.

We conclude by endorsing the many calls to managers to respect the pivotal importance of partner selection. But we would sharpen this recommendation by noting that such cooperative pursuits appear to encounter a "mid-life" crisis, contradicting the idea that the worst is over once the contractual agreements are executed. Instead, managers should be cognizant that the greatest challenges to a joint venture lie in its future, and they should expect some rocky moments. Administrative rigidity is the enemy of joint venture success; reasoned flexibility its key to longevity.[13]

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