

**TERMINATION OF RELATED AND UNRELATED JOINT VENTURES:
A CONTINGENCY APPROACH**

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ABSTRACT

Previous research has investigated various factors that influence joint venture (JV) termination. Yet the majority of studies do not distinguish between different types of JVs, particularly whether a JV is related or unrelated to the parent firm. Due to their inherent differences, related and unrelated JVs are likely to evolve distinctly, and their tendency to terminate may also differ under various conditions. This study takes a contingency approach and argues the impact of various factors on JV termination depends upon relatedness. An event history analysis finds increases in environmental uncertainty and higher resource complementarity reduce the likelihood that a firm will terminate unrelated JVs as compared to related JVs. Conversely parent firm performance and wider JV scope increase the likelihood that the firm will terminate unrelated JVs as compared to related JVs. The findings suggest the need to consider JV relatedness in understanding of JV evolution and termination.

Key words: Joint ventures, Termination, Relatedness

1. Introduction

Joint ventures (JVs) are known to be short-lived, with estimated termination rates in the vicinity of 50 percent (Harrigan, 1988). Research has investigated various factors that influence JV termination, including uncertainty in the environment (Kogut, 1991; Xia, 2011), parent firm characteristics such as size (Hennart, Kim and Zeng, 1998) and resources (Cui, Calantone and Griffith, 2011), and internal factors such as ownership structure (Killing, 1983) and the degree of competition between partners (Dussauge, Garette and Mitchell, 2000; Greve, Baum, Mitsuhashi and Rowley, 2010).

While this research provides valuable insights (Jiang, Li and Gao, 2008), it does not distinguish between different types of JVs, specifically whether they are related or unrelated to the parent firm. Related JVs are formed to access existing resources and leverage scale and scope economies, while unrelated JVs are to learn about a new market and acquire new capabilities (Lu and Beamish, 2001; Nielsen and Nielsen, 2009). These differences suggest the evolution of related and unrelated JVs is likely to be differentially affected by various factors. While previous research finds related JVs are less likely to terminate than unrelated JVs (Hennart et al., 1998), there is limited understanding about whether their termination is impacted differently by the factors identified in the literature.

This study intends to address this gap and asks the following question: how does the impact of various factors on termination vary between related and unrelated JVs? An event history analysis finds an increase in JV environmental uncertainty and higher resource complementarity reduces the termination of unrelated JVs compared to related JVs. Conversely higher parent firm performance and a broader JV scope increase the termination of unrelated JVs compared to related JVs. These findings highlight the importance of taking into account relatedness and adopting a contingent approach toward studying JV termination (Lu and Hebert, 2005; Nielsen, 2010a).

2. Theory and hypotheses

As noted above, important differences exist in terms of motives between related and unrelated JVs. Due to these inherent differences, some factors tend to have a greater destabilizing effect on related JVs compared to unrelated JVs; while others tend to have a reverse effect. The present study proposes and tests hypotheses highlighting how various factors have a *differential* effect on the termination of related and unrelated JVs. Figure 1 outlines the conceptual framework.

 Figure 1 here

2.1. *The environment and the impact of uncertainty*

The real options perspective provides a useful theoretical lens to examine how environmental conditions influence the evolution of JVs (Kogut, 1991; Reuer and Tong, 2005). JVs allow firms to learn about a new market at relatively low costs because the firm can wait for the right conditions to emerge before further increasing investment. In this sense JVs act as real options in new markets by protecting the firm from down side risk while allowing the firm to capture upside gains when conditions turn favorable (Kumar, 2005).

The real options view predicts a negative relationship between increases in environmental uncertainty and the likelihood of JV termination because when uncertainty increases it pays to ‘keep options open’. While this view has received wide empirical support (Cuypers and Martin, 2007; Vassolo, Ananad and Folta, 2004), the literature does not distinguish between related and unrelated JVs. Although Kogut (1991) highlights the real option features of JVs specifically when entering new markets, the literature has assumed all JVs exhibit such

features. More recently Tong, Reuer and Peng (2008) argue that real option theorizing does not necessarily apply to all JVs, and that it is necessary to identify its boundary conditions.

Consistent with Kogut (1991) and Tong et al. (2008) we suggest that the real options prediction may apply to unrelated JVs rather than related JVs. Following Myers (1977), Kogut (1991) and Tong et al. (2008), the value of a JV can be written as the sum of two components:

$$V_{JV} = V_{AIP} + V_{GO}$$

Where V_{JV} is the value of the JV, V_{AIP} is the value of the JV's assets in place, and V_{GO} is the value of the JV's growth options. V_{AIP} pertains to the rents derived by exploiting existing assets in current environmental conditions. V_{GO} pertains to the rents derived from *future* opportunities. Options theory suggests when uncertainty in the JV market increases, V_{GO} increases since the potential for capturing upside gains increases while the potential for downside losses is limited due to shared investment (McDonald and Siegel, 1986). On the other hand, increases in uncertainty may reduce the value of V_{AIP} as existing competencies are no longer applicable and need to be reconfigured to deal with a new set of environmental contingencies.

For unrelated JVs, V_{AIP} is relatively smaller compared to V_{GO} (that is $V_{AIP} \ll V_{GO}$) because rather than from existing resources, these JVs create value in the future through the gathering of information in new markets (Kogut, 1991; Leiblein, 2003). Thus increases in uncertainty would increase the value of unrelated JVs on the net (Belderbos and Zou, 2009), since V_{GO} would rise sufficiently to offset any decrease in V_{AIP} . In contrast, when a JV is related, $V_{AIP} \gg V_{GO}$. A significant proportion of the value in related JVs comes from deploying existing competencies in current uses rather than from growth options. When related JVs are exposed to increases in environmental uncertainty, the value of existing competencies may be reduced which reduces V_{AIP} . This loss in value would offset increase

in V_{GO} thereby lowering the overall value of the JV. Thus when uncertainty in the JV's market increases, there is more value for the parent firm to maintain an unrelated JV than a related JV. In this sense related JVs may be equally prone to risks and uncertainty as wholly owned business units, that is their susceptibility to such risks may be independent of their governance structure. This argument may help explain why some studies (Gomes-Casseres, 1987; Hennart et al., 1998) find risk and uncertainty to equally impact JVs as other business units, a finding that seems at odds with the real options literature. Hence:

Hypothesis 1: Increases in environmental uncertainty in the target market of the JV will decrease the likelihood that the firm will terminate unrelated JVs compared to related JVs.

2.2. The impact of parent firm performance

Another dimension that is likely to differentially influence the termination of related and unrelated JVs is parent firm performance. A JV is embedded in the parent firm's overall strategy and coevolves with the parent firm over time (Koza and Lewin 1998). Hence there is a necessity to take into consideration parent firm factors to further understand JV stability (Cui et al., 2011; Nielsen, 2010a). To examine parent firm factors, the important distinction between exploration and exploitation becomes relevant (March, 1991). Although JVs in related businesses can involve exploration (for example a pharmaceutical company's JV with a biotech company to develop new drug discovery capabilities), *on average* such JVs are more likely to lie at the exploitation end of the spectrum than unrelated JVs (Teece, 1986; Hennart, 1988).

While March(1991) suggests that firms need to strike a balance between exploration and exploitation, recent work argues that, rather than concurrently pursuing the two objectives, firms are likely to alternate between periods of exploration and exploitation (Gupta, Smith

and Shalley, 2006). The latter view, which Gupta et al. (2006) term as the punctuated equilibrium view, has received strong empirical support (Lavie and Rosenkopf, 2006; Rothaermel and Deeds, 2004). The punctuated equilibrium view raises the question of *when and under what conditions* firms are likely to emphasize one activity over the other. One condition that may influence the choice is the performance of a firm. Firms can be viewed as continually searching for performance peaks on a rugged, competitive landscape (Cyert and March, 1963). When a particular performance peak is attained, there is likely to be an increased emphasis on exploitation as firms temporarily stabilize their position and derive rents before embarking on further search (Hoffman, 2007).

Accordingly a parent of higher performance is more likely to face the punctuation point and transition from exploration to exploitation while terminating its unrelated JVs (Wu and Cavusgil, 2006). This rebalancing is likely to occur as the firm devotes scarce managerial resources (Kumar, 2009) to maximizing value from related JVs. In contrast, a parent with lower performance is more likely to transition from exploitation to exploration and continue search for growth opportunities through unrelated JVs.

The above arguments are also supported by the *problemistic search* model of decision making (Cyert and March, 1963). When performance is above an aspiration level, the firm's focus is mainly on exploitation; however when performance falls below aspiration exploration is initiated. Thus the problemistic search view also suggests higher performance will be associated with greater exploitation and emphasis on related JVs. Further, the literature on diversification suggests that firms experiencing lower performance tend to undertake defensive diversification and expand into unrelated markets (Chatterjee and Werfelt 1991; Rumelt, 1982). Thus:

Hypothesis 2: Higher performance will increase the likelihood that the firm will terminate unrelated JVs compared to related JVs.

On the other hand, higher performance may also provide firms the resource slack to explore new opportunities (Nohria and Gulati, 1996). This view is termed the *slack search* model of decision making (Cyert and March, 1963). When performance is at higher levels, the potential risks and failures typically associated with exploration can be more easily absorbed, which may incentivize firms to shift toward search through unrelated JVs. Consistent with these arguments, Greve (2007) hypothesizes that higher performance tends to promote innovations involving new technologies and processes. In light of these arguments, an alternative hypothesis for H2 is proposed. Empirical evidence will inform whether the incentives to emphasize unrelated JVs will outweigh incentives to invest in related JVs when a performance peak is reached.

Hypothesis 2-alt: Higher performance will decrease the likelihood that the firm will terminate unrelated JVs compared to related JVs.

2.3. JV structural characteristics

One critical JV structural parameter is the scope of collaboration (Oxley and Sampson, 2004). Scope decisions entail outlining whether a JV involves R&D, marketing, manufacturing or some combination of these activities. The greater the number of activities conducted within the JV, the wider the scope. When a JV's scope is wide, the firm may have greater difficulty contracting on how benefits are to be divided in future (Kumar, 2010). The problem is exacerbated in unrelated JVs oriented towards building new capabilities where establishing property rights may be particularly challenging (Oxley and Sampson, 2004; Vlaar, Klijn, Arino and Reuer, 2010). Further, wide scope JVs are also more complex and difficult to manage. This complexity gets amplified when the JV is formed in an unrelated market. For such JVs any unanticipated circumstances may easily cause coordination costs to exceed benefits thereby increasing the parent firm's likelihood to terminate the JV. Thus:

Hypothesis 3: Wide scope of collaboration will increase the likelihood that a firm will terminate an unrelated JV compared to a related JV of similar scope.

Another structural parameter that may influence JV termination is the degree of resource complementarity between partners (Lin, Yang and Arya, 2009), defined as the extent to which the resources of two firms are *dissimilar* yet potentially combinable to generate synergies (Nielsen, 2010b; Wang and Zajac, 2007). When partner firms have resources that are diverse and complementary, absorptive capacity and learning are enhanced (White, 2005), while homogenization of knowledge is found to facilitate knowledge exploitation but inhibit growth in new areas (Postrel, 2002; Vanhaverbeke, Gilsing, Beerkens, and Duysters, 2009).

Resource complementarity is particularly critical for unrelated JVs that are set up to acquire new capabilities. When entering a new market, similar resources may prevent the partners from effectively generating new knowledge (Phelps, 2010). On the other hand, the tasks of related JVs are well defined and depend less on the benefits from diverse resources. Thus, although complementary resources may not necessarily be detrimental to related JVs, such resources may be more important in sustaining unrelated JVs. Hence:

Hypothesis 4: High resource complementarity (rather than similarity) between partners will decrease the likelihood of a firm terminating an unrelated JV compared to a related JV.

3. Method

3.1. Data

From Thompson Financial SDC Platinum database, JVs located in the US formed between 1990 and 2001 were selected, leaving 3 years between the last JV's formation and the end of the observation period of the study (2004) since the average life span of JVs is 3-4 years (Harrigan, 1988). To obtain financial data on the parents, the sample was restricted to JVs with at least one public partner. Next, termination information for these JVs was obtained

from SDC Platinum, Corporate Affiliations and Factiva. For JVs where termination information was missing, parent companies were contacted to directly obtain such information. After obtaining termination information and combining data for the covariates, the final sample comprised of 134 observations, among which 58 JVs were terminated. The sample size is consistent with previous studies examining termination (Kogut, 1991). The overall JV termination rate in the sample is 43.28%. The final sample covers 14 major manufacturing industries, and the annual sales of these JVs averaged 17.54 million with a standard deviation of 38.96 million. All JVs in the sample were open-ended (Jiang, Chu and Pan, 2011).

To test for sampling bias, sales, net worth and gross profit of the JVs in the final sample were compared via t tests with those of JVs missing covariate values, and with those of JVs missing termination information. Tests were conducted for each year from 1990 to 2004. Test results did not show a systematic difference between the final sample and cases excluded due to missing values.

Termination information was coded at the monthly level, that is, the JV was observed at each month after formation until termination or the end of the observation period (2004). This procedure resulted in 5481 JV-months. The unit of analysis is the parent-JV link.

3.2. Measures

JV relatedness is measured by comparing the SIC codes of a JV and the parent firm. *Unrelated JV* is coded as 1 when the JV is in a different industry as the parent firm; and 0 otherwise (Xu and Lu, 2007). The sample comprised of 59 unrelated JVs (out of 134). The 2 digit SIC is used given that the diversification literature typically assumes that industries at the 2 digit level are unrelated and are dissimilar. In subsequent analyses results with *unrelated JV* coded at the 3 digit level are also presented.

Environmental uncertainty is measured as the volatility of the deviation in value of shipments in the JV industry from a trend line in the past 5 years (Kogut, 1991). Increase in environmental uncertainty is calculated as the difference in the volatility between time t and time $t-1$.

Parent firm performance is measured by Tobin's Q, given as the sum of market value of equity, short and long-term debt, preferred stock at liquidating value and book value of convertible debt normalized by book value of total assets (Villalonga, 2004).

JV scope is measured by the number of different activities (manufacturing, marketing and R&D) the JV involves (Oxley and Sampson, 2004; Tsai and Li, 2007). Scope is coded as 1 if a JV involves either one of the three types of activities; 2 if a JV involves any two of the three types of activities; and 3 if a JV involves all the three types of activities.

To calculate parent firm resource complementarity, a measure used by Teece, Rumelt, Dosi and Winter (1994) and Wang and Zajac (2007) is adopted. The approach assumes activities that are complementary will be combined within firms more frequently. Therefore, the frequency with which two SIC codes appear in one firm is proportionate to the degree of complementarity between these two SIC codes. More formally, a complementarity score between any pair of SIC codes i and j ($Comp_{ij}$) can be calculated as follows (Wang and Zajac, 2007).

$$Comp_{ij} = (J_{ij} - \mu_{ij}) / \delta_{ij}$$

Where:

J_{ij} = number of firms in which the two SIC codes appear;

$\mu_{ij} = (N_i \times N_j) / K$ (N_i = number of firms in SIC code i ; N_j = number of firms in SIC code j , K = total number of firms);

$$\delta_{ij} = \sqrt{\mu_{ij} \times (1 - N_i / K) \times (K / (K - 1)) \times (1 - N_j / K)}.$$

The intuition is to subtract the probability that two segments i and j will occur randomly within a firm, given that there are N_i and N_j firms operating in each segment and the total number of firms in the universe *operating in more than 1* segment is K (Teece et al., 1994, p6). That is because the random probability of a firm operating in i and j increases with N_i and N_j simply because there are a greater number of firms in the two industries. Hence there is a necessity to subtract the number of random firms that are likely to be operating in industries i and j from the actual number of firms involved in these two segments.

To calculate the measure, all firms with more than one SIC code are selected from COMPUSTAT (that is K above). Complementarity scores between the same SIC codes are coded as 0 because complementarity indicates different rather similar resources (Wang and Zajac, 2007). The calculation is based on 4-digit SIC codes, and these scores are applied to JVs in the sample according to the primary SIC codes of the two parent firms.

Several characteristics of the parent firm, the JV, and the environment are included as controls. At the parent firm level, firm size is controlled for since large firms are more tolerant with low-performing JVs (Hennart et al., 1998), firm diversification because diversified firms are more likely to terminate JVs (Villalonga and McGahan, 2005), and firm JV experience as firms with previous experience are more capable of JV management (Kumar, 2011; Man, Duysters and Saebi, 2010; Villalonga and McGahan, 2005). In addition, the number of JVs formed by the parent firm at each time point is controlled since increased JV activity may imply greater resources for interfirm collaboration. The number of new JVs formed with the current partner after the focal JV was formed (Xia, 2011) is also included as a control for the effects of relational capital between parents (Nielsen and Nielsen, 2009; Porri, 2004).

At the JV level, controls are included for the degree of competition between partner firms which increases the likelihood of termination (Kumar, 2011; Park and Russo, 1996). JV size

is controlled since larger JVs may suffer from inertia. Further we included JV age since older JVs may be more difficult to terminate (Hennart et al., 1998), and JV ownership since asymmetric ownership may create greater instability (Chung and Beamish, 2010). Lastly, the relatedness from the other partner's perspective is controlled since this may have an impact on JV termination independent of the effect of the focal parent.

At the environment level, controls are included for market growth and market concentration in the JV industry. High market growth improves profitability of the partnership and is expected to be negatively associated with JV termination (Kogut, 1989). High market concentration indicates lower level of competition and is expected to decrease the likelihood of termination

The covariate data were obtained from various secondary sources, including Bureau of Census, Compustat, SDC Platinum and Dun & Bradstreet. Table 1 presents the descriptive statistics of covariates.

 Table 1 here

4. Results

Event history analysis (Allison, 1995) is used to test the hypotheses. A semiparametric Cox model is employed to avoid potential biases caused by incorrect parametric specification of the baseline hazard function (Allison, 1995). Table 2 presents the results. A control-variable-only model is estimated first (model 1), then the main effects of the four hypothesized covariates are added along with the variable *unrelated JV* (model 2). Finally interaction terms between *unrelated JV* and the four variables are added (model 3). A χ^2 difference test between model 2 and model 3 indicates that including the hypothesized interaction effects provides a significantly better overall fit ($\Delta\chi^2 = 15.55, p < 0.01$). For the

final model (model 3), the χ^2 statistic based on a log likelihood test is 33.95 (df=21, $p=0.04$), suggesting a good model fit. Covariates are mean-centered before computing interaction terms. The variance inflation factors (the maximum value is 4.86) are below the suggested cutoff value of 10 (Mason and Perreault, 1991), indicating multicollinearity is not a significant concern.

 Table 2 here

Hypothesis 1 suggests a negative interaction between *unrelated JV* and increase in environmental uncertainty. As shown in model 3 of table 2, the interaction is negative and significant ($p=.04$). Thus hypothesis 1 is supported.

Hypothesis 2 suggests a positive interaction between *unrelated JV* and parent firm performance. Hypothesis 2-alt argues for a negative interaction. The interaction term between *unrelated JV* and parent firm performance is positive and significant at $p=.07$ level, indicating support for hypothesis 2. A further analysis was conducted by splitting the sample based on the mean value of Tobin's Q. The model was estimated with the two subsamples with parent firm performance below and above mean. The results indicated a significant and positive interaction ($p=0.02$) between parent firm performance and *unrelated JV* when performance was above mean, providing support for Hypothesis 2.

Hypothesis 3 suggests a positive interaction between JV scope and *unrelated JV*. As shown in model 3 of table 2, this interaction is marginally significant ($p=.07$). Thus there is some support for hypothesis 3.

Hypothesis 4 suggests resource complementarity negatively interacts with *unrelated JV* in influencing JV termination. The interaction is negative and significant ($p=.02$), indicating support for hypothesis 4.

Various analyses were conducted to examine the robustness of the results. First, the model was estimated with the variable *unrelated JV* coded at the 3 digit level (Model 4 in table 2). The results are similar except for the interaction between scope and *unrelated JV* which turns marginally insignificant ($\beta = 1.26, p = 0.13$). Next, the effects of environmental uncertainty were examined with an alternative measure based upon input cost structures and support was found for a significant and negative interaction ($\beta = -0.34, p = 0.08$). In addition, parent firm performance was replaced with changes in performance from year to year, and a positive and significant interaction ($\beta = 0.54, p = 0.06$) was found between performance change and *unrelated JV*, providing further support for H2. Finally, the hypothesized relationships were examined separately for different types of JV terminations (Chen and Hennart, 2004). Liquidations and divestitures were combined, as both liquidations and divestitures potentially indicate the firm has exited the business. When *unrelated JV* was measured at the 2 digit level, hypotheses 1 and 4 were supported for liquidations/divestitures but were not supported for acquisitions. However when the analyses were conducted at the 3 digit level, hypotheses 1, 2 and 4 were strongly supported for both acquisitions and liquidations/divestitures. These results provided broad support for the reliability of the hypothesized effects. Due to the small number of events in these analyses, caution is needed in interpreting the differences between different types of terminations.

5. Discussion

The findings suggest the effect of various factors on JV termination is contingent upon the JV's relatedness with a parent firm. Previous research on JV termination does not systematically take into account relatedness. The study identifies a range of contingent factors, including environmental uncertainty, parent firm performance, and JV characteristics such as scope and resource complementarity. Hence a failure to take into consideration

relatedness may potentially confound important theoretical relationships and lead to an incomplete understanding of JV evolution and termination.

The added value of the contingent approach is particularly highlighted when the impact of environmental uncertainty is considered. The findings suggest that the option value embedded in JVs is contingent upon its degree of relatedness (O'Brien and Folta, 2009), and the real option prediction is more applicable to unrelated JVs than related JVs (cf. Cuypers and Martin, 2010). Recently various scholars have called for research identifying the boundary conditions of the real options view (Adner and Levinthal, 2004). The findings support this argument and contribute to the identification of boundary conditions for the real options perspective.

Further, the findings shed light on how firms reallocate resources between related and unrelated JVs in response to performance. This study suggests that although performance may create slack resources which facilitate exploration, these effects are outweighed by the incentives to exploit resources in related markets. The findings also suggest performance can be an *antecedent* in determining the division of resources between exploration and exploitation, and not just an outcome. Thus the relationship between performance and exploration/exploitation may be more complex than that has been proposed and tested in previous studies.

In addition, the findings suggest that JV characteristics such as scope and resource complementarity influence termination differentially based on the JV's relatedness. This study thus provides important insights into what type of conditions and design characteristics are needed to support the stability of related and unrelated JVs. There is a necessity to consider these design characteristics at the formation stage (Mitsuhashi and Greve, 2009; Shi and Iriyama, 2010).

One of the limitations of the study is that only one parent firm is considered. While this is largely due to limited data availability, examining JV termination from the perspective of one parent firm is an approach consistent with previous studies in the literature (Villalonga and McGahan, 2005). Further, the present study employs an aggregate measure of JV relatedness based on SIC codes. While this measure is well accepted in the strategy literature, the measure is an industry level proxy for firm level capabilities. Refinement of the measure of JV relatedness may help more accurately capture the strategic purpose of a JV. In addition to these aspects, other modeling approaches could also be adopted to enhance understanding of JV termination. In particular, multi level modeling enables simultaneous consideration of JV and firm level resources as well as industry level characteristics while accounting for the correlation of error terms at different levels. This study is constrained to a non-nested approach due to the use of event history models. In general however using a nested approach allows for integrating theories at multiple levels more meaningfully (Nielsen, 2010). Finally, the study shares a common limitation of empirical research on firm strategic decisions. In testing the hypotheses the assumption is that firms make rational and well-informed decisions, while the observed data may not necessarily represent optimal decision making. Thus the observed outcome of JV termination may include firm mistakes of decision making, therefore weakening the test of the hypotheses.

Future research could build on the present study by further highlighting the impact of relatedness. For example, an examination can be conducted into how governance structures (for example JV boards) and contracts differ across related and unrelated JVs. Second, future research could also examine other antecedents that influence the degree to which a firm adopts unrelated or related JVs. For example, R&D intensive firms or firms that have a wide portfolio of patents may tend to engage in more unrelated rather than related JVs. In sum, this research demonstrates the importance of a contingent view of JV evolution and termination

based on the relatedness of the JV suggesting future efforts to investigate this important area of research.

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Table 1
Means, standard deviations, and correlations of covariates.

	Mean	Standard Deviation	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Unrelated JV	0.52	0.50	1																
2. Increase in environmental uncertainty	0.09	2.58	0.002	1															
3. Parent firm Performance	1.79	1.42	-0.09***	0.09***	1														
4. JV scope	1.23	0.66	-0.08***	0.13***	0.11***	1													
5. JV resource Complementarity	2.18	8.35	0.12***	-0.01	0.11***	-0.11***	1												
6. Parent firm size	22.84	60.18	-0.17***	0.07***	-0.04**	0.12***	-0.03*	1											
7. Parent firm Diversification	3.04	2.06	0.003	0.04**	-0.07***	0.02	0.14***	0.42***	1										
8. Parent firm JV Experience	4.04	9.92	-0.03*	0.01	0.05***	0.04**	-0.07***	0.30***	-0.05***	1									
9. Formation of other partnerships	0.24	0.87	-0.02	0.07***	0.37***	0.05***	-0.001	0.15***	-0.06***	0.41***	1								
10. Formation of partnerships with the current partner	0.003	0.06	-0.03*	-0.01	-0.01	-0.01	-0.01	0.10***	-0.01	0.04**	0.04**	1							
11. Competition between parents	10.30	14.87	0.38***	-0.04**	0.05***	0.002	-0.09***	-0.14***	0.09***	-0.02	-0.03*	-0.03*	1						
12. JV sales	17.54	38.96	-0.19***	-0.03*	-0.06***	0.08***	-0.09***	0.10***	-0.02	0.17***	0.06***	0.04***	0.05***	1					
13. JV age	4.29	2.89	-0.13***	-0.05***	-0.10***	-0.06***	-0.10***	0.09***	0.11***	0.06***	-0.09***	0.002	-0.01	0.16***	1				
14. JV ownership	49.53	10.65	-0.06***	0.01	0.06***	0.05***	-0.06***	-0.003	0.05***	0.03*	0.03*	-0.01	0.16***	0.07***	0.09***	1			
15. Unrelated for the other partner	0.46	0.50	-0.52***	-0.05***	-0.06***	0.06***	-0.07***	0.23***	-0.02	0.05***	-0.01	0.03*	-0.51***	0.07***	0.14***	-0.02	1		
16. Market growth	4.47	5.16	-0.10***	0.07***	-0.05***	-0.06***	-0.05***	-0.05***	-0.09***	-0.05***	-0.08***	-0.002	-0.02	0.12***	-0.02†	-0.04**	0.13***	1	
17. Market concentration	85.20	25.66	-0.12***	0.21***	0.02	0.05***	-0.04**	0.04**	0.13***	-0.01	0.03*	-0.001	-0.03†	0.11***	0.04**	0.07***	0.12***	0.33***	1

Note: a. JV sales are in million dollars; firm size is in billion dollars.

b. N = Number of JVs * Months =5481.

c. † p < .10, * p < .05, ** p < .01, ***p < .001.

Table 2
Test results for JV termination.

Variables	Hs	Model 1		Model 2		Model 3		Model 4	
		Coef.	p value	Coef.	p value	Coef.	p value	Coef.	p value
Unrelated JV				0.37	0.28	0.39	0.28	1.12	0.02
Increase in environmental uncertainty				0.03	0.47	0.18	0.03	0.58	<0.01
Increase in environmental uncertainty X Unrelated JV	H1					-0.21	0.04	-0.60	<0.01
Parent firm performance				0.06	0.46	-0.11	0.38	-0.47	0.02
Parent firm performance X Unrelated JV	H2					0.33	0.07	0.67	<0.01
JV scope				0.27	0.17	-0.70	0.20	-0.93	0.24
JV scope X Unrelated JV	H3					1.13	0.07	1.26	0.13
JV resource complementarity				-0.01	0.65	0.04	0.09	3.13	<0.01
JV resource complementarity X Unrelated JV	H4					-0.09	0.02	-3.67	<0.01
Controls									
Parent firm size		-0.001	0.84	-0.002	0.62	0.001	0.90	-0.004	0.36
Parent firm diversification		-0.05	0.51	-0.03	0.70	-0.08	0.37	-0.02	0.83
Parent firm JV experience		-0.002	0.89	-0.001	0.94	-0.003	0.83	-0.004	0.81
Formation of other partnerships		0.002	0.99	-0.07	0.77	-0.08	0.75	-0.02	0.93
Formation of partnerships with the current partner		-9.55	0.24	-8.78	0.26	-10.39	0.23	-8.78	0.28
Competition between parent firms		0.001	0.96	-0.002	0.85	-0.01	0.55	-0.01	0.35
JV sales		-0.01	0.30	-0.01	0.30	-0.01	0.15	-0.01	0.19
JV age		0.30	0.36	0.28	0.40	0.32	0.34	0.29	0.38
JV ownership		-0.001	0.96	-0.001	0.97	-0.002	0.87	0.003	0.85
Unrelated for the other partner		-0.29	0.36	-0.15	0.68	-0.23	0.53	-0.16	0.64
Market growth		-0.03	0.39	-0.02	0.41	-0.03	0.37	-0.02	0.61
Market concentration		0.01	0.24	0.003	0.51	0.01	0.28	0.004	0.43
Model fit									
Total number of JVs		134		134		134		134	
Number of JV terminations		58		58		58		58	
χ^2		13.67		18.40		33.95		43.39	
p value		0.32		0.36		0.04		<0.01	

Notes: a. Unstandardized coefficients are reported.

b. Positive coefficients indicate a covariate has a positive effect on the hazard rates.

c. JV sales are in million dollars; firm size is in billion dollars.

d. N = Number of JVs * Months =5481.

e. Model 1-3: unrelated JV measured at 2-digit SIC level; model 4: unrelated JV measure at 3-digit SIC level.

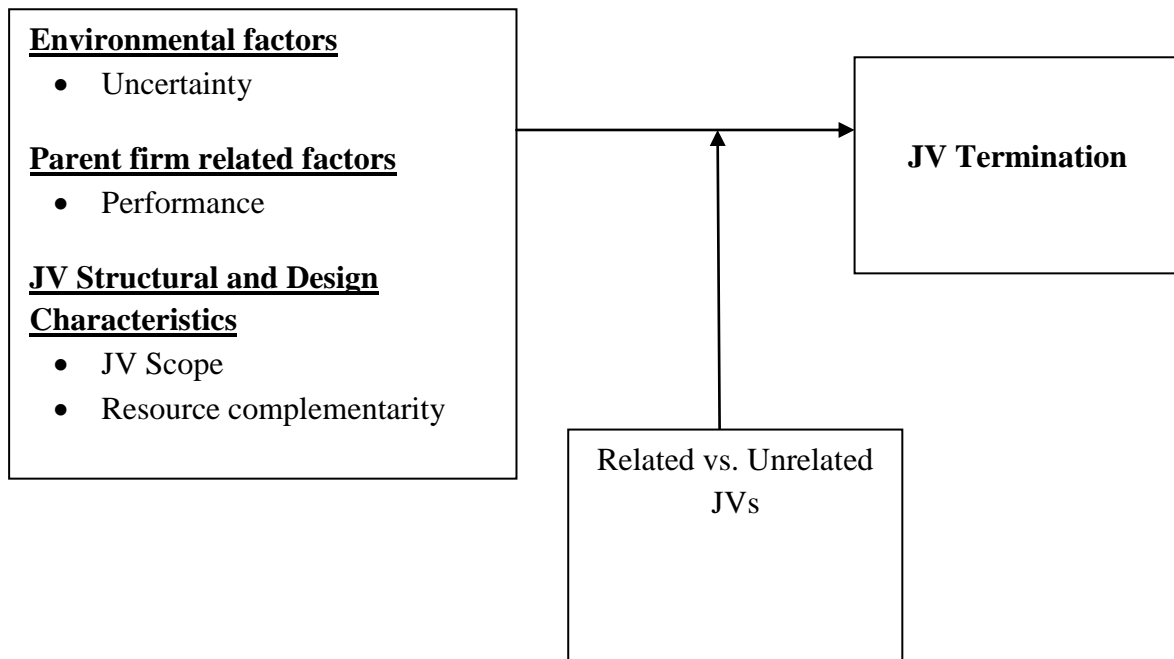


Fig. 1. Theoretical framework