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Technological knowledge, product relatedness, and parent control: The effect on IJV survival[☆]

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Abstract

This article examines the relationships among parent firm technological knowledge, parent–IJV product relatedness, parent control over the IJV, and IJV survival. Combining the knowledge-based perspective and institutional theory, we argue that parent control itself does not necessarily lead to higher IJV survival; it contributes to IJV survival when the parent firm has a high level of technological knowledge, and when the IJV is product-related to this parent. Results obtained from 1038 Japanese IJVs based in China indicate that both equity control and managerial control of a Japanese parent had a positive interaction effect, with the parent's technological knowledge, on IJV survival. Equity control also exhibited a positive interaction effect with product relatedness. In a sub-sample of 354 Sino–Japanese IJVs containing local parent information, managerial control by the Chinese parent was found to have a positive interaction effect, with Chinese parent–IJV product relatedness, on IJV survival. © 2007 Elsevier Inc. All rights reserved.

Keywords: IJV survival; Technological knowledge; Product relatedness; Equity control; Managerial control; China; Japan; Cox regression

Research on the international joint venture (IJV) has proliferated in the past two decades. Many factors have been attributed to the success or failure of this organizational form. Among these, technological knowledge of parent firms, product relatedness between parent firms and their IJV, and parent firm control over an IJV, have received extensive attention (Gatignon and Anderson, 1988; Inkpen and Beamish, 1997; Luo, 1997, 2002; Lyles and Salk, 1996; Si and Bruton, 2005). The possession of proprietary technological knowledge has been considered as an important competitive advantage enjoyed by multinational enterprises (MNEs) (Dunning, 1993; Delios and Beamish, 1999). Product relatedness between parent firms and their IJV ensures that the IJV receives knowledge that is directly relevant to its businesses (Li, 1995; Luo, 2002). These two

factors were found to have a positive effect, respectively, on IJV performance and survival (Chang, 1996; Lu and Hébert, 2005; Luo, 2002; Lyles and Salk, 1996).

On the other hand, empirical research concerning the impact of parent control over an IJV has mixed results (Yan and Zeng, 1999). Despite of the assumptions of some researchers in international management that dominant control by one parent is critical to the stability of IJVs (Killing, 1983), other studies led to contrary evidence. For instance, Harrigan (1988) found that shared ownership, as apposed to dominant equity control, was more conducive to the success of joint ventures. Still, other researchers argue that the relationship between parent control and IJV performance is dependent on the type of control exerted and a number of contingency factors (Chang and Taylor, 1999; Geringer and Hébert, 1989; Lu and Hébert, 2005).

This article examines the relationships among technological knowledge, product relatedness, parent control, and IJV survival by combining the knowledge-based perspective and institutional theory. Parent control can be seen as a mechanism for institutionalizing parent firm rules and practices at an IJV, a process that facilitates the transfer and internalization of parent firm knowledge. As such, control alone does not necessarily lead to

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higher IJV performance or survival; instead, it has an interaction effect, with parent firm technological knowledge and parent–IJV relatedness, respectively, on IJV performance. Data obtained from 1038 Japanese IJVs in China provided support for our hypotheses.

1. Background

1.1. Technological knowledge

The knowledge-based view (Steensma and Lyles, 2000) draws from related perspectives such as the resource-based view (Barney, 1991; Wernerfelt, 1984), core competence (Prahalad and Hamel, 1990), and organizational learning (Fiol and Lyles, 1985; Levitt and March, 1988). The core argument in these streams of literature is that technological knowledge is a critical intangible asset that can generate economic rents to the firm that possesses it. This perspective corresponds well to the long-held view within international management that the possession of, and ability to transfer, proprietary know-how confer an advantage to an MNE over its local competitors (Caves, 1971; Dunning, 1993; Gupta and Govindarajan, 1991, 2000; Kogut and Zander, 1993). Empirical research has supported a positive relationship between the level of proprietary knowledge, either technological or otherwise, and foreign subsidiary performance (Delios and Beamish, 2001; Makino and Delios, 1996; Shrader, 2001).

The argument is particularly strong when the overseas subsidiary is an IJV situated in a transitional or emerging economy (Lane et al., 2001; Lyles and Salk, 1996). Due to the large technological gap between MNEs and local firms (Caves, 1974; Meyer, 2004), IJVs established by foreign and domestic firms in those markets rely largely on the technological and managerial support provided by foreign parents (Steensma and Lyles, 2000). The transfer of advanced technological knowledge from parent firms situated in developed countries to their IJVs in developing countries should enhance the competitiveness of these ventures.

IJVs also benefit from contributions made by their local parents (Luo, 1997). The joint venture organizational form provides a means for MNE to internalize local knowledge (Beamish and Banks, 1987; Hennart, 1988). Research on foreign direct investments (FDIs) indicates that foreign entrants to developed markets have received technological spillover benefits from local firms (Driffield and Munday, 2000; Liu et al., 2000). In developing countries, however, contributions from local partners may typically include knowledge on the local market and resources, access to distribution channels, and good relationships with suppliers, buyers, and governmental agencies responsible for the specific industry (Beamish, 1993; Gomes-Casseres, 1989). Thus an IJV can potentially achieve a competitive advantage from two sources, namely both the foreign and local parents.

1.2. Product relatedness

Product relatedness is an important determinant of knowledge transferred between organizational units. Research

suggests that within a firm, product relatedness enhances sharing of relevant and valuable knowledge between different divisions (Porter, 1987). Emphasizing the capacity of the knowledge recipient, Cohen and Levinthal (1990) argued that learning performance is the greatest when the object of learning is related to what is already known. These views can be extended to research on MNEs, and especially on the relationship between an IJV and its parent firms.

Empirical studies on MNEs have shown that foreign subsidiaries that diversify into product areas outside the parents' business domains are more likely to exit due to a lack of industry-specific knowledge or mismatch of resources (Chang, 1996; Li, 1995). Specific to joint ventures, Merchant and Schendel (2000) found a positive effect on firm value arising from the relatedness between an IJV and its US-based parent firm. In two studies by Luo (1997, 2002) on Sino–foreign joint ventures, local parent–IJV relatedness also exhibited a positive effect on IJV performance. From a legitimacy perspective, Lu and Xu (2006) found a positive association between foreign parent–IJV relatedness and IJV performance for Sino–Japanese joint ventures in China. In general, this stream of research has suggested that foreign parent–IJV relatedness and local parent–IJV relatedness can contribute to IJV performance or survival respectively or jointly.

1.3. Parent control

Control refers to the process by which one entity influences the behavior and output of another (Geringer and Hébert, 1991; Ouchi, 1977). Control has been an important topic in research on IJVs because, by definition, an IJV involves at least two parent organizations and is technically autonomous from both. The relative level of control by either parent has implications for the protection, transfer, and acquisition of contributed knowledge between the partners (Makhija and Ganesh, 1997; Inkpen and Beamish, 1997). As the pooling of resources and acquisition of knowledge are typical reasons for the formation of an IJV, successful transfer of one partner's own intellectual property without unwanted dissemination risks and smooth acquisition of the other partner's know-how, are directly linked to the survival or failure of an IJV (Yan, 1998).

Although control is an important determinant of IJV performance, studies on control present conflicting arguments and results for the control–performance relationship. The controversy centered largely on the dominant versus balanced control over the IJV. While some researchers argued and found that a dominant structure would minimize difficulties in managing an IJV arising from parental conflicts (Killing, 1983), others believed only equal power between the partners would lead to mutual satisfaction (Harrigan, 1988). Empirically, Bleeke and Ernst (1991) found that dominant foreign parent control had a negative impact on the performance of IJVs in less developed countries. In a comprehensive review on this subject, Geringer and Hébert (1989) pointed out that most studies on this issue had been limited to a direct test on the control–performance relationship without considering contingency factors. Since then, researchers have looked into these various contingency

relationships (Lu and Hébert, 2005; Luo et al., 2001; Yan and Gray, 1994).

The different types of control are another issue concerning control in the IJV. Some studies on control have focused on equity ownership (Gatignon and Anderson 1988; Hennart 1988; Pan, 1996) as a proxy for control. Others have explicitly contrasted different types of control, for example, overall versus specific (Luo et al., 2001; Mjoen and Tallman, 1997), and formal versus informal (Makhija and Ganesh, 1997). The focus in this paper is on equity control and managerial control. Research has suggested that these are two distinct forms of control (Beamish, 1993; Mjoen and Tallman, 1997). Equity ownership was equated with control, as voting rights in the board of a joint venture are usually in proportion to equity shares that each parent holds (Mjoen and Tallman, 1997; Steensma and Lyles, 2000). Because of the power vested in the board, this control is commonly considered as “overall” or “strategic”. Managerial control refers to control exercised by key managerial personnel over the daily operations of an IJV. For foreign parents, this control is typically achieved through the use of expatriates sent from the headquarters to various host countries (Beamish and Inkpen, 1998; Delios and Bjorkman, 2000; Legewise, 2002).

1.4. Hypotheses

Following previous studies (Luo et al., 2001; Lu and Hébert, 2005), we consider a contingency approach in examining the role of parent control in IJV performance. The basic theme is that valuable and relevant knowledge possessed by the parent firm, if matched with appropriate control mechanisms, will lead to higher IJV survival (Fig. 1). Before presenting contingency arguments, however, this article first formulates two base hypotheses, on the knowledge–performance relationship, to align this study with extant research (Luo, 2002; Steensma and Lyles, 2000). We consider two constructs, technological knowledge and product relatedness, to capture valuable and relevant knowledge. The knowledge-based perspective sees technological know-how of parent firms, especially the foreign parents of IJVs in developing countries, as valuable contributed asset to be transferred to IJVs (Lane et al., 2001; Steensma and Lyles, 2000). Product relatedness ensures that the knowledge to be transferred is relevant to the IJV’s businesses. Thus both technological knowledge and parent–IJV relatedness contribute to IJV survival.

Hypothesis 1. Technological knowledge of a parent firm has a positive effect on IJV survival.

Hypothesis 2. Product relatedness between a parent firm and its IJV has a positive effect on IJV survival.

The study then combines the knowledge-based perspective with institutional theory in generating the major theoretical arguments of this study. Institutional theory emphasizes the role of legitimacy in supporting the operations of business organizations (Suchman, 1995; Zimmerman and Zeitz, 2002). An organization that lacks social legitimacy and institutional support may have a higher rate of failure, although it may be run efficiently from an economic perspective (DiMaggio and Powell, 1983; Meyer and Rowan, 1977). The institutional perspective has been applied to research in international management and the multinational enterprise (Rosenzweig and Singh, 1991; Westney, 1993). Recent years witness a shift in attention by researchers from a foreign subsidiary’s external isomorphic pressures to the concurrent consideration of its internal legitimacy requirements: A foreign subsidiary is expected to conform to the rules and norms of its parent firm in order to receive legitimacy and resource support from the latter (Hillman and Wan, 2005; Kostova, 1999).

As a special type of foreign subsidiary, an IJV involves two functioning parent firms, and has to rely on resource contributions, either tangible or intangible, from both parents. Thus an IJV needs to secure legitimacy and support from both parents. Yet institutional theory suggests that, because two parents represent two different sets of institutional rules and norms of their respective countries, isomorphism, and hence legitimacy, with one of the parents implies non-conformity to, and lack of legitimacy with, the other parent (Lu and Xu, 2006). In order to ensure that an IJV remains a “legitimate” sub-unit of its own, a parent will likely impose its own rules and norms on the IJV through coercive isomorphism and regulative institutional processes (DiMaggio and Powell, 1983; Scott, 1995).

Equity control and managerial control by a parent represent one source of such coercive pressures exerted on an IJV. Equity holding in a joint venture ensures that a parent has contractual rights to determine the structure, process, and behavior of an IJV in a way consistent with the parent’s own strategic goals. This is usually achieved through the appointment of board members and high-level executives (Child et al., 1997; Mjoen and Tallman, 1997). Managerial control achieves the same

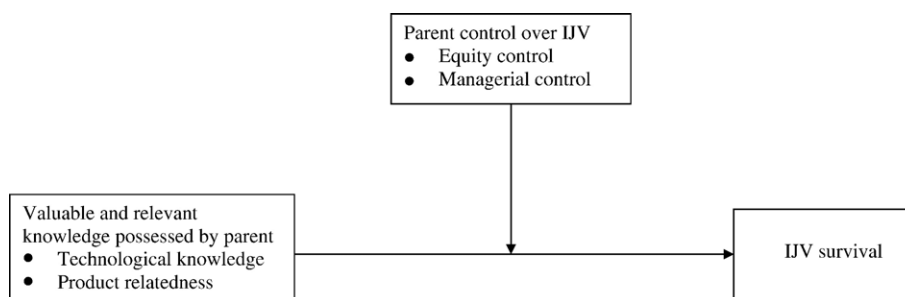


Fig. 1. A contingency model of IJV survival.

objectives through the monitoring of daily routines of an IJV. The physical presence of parent-appointed managers will exert powerful influences on the personnel at an IJV, forcing, persuading, or inviting them (DiMaggio and Powell, 1983) to meet the expectations of the parent (Boyacigiller, 1990; Chang and Taylor, 1999; Delios and Bjorkman, 2000).

Parent control in an IJV, however, does not necessarily lead to a definitive performance consequence because of the unique dual-parent structure of an IJV and its related legitimacy implications. Although an IJV that is under equity or managerial control by a parent firm will conform to the rules and norms of this particular parent, and thus enjoy legitimacy and support from this parent, the effect of such control on the relationship between the IJV and the other parent is likely to be negative due to the different legitimacy requirements between the two parents (Lu and Xu, 2006). Thus the overall effect of control on IJV performance by one of the parents is theoretically unpredictable, and hence the conflicting results in extant research.

Nevertheless, through these equity and managerial control mechanisms, a parent firm can ensure that its contributions to an IJV, especially technological knowledge, will be properly utilized to achieve its own objectives. Tighter control will also enable a parent to protect its technological intellectual property against opportunistic behavior on the part of the other partner (Hennart, 1988), and ensure that such technological know-how can be transferred smoothly to the IJV (Lu and Hébert, 2005). These objectives can be achieved not only through formal equity control mechanisms, but also through the institutionalization of managerial rules, norms, and processes at the IJV to make them more aligned with those of the parent (Kostova, 1999; Makhija and Ganesh, 1997).

A logical extension of this analysis is that, when the value of technological assets of a parent firm is high, or in other words, when the IJV depends largely on a parent's technologies for survival, control by this parent becomes a performance-enhancing factor, because it ensures the successful transfer and internalization of these valuable technologies at the IJV. Although control itself has mixed performance implications, technological knowledge and control together will lead to higher survivability of the IJV. When a parent does not possess such technological knowledge, on the other hand, high control by this parent will not contribute to the transfer of proprietary knowledge. On the contrary, high equity shares and excessive use of its own managers by this parent might cause institutional conflicts between the partners (Lu and Xu, 2006), thus interfering the successful transfer of valuable knowledge to the IJV from the other parent.

Hypothesis 3a. Technological knowledge of a parent firm and equity control by this parent over the IJV has a positive interaction effect on IJV survival.

Hypothesis 3b. Technological knowledge of a parent firm and managerial control by this parent over the IJV has a positive interaction effect on IJV survival.

In a similar vein, when an IJV is product-related to a parent firm, or in other words, when the core competence of a parent firm is directly relevant to an IJV's businesses, control by this

parent also plays a role in boosting IJV performance, because it ensures the transfer of relevant knowledge and practices to the IJV. Conversely, if an IJV falls outside a parent's product domains, control exerted by this parent will not lead to desired economic results, since the parent has no useful, industry-specific knowledge or experience to transfer. In the worst scenario, the "experience" that this parent imposes on the IJV may even cause a negative performance consequence when applied to a different external environment (Levinthal and March, 1993).

Hypothesis 4a. Product relatedness between a parent firm and the IJV, and equity control by this parent over the IJV, has a positive interaction effect on IJV survival.

Hypothesis 4b. Product relatedness between a parent firm and the IJV, and managerial control by this parent over the IJV, has a positive interaction effect on IJV survival.

2. Method

2.1. Sample and data sources

This study used a sample of Japanese IJVs in China to implement empirical investigation. China has become the world's largest recipient of FDI in recent years, while Japan is a major source of outward FDI. Since 1996, China has been home to 40% of Japan's annual outflows of foreign investment, and 70% of Japanese FDIs in China were established as joint ventures with Chinese firms (Beamish et al., 1997; Lu, 2000). In addition, significant differences exist in the institutional environments in which the Japanese and Chinese firms are embedded, one being a developed country, the other an emerging market. Such differences between the foreign and local parents' home institutions present an ideal setting for a study on the role of institutional influences in IJVs.

Data were obtained on Japanese IJVs in China, and on the Japanese and Chinese parents. The source of information for the Japanese IJVs in China is Kaigai Shinshutsu Kigyō Souran, Kuni-Betsu. This source is published annually by Toyo Keizai Inc., a large Japanese compiler and publisher of business-level, statistical and economic information. The data reported in Kaigai Shinshutsu Kigyō Souran was based on responses to questionnaires sent to all firms listed on Japanese stock exchanges, as well as to major unlisted firms. The coverage of this information is close to the population of foreign subsidiaries for Japanese firms that responded to the survey (Beamish et al., 1997). For this study, editions from 1986 to 2001 were used to develop a longitudinal database of Japanese IJVs in China.

The main source of Japanese parent company information is the *Nikkei NEEDS* tapes, an electronic database compiled by Nihon Keizai Shinbun-sha, one of the largest compilers and publishers of statistical and corporate information in Japan. This database provides financial information on all Japanese firms listed on the Tokyo stock exchange. The *Nikkei NEEDS* tapes report detailed firm-level information compiled from the firm's financial statements as well as include some supplementary data. Annual information can be traced since 1964 from this database, which provides information on more than 3000

publicly listed Japanese firms. Where required, additional parent company information was gathered from the *Analysts' Guide*, the *GlobalVantage* database, and various editions of the *Japan Company Handbook*, all of which have coverage of parent firms similar to those in the *Nikkei NEEDS* tapes.

Information on the Chinese partners was obtained from Wanfang Data Company (www.wanfangdata.com.cn), a Beijing-based business information provider under China's Ministry of Science and Technology. Wanfang's *Chinese Enterprises and Companies Database* was started in 1988 as a joint effort between Wanfang and dozens of other information service providers. Currently this database contains information on about 200,000 Chinese firms in 96 industries. Its data are included in the DIALOG online systems (www.dialog.com). Wanfang's data were collected through multiple means, including printed materials, telephone surveys, and mailed questionnaires. The assignment of SIC codes to the firms was done by specialists based on verbal descriptions obtained. Information in Wanfang's databases is updated annually.

2.2. Variables

2.2.1. Dependent variable

IJV survival is the dependent variable for this study. Exits were identified by comparing preceding editions of *Kaigai Shinshutsu Kigyō Souran* with later editions. The earliest edition used is 1986, and the latest edition is 2001. Exits were coded as 1, and surviving IJVs were coded as 0. The duration of an IJV was computed as the number of years from its foundation to the year of its exit or to the year of 2001. The exit year is the year that a joint venture was de-listed in the database. Although one could not equate exit completely with failure, one could expect that an IJV would remain in operation as long as the IJV mode represented the most efficient organizational form (Inkpen and Beamish, 1997). Empirical evidence from prior studies also suggests that survival correlates positively with financial and satisfaction measures of performance (Geringer and Hébert, 1989).

2.2.2. Independent variables

Technological knowledge of Japanese parents was measured by R&D intensity, which is computed as R&D expenditure as a percentage of total sales. For *Japanese parent–IJV relatedness*, a dummy variable was used to indicate whether the 2-digit SICs of an IJV matched any of the 2-digit SICs of the Japanese parent at the time of IJV foundation, following Li (1995). If an overlap in the IJV and its Japanese parent's SICs was detected, the variable would be assigned a value of 1. Similarly, a dummy variable was used to indicate whether the 2-digit SICs of an IJV matched any of the 2-digit SICs of the Chinese parent at the time of IJV foundation. The variable, *Chinese parent–IJV relatedness*, took a value of 1 if an overlap in the IJV and the Japanese parent's SICs was found.

We operationalized *equity control of the Japanese parent* as the percentage of equity shares owned by Japanese parents in an IJV, and *managerial control* as the percentage of Japanese expatriates in the total employment of an IJV. Although detailed

information on these expatriates is not available, one can reasonably assume that they either held key managerial positions at IJVs or controlled core technological know-how transferred from parent firms, thus exerting important influences on the processes and operations of IJVs (Peterson et al., 1996; Xu et al., 2004). We did not include separate measures for equity and managerial controls of the Chinese parents because these are the opposite of Japanese equity shares and Japanese expatriate ratios. The more a Japanese parent's control, the less a Chinese parent's control over the IJV, and vice versa.

2.2.3. Control variables

Three measures were included to account for the major factors at the IJV level that could affect IJV survival. They are IJV size (measured as total number of employees), the industry in which the IJV operates (a set of industry dummies based on 2-digit industry codes), and IJV location (a dummy variable which we gave a value of 1 if the IJV was located in either a special economic zone or an open coastal city). The control variable for the Japanese parent was its size, which was computed as the number of employees. For the sub-sample with information on Chinese parent firms, two more control variables were included. They are the size of the Chinese parent (as measured by the number of employees) and its ownership type (coded 1 if it is a state-owned enterprise).

2.3. Analysis

To minimize the sample bias towards exits arising from the intrinsic instability in the initial years of IJV operation (Nitsch et al., 1996; Li, 1995; Park, and Russo, 1996), the sample was restricted to IJVs that were at least two years old. After matching the parent information to subsidiary information and deleting cases with missing values, we had a sample of 1038 Sino–Japanese IJVs. For the hypotheses concerning local parent firms, a sub-sample of 354 Sino–Japanese IJVs was used, a reduction from the full sample due to missing information on the Chinese partners.

Cox's proportional hazard model (Cox and Oakes, 1984) was used to test the hypotheses. This model estimates the influence of explanatory variables (or covariates) on the hazard of exit without specifying a parametric form for the precise time to failure. Instead, the procedure ranks ventures in terms of the sequence of exit and maximizes the partial likelihood that the *i*th venture should exit conditional on the characteristics of the other ventures at risk at the time of exit. By incorporating the age distribution directly into the estimation, the Cox regression procedure corrects the problems of censored data and aging effects on IJV dissolution and brings the exit rate closer to failure rate (Li, 1995).

3. Results

Table 1 presents the descriptive statistics and a correlation matrix for the study's variables. The descriptive statistics show that the average numbers of employees are about 10,000 for the Japanese partner, 16,000 for the Chinese partner, and 250 for the

Table 1
Descriptive statistics and correlations

Variable and definition	1038 IJVs		354 IJVs		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
	Mean	S.D.	Mean	S.D.												
1. IJV exit	0.18	0.38	0.12	0.33	–	–0.07	–0.12	0.06	–0.04	–0.05	0.21	–0.10	–0.22	–0.06	0.01	–0.10
2. IJV age	6.20	2.88	6.30	3.08	–0.08	–	0.05	0.08	0.00	–0.17	–0.04	–0.05	–0.07	0.11	0.01	–0.05
3. IJV size	248	412	250	335	–0.08	0.12	–	–0.05	0.22	–0.04	–0.20	0.10	0.06	0.04	–0.05	0.09
4. IJV location	0.53	0.50	0.47	0.50	0.00	0.05	–0.06	–	0.03	0.09	–0.03	0.01	0.07	0.03	0.09	0.01
5. Japanese parent's size	10,255	17,111	9654	17,260	–0.01	–0.01	0.18	–0.05	–	–0.01	0.14	0.37	0.00	0.04	–0.09	–0.09
6. Japanese parent's equity control in IJV	0.62	0.22	0.55	0.16	–0.11	–0.16	–0.01	0.16	–0.03	–	0.11	0.15	0.11	–0.01	0.05	0.04
7. Japanese parent's managerial control in IJV	0.04	0.09	0.03	0.07	0.12	–0.09	–0.18	0.05	0.06	0.09	–	0.05	–0.05	–0.02	0.01	0.05
8. Japanese parent's technological knowledge	0.02	0.02	0.02	0.02	–0.03	0.01	0.13	–0.03	0.44	0.00	0.04	–	0.11	–0.01	0.01	0.07
9. Japanese parent–IJV relatedness	0.66	0.47	0.73	0.44	–0.27	–0.07	0.06	0.05	0.04	0.07	–0.05	0.10	–	–0.03	–0.02	0.12
10. Chinese parent size			16,502	80,142										–	0.10	0.01
11. Chinese parent's ownership type (SOE)			0.69	0.46											–	–0.04
12. Chinese parent–IJV relatedness			0.38	0.49												–

Notes:

1) All descriptive statistics are reported for non-transformed values.

2) Numbers in upper part of the correlation matrix are for IJVs with Chinese partners. Numbers in lower part of the correlation matrix are for all IJVs.

3) Significant at the 0.05 level (two-tailed test) when Pearson correlations >0.108 or <-0.108 for upper part of the correlation matrix and >0.062 or <-0.062 for lower part of the correlation matrix.

IJVs. On average, the equity ownership of Japanese parents is between 55% (sub-sample) and 62% (full sample). 73% of the IJVs are in the same 2-digit SICs as the Japanese parents in the sub-sample. In contrast, only 38% of the IJVs are within the Chinese parents' 2-digit SIC industries. Finally, 69% of the Chinese partners are state-owned enterprises (SOEs). The magnitude of the correlations between variables is in the range of low to medium, suggesting that multicollinearity was not a serious problem in the hypothesis-testing procedure.

Fourteen regressions test the hypotheses: six for the full sample of Japanese IJVs in China and eight for the sub-sample with information on Chinese partners. The results of these regressions are displayed in Tables 2 and 3. All models are significant. For the interpretation of the results, a negative coefficient estimator suggests an increase in the survival rate of IJVs or a reduction in the exit rate.

Model 1 in both tables is the baseline model, which only include the five control variables and the set of industry dummies (not reported here). Model 1 of Table 3 includes size and ownership type controls for the Chinese parents. In both tables, IJV size as measured by the number of employees enhances the survival chances of the IJVs. The level of Japanese parents' equity ownership has no effect on the survival of IJVs. However, the level of Japanese expatriates (as a percentage of total employment of IJVs) increases the likelihood of exit in the full sample. In the sub-sample with Chinese parent characteristics, Chinese parent size as measured by the number of employees enhances the survival chances of the IJVs.

Model 2 adds to Model 1 Japanese parents' technological knowledge variable to test Hypothesis 1. As shown in both Tables 2 and 3, the coefficient estimates for Japanese parents'

technological knowledge are negative, suggesting that Japanese parents' technological knowledge enhances IJV survival. However, these coefficient estimates are not statistically significant. Hence, Hypothesis 1 is not supported. Since we did not have information on the technological knowledge level of the Chinese parents, we did not test Hypothesis 1 with respect to the Chinese parents.

Model 3 tests Hypothesis 2 by adding Japanese parent–IJV product relatedness to the baseline models. As shown in both tables, Japanese parent–IJV relatedness has a positive and significant ($p < 0.10$ and $p < 0.05$, respectively) impact on the survival rates of IJVs, providing support for Hypothesis 2. Model 4 of Table 3 further adds Chinese parent–IJV product relatedness to the base model. Chinese parent–IJV relatedness has no significant effect on IJV survival, although the sign is in the hypothesized direction. Thus Hypothesis 2 is supported for the Japanese parents but not for the Chinese parents.

Model 4 of Table 2 and Model 5 of Table 3 enter all independent variables as the baseline model for the tests on Hypotheses 3a–4b. In these two full main-effect models, the signs and significance of all independent variables remain stable, as compared to those in models in which they were entered separately, confirming the robustness of the results reported in these models.

Model 5 of Table 2 and Model 6 of Table 3 introduce the interaction term between Japanese parents' technological knowledge and Japanese parents' control at IJVs (as gauged by equity control and managerial control) to test Hypotheses 3a and 3b. To guard against spurious significance of the interaction results, we first checked whether the overall change in the fit of each model was significant, as compared to their baseline full

Table 2
Cox regression on 1038 Japanese IJVs in China^{a, b, c, d}

Variable		Exit=1 (N=1038, 187 exits)					
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
1.	IJV size ^d	-0.28*** (0.06)	-0.28*** (0.06)	-0.28** (0.06)	-0.27*** (0.06)	-0.26*** (0.06)	-0.26*** (0.06)
2.	IJV location	-0.17 (0.15)	-0.17 (0.15)	-0.07 (0.15)	-0.07 (0.15)	-0.07 (0.15)	-0.07 (0.15)
3.	Japanese parent's size ^d	0.06 (0.06)	0.07 (0.06)	0.05 (0.06)	0.06 (0.06)	0.07 (0.06)	0.06 (0.06)
4.	Japanese parent's equity control in IJV	-0.29 (0.37)	-0.28 (0.37)	-0.11 (0.36)	-0.11 (0.36)	0.42 (0.44)	0.37 (0.44)
5.	Japanese parent's managerial control in IJV	1.08** (0.53)	1.24** (0.56)	0.89* (0.52)	1.06* (0.57)	2.29*** (0.75)	0.58 (0.69)
6.	Japanese parent's technological knowledge		-0.04 (0.03)		-0.03 (0.03)	0.18* (0.10)	-0.02 (0.04)
7.	Japanese parent-IJV relatedness			-0.97*** (0.16)	-0.97*** (0.16)	-1.02*** (0.16)	-0.31 (0.46)
8.	Japanese parent's equity control* technological knowledge					-0.31* (0.16)	
9.	Japanese parent's managerial control* technological knowledge					-0.24* (0.12)	
10.	Japanese parent's equity control* Japanese parent-IJV relatedness						-1.30* (0.75)
11.	Japanese parent's managerial control* Japanese parent-IJV relatedness						1.48 (1.05)
Log-likelihood		-1111.23	-1110.65	-1092.71	-1092.34	-1088.16	-1090.09
Model chi-square		50.72***	51.88***	87.77***	88.50***	96.86***	93.00***
Incremental chi-square						8.36**	4.50*

^a Fixed effects for 2 digit SIC industries of entry were included in the models, but are not reported in the table.

^b *** $p < .01$; ** $p < .05$; * $p < .10$; all two-tailed tests.

^c Cell entries are unstandardized coefficient estimates. Numbers in parentheses are standard errors.

^d Logarithmic transformation.

main-effect models, after the inclusion of each interaction term. A significant change in chi-square suggests that the inclusion of an interaction term is a significant improvement over the baseline model.

As shown in Table 2, Model 5 has significant incremental chi-square. Correspondingly, the coefficient estimate of the interaction term of Japanese parents' technological knowledge and Japanese parents' equity control in Model 5 is significant ($p < 0.10$) and negatively signed, indicating that the survival rate of an IJV improves when higher levels of technological knowledge are coupled with higher levels of equity control from the same parent. Similarly, the coefficient estimate of the technological knowledge–managerial control interaction term is negative and significant ($p < 0.10$). Both Hypotheses 3a and 3b are supported in the full sample with respect to the Japanese parents. In the sub-sample (Model 6 of Table 3) that includes Chinese parent information, however, the coefficient estimates for these two interaction terms are not statistically significant.

Model 6 of Table 2 and Model 7 of Table 3 introduce the interaction term between Japanese parent–IJV product relatedness and Japanese parents' control over the IJV to test Hypotheses 4a and 4b. As shown in Table 2, only the interaction term between Japanese equity ownership level and Japanese parent–IJV relatedness is significant ($p < 0.10$). The negative sign of this interaction term indicates that the survival rate of an IJV improves if a Japanese parent assumes a high level of equity

ownership in the IJV when the IJV is product-related to the parent. In the sub-sample (Model 7 of Table 3), however, the coefficient estimate of this interaction term is not statistically significant. Thus Hypothesis 4a is partially supported with respect to the Japanese parents. The interaction term between Japanese expatriates and Japanese parent–IJV relatedness is statistically insignificant in both tables, lending no support for Hypothesis 4b.

Finally, Model 8 of Table 3 tests Hypotheses 4a and 4b on the Chinese parent by adding the interaction term of Chinese parent–IJV product relatedness and the Japanese parent's control over the IJV. Only the interaction term between Japanese expatriates (which can be interpreted as the reciprocal of Chinese managerial control) and Chinese parent–IJV relatedness is significant. The positive sign ($p < 0.10$) of this interaction term indicates that the survival rate of an IJV increases if the Japanese parent assumes a low level of managerial control over the IJV—or in other words, if the Chinese parent assumes a high level of managerial control—when the IJV is product-related to the Chinese parent. Thus Hypothesis 4b is supported for the Chinese parents.

4. Discussion

This study aims to examine the effects of technological knowledge, parent–IJV relatedness, and parent control on the

Table 3
Cox regression on 354 Japanese IJVs in China^{a, b, c, d}

Variable		Exit=1 (N=354, 44 exits)							
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
1.	IJV size ^d	-0.34** (0.13)	-0.31** (0.13)	-0.32** (0.14)	-0.32** (0.13)	-0.28** (0.14)	-0.28** (0.14)	-0.29** (0.14)	-0.34** (0.14)
2.	IJV location	0.14 (0.31)	0.16 (0.31)	0.23 (0.32)	0.18 (0.31)	0.26 (0.32)	0.24 (0.33)	0.29 (0.32)	0.40 (0.33)
3.	Japanese parent's size ^d	0.18 (0.12)	0.24* (0.13)	0.12 (0.12)	0.16 (0.12)	0.15 (0.13)	0.15 (0.13)	0.15 (0.13)	0.18 (0.13)
4.	Japanese parent's equity control in IJV	0.09 (1.02)	0.41 (1.03)	0.30 (0.99)	-0.10 (1.03)	0.39 (1.00)	-0.33 (1.19)	0.66 (1.31)	0.18 (1.13)
5.	Japanese parent's managerial control in IJV	1.78 (1.22)	1.87 (1.23)	2.00 (1.22)	2.18* (1.28)	2.36* (1.25)	2.93 (2.29)	1.66 (2.39)	-1.61 (3.17)
6.	Chinese parent's size ^d	-0.18* (0.09)	-0.18** (0.09)	-0.14 (0.09)	-0.16* (0.09)	-0.12 (0.09)	-0.12 (0.09)	-0.13 (0.10)	-0.11 (0.10)
7.	Chinese parent's ownership type (SOE)	-0.01 (0.35)	-0.01 (0.35)	0.03 (0.35)	-0.01 (0.35)	0.04 (0.35)	0.04 (0.36)	0.03 (0.35)	0.03 (0.36)
8.	Japanese parent's technological knowledge		-0.16 (0.10)			-0.13 (0.10)	-0.52 (0.38)	-0.14 (0.11)	-0.12 (0.10)
9.	Japanese parent-IJV relatedness			-0.84** (0.34)		-0.78** (0.34)	-0.74** (0.34)	-0.51 (1.08)	-0.71** (0.35)
10.	Chinese parent-IJV relatedness				-0.56 (0.37)	-0.50 (0.38)	-0.53 (0.39)	-0.49 (0.38)	-1.96 (1.50)
11.	Japanese parent's equity control* technological knowledge						0.68 (0.60)		
12.	Japanese parent's managerial control* technological knowledge						-0.34 (0.94)		
13.	Japanese parent's equity control* Japanese parent-IJV relatedness							-0.60 (1.97)	
14.	Japanese parent's managerial control* Japanese parent-IJV relatedness							0.99 (2.67)	
15.	Japanese parent's equity control* Chinese parent-IJV relatedness								0.20 (0.25)
16.	Japanese parent's managerial control* Chinese parent-IJV relatedness								0.06* (0.04)
	Log-likelihood	-204.50	-202.99	-201.46	-203.30	-199.46	-198.82	-199.36	-197.54
	Model chi-square	31.37***	34.40***	37.46***	33.77***	41.46***	42.74***	41.66***	45.30***
	Incremental chi-square						1.28	0.20	3.84*

^a Fixed effects for 2 digit SIC industries of entry were included in the models, but are not reported in the table.

^b *** $p < .01$; ** $p < .05$; * $p < .10$; all two-tailed tests.

^c Cell entries are unstandardized coefficient estimates. Numbers in parentheses are standard errors.

^d Logarithmic transformation.

survival of IJVs by combining the knowledge-based and institutional perspectives. To this end, both the main effects of technological knowledge and parent-IJV relatedness and their interaction effects with parent control were explored. The investigation was implemented with a sample of 1038 Japanese joint ventures in China. Our theoretical hypotheses in this paper received reasonable empirical support.

Japanese parents' technological knowledge was negatively signed, indicating a positive effect on IJV survival, but the variable was statistically insignificant. This finding is not entirely inconsistent with prior studies. As argued by Meyer (2004), knowledge transfer from parent company to an IJV is neither automatic nor guaranteed. Research indicates that successful knowledge transfer is dependent on various contingency factors (Bjorkman et al., 2004; Lu and Hébert, 2005; Luo et al., 2001), such as parent control—a condition we explored in this study.

The support for a positive performance effect of foreign parent-IJV product relatedness, and the lack of evidence for this effect with respect to local parent-IJV relatedness, suggest that the former plays a major role in the transfer of industry-relevant knowledge. Taking the context of our research setting, Japanese IJVs in China, into consideration, the importance of foreign parent-IJV relatedness indicates that foreign parents are the main contributors of core competences to IJVs in developing countries, and that such contribution is crucial for the survival of these IJVs. Consistent with the findings by Luo (2002) in a sample of IJVs in China established by parent firms from other countries, this study alerts MNEs to the risks of diversifying into product-unrelated business segments in an increasingly competitive emerging market.

With regard to parent control, foreign equity control had no significant effect, while foreign managerial control through assigning expatriates to the IJV was inversely related to IJV

survival, in most of the models. The latter contradicts the findings of Killing (1983), who had a sample of joint ventures established in developed countries. Given that Japanese firms have traditionally assumed a high control mode in developing countries (Beamish, 1993) but achieved unsatisfactory performance (Lu, 2000), findings obtained here provide supporting evidence for a weakening of the link—between foreign control and IJV survival—when the focus shifts from developed markets to developing countries.

More importantly, the results have confirmed our major theoretical conjecture, namely, there are interaction effects between technological knowledge and parent–IJV relatedness on one hand, and parent control over the IJV on the other. A combination of higher levels of technological knowledge possessed by the foreign parent and higher levels of foreign parent control, either equity or managerial, contributes to higher IJV survival rates. Prior research has emphasized that successful knowledge transfer is dependent on various contingency factors (Bjorkman et al., 2004; Lu and Hébert, 2005). Our study has identified parent control as one of these conditions. An important theoretical implication of this finding is that institutional processes can serve as a catalyst for mobilizing knowledge-based organizational resources. In the case of IJVs, the effect of technological technologies—a critical resource possessed by MNEs—was amplified when the rules, norms, and processes in the IJV are shaped by foreign parents. Thus we confirm the strategic value of a fit between the source of external resources and the source of institutional pressures (Oliver, 1991, 1997). Our contribution is in extending this view to technological and knowledge-based resources, and to organizations spanning different national institutions.

Parent control also interacts with parent–IJV product relatedness. Specifically, there is a positive interaction effect between Japanese parent–IJV product relatedness and equity control by the Japanese parent on IJV survival. Meanwhile, results in Table 3 can be interpreted as pointing to a positive interaction effect between Chinese parent–IJV relatedness and managerial control by the Chinese parent on the IJV. In other words, Chinese parents make more contributions when the IJV is inside their industry segments, and when they exercise managerial control as opposed to equity control over the IJV. Although not a major thrust in this study, the latter finding, along with the negative performance effect of Japanese expatriates discussed earlier, may have identified an interesting phenomenon for future research to focus on. It may be that the greatest contribution made by local Chinese partner is the personal *guanxi* (Ramamamy et al., 2006) that Chinese managers bring to an IJV, namely their connections with clients, suppliers, and government agencies overseeing a particular industry segment.

Interpretations of the results should take into account limitations in the analysis. The most notable of these is the fact that the empirical results in this study were derived from a sample of Japanese IJVs in China, and hence the concern that the findings might be country-specific. For example, Japanese firms in general are more advanced in technological capabilities compared to their Chinese counterparts. This could be an underlying reason for the positive association between Japanese

parent–IJV product relatedness and IJV survival rates, and for the significant interaction effects with respect to Japanese parent control. This pattern may not hold for foreign investments from a different home country or for IJVs established in a different host country. Therefore, future studies should use samples of foreign firms or IJVs from other countries to extend the generalizability of findings in this paper.

Another limitation of the study is the assumption that IJV termination is an indicator of IJV failure. Although this is a conventional assumption in many empirical studies on IJVs over the last three decades, recent studies have shown that IJVs can also terminate because of the fulfillment of one or more partners' strategic objectives (Yan and Zeng, 1999). Future studies need to investigate the outcomes of IJV termination to derive a more accurate measure of IJV success or failure.

Finally, this study did not test the effect of local parents' technological knowledge on IJV survival due to the lack of this information in our dataset. This may not be a major issue in this study because it is quite likely that the Japanese parents are the major contributors in terms of technological knowledge in Sino–Japanese joint ventures. However, it will be useful to test this possible effect in future studies, especially in empirical settings in which both parties can contribute such knowledge.

5. Conclusions

This study extends understanding of the relationships among parent firm technological knowledge, parent–IJV relatedness, parent control, and IJV survival by combining the knowledge-based perspective and institutional theory, and by adopting a contingency approach to these relationships. Its analytical framework and empirical findings have important implications for both academics and managers.

Product relatedness between an IJV and its foreign parent has a positive influence on the likelihood of IJV survival, while product relatedness between an IJV and its local parent does not contribute to IJV survival. These findings highlight the importance to examine the differential effects of different types of parent–IJV relatedness.

Foreign managerial control has a negative main effect on the survival chances of IJVs in China. The negative association of the use of Japanese expatriates with IJV survival, and its negative interaction effect with foreign parent–IJV relatedness, indicate a weakening of the link—between foreign control and good IJV performance—when the focus shifts from developed countries to developing countries. These findings illustrate the importance of localization in IJVs in developing countries.

Finally, parent control has a positive interaction effect with both technological knowledge and parent–IJV product relatedness. These significant interaction effects highlight the value of a contingency approach in the study of control–performance relationships. It also indicates that managers need to design control mechanisms in IJVs with specific considerations to resource contributions from IJV partners and their respective institutional influences.

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