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Empirical test of a model for organizational governance structure choices in construction joint ventures

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In the construction industry, joint ventures (JVs) have become one of the major organizational forms utilized in large-scale and international projects. Because of the complexity of JVs, the management of JVs is much more difficult than that of usual projects. Among various management challenges, the choice of organizational governance structure has a profound impact on JV success. A model for governance structure choices in construction JVs (CJVs) is tested. The governance structure model focuses on four major factors, namely, corporate cultural difference, trust, needs for procurement autonomy and motivation for learning, and is expressed in terms of four propositions, which are tested. We conclude from the econometric analysis results that the four model variables together explain about 53% of the variation of governance structure choices. Most important, all the four model propositions are strongly supported by the econometric analysis results and the sign of each coefficient is consistent with that in each proposition. Overall, the governance structure model is well supported by statistical testing, which complements previous case-study-based evidence.

Keywords: Joint venture, organizational design, strategic management, governance structure, econometric analysis.

Introduction

In the construction industry, joint ventures (JVs) have become one of the major organizational forms utilized in large-scale projects and are considered one of the major entry modes for international markets. Owing to the recent trend of using construction JVs (CJVs), major construction firms are faced with various challenging issues in managing JVs. Among these issues, the choices of governance structures have a profound impact on the JV success.

In their pilot study of the organizational governance structure choices in CJVs, Ho *et al.* (2009) identified two major organizational control structures and developed a conceptual framework for governance structure decisions. In addition to a critical literature review in both management and construction disciplines, they have also conducted a qualitative empirical study in evaluating their model. According to Ho *et al.* (2009), two distinctive organizational forms, focusing on the control aspect of governance, are identified and defined for CJVs: jointly managed JVs (JMJ) and separately managed JVs (SMJ). In JMJ, all partners jointly share profits and risks and the JV officers make most of the decisions, which will be followed by all partners. Plus, close coordination and frequent communications are extended to all levels of a JV organization. In contrast, in SMJ, a project is divided into a few distinctive subtasks and each partner is primarily responsible, technically and/or financially, for its assigned tasks and makes decisions directly without formal consent from other partners. The terms 'integrated JVs' and 'non-integrated JVs' are also found in construction practice and literature (Chen, 2005) to describe two different modes of governance structures.

Ho *et al.* (2009) maintain that the choice of CJV governance structure can be largely influenced by four major factors, namely, corporate cultural difference, trust, needs for procurement autonomy, and motivation for learning, even though other factors, such as project

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types, project complexity, opportunism and the institutional environment, may also influence the governance structures decisions. Their model is expressed as four propositions, which we shall discuss briefly in the next section. To empirically evaluate their model, they conduct multiple-case studies on eight major CJVs in Taiwan High Speed Rail project, a US$15 billion project. However, their empirical evidence has the following two limitations that call for further investigation. First, through case studies, it is difficult to assess the overall and relative importance of the model variables. Second, their model evaluation is subject to potential bias because of a very limited number of observations. An econometric study based on a larger sample is desired to complement their case study evidence. Therefore, for this research, we conduct an econometric study of the international CJVs in Taiwan to empirically test the model propositions and quantitatively evaluate the overall and relative importance of proposed determinants.

The remaining sections of the paper are organized as follows. Section 2 briefly introduces the theoretic perspectives underlying the model and the governance structure model to be tested. Section 3 explains the research design and method for the study. Section 4 presents the results of our econometric study and discusses the model's limitations and practical implications associated with the empirical results. Section 5 concludes this study.

The governance structure model and propositions to be tested

Theoretic background of the model development

Ho *et al.* (2009) argue that an integrated framework fusing cost-based perspective (CBP) and recent resource-based view (RBV) can provide a more comprehensive explanation of the governance structure choices in CJVs. In this section, we summarize their arguments concerning why CBP and RBV can be integrated to develop their model. According to CBP, optimal governance forms should minimize transaction overheads, which may include opportunism costs and certain managment costs, such as the costs of coordination, contracting and monitoring (Williamson, 1985; Matthews, 1986).

While transaction overheads are thought to shape governance choices, they are not the only factors that stand to influence the governance decisions. In addition to the impacts of transaction costs, scholars have gradually recognized the potential of the influence of firm capabilities on governance modes (Argyres, 1996; Silverman, 1999; Nickerson and Zenger, 2002; Leiblein and Miller, 2003; Nickerson and Silverman, 2003; Mayer, 2006).

In this regard, Ho *et al.* (2009) incorporated the resource-based view of organizational control, which emphasizes value creation and sustainability of competitive advantages of a firm through the continuous accumulation and utilization of valuable tangible or intangible resources (Wernerfelt, 1984; Das and Teng, 2000). Complementary resources and learning from partners through JVs are considered one of the major sources that lead to a long-lived competitive advantage. Following the logic of RBV, different firms should take into account the characteristics of their specific resources and advantages to pursue different strategies for profits.

The governance structure model and propositions

Based on the new perspective integrating classic CBP and recent RBV, Ho *et al.* (2009) developed a governance structure decision model for CJVs, proposing four propositions, introduced below, that specify the relationships between the main determinants and the CJV governance structure choices. Their derivation of these propositions involved extensive literature reviews and studies of multiple cases. Readers are recommended to refer to Ho *et al.* (2009) for details. The following is a recap of their model propositions and underlying reasoning.

> *Proposition 1*: A CJV with larger corporate cultural difference among partners is more likely to adopt SMJ, while a CJV with smaller cultural differences is more likely to adopt JMJ.

Organizational culture refers to the set of values, beliefs, understandings and ways of thinking that are common to the members of an organization (Daft, 2001). Many problems experienced by firms in JVs can be traced back to cultural difference (Meschi, 1997; Horii *et al.*, 2004). Greater cultural distance often results in greater differences in their organizational and administrative practices, employee expectations, and interpretation of and response to strategic issues (Park and Ungson, 1997). The rationale underlying this proposition is that, through limited inter-dependence between partners, the SMJ structure helps to reduce the transaction costs caused by the culture-associated management problems. On the other hand, a low level of cultural difference provides a better environment for adopting the JMJ structure.

> *Proposition 2*: A CJV with greater trust among partners is more likely to adopt JMJ, while partners with less trust among them will tend to adopt SMJ.

Trust is built upon an expectation that one partner has for another in the partnership such that their interaction is predictable and the behaviour and responses are mutually acceptable to one another (Harrigan, 1985). Based on the broader view of transaction costs (Matthews, 1986), higher trust can reduce many transaction costs such as monitoring, outcome verification, communication, etc., while a lack of trust among partners will cause major management problems and subsequent transaction costs. Similar to the reasoning underlying the first proposition, on the one hand, use of the SMJ structure may help to reduce transaction costs due to distrust and, on the other hand, trust provides an appropriate environment for adopting the JMJ structure.

Proposition 3: A CJV where partners have higher needs for procurement autonomy is more likely to adopt SMJ, while a CJV with fewer needs from partners for procurement autonomy is more likely to adopt JMJ.

In the construction industry, the success of a contracting firm relies heavily on its capability to acquire inputs at the best price, quality and reliability (Warszawski, 1996). Here the procurement autonomy is defined as the decisional power to select a firm's preferred suppliers or subcontractors for a JV project. According to the RBV, the procurement advantage may help to obtain favourable tangible resources, such as cheaper materials or capable subcontractors. Depending on the conditions of a JV, sometimes the procurement autonomy will become an important factor that affects a firm's profitability in a JV. For example, when there is serious information asymmetry in the market, procurement through specific channels that are more informed or trusted may reduce transaction costs significantly. Thus, the needs for procurement autonomy may become a motivating factor for adopting the SMJ structure in a JV to ensure the maximum procurement autonomy.

Proposition 4: A CJV with stronger motivation in partners for learning is more likely to adopt JMJ, while a CJV where partners are less motivated in learning is more likely to adopt SMJ.

A firm's organizational learning capability can create competitive advantages (Ulrich and Lake, 1991; Inkpen and Crossan, 1995). Learning helps to achieve the objective of internalizing the desired external intangible resources such as know-how and expertise. In many cases, learning from partners is one of the major reasons that a firm participates in a CJV and motivates the adoption of the JMJ structure to ensure the maximum interacting environment for learning.

Research design and method

Econometric model for testing propositions

OLS (ordinary least squares) multiple linear regression analysis was used to test our hypotheses. OLS estimators are the best linear unbiased estimators (BLUE) (Wooldridge, 2003). However, several regression diagnostics are needed to ensure that basic assumptions for OLS regression are satisfied. In this study, the White test (White, 1980) was performed to examine whether the sample met the homoskedasticity assumption of the OLS regression. The RESET test (Ramsey, 1969) was performed to test specification errors such as omitted variables and non-linearity of functional form. The empirical model designed to test Propositions 1 to 4 is shown in Equation 1, where the first four regressors are control variables and the next four regressors are the hypothesized determinants of governance structure choices. The dependent variable, JMJ orientation, depicts the degree of governance structure choice in a continuum from one extreme, the JMJ, to the other extreme, the SMJ. Details concerning the regression variables will be given in later sections. The empirical model is also depicted as shown in Figure 1, where control variables are ignored.

$$\text{JMJ orientation} = C + b_1 Size + b_2 Type + b_3 Nationality + b_4 Experience + \beta_1 Culture + \beta_2 Trust + \beta_3 \text{Pr}ocurement + \beta_4 Learning + \mu \quad (1)$$

where C is the constant, $b_1 \sim b_4$ and $\beta_1 \sim \beta_4$ are the regression coefficients and μ is a random disturbance. The

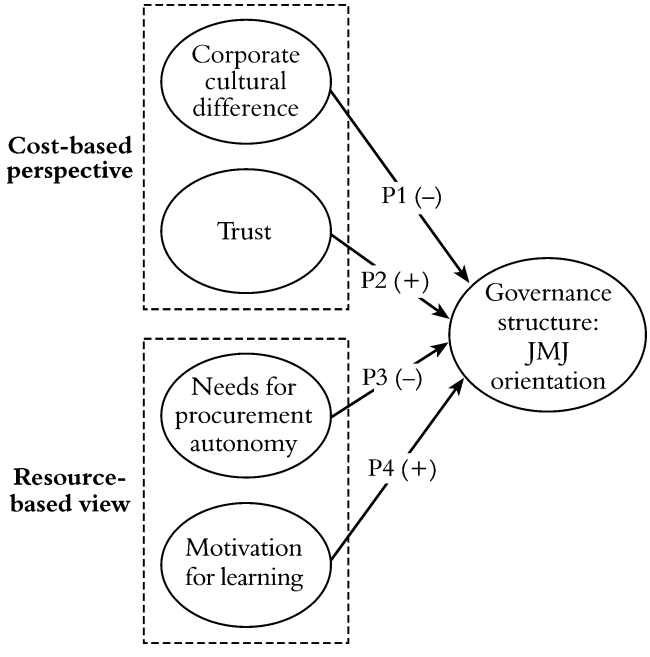

Figure 1 The diagram of the econometric model

first four regressors are project size, project type, foreign partner's nationality, and cooperation experiences, respectively, and the last four regressors are the governance structure determinants in Propositions 1 to 4, respectively.

To test each proposition, we evaluate the data against the null hypothesis that the hypothesized variable has no significant impact, positive or negative, on the JMJ orientation. We use the two-tailed significance level because it gives a more conservative or stringent criterion.

Data

Data for this study were collected from a cross-sectional survey of the CJVs in Taiwan. The sampling frame included those CJVs from the major construction projects conducted in Taiwan during the past 10 years, such as Taipei Metro, Kaohsiung MRT, Taiwan High Rail Speed, Taipei 101 building, and other building projects in Taiwan. In total, 128 CJVs were included in our survey list. After extensive interviews with 13 executives from both contractors and project owners between March 2006 and December 2006, along with relevant literature review, we designed and pre-tested a questionnaire including all constructs of interest for measuring the model variables.

The questionnaires were then mailed to project managers of all partners in the aforementioned CJVs, including 97 CJVs in Taipei Metro project, nine in Kaohsiung MRT project, 17 in Taiwan High Speed Rail project, and five in others. Two weeks later, a second copy of the survey was sent to the non-respondents, along with follow-up letters. Responses with missing data or unclear or contradictory answers that could not be reconciled through follow-up telephone calls were removed from the sample. This approach yielded a total of 54 CJV observations from questionnaire replies, with a response rate of 42.2%.

The sample size and response rate are in line with other recent empirical studies, such as Mohamed (2003) on the performance of international CJVs in different stages using samples from Australia and the UK. In our study, the CJVs that responded to the survey represented a broad coverage of CJVs, ranging in size from $33 million to $462 million and including different international participants, including 40 from Japan, eight from France, three from Germany, two from Korea, one from Thailand, and one from Holland.

Measures of regression variables

Dependent variable: JMJ orientation

According to Ho *et al.* (2009), although JMJ and SMJ represent two conceptually opposite and extreme sides of governance structures of a CJV, in reality, the actual governance structures are usually somewhere in the spectrum between the two extremes because they often exhibit mixed attributes of both JMJ and SMJ in terms of the constructs characterizing governance structures. In this empirical study, we define 'JMJ orientation' on seven-point Likert scales as a parsimonious way of depicting the degree of governance choice in a continuum from JMJ to SMJ. Since JMJ and SMJ are different in (1) the sharing of profits and risks; (2) the distribution of decision-making power; and (3) the degrees of coordination and communication (Ho *et al.*, 2009), JMJ orientation is operationalized and measured by the tendencies of the following five constructs : (1) Most tasks were carried out jointly by the joint venture; (2) All partners jointly shared project profits and risks; (3) Most decisions were made upon the consent of all partners; (4) The JV employees followed mainly the commands of JV managers, instead of the commands from their parent company; (5) All partners jointly solved most problems or difficulties encountered in the project. The responses were scored on seven-point Likert scales ranging from 1 (strongly disagree) to 7 (strongly agree). For each CJV, we summed the responses from each JV member and averaged the answers of the five questions as a proxy for the JMJ orientation. Table 1 summarizes the responses from the major CJVs of the Taiwan High Speed Rail project and serves as an example that the scores of JMJ orientation in these CJVs scatter in the spectrum ranging from 2.6 to 7.0. The C230 JV shown in Table 1 demonstrates that a JMJ-oriented structure can mix with the division of tasks (see the score of question 1), an attribute of SMJ structure.

In this econometric study, JMJ orientation and other governance structure determinants are designed as Likert-scaled ordinal variables. It is worth noting that although the use of the ordinal ranking in OLS regressions deviates from the regression assumption of interval data, it is a common practice in literature that ordinal variables measured in Likert scales are treated as interval variables and can be analysed in OLS regression models. For example, Parkhe (1993), Michel and Hambrick (1992), Keats and Hitt (1988) and several Monte Carlo studies (e.g. Labovitz, 1970) have suggested that the use of Likert-scaled ordinal variables in linear regressions is not a serious problem.

For each variable in the regression, we calculated the Cronbach's alpha (α) as a measure of internal scale consistency, indicated by an α of 0.7 or above (Nunnally, 1978; Mohamed, 2003). For this variable, the Cronbach's alpha was 0.76, according to our data.

Table 1 Measures of JMJ orientation for the CJVs in Taiwan High Speed Rail Project

JV team	Question 1	Question 2	Question 3	Question 4	Question 5	JMJ orientation
C210	4.0	4.5	5.5	4.0	4.5	4.5
C215	4.0	4.5	5.5	4.5	4.5	4.6
C220	3.0	3.0	2.5	5.0	4.0	3.5
C230	3.0	6.0	7.0	7.0	7.0	6.0
C250	5.0	5.0	5.0	5.0	6.0	5.2
C270	5.0	5.0	5.0	5.0	5.0	5.0
C280	1.5	1.5	5.0	3.0	2.0	2.6
C291	6.0	7.0	7.0	5.0	7.0	6.4
C295	6.0	7.0	5.0	5.0	6.0	5.8
C296	7.0	7.0	7.0	7.0	7.0	7.0

Independent variables

- **Corporate cultural difference:** This variable was used to test the impact of cultural difference among partners on the JMJ orientation, as specified in Proposition 1. According to Ho *et al*. (2009), cultural distance often results in differences within their value systems and administrative practices. Thus, the measure of cultural difference was based on, first, the overall assessment of the level of corporate cultural difference, and second, the perceived differences in managerial practices. The survey results regarding this variable are: (1) overall, there were obvious corporate cultural differences among partners; (2) there were significant differences in the administration practices among partners. The Cronbach's alpha coefficient for this variable was 0.81.
- **Trust:** This variable was used to test Proposition 2. To date, scholars have had no universal accepted academic definition of trust (Rousseau *et al*., 1998). Harrigan (1985) maintains that trust is built upon an expectation that one partner has for another in the partnership such that their interaction is predictable and the behaviour and responses are mutually acceptable to each other. In this research, we operationalized trust as 'ex-ante belief toward partners', which is very close to the concept of 'trustworthiness' proposed by Sheppard and Sherman (1998). As a result, trust was measured by averaging the evaluations of the following four statements: (1) Before the JV was formed, you believed that your partner(s) in the JV could provide the technology and skills promised in the contract; (2) Before the JV was formed, you had confidence on the financial status of your partner(s) and believed that all transactions were to be done in the fiduciary manner; (3) Before the JV was formed, you believed that your partner(s) would do their best to complete the project in the face of major difficulties; (4) Before the JV was formed, overall, you felt that your partner(s) was/were trustworthy. The measure of this variable in this study yielded a Cronbach's alpha coefficient of 0.84.
- **Needs for procurement autonomy:** This variable was used to test the impact of partners' needs for procurement autonomy on the JMJ orientation, as specified in Proposition 3. The needs for procurement autonomy were measured by averaging evaluations of the following two statements: (1) Most procurement decisions were independently made by each partner, instead of jointly made by the JV; (2) Procurement autonomy was crucial to each partner's profitability or schedule control. The Cronbach's alpha coefficient for this variable was 0.78.
- **Motivation for learning:** This variable was used to test Proposition 4. The motivation for learning was measured by averaging evaluations of the following three statements: (1) Employees from different partners were arranged to work together so as to facilitate learning; (2) The partner(s) with advanced technology or more experience would guide the other partner(s) in the JV; (3) The partner(s) with weaker technology or less technology had strong motivation for learning from the other partner(s). The Cronbach's alpha coefficient for this variable was 0.84.

Control variables

In order to ensure that our hypothesized relationships were under better-controlled environments, we included four variables to control for potential factors that might be correlated with the hypothesized determinants or dependent variable. *Project size* was measured by the natural logarithm of the contracted project

costs, ranging from $33 million to $462 million. *Project type* is a dummy variable, where '0' indicated non-transportation projects and '1' indicated transportation projects. *Partner nationality* is also a dummy variable, where '0' indicated the JV having non-Asian foreign partner(s) and '1' indicated the JV having Asian foreign partner(s). *Experience of cooperation* is a dummy variable, where '0' indicated that the JV partners had no prior experience of cooperation and '1' indicated otherwise.

Results of econometric analysis and discussion

Robustness of OLS regression analyses

Several regression diagnostics were taken to ensure that major OLS assumptions were satisfied. Specifically, we tested whether there were multicollinearity problems, specification errors and heteroskedasticity. First, since suspected significant correlations were found among some regressors as shown in Table 2, a variance inflation factor (VIF) test against each regressor was performed to test the no-multicollinearity assumption for OLS. The maximum VIF obtained in our models was 1.51, substantially below 5, above 5 multicollinearity would be considered high (Ryan, 1997). Second, the Ramsey RESET test was performed to test the linearity assumption for OLS. The F-statistic of the RESET test was 0.41 with a p-value of 0.66. The test statistics indicated that the functional form problem was not significant; i.e., linear regression was a proper empirical method for our study. Third, a White test was performed to test the homoskedasticity assumption for OLS. The F-statistic of the White test was 2.67 with a p-value of 0.02; thus, we rejected the homoskedasticity assumption. Owing to the heteroskedasticity concern, we calculated the more stringent hetero-robust standard errors to determine the significance of regression coefficients through OLS regression.

Empirical results of hypothesis tests

Table 3 summarizes the empirical results from the regression analysis, where two regression steps were involved. In the first step, we built the baseline regression model, 'Model 1' shown in Table 3, by including only the control variables as regressors. In the second step, we built the full model, 'Model 2' shown in Table 3, by adding the hypothesized determinants of governance structure to the baseline model. Equation 1 is the mathematical form of Model 2. As shown in Table 3, the R-squares (R^2), adjusted R-squares (adj. R^2), and F-value of Model 1 are 0.06, −0.02 and 0.79, respectively. These small statistics indicate that the control variables together have no impact on governance structure choices. Thus, the inclusion of these control variables in Model 2 will contribute little to the R^2 and adj. R^2 of Model 2.

In Model 2, the F-value is 8.35, which indicates a significance level well below 0.1%; thus, we soundly reject the null hypothesis that the four proposition variables together have no effect on governance structure choices. Furthermore, the values for R^2 and adj. R^2, 0.60 and 0.53, are considerably high in Model 2, compared to the statistics in management literature with a sample size around 100. For example, an important study by Parkhe (1993) investigated the performance of 111 interfirm alliances and the values for R^2 and adj. R^2 were 0.36 and 0.31, respectively. The values for R^2 and adj. R^2 were also larger than those of recent empirical studies in CJVs. For example, the values for R^2 and adj. R^2 in Sillars and Kangari's (2004) three regression models for studying CJVs fell within 12% and 20%. Therefore, statistically, based on the adj. R^2 obtained in the study, we may conclude that

Table 2 Means, standard deviations and correlations of regression variables

Variable	Mean[a]	SD[a]	1	2	3	4	5	6	7	8	9
1 JMJ orientation	4.82	1.04	1.00								
2 Cultural difference	4.88	1.08	−0.27**	1.00							
3 Trust	5.22	0.78	0.21*	0.24*	1.00						
4 Needs for procurement autonomy	4.07	1.59	−0.61***	0.30**	0.10	1.00					
5 Motivation for learning	5.00	1.02	0.39**	0.29**	0.38***	−0.07	1.00				
6 Project size[b]	2.17	0.25	0.08	−0.12	0.19*	−0.15	0.14	1.00			
7 Project type[c]	0.94	0.23	0.03	−0.04	−0.03	0.01	−0.05	−0.16	1.00		
8 Partner nationality[c]	0.74	0.44	0.23	−0.36***	0.18	−0.30**	0.13	0.21*	−0.14	1.00	
9 Experience of cooperation[c]	0.43	0.50	0.03	−0.11	0.00	−0.19	0.00	0.12	0.21	0.08	1.00

Notes: [a] $n=54$. [b] Long-transformed, in millions. [c] Dummy variable. * $p<0.10$; ** $p<0.05$; *** $p<0.01$.

Table 3 Results of OLS regression analyses

Variables	Model 1 Coefficients	Model 2 Coefficients/Standard Errors
Control variables		
Project size	0.20	−0.40 (0.43)[a] [0.38][b]
Project type	0.33	0.18 (0.45) [0.27]
Partner nationality	0.55	−0.25 (0.26) [0.22]
Experience of cooperation	−0.02	−0.22 (0.21) [0.23]
Main determinants		
Cultural difference		−0.32*** (0.11) [0.12]
Trust		0.32** (0.15) [0.17]
Procurement		−0.37*** (0.07) [0.07]
Learning		0.39*** (0.11) [0.12]
R^2	0.06	0.60
Adj. R^2	−0.02	0.53
F	0.79	8.35***
n	54	54

Notes: * $p<0.10$; ** $p<0.05$; *** $p<0.01$ (two-tailed). [a] OLS standard errors are shown in parentheses. [b] Hetero-robust standard errors are shown in square brackets.

cultural difference, trust, procurement autonomy and learning together explain 53% of the variation of governance structure choice.

Most important, Table 3 shows that all four propositions are strongly supported by the small p-values less than either 1% or 5%, based on the more stringent hetero-robust standard errors for heteroskedasticity adjustment. Moreover, the sign of each coefficient is consistent with that in each proposition. Note that given a medium-sized sample, the statistical significance shown in each coefficient indicates that the hypothesized relationships between the decisional variables and the governance structure choices are strong and sample size in this study is not a concern for causing problems. To conclude the hypothesis tests, our econometric analysis results strongly support the four propositions proposed by Ho *et al.* (2009).

Relative importance of governance structure determinants

Are the four determinants equally important? Most likely not. However, in their model development and case studies, Ho *et al.* (2009) could only explain the partial causal relationship between independent and dependent variables, *ceteris paribus*. The polled effects are difficult to detect in either the theoretic development or case studies. Yet, from a statistical perspective, the evidence provided in this empirical study may help to further compare the relative impacts of the four determinants. The canonical way of determining the relative importance of explanatory variables in regression models is to compare their coefficients, given that the coefficients are significant.

According to the regression results of Model 2, the 'motivation for learning' and 'needs for procurement autonomy' are the most influential governance structure determinants with coefficients equal to 0.39 and −0.37, respectively. The 'cultural difference' and 'trust' are about equally important with coefficients equal to −0.32 and 0.32, respectively. Why is the determinant 'motivations for learning' relatively more important than others? In recent literature on JVs and international collaboration, one construct that particularly catches our attention is the 'learning intent' of partners (Hamel *et al.*, 1989; Hamel, 1991). According to Hamel *et al.* (1989), learning intent is particularly important in determining the success or failure of international collaborations when there is a competence gap or information gap between the two partners. Therefore, the 'learning' construct may overlap with other possible impacting factors and plays a more critical role in governance structure choices.

However, even given the statistical evidence presented in this study, we believe that the relative impacts of proposed variables on governance structure choices may still vary significantly in each unique project and the statistical results here may not be directly applied to every project. To practitioners, the value of Ho *et al.*'s model is to offer a new perspective and a set of constructs to determine the governance structure in a CJV. Thus, it may be better to leave the relative effect of each factor for the practitioners' judgment based on each project's unique characteristics.

Limitations of the study

Some limitations of the econometric analysis deserve our attention. First, our empirical model implicitly

assumed that the observed/actual governance structure choice was an appropriate choice. Future research can relate the CJV performance/success with how well the governance structure choices match their determinants. However, although the aforementioned assumption may seem strong, it is not uncommon in governance structure literature to forgo the consideration of JV performance (see e.g. Pangarkar and Klein, 2001; Santoro and McGill, 2005; Villalonga and McGahan, 2005) and resort to the evolutionary perspective that the observed firms were those who outperformed others and survived the competition. Second, our empirical investigation focused on a specific population of CJVs from Taiwan. Future research can include those CJVs from other emerging countries or developed countries. Yet, this limitation may not be too serious since almost all surveyed CJVs have international participants, coming from Asia and European countries. Third, different parties in a JV may have different perceptions of the four hypothesized determinants. Since the propositions didn't assume that JV partners have identical perceptions of the model variables, technically and practically speaking, the final decision can be considered as the results of averaging each partner's perception of determinants and consequent governance structure preference, using each partner's bargaining power for average weights. This study is therefore limited by its inability to assess the weighting average results via questionnaires. Lastly, the ownership structure can play a role in measuring the constructs of the JMJ orientation. For example, a partner with a very small share might not take any executive position and be involved in only a small portion of decision making. However, it is possible that the ownership structure is the consequence of governance structure choices/JMJ orientation. If the ownership structure is the consequence, for example, of taking a smaller ownership under SMJ because of some SMJ attributes such as cultural difference and the lack of trust, the ownership may not be critical in influencing or measuring the constructs of JMJ orientation. Because of the complexity of the ownership structure concerns, the impact of ownership structure on governance structure choices deserves a separate study and could be a potential topic for future research.

Some extensions due to the descriptive statistics of regression variables

According to the statistics in Table 2, there are several interesting observations worth further analysis. Although these observations are not directly related to empirical evidence, they provide insights regarding the tested model and the model's application in practice. These insights are based on logical conjectures or inferences of the data within the context of the tested model, which could be topics for future studies.

First, if we take a two-standard deviation range for 'JMJ orientation', most governance structure choices will fall within 2.7 to 6.9 of seven-point Likert scales. That is, the near-extreme structure towards JMJ is more likely to be chosen and the near-extreme structure towards SMJ is almost impossible. One possible reason is that, because of the nature of CJVs, the complete independence without sharing any resources among partners is almost impossible and may not match the owner's expectation. Therefore, practitioners who wish to apply the tested propositions should be aware that even if SMJ is a preferred structure based on the model variables, they should avoid being too close to an extreme end.

Second, the mean of 'learning' is 5.0, indicating that most CJVs do consider 'learning' an objective of participating in a CJV, in addition to direct project profits. This is consistent with modern theory such as RBV on why JVs are becoming more important and popular. Such strategic importance of learning partly explains why the average of governance structure choices, the mean of JMJ orientation, is closer to JMJ.

Third, 'trust' has the highest mean value, 5.22, and smallest SD, 0.78, indicating that because of the strong legal bonding between partners and the possible opportunism problems, a sufficient level of trust is almost a prerequisite of a CJV. We believe that although SMJ can reduce some effects of relatively weak trust, the level of trust for a JV cannot be too low even for a SMJ. The practical implication is that SMJ should not be considered a remedy for insufficient trust; instead, firms in CJVs should focus on searching for trustworthy partners or establishing trust through cooperation.

Fourth, the mean of the 'needs for procurement autonomy' is in the neutral position, 4.07, yet, with largest SD, 1.59. This may indicate that, unlike 'trust', the pursuit of procurement advantage is more related to firm-specific characteristics, instead of the nature of CJVs. Since the variation of this variable is very large, one practical implication is that if a firm sets a goal to learn from partners through the JMJ structure, the firm should pay more attention to partners' potential needs for procurement autonomy, which discourage the use of JMJ structure.

Conclusions

The organizational governance structure choices in CJVs are critical to the success of both JVs and participating firms. A model for governance structure

choices in CJVs was empirically tested and an econometric analysis was conducted to statistically test the model. According to the OLS regression results, we conclude that corporate cultural difference, trust, needs for procurement autonomy and motivation for learning together explain about 53% of the variation of governance structure choice. Most important, all four model propositions are strongly supported and the sign of each coefficient is also consistent with the sign hypothesized in each proposition.

The regression results also provide statistically the relative importance of model variables, although we believe that the relative importance of model variables may still vary significantly in each unique project, depending on particular environments or project characteristics. Future research may consider employing case study as an exploratory method to search for other important decisional variables for governance structure choices. Further econometric research can incorporate the JV success into a model and include those CJVs from other emerging countries and developed countries.

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