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Antecedents and Consequences of Share Distribution in Equity Joint Ventures: A Pricing-Error Approach and Empirical Evidence

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A thesis submitted in partial fulfillment of the requirements for the Doctor of Philosophy degree in Business

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Abstract

Equity joint ventures (EJVs) have been a widely used and extensively studied governance structure for inter-firm cooperation. To date, the literature has largely overlooked share distribution between EJV partners although it is critical to the organization and operation of EJVs. Only recently has a pricing-error rule of share distribution been proposed; it argues that partners should align the equity split with the relative size of the error committed in pricing assets into the EJV. As the first conceptual guideline on share distribution in EJVs, this rule has yet to be empirically verified. Furthermore, no study has sought to identify and verify the antecedents of share distribution, which varies extensively across EJVs. As well, studies have not explored the impacts of share distribution on the consequences associated with EJVs.

This dissertation bridges the identified literature gaps by developing and testing two empirical models based on the pricing-error rule. According to this rule, only when share distribution of an EJV perfectly matches the two pricing errors will profit sharing to each partner fully offset the errors, which helps save the most on transaction costs. Guided by this argument, the first model contends that transaction cost saving will motivate partners to follow the pricing-error rule in splitting the equity shares. In turn, share distribution of EJVs will vary with two antecedents, specifically the relative efficiency of the intermediate market that each partner uses to transact input into the EJV and the partners' relative pricing capabilities. Empirical results largely fail to support the proposed effect of market efficiency and pricing capabilities on share distribution.

The second model links share distribution with a specific consequence measure – the termination of EJVs. It is recognized that equity shares are misallocated between partners if the actual share distribution deviates from the optimal share distribution stipulated by the pricing-error rule. Depending on its degree, share misallocation is argued to increase the likelihood of EJV termination. Empirical findings from survival analysis suggest that share misallocation that occurs during the mid-life of an EJV is positively related to the probability the EJV ends whereas share misallocation at the formation of an EJV does not

increase the termination likelihood until the EJV matures. The theoretical arguments and empirical findings of this dissertation contribute to the research on the antecedents and consequences of share distribution in EJVs as well as extending the pricing-error rule.

Keywords

Equity joint ventures (EJV), share distribution, pricing error, co-ownership structure, market efficiency, pricing capabilities, share misallocation, share adjustments, termination of EJVs, transaction cost economics

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Table of Contents

Abstract	i
Acknowledgments.....	iii
Table of Contents	v
List of Tables	ix
List of Figures	x
Chapter 1	1
1 Introduction	1
1.1 The phenomenon.....	1
1.2 Previous research	2
1.3 Research objectives.....	5
1.4 Contributions.....	6
1.5 Dissertation structure	8
Chapter 2.....	10
2 Literature review	10
2.1 Theories of EJV	10
2.1.1 The motivation of EJV theories	10
2.1.2 Capital sharing theory	12
2.1.3 Operation costs saving theory	12
2.1.4 Risk reduction theory	12
2.1.5 Strategic consideration theory.....	14
2.1.6 Organizational learning theory	15
2.1.7 Institutional theory	16
2.1.8 Transaction cost theory	18
2.1.9 Comments	19

2.2	Comparative empirical studies on EJVs	20
2.2.1	EJV versus wholly owned subsidiary	20
2.2.2	EJV versus non-equity based alliance.....	27
2.2.3	EJV versus full acquisition	31
2.2.4	Comments	34
2.3	Foreign ownership in international EJVs.....	35
2.3.1	Antecedents of foreign ownership	35
2.3.2	Consequences of foreign ownership	39
2.3.3	Comments	40
2.4	Design of the co-ownership structure	41
2.4.1	Balanced versus unbalanced ownership structure.....	41
2.4.2	Empirical evidence.....	42
2.4.3	Comments	43
2.5	The pricing-error rule of share distribution	43
2.5.1	Comments	45
2.6	Research gaps.....	45
Chapter 3	48
3	Antecedents and consequences of share distribution	48
3.1	Antecedents of share distribution.....	48
3.1.1	Efficiency of the two intermediate markets	51
3.1.2	Pricing capabilities of the two partners.....	53
3.2	Consequences of share distribution	54
3.2.1	Share misallocation	55
3.2.2	Share misallocation and EJV performance	56
3.2.3	Share misallocation and share adjustments.....	58

3.3 Summary of the chapter	63
Chapter 4	65
4 Antecedents of share distribution	65
4.1 Hypothesis development	65
4.1.1 The relative efficiency of the intermediate markets	65
4.1.2 Pricing capabilities of the partners	69
4.2 Method	73
4.2.1 Sample and data	73
4.2.2 Variables and measures	74
4.2.3 Modeling approach	79
4.2.4 Results	81
4.3 Summary of the chapter	87
Chapter 5	88
5 The consequence of share distribution: EJV termination	88
5.1 Hypothesis development	88
5.2 Method	92
5.2.1 Sample and data	92
5.2.2 Variables and measures	92
5.2.3 Modeling approach	96
5.2.4 Results	97
5.3 Summary of the chapter	106
Chapter 6	107
6 Discussions on the empirical findings	107
6.1 Findings on the antecedents of share distribution	107
6.2 Findings on the consequences of share distribution	113

6.3 Limitations and future extensions	116
Chapter 7	119
7 Contributions and conclusion	119
7.1 Scholarly contributions	120
7.2 Practical implications	123
7.3 Conclusion	123
References	126
Curriculum Vitae	147

List of Tables

Table 3.1 Optimal share distribution across pricing error combinations.....	50
Table 3.2 Share misallocation and adjustment in the developer-distributor EJV.....	64
Table 4.1 Variables, measures, and data.....	80
Table 4.2 Descriptive statistics and Pearson correlation	82
Table 4.3 Regression results	83
Table 4.4 Regression results with two random effects	86
Table 5.1 Descriptive statistics and Pearson correlation	100
Table 5.2 Regression results	101
Table 5.3 Regression results from additional analyses.....	104

List of Figures

Figure 3.1 The EJV structure	49
Figure 5.1 Distribution of time to failure.....	98
Figure 5.2 Survival probability	99

Chapter 1

1 Introduction

1.1 The phenomenon

An EJV is an independent legal entity in which two or more unaffiliated firms pool proprietary inputs to accomplish certain common tasks (e.g., product development, joint research, mineral exploration, etc.) (Franko, 1971; Harrigan, 1988; Stopford & Wells, 1972). In the past few decades, EJVs have been an extensively used governance structure for inter-firm collaboration. A report from KPMG (2013), for instance, shows that EJVs topped the list of modes used by U.S. firms to enter foreign markets in 2012 – about 42 percent of all entries. Documented in SDC Platinum, U.S. firms alone formed more than 5,700 EJVs from 2006 to 2016.

To build an EJV, partners must distribute equity shares of the co-owned venture to a specific percentage combination (e.g., 20/80, 30/70, 50/50). For a variety of reasons, share distribution is perhaps the most critical decision when an EJV is formed. To start, share distribution dictates board seats and executive positions that each partner receives, which determines the governance and management control each partner exercises over the co-owned business (Gatignon & Anderson, 1988; Makhija & Ganesh, 1997; Mjoen & Tallman, 1997; Schaan, 1983; Yan & Gary, 1994). Furthermore, share distribution is fundamental to the profit-sharing scheme, thereby shaping partners' cooperative incentives and commitments to the joint operation (Adegbesan & Higgins, 2010; Borys & Jemison, 1989; Chi & Roehl, 1997; Gomes-Casseres, 1989; Grossman & Hart, 1986; Kumar, 2010). Logically, the performance and survival of an EJV hinge on how partners split ownership (Blodgett, 1992; Chung & Beamish, 2010; Dhanaraj & Beamish, 2004; Lu & Hebert, 2005). Even when the co-owned venture goes bankrupt, the relative equity stakes decide which party holds the right to claim the remaining property and wind up the business.

Settling share distribution is also particularly challenging. In essence, share distribution is a collective and zero-sum decision with a vast range of options (e.g., 20/80, 30/70, 50/50, or 90/10). For EJVs with two partners, virtually any percentage combination between 0/100

and 100/0 is a possible way to divide the total equities. The existence of many alternatives imposes burdens on each partner to identify their preferred equity division, and it also increases the chance and extent to which their preferences diverge. Any divergence regarding share distribution must be reconciled to reach a mutually agreed outcome (Beamish, 1993; Das & Teng, 2000a; Killing, 1983). And the zero-sum fashion of share distribution makes bargaining tough and concessions difficult (Beamish, 1993; Das & Teng, 2000a; Killing, 1983; Luo, Shenkar, & Nyaw, 2001; Parkhe, 1991). The complexities to locate a mutually agreed equity split is demonstrated by the costly and lengthy process of ownership negotiation in all EJV formations (Harrigan, 1986; Killing, 1983).

Despite considerable costs partners incur to determine share distribution when forming the EJV, rampant inter-partner disputes regarding share distribution can still arise during subsequent operation periods. As the cooperation proceeds, previously unknown information about each other's asset input tends to emerge from the external market and within the two-party cooperation; environmental parameters and strategies of the partners also evolve (Baum & Ingram, 1998; Blodgett, 1992; Cui, Calantone, & Griffith, 2011; Koza & Lewin, 1998; Reuer, Zollo, & Singh, 2002). All these changes are likely to render the original equity split obsolete to one or both partners, necessitating adjustments in share distribution. Rarely will partners see eye-to-eye on share adjustments, and disputes often break out in the process of renegotiating share distribution. If not resolved properly and timely, share disputes can strain cooperation, aggravate competition between partners, or even jeopardize EJV survival (Das & Teng, 2000a; Greve, Baum, Mituhashi, & Rowley, 2010; Kale, Singh, & Perlmutter, 2000; Lin & Germain, 1998).

In summary, share distribution is central to the organization, operation, and performance of EJVs. To determine a mutually agreed distribution is daunting because of the zero-sum feature and countless decision options. The issue is made even more complicated by harmful share disputes between partners that may emerge during the lifetime of an EJV.

1.2 Previous research

Despite its clear importance and complexities, share distribution has largely been overlooked by previous literature. This is surprising given that EJVs have attracted

extensive scholarly attention in the past few decades (Kogut, 1988; Yan & Zeng, 1999). A close examination of the literature suggests the neglect of share distribution can be traced back to the limitations of four research streams: theories of EJV, comparative empirical studies on the choice between EJV and another operational mode, research on foreign ownership in international EJVs, and the debate over the optimal ownership design of EJVs. However, there is one exception that specifically explores share distribution in EJVs.

Research on EJV theories has evaded share distribution. These theories attempt to understand the motives of firms to enter a co-ownership arrangement. The motives identified thus far include cost and risk sharing (Contractor & Lorange, 1988; Harrigan, 1988; Killing, 1983), real-option investment (Chi & Seth, 2002; Cuypers & Martin, 2007; Kogut, 1991; Mccarter, Mahoney, & Northcraft, 2011; Reuer & Tong, 2005), organizational learning (Hamel, 1991; Inkpen, 2000; Kogut, 1988), legitimacy seeking (Dacin, Oliver, & Roy, 2007; Oliver, 1990; Yiu & Makino, 2002), and transaction costs minimization (Beamish & Banks, 1987; Gomes-Casseres, 1989; Hennart, 1988; Williamson, 1991). Although investigating *why* firms enter EJVs is undoubtedly meaningful, the exclusive focus on this inquiry has led EJV theorists to forego the issue of *how* partners distribute and adjust the equity shares.

Share distribution has also been absent in empirical studies because of their dominant focus on comparative analysis. In particular, most of these studies center on a firm's either-or choice between an EJV and an alternative mode including a wholly owned venture (Anderson & Gatignon, 1986; Chen & Hennart, 2002; Erramilli & Rao, 1993), a market contract (Hennart & Reddy, 1997; Osborn & Baughn, 1990; Oxley, 1997; Pisano, 1989), or an acquisition (Anderson & Gatignon, 1986; Chen & Hennart, 2002; Erramilli & Rao, 1993; Lu, 2002; Zhao, Luo, & Suh, 2004). Common in their empirical operationalization, these comparative analyses lump all co-ownership observations into one category and attach them to the same dummy code (e.g., 1=EJV, 0=the other mode). Share distribution, which varies extensively across EJVs, has consequently been dismissed.

Even the studies that touched upon ownership design of EJVs have overlooked the issue of share distribution. Among these studies, some come from the international business

field, exploring the ownership strategy of multinational enterprises (MNEs) in their overseas EJV. They have examined both the precedents and consequences of foreign ownership in international EJV (Delios & Beamish, 1999; Li & Li, 2010; Luo, 2001b; Mjoen & Tallman, 1997; Pan, 1996; Shan, 1991). By adopting the foreign partner's perspective, these international studies have given nearly no consideration to the other, mostly local partner (Hennart, 2009; Luo et al., 2001; Wang & Zajac, 2007). This single-focused approach has diverted these international studies away from share distribution that always takes two parties to decide.

Other studies on the ownership design of EJV debate whether a balanced or unbalanced ownership structure is more appropriate. One group of scholars advocates for the unbalanced ownership structure for its effect of enhancing decision-making efficiency (Killing, 1983; Lecraw, 1984; Park & Ungson, 1997; Reus & Rotting, 2009). Another group supports the balanced structure on the ground that it can induce commitments, foster trust, and cultivate a cooperative spirit within the inter-firm cooperation (Beamish & Banks, 1987; Bleeke & Ernst, 1991; Harrigan, 1986). Balanced or unbalanced, scholars on both sides of the debate view co-ownership design as a choice with two alternatives. This dichotomous choice is clearly distinct from share distribution wherein partners do not merely select between balanced or unbalanced division but have to pick a specific equity split out of numerous percentage combinations (e.g., 50/50, 30/70, 10/90, etc.).

While studies in the four research streams have largely omitted share distribution in EJV, there is one exception. Recently, Chen, Pun, and Wang (2017) examined share distribution by proposing a precise rule following which partners can optimally split equity shares. According to the authors, equity participation creates a structural mechanism that corrects the error partners commit when pricing their assets into the EJV (i.e., a pricing error). Both parties derive private gains when they overprice or under-deliver their asset input to the co-owned entity *ex ante* but also bear the profit losses when they claim the residuals from the EJV *ex post*. To fully nullify the pricing error of both parties, the equity shares of the co-owned venture should be divided in a percentage combination that matches the relative size of the two pricing errors. Only under this share distribution will profit sharing *ex post* completely correct the pricing errors *ex ante* and produce the best incentive alignment

between the partners. As the cooperation progresses over time, the parties keep renewing the estimated pricing errors and accordingly adjust share distribution to maintain the optimal correction. This updating process repeats itself until one party's pricing error shrinks to a tolerable level and no longer justifies correction through equity ownership. The other party whose pricing error is still significant is then motivated to buy out the EJV, thereby terminating the co-ownership relationship.

As an important but overlooked phenomenon, share distribution deserves more scholarly attention than a conceptual rule. First, the pricing-error rule has not been tested against empirical evidence. Without systematic verification, the validity of the rule remains questionable. We are uncertain as to whether partners indeed determine or adjust the equity shares of an EJV in a way prescribed by the rule. Second, no study has investigated the specific factors that influence share distribution in EJVs. We thus lack the knowledge about what explains the extensive variances in share distribution across EJVs. Third, research has yet to provide thoughtful and proven insights regarding the implications of share distribution on the performance and survival of EJVs.

1.3 Research objectives

This dissertation aims to fill the three literature gaps outlined in the previous section. That is, to empirically test the pricing-error rule, to identify and verify the antecedents of share distribution, and to explore the performance implications of share distribution. These objectives are met by testing two empirical models built upon the pricing-error rule. The following two questions guide the two tests, respectively:

- (1) What are the antecedents of share distribution in EJVs at formation?*
- (2) What are the performance consequences of share distribution in EJVs?*

The first empirical model focuses on the antecedents of share distribution. Drawing on the pricing-error rule, I argue that share distribution of an EJV depends significantly on the relative efficiency of the two asset markets and the relative pricing capabilities of the two partners. The overarching proposition is that a partner will control more equity shares if

the market for its asset is less efficient or its pricing capabilities are stronger. To test this, I identify two sets of factors that theoretically proxy the relative market efficiency and the relative pricing capabilities and then hypothesize the relationship between these factors and share distribution of EJVs at formation.

In the second test, I argue that how share distribution affects the performance of an EJV depends on the degree it deviates from the optimal solution suggested by the pricing-error rule. This actual-optimal deviation is captured by the concept, share misallocation. EJV termination is selected as the focused consequence. Marking the end of a co-ownership relationship, termination of an EJV exerts considerable impacts on the co-owned business and both partners; it can also be objectively and reliably measured. The hypothesis in this test is that share misallocation will increase the likelihood that an EJV terminates.

I estimate the two empirical models with a sample of two-party EJVs. Employing a two-party EJV sample is reasonable because the pricing-error rule is also developed in the context of the two-party setup. Furthermore, two-party EJVs are much more pervasive than multilateral EJVs (Li, Eden, Hitt, Ireland, & Garrett, 2012; Parkhe, 1993). Nevertheless, the conceptual arguments and the empirical findings of this dissertation can certainly be generalized to multilateral EJVs.

1.4 Contributions

To the best of my knowledge, this dissertation represents the first empirical study on share distribution in EJVs. The findings in this dissertation make meaningful contributions to the literature and offer useful insights to practitioners who are managing or contemplating an EJV.

The first test of this dissertation contributes empirical insights into the antecedents of share distribution. In this test, the model that predicts share distribution from the perspective of the pricing-error rule is largely unsupported by empirical evidence. Among the eight factors that theoretically proxy the pricing errors of partner inputs, only one factor – the relative diversification level of partners – is significantly related to share distribution. Moreover, two control variables, relative firm size and relative firm age, show a

consistently significant effect. As such, share distribution in EJVs is shaped not by the two pricing errors of partner input, but by readily-visible characters such as firm size and age. This finding is noteworthy in that this model is among the first attempts to explain the variances of share distribution between EJV partners, whereas previous models only distinguish between an EJV and an alternative mode – either a wholly owned subsidiary or a market contract (Agarwal & Ramaswami, 1992; Brouthers, 2002; Gomes-Casseres, 1989; Gulati, 1995b; Kale et al., 2000).

The second test of this dissertation proposes and verifies an additional approach to examining the consequences of EJVs' ownership structure of. To study the ownership-performance linkage, scholars usually have to choose between two approaches: to focus on the equity shares of a single party or to categorize the co-ownership structure as balanced or unbalanced. Alternatively, a share distribution in an EJV can also be evaluated by benchmarking it against the optimal share distribution proposed by the pricing-error rule. Evidence in this dissertation suggests share misallocation that occurs in an EJV's mid-life can trigger its termination, but share misallocation at the formation of an EJV will only increase termination hazards after the EJV matures.

This dissertation also contributes to the emerging, two-party perspective in the research on the design of EJVs. With few exceptions (e.g., Luo, 2000), previous studies have overwhelmingly adopted only one party's perspective when looking at the structural arrangement of EJVs. This approach is incongruent with the reality that the settlement and adjustment of a co-ownership structure are always decided by two parties. Within the context of share distribution, this dissertation advances the two-party view by accounting concerns from both parties in theoretical reasoning and by incorporating data from both parties in empirical modeling.

The findings from the two empirical tests validate the pricing-error rule of share distribution. An interesting pattern emerges from these two tests. According to the first test, the rule does not apply to the formation of the sampled EJVs. Partners do not align share distribution with the pricing error in their inputs. Yet, the proposition that the violation of the rule will dampen the performance and stability of EJVs is supported. The probability

of unexpected termination increases in an EJV if share misallocation occurs during the cooperation periods. The observation from the two tests is that partners do not follow the pricing-error rule when determining share distribution, but this harms their subsequent cooperation.

To practitioners, the prescriptive implications of this dissertation are clear. When forming an EJV, partners should allocate equity shares in line with the relative pricing uncertainties over their inputs. Only this version of share distribution optimizes the pricing-error correction mechanism and best curbs opportunism within inter-firm cooperation. Share misallocation, especially during the cooperation periods, risks destabilizing or even dismantling the partnership. Furthermore, share distribution is not a one-off deal. The two partners should adjust the structure when share distribution turns out to misalign with their evolving pricing errors. This calls for some degree of flexibilities into the co-ownership structure. Although share adjustments inevitably incur costs, sustaining a mis-fitted co-ownership structure may prove to be costlier. All in all, a collaborative spirit is necessary if partners wish to establish and maintain optimal share distribution.

1.5 Dissertation structure

This dissertation consists of seven chapters. Following the Introduction, Chapter 2 reviews the current literature. The review and critique of previous research expose three major literature gaps: the pricing-error rule of share distribution has not been tested and the antecedents and consequences of share distribution have remained unexplored.

Chapter 3 develops the theoretical arguments on the antecedents and performance implications of share distribution. Drawing on the pricing-error rule, I identify two antecedents of share distribution, namely the relative efficiency of the intermediate markets partners use to transact their input into the EJV and the relative capabilities of partners in pricing each other's input. The analysis then switches to the consequences of share distribution. The core argument is that share distribution undermines the performance and stability of an EJV if it deviates from the optimal solution prescribed by the rule.

Chapter 4 verifies the two antecedents of share distribution. I develop two sets of hypotheses. The independent variables are those factors that proxy the relative market efficiency and partners' pricing capabilities, and the dependent variable is the equity share of one partner relative to that of the other. I then test the two sets of hypotheses with a two-party EJV sample.

Chapter 5 undertakes another test on the relationship between share distribution and EJV termination. I hypothesize that an EJV is more likely to end if the equity shares are misallocated to a greater extent. Here I distinguish between two types of share misallocation: share misallocation that occurs at the formation of an EJV and share misallocation during its operation. Hypotheses are tested via survival analysis.

Chapter 6 discusses the empirical results from the two tests. I first convey the implications of empirical findings and explore potential explanations for the insignificant results. Next, I acknowledge the limitations of the research design and point out promising avenues for future research in the emerging field of share distribution.

Chapter 7 concludes this dissertation. I reiterate the literature gap and summarize the theoretical arguments as well as the empirical findings. The scholarly and practical contributions of this dissertation are discussed before the conclusion.

Chapter 2

2 Literature review

This chapter surveys the studies on EJVs, which are classified into five streams according to their research objectives. The first stream concerns theories of EJV. The second stream comprises empirical studies that analyze a firm's choice between an EJV and an alternative mode of accomplishing a specific goal. The third explores foreign ownership in international EJVs. The fourth looks at the optimal co-ownership design of EJVs. The last consists of the only study that has examined share distribution in EJVs. This chapter concludes with a summary of the literature review.

2.1 Theories of EJV

EJV theories are among the earliest and most mature inquiries concerning EJVs (Harrigan, 1986; Jaeger, 1960; Killing, 1983; Nicholas, 1950). To date, research has developed seven theories of EJV, including capital sharing theory, operation costs saving theory, risk reduction theory, strategic consideration theory, organizational learning theory, institutional theory, and transaction costs theory. These theoretical developments all aim to tackle the puzzle raised by the formation of EJVs.

2.1.1 The motivation of EJV theories

To management and economics scholars, forming EJVs is counterintuitive. At first glance, an EJV should rarely be contemplated because of its considerable costs. First, they are fraught with opportunism from partners, which demand on-going resource commitments to resolve. Typical examples of partner opportunism include misappropriation of proprietary technologies, shirking, and brand free-riding (Gatignon & Anderson, 1988; Hill, Hwang, & Kim, 1990; Oxley, 1997). Opportunism is entrenched in EJVs because each partner has the opportunity to pocket private gains while shifting the resulting losses to the EJV and the other partner. In addition to the opportunistic incentive, both partners have an inalienable right to put their own interests above the partnership (Buckley & Casson, 1988).

Second, inefficient decision-making is another salient cost of EJVs (Harrigan, 1986; Killing, 1983). A simple decision can easily become cumbersome and complicated within EJVs. Decisions pertinent to managing an EJV are collective in nature, forcing partners to engage in excessive communications and negotiations (Nitsch, Beamish, & Makino, 1996; Pearce, 1997; Sampson, 2007; Woodcock, Beamish, & Makino, 1994). Not only is this decision-making process time- and resource-consuming, it also can lead to the missing of profitable market opportunities, especially when a stalemate occurs. Noting decision rigidity by co-management, Meyer & Wang (2015) go so far as to assert that “EJVs are highly exposed to coordination risk and hence more likely to miss emergent market opportunities because they are so slow to react” (p. 110).

Third, internal conflicts between partners are laborious to resolve (Adegbesan & Higgins, 2010; Heidle, Steensma, & Phelps, 2014; Lin & Germain, 1998; Ring & Van de Ven, 1994). Since partners can disagree about anything, disputes or conflicts are rampant in EJVs (Killing, 1983). The trigger for these conflicts lies in the inter-partner differences concerning organizational culture, routines, management philosophies and styles, the goal of entering the cooperation, and so on (Borys & Jemison, 1989; Das & Teng, 2000a; Hennart & Zeng, 2002; Killing, 1983; Park & Russo, 1996; Parkhe, 1991; Yan & Gary, 1994). Resolving disputes, either through internal settlement mechanisms or external arbitration, can waste extensive managerial attention, time, and resources of both partners (Gomes-Casseres, 1989; Lin & Germain, 1998; Parkhe, 1991; Pearce, 1997). The costs of handling conflicts can be so overwhelming that many partners simply opt to break up (Greve et al., 2010; Park & Russo, 1996).

In light of the considerable costs associated with EJVs, pursuing the same task alone appears to be a more sensible option. After all, full ownership of a venture neatly avoids the costs of opportunism, collective decision-making, and internal conflicts that arise from splitting the ownership with another firm. Unprecedentedly, numerous firms wittingly join EJVs, making them the most frequently-used arrangement for inter-firm cooperation in the past few decades. EJVs have proliferated domestically in the U.S., and they have also been pervasive in the international business realm (Beamish & Banks, 1987; Contractor, 1985; Contractor & Lorange, 1988; Gomes-Casseres, 1989; Stopford & Wells, 1972). The

considerable costs and the pervasiveness of EJVs raise an intriguing question: why would firms form EJVs?

2.1.2 Capital sharing theory

One theory proposes that firms establish EJVs to share capital investments of a business project (Johnson & Houston, 2000; Nicholas, 1950). An EJV here provides a financing arrangement. A firm bears all the capital outlays of a project when going it alone but only a portion of the investments if it pursues the same opportunity through an EJV. By sharing investments with its EJV partners, a firm is able to undertake projects that it cannot afford or diversify into more products or geographic areas than would otherwise be possible if it goes solo (Meynen, Friedmann, & Weg, 1966).

2.1.3 Operation costs saving theory

The second theory observes that some firms form EJVs at their upstream or downstream value-chain stage and highlights operation cost saving as their motive (Contractor & Lorange, 1988; Dixon, 1962; Harrigan, 1986). The successive stages in a value chain normally differ in minimum efficiency scale (MES). A firm seeking to integrate an upstream function may find the output scale of that function too large to absorb alone, or that its output level is insufficient to feed the efficient operation of a downstream function. To bridge the discrepancy in the MES across value-chain stages, two or more firms can set up an EJV with the upstream function and split the output or co-supply their outputs to an EJV in a downstream stage. In either case, the EJV helps achieve economy of scale and brings cost advantages to both partners.

2.1.4 Risk reduction theory

Previous studies recognize that the attempt to reduce various risks explains the rise of many EJVs (Dixon, 1962; Johnson & Houston, 2000; Nicholas, 1950). First, some firms build EJVs to share the risks of business failure, especially in innately risky business sectors such as mineral exploration. If the business collapses, each partner suffers only partial losses. Second, some firms enter an EJV with another firm for the knowledge or capabilities

necessary to steer clear of environmental risks. Specifically, a new market entrant can leverage market insights of an experienced partner to predict market trends and mitigate supply or demand turbulences (Powell, 1987). A foreign firm often circumvents government interventions, expropriations, or other policy discriminations through the political clout of a local partner (Contractor & Lorange, 1988; Das & Teng, 1996; Delios & Henisz, 2000; Meynen et al., 1966; Shan, 1991). Third, value-chain partners sometimes join forces in an EJV to absorb uncertainties that could destabilize their supply-demand interdependence (e.g., market fluctuations). As the mediator between value-chain partners, the co-owned entity permits a timely and steady exchange of information, resources, and products. (Contractor & Lorange, 1988; Oliver, 1990; Pfeffer & Nowak, 1976; Xia, 2011). Lastly, the attempt to mitigate risks of portfolio investments also leads some firms to control partial instead of full ownership of a business (Berg, Duncan, & Friedman, 1982; Bleeke & Ernst, 1991; Contractor & Lorange, 1988; Reuer & Leiblein, 2000).

Some firms make partial ownership investments into uncertain environments to accomplish more than reducing risk exposure. These firms, as argued by real-option theorists, create an option, the EJV, to strike a balance between upside opportunities and downside risks that can arise from environmental uncertainties (Chi & McGuire, 1996; Cuypers & Martin, 2010; Kogut, 1991; Li, 2007; Tong, Reuer, & Peng, 2008). If the downside risks escalate and become intolerable, the firm can salvage its upfront investments – at least partly – by divesting the equity to its partner or a third party. Even if the co-owned venture collapses before exit, the loss would only be partial. When the environment turns favorable and upside opportunities emerge, the initial presence through the EJV offers a platform for a firm to expand its investment via buyout and, thereby, fully appreciate the growth potential (Iriyama & Madhavan, 2014). Without the EJV platform, the firm risks being preempted from market opportunities by the early movers (Chi & McGuire, 1996; Reuer & Tong, 2005).

The real-option theory of EJV is reinforced by the notion that an EJV can serve as an option with or without option clauses in contract. Some EJV contracts clearly stipulate clauses of call or pull options, specifying the option holder, striking price, timing, and so on (Reuer & Tong, 2005; Tong & Li, 2013). Many more EJV contracts do not pre-specify option

details, but partners, as real-option scholars allege, can negotiate buyout or selloff terms *ex post* (Chi & McGuire, 1996; Cuypers & Martin, 2010; Dixit & Pindyck, 1994; Tong & Li, 2013).

2.1.5 Strategic consideration theory

Strategy scholars invoke strategic considerations to explain the rise of the EJVs. The first is market power enhancement. Large competitors in an industry sometimes merge operations into a co-owned entity to eliminate competition between them and to consolidate market power (Berg et al., 1982; Pate, 1969; Porter & Fuller, 1986). As a result, the partners gain more control over price and can extract more monopolistic rents. The gains to the coalition firms, however, often come with industry-level costs such as reduced intensity in competition (Contractor & Lorange, 1988; Dixon, 1962; Oxley, Sampson, & Silverman, 2009; Tong & Reuer, 2010).

Second, some industry incumbents form EJVs to *pre-empt* competition from outside entrants. In high-tech industries where innovation speed is critical, incumbents often join forces into EJVs to expedite the development of new technologies and then leverage the patent system as barriers to keep external firms at bay (Vickers, 1985). Alternatively, an incumbent can form an EJV with a potential entrant to its market (i.e., turning a possible foe into an ally) and stave off the direct competition with that partner (Contractor & Lorange, 1988; Harrigan, 1986).

Third, unlike large firms that use EJVs to reinforce market dominance, some small or medium firms are forced into EJVs as a defensive maneuver against formidable competitors (Dixon, 1962; Harrigan, 1986). Due to various liabilities such as limited resource endowments and low visibility, small firms are in a fragile competitive position. When competition is too fierce for them to withstand alone, bundling up into a co-owned entity may be the only way to survive.

2.1.6 Organizational learning theory

Organizational learning theory proposes that some EJVs are launched by one partner to acquire the proprietary knowledge and capability of the other (Berg et al., 1982; Hamel, 1991; Kogut, 1988). Organizational learning becomes necessary when a firm's own knowledge and capabilities are insufficient to deliver a desired strategic agenda, such as entering a new market or developing a new product (Chen & Hennart, 2002; Madhok, 1997; Powell, 1987; Speckbacher, Neumann, & Hoffmann, 2015; Stopford & Wells, 1972). Besides entering an EJV with another firm that possesses the sought-after knowledge, the firm can also internally duplicate the knowledge (i.e., 'do it yourself'). Due to inherent costs of a co-ownership structure, a firm will not opt for an EJV to acquire knowledge unless independent duplication is costlier and more time-consuming.

Literature recognizes various impediments that render independent duplication economically infeasible. Patented knowledge or skills are simply out of reach without proper authorization (Grant & Baden-Fuller, 2004; Inkpen, 2008; Teece, 1998). The incremental nature of the knowledge creation process poses another steep barrier for duplication. Firms generate new knowledge and capabilities mainly by adapting and combining the elements and processes in the existing repository (Kogut & Zander, 1992; Speckbacher et al., 2015). This requires a firm to obtain necessary precedents before duplicating the knowledge of others. However, some precedent processes or conditions are not replicable. They are either one-off events or woven with the idiosyncratic evolutionary path (path dependence) or social networks of the original developer (social embeddedness) (Barney, 1999; Simonin, 1999). Even with replicable conditions, many are difficult to isolate due to their ambiguities to outsiders (Peteraf, 1993). By the time a firm manages to overcome all obstacles, the duplicated knowledge may have been rendered obsolete and worthless by the updates from the original developer (i.e., time diseconomy) (Dierickx & Cool, 1989).

Organization learning scholars propose when obstacles of internal duplications are insurmountable, an EJV with another firm that possesses the desired knowledge may be a more efficient way of learning. Forming a co-owned business opens the door to the

knowledge and capability of the other partner, allowing for ample learning opportunities that are unavailable without the cooperation (Hamel, 1991). In some cases, the learning partner can directly observe the knowledge exploitation or development done by the other (e.g., through joint projects). Indirectly, it can glean information from avenues such as board and management meetings. Learning efforts gradually reduce the ambiguities in the knowledge and capabilities of the other, making assimilation feasible. After acquiring knowledge from its EJV, the learning partner then transfers and integrates the knowledge back to its own knowledge base (Inkpen, 2000; Inkpen & Dinur, 1998). Inasmuch as the knowledge assimilation and integration effectuate, one party becomes equipped to take over the function of the other and the knowledge portfolio of the two parties converge to a greater extent (Khan, Shenkar, & Lew, 2015; Mowery, Oxley, & Silverman, 1996; Sampson, 2007).

Although the EJV, in principle, creates learning opportunities for both partners, learning effectiveness tends to be asymmetrical. Research shows that this learning asymmetry can be attributed to multiple factors. Knowledge and capabilities contributed by the two parties can differ in tacitness, and the more tacit the knowledge from one party, the harder it is for the other to acquire (Inkpen, 2000; Simonin, 1999). Furthermore, partners are usually unequal in their learning desire (Hamel, 1991), capabilities to assimilate and transfer the knowledge (Khan et al., 2015; Lane & Lubatkin, 1998; Mowery et al., 1996; Zhao, Anand, & Mitchell, 2005), and learning-focused resource commitments (Khanna, Gulati, & Nohria, 1998). A partner can also learn better and more quickly because of the trust from the other partner (Inkpen & Dinur, 1998; Tsang, 2002). A trusting relationship encourages information exchange between partners and alleviates the protectiveness of their proprietary knowledge (Kale et al., 2000; Lane, Salk, & Lyles, 2001; Tsang, 2002).

2.1.7 Institutional theory

Institutional theorists approach the co-ownership phenomenon by highlighting an EJV as a device for firms to acquire institutional legitimacy. This theory was developed in international business literature since institutional legitimacy is a particularly significant concern to firms foraying into another country. The premise of this theory is that in addition

to operational efficiency, legitimacy is necessary for a foreign operation to survive and prosper in host countries (DiMaggio & Powell, 1983; Oliver, 1990; Peng, Sun, Pinkham, & Chen, 2009; Scott, 1995; Westney, 1993). Failure to acquire sufficient legitimacy in an institutional environment can deprive an MNE of market opportunities and critical resources such as customer recognition, endorsements from industry associations, and governmental policy supports (e.g., tax cut) (Kostova & Zaheer, 1999; Zaheer, 1995). Institutional scholars distinguish between external and internal legitimacy – both are critical to a foreign operation and can motivate a foreign firm into an EJV.

On one hand, external institutional pressures can drive MNEs into EJVs with indigenous firms. In countries that ban wholly owned foreign operations, sharing ownership with a local partner is the only way to invest (Contractor & Lorange, 1988; DiMaggio & Powell, 1983; Fagre & Wells Jr, 1982; Gomes-Casseres, 1990; Lecraw, 1984; Meynen et al., 1966). Moreover, a co-ownership arrangement with a local firm alleviates the foreignness of an operation (Zaheer, 1995), offers a shortcut to size up formal and informal ‘rules of the game’ (Cui & Jiang, 2012; Meyer, 2001; Westney, 1993), and allows the foreign entrant to amass connections with and acceptance from key constituents (Shi, Sun, Pinkham, & Peng, 2014; Yiu & Makino, 2002). In countries where co-ownership is widely employed by other investors, mimicking co-ownership entry enables a new entrant to be perceived as legitimate and appropriate as previous peers (Davis, Desai, & Francis, 2000; DiMaggio & Powell, 1983; Lu, 2002; Xia, Tan, & Tan, 2008).

On the other hand, pursuing internal legitimacy can also lead an MNE to build EJVs in foreign countries. Every MNE operates with a set of norms, routines, and standard procedures that are largely firm-specific (Kostova & Zaheer, 1999; Westney, 1993) and history-dependent (Yiu & Makino, 2002). An MNE that has repeatedly established co-owned entities in the past tends to develop norms and procedures geared toward this structure. Internal norms can grow so influential in some MNEs that partial ownership may have become a ritual. For these MNEs, structuring an investment under co-ownership replicates existing norms and routines and, in turn, reduces uncertainties, ambiguities, and implementation costs (Chan & Makino, 2007; Lu, 2002; Meyer, 2001; Scott, 1995; Suchman, 1995; Xia et al., 2008; Yiu & Makino, 2002). For the new entity, resembling its

peer units helps attract resources and connections within the global network of an MNE (Kostova & Zaheer, 1999; Rosenweig & Singh, 1991; Westney, 1993).

More recently, Dacin, Oliver, and Roy (2007) expand the legitimacy seeking motive by distinguishing five types of legitimacy that a firm can gain from an EJV. In particular, an EJV can help a firm gain market legitimacy (qualification to operate in a marketplace), relational legitimacy (perception as an attractive alliance partner), social legitimacy (conformity to expectations of governments and community), investment legitimacy (worthiness of certain investments in the eyes of corporate insiders), and alliance legitimacy (appropriateness of the alliance to external constituents). Although the need for one type of legitimacy can prompt a firm into an EJV, multiple types of legitimacy can often be achieved concurrently.

2.1.8 Transaction cost theory

Although different in their specific justifications, the aforementioned EJV theories invariably highlight the benefits of inter-firm cooperation. Transaction cost theory of EJVs recognizes that cooperative benefits are a *necessary* but *insufficient* condition for the rise of an EJV (Gomes-Casseres, 1989; Hennart, 1988). Regardless of the desired benefits, partners do not need to enter a co-ownership relationship so long as at least one party can efficiently procure the needed assets or services from another (Gomes-Casseres, 1989). Instead of enlisting capital investments from its EJV partner, for instance, a firm can use the financing market (e.g., bank loans) to fund a wholly owned operation. A firm can pay a premium for another firm to bear the risks of the joint undertaking. A contractual coalition between industry incumbents seems adequate to consolidate market power and avoid direct competition. To achieve inter-organizational learning, one firm can hire another firm to teach required knowledge (Caves, Crookell, & Killing, 1983; Kogut, 1991; Madhok & Tallman, 1998; Teece, 1981). A foreign investor can also rent the trademark, brand, or goodwill from a local firm to legitimize its presence in host countries (Chen, 2010; Hennart, 1991).

As Hennart conceptualized (1988), the sufficient condition for forming an EJV is the simultaneous failure of two intermediate markets that two partners could use to support the asset exchange. If the market for both parties' assets features low transaction costs, the parties can directly trade their assets through two-way transactions (A sells to B and B sells to A). Even if one market collapses, they can readily switch to the other market to cut a deal (A sells to B or B sells to A). Only when both markets concurrently break down due to intolerable transaction costs will firms go to the extra length of pooling the complementary assets into a co-owned entity. This transaction cost economics (TCE) framework clarifies that EJVs help firms save on transaction costs otherwise incurred if partners directly deal with each other (Brouthers & Hennart, 2007; Hennart, 2006; Hennart, 2009).

In TCE, an EJV saves on transaction costs because of a fundamental shift in the payoff structure to each party. In a market transaction, the seller of an asset receives a market fee from the buyer as the reward. To determine and enforce the market fee requires the two parties to specify the asset's performance *ex ante* and measure it *ex post*. When transaction costs incurred in an asset exchange overwhelm anticipated gains, market fails. By pooling the assets into a co-owned entity, the two parties theoretically forfeit the fee for their input *ex ante* and claim only the profit sharing *ex post* (Hennart, 1988). Since the payoff to each party no longer depends on a fee, "suppliers of intermediate goods have therefore less incentive to take advantage of the buyer by charging inflated prices or reducing the quality of the goods" (Hennart, 1991, p. 484). In essence, a co-ownership structure internalizes two transactions and in turn evades the two failing markets (Beamish & Banks, 1987; Gomes-Casseres, 1989).

2.1.9 Comments

The seven theories reviewed above significantly advance our understanding of the motivations behind forming EJVs. Implicitly or explicitly, the first six theories hold going-it-alone as the alternative to an EJV. This orientation leads theorists to justify EJVs with the cooperation benefits that would otherwise be unobtainable if a firm plays solo, whether to share costs or risks, achieve strategic advantages, acquire knowledge or legitimacy. TCE

theory distinctively recognizes that partners can also gain the cooperation benefits through market, and it is market failure that drives firms into EJVs.

Regardless of the specific motivation, all these EJV theories end the analysis at the decision to form an EJV. Although critical, this decision is only one of many decisions facing the partners when they seek to build a co-owned entity. Subsequent to deciding to enter a co-ownership relationship, partners must structure the EJV by settling such issues as share distribution, managerial staffing, board compositions, dispute settlement procedure, etc. Among these structuring decisions, share distribution is perhaps the most fundamental, but it has escaped the attention of EJV theorists who have been preoccupied with *why* firms join a co-owned entity.

2.2 Comparative empirical studies on EJVs

Besides theorizing about the formation of EJVs, previous literature has also accumulated numerous empirical works involving this unique inter-firm cooperation mode. Many of these empirical studies are comparative in nature as they contrast an EJV with another mode for firms to obtain a specific goal. In particular, studies on entry mode choice have viewed an EJV and a wholly owned subsidiary (WOS) as two ownership structures of foreign investments. Strategic alliance literature has compared an EJV, which is an equity-based alliance structure, with non-equity based alliances. Some studies have even held an EJV and an acquisition as two approaches for unaffiliated firms to combine their resources and capabilities within a single entity.

2.2.1 EJV versus wholly owned subsidiary

Entry mode choice, i.e., the selection between an EJV and a WOS, is one of the most important decisions a firm makes when investing in another nation (Anderson & Gatignon, 1986; Brouthers & Hennart, 2007; Stopford & Wells, 1972; Zhao et al., 2004). With a WOS, a foreign entrant bears all the investments and responsibilities required to establish and run the venture and, accordingly, is entitled to all residual profits. If an EJV is chosen, the entrant partners with one or more firms – usually indigenous ones – to share the

investments, equity ownership, management, and residual profits. A huge body of literature has been devoted to the antecedents of entry mode choice while some studies have examined the performance implications of the choice.

2.2.1.1 Antecedents

In a broad sense, most research predicting the entry mode choice has rested on the cost-benefit trade-off of an EJV against a WOS. On one hand, an EJV offers two attractive benefits to a foreign entrant relative to a WOS. Through an EJV, the foreign entrant can enlist the needed but non-marketable assets from its partner (e.g., tacit knowledge about the local market) (Chen & Hennart, 2002; Gomes-Casseres, 1989; Hennart, 1991; Stopford & Wells, 1972). Further, an EJV helps mitigate various business and environmental risks in a foreign country by cutting resource commitments and reducing exit barriers (Contractor & Lorange, 1988; Das & Teng, 1996; Delios & Henisz, 2000; Shan, 1991). On the other hand, an EJV also imposes two major costs that can be eliminated through a WOS. A co-ownership structure subjects the foreign parent to potential behavioral risks that arise from opportunistic attempts by its partner (Buckley & Casson, 1988; Das & Teng, 2001; Das & Teng, 1998b; Gomes-Casseres, 1989; Hill et al., 1990). In addition, sharing ownership means the foreign entrant has to relinquish some control rights to its partner; therefore, it cannot assume complete control in an EJV as it does in a WOS (Erramilli & Rao, 1993; Gatignon & Anderson, 1988; Geringer & Hebert, 1989; Hill et al., 1990; Stopford & Wells, 1972; Williamson, 1991).

Since EJVs allow access to needed but non-marketable resources, conditions that intensify or alleviate the foreign entrant's resource needs should predictably affect the favorability of an EJV. Some studies (Brouthers, Brouthers, & Werner, 2008; Meyer, 2001) argued that an EJV will be a more attractive entry mode than a WOS to firms lacking *international experience* and *host country experience*. Firms at the early stage of internationalization have not yet acquired the necessary skills, processes, and routines to operate and compete alone. Those with little *host country experience* have not acquired country-specific knowledge and connections to independently enter an unfamiliar country. Consistently, studies have found that less international experience is associated with a greater likelihood

of EJV over WOS when U.S. (Erramilli, 1991; Gatignon & Anderson, 1988), Japanese (Hennart, 1991; Makino & Neupert, 2000), and European MNEs (Brouthers et al., 2008; Meyer, 2001) expand to other countries. Studies in various empirical contexts have also confirmed that an MNE with less host country experience is more likely to choose an EJV over WOS as an entry mode (Gomes-Casseres, 1989; Lu, 2002; Luo, 2001a; Yiu & Makino, 2002).

Further, studies have observed that the barriers to entering a target industry increase the need for an EJV to acquire additional resources and capabilities. One such barrier is the government-granted permit to operate in resource industries (Hennart, 1991). A foreign company can only access the operation permit through EJVs with a local partner. Another barrier is the lack of industry-specific knowledge to succeed in unrelated industries. Some industries also rely heavily on brand equity and technological know-how, posing entry challenges for a foreign firm without comparable investments in research and development (R&D) and brand. Using a sample of Japanese subsidiaries, a group of empirical works found that Japanese firms are more likely to select an EJV over a WOS to enter resource-intensive industries (Chen & Hennart, 2002; Hennart, 1991; Lu, 2002; Makino & Neupert, 2000), unrelated industries (Hennart, 1991; Hennart & Larimo, 1998; Hennart & Zeng, 2002), and industries with high investments in advertising and R&D (Chen & Hennart, 2002).

Reliance on local knowledge and resources is also intensified when a firm enters a culturally-distant country. Reasonably, the longer the culture distance between the home and a host country, the more likely a foreign firm will choose an EJV to acquire the local resources. Empirical results on the link between cultural distance and entry mode have been highly mixed. Some studies found that cultural distance increases the likelihood of EJV in foreign entries by Japanese (Hennart & Larimo, 1998; Yiu & Makino, 2002), U.S. (Agarwal, 1994; Kogut & Singh, 1988), and European MNEs (Brouthers & Brouthers, 2001). In other studies, cultural distance either does not matter to entry mode choice (Cho & Padmanabhan, 2005) or leads to the selection of WOS (Yamin & Golesorkhi, 2010). The meta-analysis by Tihanyi, Griffith, and Russell (2005) on 55 studies yielded no significant

evidence as to the direct link between cultural distance and entry mode choice, except only U.S. MNEs tend to choose EJV more than WOSs to foray into culturally distant countries.

Studies have generally supported the contention that firms would select an EJV over a WOS to mitigate risks in international investments. A foreign entrant faces risks from the invested project, the industry, and the host country environment. At the project level, project duration has been found to negatively relate to the likelihood of an EJV (over a WOS) for foreign entrants into China (Chen & Hu, 2002; 2001a). This finding supports the argument that a foreign entrant opts to establish an EJV to take on projects with shorter time span and, therefore, higher risks of recouping returns. Although the project's investment scale has been argued to increase risks and the favorability of EJV, this postulation received insignificant results (Gatignon & Anderson, 1988; Hennart, 1991; Makino & Neupert, 2000). At the industry level, industry uncertainties increase the likelihood of an EJV in a sample of foreign entries into China (Li & Li, 2010), U.S. firms into other countries (Folta, 1998), and Greek and Dutch companies into central European countries (Brouthers et al., 2008). Conversely, industry growth – which indicates fewer risks – leads to the selection of WOSs (Brouthers, 2002; Chen & Hu, 2002; Luo, 2001a). At the country level, overall country risks have been observed to lead a firm to choose partial ownership, whether the country risks are measured by the ratings of an independent agency (Gatignon & Anderson, 1988; Reuer & Leiblein, 2000; Shan, 1991) or by the self-reported assessment of survey respondents (Brouthers, 2002; Brouthers et al., 2008; Brouthers & Nakos, 2004). In fact, the meta-analysis by Zhao, et al. (2004) confirms that country risks are the most deterministic TCE-based predictor of entry mode choice. Beyond overall country risks, evidence also suggests that a foreign investor often form an EJV over WOS in response to the specific country-level risks stemming from restrictive regulations toward foreign operations (Cui & Jiang, 2012; Meyer, 2001; Pan et al., 2014; Yiu & Makino, 2002), corruption (Uhlenbruck, Rodriguez, Doh, & Eden, 2006), weak property right protection (Delios & Beamish, 1999), and government interventions (Luo, 2001a).

Because partnering with another firm comes with potential behavioral risks, a foreign entrant is prone to establish WOS when such risks are perceived to be high. One common behavioral risk is the misappropriation of proprietary know-how by the other partner.

Previous studies (Brouthers & Hennart, 2007) have argued that a foreign firm with intensive R&D tends to select a WOS over an EJV to protect its proprietary know-how from being stolen by another firm, but this position has met with mixed findings. A positive relationship between R&D intensity and the likelihood of full ownership entry has been confirmed in a sample of foreign subsidiaries by U.S. MNEs (Gatignon & Anderson, 1988) and by Japanese MNEs in the electronic and automotive industries (Yiu & Makino, 2002). Yet, many other studies failed to replicate the positive link between R&D intensity and selection of a WOS in other samples, including Japanese subsidiaries in the U.S. (Chen & Hennart, 2002; Hennart, 1991), U.S. subsidiaries across the world (Gomes-Casseres, 1989; Gomes-Casseres, 1990; Shrader, 2001), foreign entries into China (Chen & Hu, 2002), and worldwide entries by British and German MNEs (Meyer, 2001).

Besides know-how, brand reputation that results from investing in advertising is another valuable asset that a foreign partner usually contributes to an EJV, but can easily be misappropriated. With few exceptions (Hennart, 1991; Shrader, 2001), many empirical tests support the stance that a firm with high advertising intensity will seek full ownership to safeguard its brand reputation from free-riding (Chen & Hu, 2002; Chen & Hennart, 2002; Gatignon & Anderson, 1988; Gomes-Casseres, 1989; Gomes-Casseres, 1990; Lu, 2002). Observing the inconsistent findings on the effect of R&D intensity and consistent results on advertising intensity, Chen & Hennart (2002) noted that marketing assets are more influential to a firm's entry mode choice than technological know-how.

Firm-level R&D intensity and advertising intensity proxy the potential behavioral uncertainties a foreign firm encounters in an investment. Departing from this approach, Brouthers and his co-authors administered a questionnaire instrument to capture overall behavioral risks perceived by the decision maker (Brouthers, 2002; Brouthers et al., 2008; Brouthers & Nakos, 2004). They found a positive link between the perceived behavioral risks and WOS entry on Greek and Dutch companies entering Central and Eastern European countries (Brouthers et al., 2008; Brouthers & Nakos, 2004) and worldwide entries made by European Union firms (Brouthers, 2002).

Besides avoiding behavior risks, the costs of shared control may also push a foreign firm to favor WOSs over EJVs. Evidence consistently suggests that foreign firms entering China (Cui & Jiang, 2009) and Chinese firms going abroad (Luo, 2001a) elect to control full ownership if they have stronger intentions of global integration. These results support the argument that MNEs prefer full ownership control to integrate and coordinate operational units across national boundaries, but are willing to relinquish some control to local partners to cultivate local responsiveness.

Common to the cost-benefit analysis on entry mode choice is the efficiency assumption. Yet, institutional theorists contended that legitimacy is an additional consideration to entry mode choice. On one hand, a firm tends to mimic its own historical entries in entry mode selection to help the new entity gain internal legitimacy. Supporting this argument, studies have found that Japanese (Lu, 2002; Padmanabhan & Cho, 1999; Yiu & Makino, 2002) and Korean MNEs (Guillen, 2003) are more likely to choose an EJV if they have frequently established EJVs in the previous year. On the other hand, a foreign firm may also replicate entries of other firms to become isomorphic with an institutional field and to acquire external legitimacy. Consistent with this contention, studies (Lu, 2002; Yiu & Makino, 2002) have observed that Japanese firms are inclined to adopt the same entry mode chosen by other Japanese peers and by firms entering the same industry in a host country. Korean MNEs have also been found to follow their peers in the same business group and industry when selecting a foreign entry mode (Guillen, 2003). Using foreign entries into China from 1991 to 2004, Xia et al. (2008) found a bandwagon effect in mode selection, where a foreign firm adopted or rejected EJVs as this ownership structure rose or declined in the same host industry.

2.2.1.2 Performance consequences

Entry mode choice has caught ongoing interest from scholars because of its significant impact on the performance of the foreign operation and even the global competitiveness of MNEs. Beyond this assumption, some scholars have endeavored to obtain a deeper understanding of the outcomes of the choice. Focusing on managers' self-reported assessment of subsidiary performance, some early studies supported that WOSs

outperform EJVs. For example, Japanese manufacturing WOSs in North America (Woodcock et al., 1994) and Western Europe (Nitsch et al., 1996) are more likely to be rated as ‘gain’ or ‘breakeven’ whereas EJVs are more likely to be at ‘loss’. These authors attributed the underperformance of EJVs to various liabilities of co-management such as conflicts and goal incompatibility between partners.

Using objective performance measures, other studies disagreed with a universal superiority of WOSs over EJVs. Examining foreign operations in China from 1900 to 1995, Li, Lam, and Qian (2001) found that WOSs perform better than EJVs in terms of sales growth, productivity, and return on assets. This performance difference became insignificant once technological input to the venture is accounted for, suggesting that it is not the mode of entry *per se*, but the technology contribution that is responsible. Shrader (2001) also failed to discriminate between collaboration – including licensing and EJV – and WOS in terms of the profits and sales growth a U.S. firm derives from a foreign market.

The inconsistent results also characterized studies that compared the two entry modes in terms of the survival (or failure) of the foreign venture. For instance, Li (1991) observed that the failure rate of EJVs and WOSs is largely comparable on a sample of 5,588 entries from 1978 to 1988 into the U.S. A later study by Li (1995) revealed that WOSs have a significantly lower exit rate than EJVs in U.S. computer and pharmaceutical industries from 1974 to 1989. Similarly, the data in the study by Hennart et al. (1998) demonstrated that Japanese EJVs in the U.S. have significantly shorter longevity than WOSs. Noting the inconsistent findings, Papyrina (2007) argued that the entry mode-longevity link is contingent on entry timing. His study revealed that Japanese EJVs in China outlive WOSs at the early institutional development stage when inputs from local partners are critical, but WOSs live longer at the stage of mature institutions when partnership brings more costs than benefits.

Moving away from the simple comparison of one mode over the other, Brouthers and his colleagues explored whether an entry with a theoretically prescribed mode performs better than an entry without (Brouthers & Brouthers, 2001; Brouthers, Brouthers, & Werner, 2003; Brouthers et al., 2008; Brouthers & Hennart, 2007; Brouthers & Nakos, 2004). The

issue is ‘mode fit’ as opposed to the selected mode *per se* in an entry observation, and the authors captured mode fit by using a two-stage method. Employing logistic regression, they first predicted the mode a firm *should* adopt for a given subsidiary with independent variables informed by theories such as TCE and organizational learning. Next, they devised a dummy variable that indicates whether or not the actual mode of an entry is the same as predicted. This dummy variable was included in a model that explains entry performance. Using 105 entries of European Union firms into 27 countries, Brouthers et al. (2002) observed that the subsidiaries with entry mode predicted by TCE, institutional, and cultural variables performed significantly better on a subjective assessment of financial and non-financial criteria. This result was later replicated in a sample of entries into Central and Eastern Europe by Dutch, German and British firms (Brouthers et al., 2003, 2008; Brouthers & Nakos, 2004), and of foreign investments into China (Chen & Hu, 2002).

Scholars later realized one flaw – endogeneity – in the approach of directly comparing the performance of the two entry modes (Shaver; 1998; Brouthers, 2002). More precisely, “the most distinctive issue for mode of entry (MOE) research is one of self-selection, whereby managers choose an MOE based on characteristics that are expected to affect performance, but which are (partly) unobservable to the researcher.” (Martin, 2013, p. 32). To remedy the endogeneity bias, performance models by Brouthers et al. (2008) included an inverse Mills ratio obtained from Heckman’s two-stage method. The results still support that foreign investments with a theoretically-predicted mode outperform those without. More recently, Chang, Chung, and Moon (2013) tackled the endogeneity issue with the propensity score method. They first employed the method to yield a matched sample consisting of ongoing EJVs and those WOSs that converted from EJVs and then used the difference-in-difference approach to compare the performance between the two groups. Their results on foreign subsidiaries in China from 1998 to 2006 confirmed that WOSs converted from EJVs see superior performance to those that continue operating as EJVs.

2.2.2 EJV versus non-equity based alliance

When two or more firms decide to form an alliance, they can structure the alliance as equity-free (contractual) or equity-based. Alliances without equity commitments are

contracts that allow allies to pool resources to accomplish common goals. Non-equity alliances entail a wide array of forms such as consortia, franchising, licensing, outsourcing, countertrade, distribution agreement, cooperatives, and so on (Chen, 2010; Ménard, 2012; Parkhe, 1993). Equity-based alliances also involve pooling resources into an entity that is jointly owned and managed by the allies, namely an EJV.

Most studies that examine the choice between equity versus non-equity alliances are influenced by TCE (Williamson, 1985, 1991). According to TCE, equity-based alliances afford stronger hierarchical control to both parties over their inter-firm cooperation than non-equity alliances. An EJV replicates more hierarchical elements such as board of directors and shared management, and these hierarchical elements enable the parties to hold each other accountable to their promised commitments to the alliance (Cuypers, Ertug, Reuer, & Bensaou, 2017; Gulati, 1995a; Gulati & Singh, 1998; Pisano, 1989; Sampson, 2004b). Since allies must incorporate a separate entity, EJVs are more complex to negotiate, change, and terminate than non-equity alliances; therefore, firms would not take the trouble of creating an EJV unless contractual alliances have failed (Gulati, 1995a; Oxley, 1997; Pisano, 1989; Sampson, 2004b).

Research has highlighted *alliance properties* as the precedents to the choice between the two alliance structures. The alliance property that has been studied the most is whether an alliance involves the exchange of technological know-how which, according to TCE, is particularly vulnerable to appropriability hazards and costly to contract (Gulati, 1995a; Oxley, 1997). Evidence suggests alliances with an R&D functionality are more likely to be equity-based in biotechnology, telecom, and automotive industry (Gulati, 1995a; Kim & Hwang, 1992; Osborn & Baughn, 1990; Oxley, 1997; Pisano, 1989; Sampson, 2004a, b, 2007; Teng & Das, 2008). In addition, an alliance is also more likely to be equity-based when it takes on more projects (Oxley, 1997; Pisano, 1989), involves more value chain functions (Li et al., 2012; Sampson, 2004a, b), or has more participants (Li et al., 2012; Oxley, 1997; Sampson, 2004a, b). The alliances with these features pose additional complexities for specifying and enforcing the responsibilities of the allies and are, therefore, efficiently governed by an equity-based structure. Due to cultural differences, it has been argued that the presence of international participants in an alliance dampens contractibility;

however, this property shows no impact on the alliance structure choice in empirical studies (Gulati, 1995a; Li et al., 2012; Sampson, 2004a).

Scholars have also recognized that *inter-partner relationship* can significantly shape how partners behave in an alliance and influence their choice of alliance structures. In this research, trust between firms is the most frequently invoked relational factor. Gulati (1995) contended that trust, which is bred from past alliance experience, enhances the predictability of partner behaviors and, in turn, decreases dependency on formal, hierarchical oversight. Using alliances in biopharmaceutical, new materials, and automotive sector, he (1995) observed that firms with more alliances formed in the past are more probable to structure the current alliance as equity-free (Gulati, 1995a; Gulati & Singh, 1998). This result is also replicated in the study by Gulati & Singh (1998), but not in others (Oxley, 1997; Sampson, 2004a). Another relational factor influencing alliance structure is the dissimilarity between firms, which can be a source of information asymmetry and communication complexities. Consistently, establishing an EJV is more likely than initiating a contractual alliance if the partners are more dissimilar in their national cultures (Georgieva, Jandik, & Lee, 2012) and technological capabilities (Sampson, 2004b). Inter-partner relationship has also been characterized by the number of concurrent alliances between the two partners, which is argued to enhance cooperation and reduce the dependency on the equity-based structure. However, the empirical findings disagreed (Sampson, 2004a).

Some scholars looked beyond alliance properties and immediate inter-partner relationship to examine how the *industry* and *national environment* affects the organization of an alliance. Pisano (1989) observed that the number of alternative partners in an industry segment is positively related to the selection of a non-equity alliance structure. This result supports his rationale that opportunistic hazards and switching costs are reduced in situations with more qualified partners, making a contractual alliance an efficient governance structure. Moreover, in countries with credible institutions, well-enforced contracts are efficient to mitigate the transaction hazards, rendering a joint equity relationship unlikely. Consistent with this contention, previous studies found that firms are more inclined to choose non-equity alliances in an environment with stronger intellectual

property protection (Li et al., 2012; Sampson, 2004a), rule of law (Georgieva et al., 2012), and judicial efficacy (Sampson, 2004a). Conversely, EJV's are more likely when the public order is upset by arbitrary corruption (Uhlenbruck et al., 2006) and high political risks (Kim & Hwang, 1992; Sampson, 2004a).

Departing from the TCE tradition that highlights transactional hazards in alliances, scholars have proposed other considerations that can shape the choice of alliance structure. To begin with, Gulati & Singh (1998) argued that an EJV with its formal structure and processes is superior to a contractual arrangement in coordinating joint decision making and actions. When an alliance involves frequent and complex joint actions, only the equity-based structure can provide the desired coordination. Their results showed that an EJV is more likely when allying firms' interdependence becomes more complex, going from a pooled, to a sequential, to a reciprocity independence (Gulati & Singh, 1998). Furthermore, equity provides firms with stronger strategic control over an alliance, which allows them to better integrate the alliance with other operations. Kim & Huang (1992) found firms with a stronger intention of global synergy tend to ally with another firm through EJV's rather than licensing contracts. Lastly, relative to a contract, an equity-based alliance is usually harder to form and dissolve. Exit barriers make an EJV less attractive when partners value strategic flexibility. Osborn and Baughn (1990) found that alliances tend to be contractual rather than equity-based in high-tech product areas where flexibility is crucial to competition.

Compared with abundant scholarly attention to the antecedents of choosing equity and non-equity alliances, research on the performance of the choice has been sporadic. By investigating 14,466 foreign alliances in China in 1995, Pan (1999) observed that equity-based alliances have a larger market share and higher profitability than contractual alliances. Relying on market entries by small and medium enterprises into Central European countries, Brouthers & Nakos (2004) distinguished between the alliance structures that are selected according to TCE theory and those not so selected, regardless of whether the alliances are equity-based or not. Their results revealed that a foreign alliance partner gains higher satisfaction from the alliances with a structure that fits the prediction of TCE theory over alliances with a structure that does not fit. Similarly, R&D

alliances with TCE-predicted governance structure were found to contribute more patents to their parent firms (Sampson, 2004a) and have longer durations (Li et al., 2012) than those with a misaligned structure.

2.2.3 EJV versus full acquisition

While firms often form EJVs to combine proprietary and complementary resources, they can also achieve the same purpose through a more drastic approach – acquisition (Chi, 1994; Wang & Zajac, 2007). In other words, an EJV and an acquisition can serve as alternative resource combination devices. With an EJV, the cooperating partners pool their respective resources into a separate entity for joint exploitation and split the resulting profits in proportion to their equity ownership (Chen & Hennart, 2002; Stopford & Wells, 1972). In an acquisition, the acquirer overtakes ownership of the target firm along with all its assets, capabilities, and liabilities, merging the two unaffiliated firms under one common ownership (Balakrishnan & Koza, 1993; Chen, 2008; Reuer & Ragozzino, 2012; Villalonga & McGahan, 2005).

Between these two resource-combination approaches, an acquisition can be less efficient than an EJV due to the adverse selection hazards at the pre-acquisition stage. Information asymmetry is usually present in the merger and acquisition market (Wang & Zajac, 2007). Normally, firms up for sale hold private information about their assets and resources. The seller then has a natural tendency to exaggerate values of its assets and inflate the price. Lacking complete information, the acquirer cannot tell the true value of a target firm and is subject to a high risk of buying a ‘lemon’ (Akerlof, 1970; Chen & Hennart, 2004; Stigler, 1961). An EJV can free firms from adverse selection hazards while providing access to desired resources and assets (McCann, Reuer, & Lahiri, 2016; Ozmel, Reuer, & Gulati, 2013; Reuer & Ragozzino, 2012; Reuer, Tong, Tyler, & Arino, 2013). Those firms seeking to oversell their assets are inclined to reject an EJV for the lack of opportunities to play ‘hit and run’ (Chen & Hennart, 2004). An EJV also curbs value manipulation in that the value of each other’s contributions will eventually become transparent during the collaboration periods (Balakrishnan & Koza, 1993). Hence, “an alliance may be more preferable than an

acquisition when the information asymmetry problem is great” (Wang & Zajac, 2007, p. 1295).

Furthermore, an acquisition can also be unfavorable due to the integration challenges at the post-acquisition stage. First, friction and conflict between the target and the acquirer can plague the integration process. The buyer and the seller usually differ in numerous organizational structures and operational processes (Chari & Chang, 2009; Datta, 1991; Hennart & Park, 1993; Reuer & Ragozzino, 2012; Villalonga & McGahan, 2005; Wang & Zajac, 2007). Widespread conflicts can cause a drop in employee morale, an exodus of managerial talent, and a loss of customers, which destroys the value of an acquisition (Graebner, Heimeriks, Huy, & Vaara, 2017). Conflicts at the integration stage can easily be avoided by forming an EJV with the target company, which leaves the ownership of both partners unchanged. Second, an acquirer bears the burden of unwanted assets. An acquisition never overtakes only the needed assets – a whole organization has to come with them. The acquirer must either internally digest or divest the unwanted parcels that tag along (e.g., products, assets, and staff) (Hennart & Reddy, 1997; Villalonga & McGahan, 2005). In contrast, an EJV exempts partners from challenges stemming from superfluous resources and employees since both only contribute assets and human talent necessary to attain the cooperation goals.

Resource commitments and risks also differ between an acquisition and an EJV. Joint venturing with a firm tends to be less risky than acquiring it (Datta, Musteen, & Herrmann, 2009; Folta, 1998). In an acquisition, the acquirer has to put up all costs incurred in purchasing another business and bear all the risks afterward. In contrast, an EJV allows a firm to save on investment costs and to share operation risks.

Although an acquisition comes with various shortcomings when compared with an EJV, it does offer one benefit – speed. Building an EJV from scratch takes time, whereas overtaking the ownership of an existing entity offers a shortcut for a firm to quickly establish a presence in another industry or a geographic market (Hennart & Park, 1993; Hennart & Reddy, 1997; Reuer & Ragozzino, 2012).

When adverse selection hazards are severe in an acquisition, firms should expectedly opt for an EJV to combine their resources. This contention is largely supported by empirical inquiries. Specifically, information asymmetry is less problematic if two firms operate in related businesses (Villalonga & McGahan, 2005), have a higher similarity in firm resources (Wang & Zajac, 2007), and are located in the same regional cluster (McCann et al., 2016). Under these conditions, the two firms are more likely to embrace acquisition than an EJV. From the perspective of the target firm, Reuer and Ragozzino (2012) suggested that the newly IPO firms signal their quality on market and increase their chances of being acquired rather than entering an EJV if these firms are taken public by reputable investment banks and backed by venture capitalists. The experiment carried out by Reuer et al. (2013) showed that executives prefer acquiring to joint venturing with local firms in foreign countries when they are familiar with the firm's product of the firm and can easily evaluate the target asset.

Conditions that increase integration costs of an acquisition have also been shown to discourage firms from choosing this structure. Both American (Kogut & Singh, 1988) and Japanese MNEs (Hennart & Larimo, 1998) have been found to select an EJV over an acquisition to enter culturally distant countries where post-merger integration is more complicated. Highlighting the difficulties to digest unwanted assets and resources from an acquired firm, Hennart & Reddy (1997) argued that the digestibility of a firm depends on its size and whether it is divisionalized. Their results suggest that the likelihood of acquisition increases when the target firm is smaller and divisionalized. Also consistent with the digestibility proposition, Villalonga (2005) found that acquisition is more likely than an alliance if two firms feature a greater difference in size.

To trade off resource commitments and associated investment risks of acquisitions leads firms to favor EJVs to combine resources. Studies found that firms opt for EJVs over acquisitions if they come from countries with high uncertainty avoidance (Kogut & Singh, 1988) or enter industries with high technological uncertainties (Folta, 1998). Datta, Musteen, and Herrmann (2009) showed that a firm is more likely to pursue an acquisition over an EJV when its board oversight is tightened – as indicated by a higher proportion of outsider members and a separation of CEO and chair – and when manager incentives are

aligned with firm long-term performance. These results support an agency theoretic prediction arguing that managers as risk-averse agents prefer a less risky mode (i.e., an EJV over an acquisition). Factors of agency theory, including insider ownership, blockholder ownership, and institutional ownership – were largely irrelevant to the acquisition-EJV choice in the sample by Villalonga and McGahan (2005).

Empirical evidence supports the speed advantage of an acquisition than an EJV. When an industry grows fast, acquiring an incumbent firm avoids the high opportunity costs a firm otherwise bears if it enters with an EJV. Consistent with this contention, industry growth rate has been shown to increase the likelihood of an acquisition (Hennart & Reddy, 1997; Reuer & Ragozzino, 2012).

With few exceptions, literature pays little attention to the performance consequences of the acquisition-EJV choice. Among the exceptions, an early attempt was from Balakrishnan & Koza (1993). They found that the stock value of a firm appreciates after the announcement of an EJV with partners from different industries, but decrease after the announcement of an acquisition into different industries. They explained that information asymmetry in cross-industry acquisitions destroys values, while across-industry EJVs create value through resource complementarity. Focusing on Japanese manufacturing entries, both Woodcock, Beamish, and Makino (1994) and Nitsch (1996) observed that EJVs outperform acquisitions in managers' self-reported assessment. However, these empirical findings and conclusions may be biased by endogeneity threats. As Shaver (1998) showed, greenfield entries, either WOSs or EJVs, reported higher performance than acquisitions, but this difference vanishes once the self-selection bias is taken into account.

2.2.4 Comments

Comparative analyses of the three research streams have produced a large body of knowledge about an EJV and its alternatives, whether a WOS, a non-equity alliance, or an acquisition. More important, they identified and verified numerous conditions under which one mode is more suitable than the other. The empirical evidence further confirmed that the upfront choice between an EJV and another mode can affect subsequent performance.

These comparative studies are diverse in empirical questions, statistic approaches, and research settings. Nevertheless, they follow the same procedure to construct the EJV category when measuring the binary choice. These studies first defined an EJV according to a cut-off value in one party's equity holding (below 95% or 80%), then lumped all observations that satisfy the definition into one group, and attached these observations with the same dummy value.

The operationalization of pooling all EJVs into one category treats all observations as the same, but observations *within* the EJV category are not without differences. In fact, share distribution across these observations varies extensively (e.g., 20/80, 30/70, 50/50, 70/30, 90/10). Along with the variations in share distribution, numerous governance designs (e.g., decision-making power, profit sharing, etc.) also differ. By omitting the variances in share distribution, the comparative analyses disregarded one of the most fundamental distinctions among EJVs.

2.3 Foreign ownership in international EJVs

When expanding internationally, many firms have employed EJVs to enter host countries (Beamish & Banks, 1987; Gomes-Casseres, 1989; Kogut, 1988; Stopford & Wells, 1972). To these foreign entrants, a critical issue is determining an appropriate ownership level in an overseas EJV. This has stimulated international studies to explore both the antecedents and the performance implications of foreign ownership in EJVs.

2.3.1 Antecedents of foreign ownership

To date, research on the antecedents of foreign ownership has been largely built on three concerns confronting a foreign partner, including effective control over a subsidiary, sharing investment risks, and bargaining with the local government and the local partner.

Keeping a leash on an overseas EJV is always a challenge to an MNE (Gatignon & Anderson, 1988; Geringer & Hebert, 1989; Kumar & Seth, 1998; Li, Zhou, & Zajac, 2009; Luo et al., 2001; Schaan, 1983). A foreign parent can gain some control over a local EJV through socialization mechanisms (Schaan, 1983), or it can leverage its technical expertise

to dominate an operational function (Child & Yan, 2003; Mjoen & Tallman, 1997). Regardless, nothing compares to equity ownership in affording comprehensive control (Geringer & Hebert, 1989; Luo, 2001b; Yan & Gary, 2001). Ownership dictates a foreign partner's governance control over the EJV's strategic decisions by affecting its seats in the boardroom (Cuypers et al., 2017; Kumar & Seth, 1998). Especially with a majority ownership position, the foreign party holds an ultimate resort – majority voting – to steer the strategic agenda of the EJV to serve its own interests rather than those of its partner (Killing, 1983; Kumar & Seth, 1998; Mjoen & Tallman, 1997; Yan & Gary, 1994). In addition, with more ownership, the foreign partner can send more of its own managers to staff the EJV, thereby gaining more oversight on daily operations (Kumar & Seth, 1998).

Additionally, the ownership level of the foreign partner also relates to its risk exposure in an EJV. By holding more equity shares, the foreign party is obligated to invest more capital, tangible or intangible assets, and human talents into an EJV. A significant portion of these investments will sink into the host environment, posing exit barriers and inflicting the entrant's vulnerability to environmental hostility and business failure (Contractor & Lorange, 1988; Das & Teng, 2001; Das & Teng, 1996; Delios & Henisz, 2000; Dixon, 1962; Johnson & Houston, 2000; Meynen et al., 1966; Nicholas, 1950; Shan, 1991). By relinquishing more equity ownership and scaling back resource commitments, the foreign party shifts more risks to its partner and strengthens its flexibility to retreat from an EJV.

While foreign firms wish to maintain control and mitigate risks by adjusting its ownership level, ownership design of an EJV is never a decision by a single party, but an outcome of multi-party bargaining (Killing, 1983; Meyer & Wang, 2015). Literature has recognized that an MNE has to bargain with two relevant opponents for its ownership in an EJV. The first is the host-country government (Gomes-Casseres, 1990; Lecraw, 1984; Vachani, 1995). In some countries, the government imposes a cap on the ownership a foreign entrant is allowed to control. The government would not permit a foreign MNE to go beyond the cap in an EJV unless it offers valuable contributions to the local economy in the form of job creation, exports, or transfer of advanced know-how or managerial expertise (Gomes-Casseres, 1990; Lecraw, 1984; Vachani, 1995). The second bargaining opponent is the local partner (Parkhe, 1993). Like its foreign counterpart, the local partner also wishes to

gain a desired ownership position in the EJV, either for control or risk considerations. Since ownership expectations from the local partner are rarely congruent with those of the foreign partner, bargaining and concessions are inevitable to close ownership negotiations (Blodgett, 1991; Mjoen & Tallman, 1997; Yan & Gary, 2001).

In general, evidence supports the positive link between the foreign party's desire for control and its ownership level in an EJV. From the TCE perspective, ownership control is needed for a foreign partner to safeguard its proprietary contributions against appropriation hazards (Oxley, 1997). Along with this line, studies have found that Japanese firms hold higher equity ownership in overseas EJVs when the firm is R&D- and advertising-intensive (Delios & Beamish, 1999; Delios & Henisz, 2000) and when intellectual property protection in host countries is ineffective (Delios & Beamish, 1999). In addition, ownership control can also arise from strategic considerations. Luo (2001b) observed that foreign ownership in Chinese-based EJVs is higher if the EJV is set up for pro-active projects and requires tight global integration. In addition, the MNE's home culture also shapes its preference toward ownership control. Studies have found that MNEs from countries with high power distance tend to hold more foreign ownership in their international operations (Pan, 2002; Richards & Yang, 2007).

Previous studies have also supported a trade-off between equity ownership and the risks imposed by projects or the external environment. At the project-level, research (Pan, 1996; Shan, 1991) observed that contract duration is associated with higher foreign ownership, supporting that a longer contract affords more time for the foreign partner to reap the benefits of an investment and is less risky. Although investment scale of a project has been argued as another indicator of riskiness, empirical findings are mixed about the impact of investment scale on foreign equity (Chadee & Qiu, 2001; Pan, 1996; Shan, 1991; Zhao & Zhu, 1998). In other studies, various environmental risks were found to decrease the foreign equity level, including public expropriation hazards (Delios & Henisz, 2000), economic, institutional, and exchange rate uncertainty (Cuypers & Martin, 2010), country risks (Pan, 1996), industry demand uncertainty (Li & Li, 2010), and environmental complexity and hostility (Luo, 2001b).

Some scholars noted that the trade-off between foreign ownership and environmental risks does not uniformly apply across firms, highlighting a moderating effect of firm capabilities (Chen & Hennart, 2002; Madhok & Tallman, 1998). Some firms may have developed certain resources, capabilities, and connections, which enable them to mitigate the environmental threats without scaling back their ownership. Consistently, Delios and Henisz (2000) found that international experience of Japanese firms weakens the negative impact of political risks on foreign ownership in international EJVs. Recently, the results reported by Pan, Teng, Supapol, Lu, Huang, and Wang (2014) revealed that state ownership and legislative connections of Chinese firms attenuated the negative relationship between equity ownership in international EJVs and the uncertainties in the institutional environment of host countries. In their framework, state ownership and legislative connections help a firm attract political and financial resources as well as enhance its capabilities to tolerate environmental risks.

Furthermore, the bargaining power prediction of foreign ownership is generally consistent with empirical findings. Focusing on the bargaining between MNEs and host-country governments, Lecraw (1984) found that equity shares of foreign MNEs increase with factors (e.g., technological leadership, marketing, and export intensity of the subsidiary) that enhance the MNE's bargaining power, but decreases with factors (e.g., market attractiveness and the availability of alternative foreign investors) that strengthen the local government's suasion. In a sample of U.S. and U.K. subsidiaries in India, Vachani (1995) found that only the MNE's technological intensity significantly increased its ownership in foreign EJVs, whereas other factors such as capital intensity and export performance of the project exert non-significant impacts. In terms of bargaining with the local partner, Blodgett (1991) observed the foreign partner that makes technological contributions wields more power to compete for majority ownership and subsequently to acquire more equity shares, whereas the local partner contributing location-specific assets are likely to hold minority ownership and later cede their equity. Similarly, the study by Mjoen & Tallman (1997) revealed that partners with more valuable contributions have more bargaining power and claim a higher equity percentage. Studying foreign operations in China, Pan (1996) found that the foreign partner's equity percentage diminishes with the number of

local partners in EJVs since the collusion between local peers enhances their collective bargaining power over the foreign partner.

2.3.2 Consequences of foreign ownership

A collection of studies considered performance consequences of foreign ownership in EJVs. Most of these studies cast a positive light on the relationship between foreign ownership and EJV outcomes. More foreign ownership, according to these studies, attracts more proprietary assets, human talent, and managerial attention from the foreign parent. This is because more foreign ownership strengthens the correlation between the payoff to the foreign parent and the EJV's residuals (Beamish & Banks, 1987; Chi & Roehl, 1997; Dhanaraj & Beamish, 2004; Grossman & Hart, 1986), provides stronger hierarchical oversight to safeguard the proprietary assets (Killing, 1983; Oxley, 1997), and allows the foreign partner to put its own assets to the best possible use (Child & Yan, 2003; Luo et al., 2001; Yan & Gary, 1994, 2001).

The positive link between foreign ownership and various EJV outcomes has been met with inconsistent empirical findings. In some studies, ownership enhances satisfaction and goal attainment of foreign partners (Luo et al., 2001; Yan & Gary, 1994, 2001); however, other studies did not replicate this finding (Mjoen & Tallman, 1997). Luo (2002) also failed to find evidence that foreign ownership is related to the return on investment of EJVs in China. Focusing on the longevity of Japanese foreign EJVs, Dhanaraj & Beamish (2004) showed that ownership of the Japanese parent extends the longevity of its EJVs, whereas Makino (2007) found no such relationship.

Inconsistent findings seem to imply that foreign ownership brings benefits along with costs to an EJV. Li et al. (2009) recognized that increasing the foreign partner's ownership encourages it to transfer valuable assets to the EJV, but that inevitably drives down the local partner's ownership to the same extent and can, in turn, cut the incentive of the local partner to contribute its resources. An overly dominant foreign owner can erode the collaboration of the local party and eventually harm the co-owned business. Empirically, they found an inversed curve relationship between foreign ownership and productivity of

international EJVs in China, where productivity first increases, but after a threshold, declines with foreign ownership.

2.3.3 Comments

Previous studies on foreign ownership have produced valuable insights regarding the ownership strategy of MNEs in overseas EJVs. These insights suggest that MNEs have to balance the opposing demands of control and risk-aversion when deciding the ownership level in an EJV. MNEs can enhance their control over foreign operations by increasing their ownership, but doing so often requires more equity commitments, thus exposing the MNEs to more environmental and operational risks. However, an MNE may not achieve its preferred ownership level when negotiating an EJV, in that the process is also shaped by the bargaining with the local partner and sometimes the local government. In addition, the ownership held by the foreign party brings both benefits and costs to an EJV, indicating a complex relationship with EJV performance and longevity.

Most of the studies on foreign ownership employed an MNE-centric approach giving no consideration to the other partner – often an indigenous firm (Hennart, 2009). Implicitly or explicitly, studies on foreign ownership assume that the local partner always succumbs to the equity claim of the foreign party (Luo et al., 2001); this assumption is flawed (Wang & Zajac, 2007). Compared with the foreign partner, the local partner is no less motivated to fulfill its ownership claim so its control over the EJV is fastened (Gatignon & Anderson, 1988; Geringer & Hebert, 1989; Mjoen & Tallman, 1997) and a fair share of profits secured (Contractor, 1985; Killing, 1983). The local partner, for its valuable contributions, is often equipped with sufficient bargaining chips to obtain its own preferences when finalizing the deal (Brouthers & Hennart, 2007; Chen, 2010; Inkpen & Beamish, 1997; Mjoen & Tallman, 1997; Pearce, 1997).

Whereas few studies from the bargaining power perspective considered the local partner's role, theoretical arguments and empirical models still focus on foreign ownership only. Consequently, bargaining power studies shed no light on how the two parties collectively find a specific percentage combination to split the equity shares.

2.4 Design of the co-ownership structure

Another stream of research has sought to identify the optimal design of the co-ownership structure (Killing, 1983). So far, this stream has been dominated by one debate: whether a balanced or unbalanced structure (i.e., 50-50 vs. otherwise) is superior.

2.4.1 Balanced versus unbalanced ownership structure

Some scholars endorse a balanced ownership and justify their preference on three benefits of equal ownership structure (Beamish & Banks, 1987; Bleeke & Ernst, 1991; Harrigan, 1986). From an incentive alignment perspective, equal ownership can better secure continuous interests and commitments of both parties to the EJV (Harrigan, 1986; Kogut, 1989; Park & Russo, 1996; Parkhe, 1993). Both claim half the profits from the EJV, making them equally motivated to contribute to the collective endeavor. Too little equity risks discouraging a party from sustaining its contributions, or worse, pushes it toward self-serving behaviors. From a relationship-building perspective, equal ownership helps breed trust and a sense of equality, allowing partners to smoothly collaborate (Gulati, 1995a; Madhok, 1995; Ring & Van de Ven, 1992). A structure with evenly divided ownership best embodies the spirit of partnership and guarantees no partner feels overwhelmed by the other. From a hierarchical control perspective, equal ownership affords equal decision-making power to both parties, thereby deterring any party from putting its own interests above the other or the EJV (Bleeke & Ernst, 1991). In the end, equal ownership can maintain cooperative incentives, harmonize the inter-partner interactions, and ultimately enhance the performance of the EJV.

By contrast, other scholars advocate for an unbalanced ownership structure (Killing, 1983; Lecraw, 1984; Park & Russo, 1996). They contend that equal ownership drains decision-making efficiency and causes strategic rigidity. Partners to an EJV normally hold divergent and sometimes conflicting agendas toward the strategy and operation of the co-owned entity, and equal ownership confers them with equal power to press their preferences in the decision-making process. Subsequently, equal owners have to undergo excessive communications and reconciliations before reaching an agreement. Furthermore, equal

ownership often leads to “friction at the operating level, compromises with which neither partner is satisfied, reduced commitments to the venture, and unsatisfactory performance” (Lecraw, 1984, p. 32). Splitting equity shares unevenly solves this issue. An unbalanced ownership design gives the majority owner sufficient power to manage the EJV as if it is unitarily owned. The asymmetrical arrangement then significantly reduces the necessity to coordinate decisions, expectations, and preferences of both parties. Impasses, a serious drain on decision timeliness, can be avoided. Killing (1983) fervently warned firms to avoid an equal co-ownership structure – by any means.

2.4.2 Empirical evidence

Beyond conceptual debate, empirical studies have contrasted the performance implications of the balanced and unbalanced ownership structure. The results, however, are highly mixed. A group of findings supported the superiority of the balanced ownership structure. Specifically, these studies observed that balanced ownership structure enhances partner satisfaction (Beamish & Banks, 1987), stabilizes the cooperation by discouraging contract renegotiation (Blodgett, 1992) and share adjustments (Iriyama, Shi, & Prescott, 2014), and thwarts unplanned dissolution of the partnership (Beamish & Banks, 1987; Bleeke & Ernst, 1991; Hennart & Zeng, 2002).

Other studies found that EJVs with an unbalanced equity split are more effective in acquiring knowledge from their parents (Lyles & Salk, 1996), perform better (Killing, 1983; Lecraw, 1984), and are less likely to go bankrupt or be sold to a third party (Park & Ungson, 1997). The meta-analysis by Reus and Rotting (2009) showed that EJVs with their foreign owner in a dominant position outperform those with equal ownership.

Still, in other studies, whether ownership structure of EJVs is equal or not does not matter to subjective assessments of EJV performance (Luo & Park, 2004), goal attainment (Child & Yan, 2003), return on investments of the EJV (Zhang, Li, Hitt, & Cui, 2007), or the likelihood of termination (Makino et al., 2007; Mohr, Wang, & Fastoso, 2016). The debate on the unbalanced versus balanced ownership structure has not been settled theoretically or empirically.

2.4.3 Comments

Scholars involved in the debate over optimal ownership design in EJVs have attempted to prove theoretically and empirically that one structure – balanced or unbalanced – is universally superior to the other and should always be chosen. More realistically, however, each structure has its own pros and cons. Balanced ownership ensures incentive alignment and an equitable relationship, but causes decision delays and strategic rigidity, whereas unbalanced ownership allows for swifter decision making only at the risk of minority owners losing interests. As neither ownership design is perfect across time and scenarios, the mixed findings regarding the consequences of the two ownership designs come as no surprise.

By categorizing ownership design as a dichotomous choice, both sides of the debate oversimplifies reality. When partners divide the equity of an EJV, they face not two, but a wide range of alternative percentage combinations – virtually any combination between 0-100 and 100-0. Whereas the balanced ownership structure refers to a specific percentage split (50-50), unbalanced ownership structures encompass all remaining possibilities. Simply contrasting a balanced versus an unbalanced ownership design may inform whether to go with a 50-50 split, but is of little value once a partner tries to locate an unbalanced division.

2.5 The pricing-error rule of share distribution

Previous studies on the ownership design of EJVs overlooked share distribution between partners. These studies have centered on either the ownership of a single partner or the choice between a balanced and unbalanced structure. Yet, share distribution requires two parties to select a specific percentage combination out of numerous alternatives. Share distribution has remained unnoticed in literature until a recent study by Chen et al. (2017), in which the research objective was to probe how partners can best divide the equity shares of the EJV.

Chen et al. (2017) first clarify a fundamental misconception in the existing TCE theory of EJVs. According to TCE (Hennart, 1988), an EJV is a more efficient arrangement than market for unaffiliated firms to combine complementary but hard-to-price assets. An EJV is more efficient as it allows partners to pool their assets into the co-owned business for free, and claim only the residual profits as rewards. The market fee for their assets is eliminated as are associated transaction costs (Brouthers & Hennart, 2007; Hennart, 2009). Chen et al. (2017) observed that even with an EJV, partners still collect a fee for their inputs before splitting the residual profits. Partners to an EJV, therefore, still face similar pricing difficulties as they do in a market transaction.

According to Chen et al. (2017), an EJV derives its relative efficiency over market by constructing a pricing-error mechanism. Since the value of the assets pooled into the EJV is inherently ambiguous, self-interest maximization constantly tempts both parties to overprice *ex ante* and under-deliver *ex post* their assets (Hennart, 1993; Hennart, 2006; Williamson, 1975, 1985). The fee to each partner will then deviate from the value of the assets eventually transferred into the EJV. Chen (2015) coined this fee-value gap as a pricing error. Whereas overpricing and under-delivery brings private gains to each party, such opportunistic behaviors drain profits of the EJV. This profit reduction later loops back to each partner at the dividend-sharing stage, technically offsetting the gains from the upward pricing error *ex ante*. By correcting the pricing error in the two fees, equity participation in the EJV reduces the opportunism incentive of the partners and save on transaction costs otherwise incurred if they directly traded with each other in market.

The degree of correction to each partner rests on the difference between its pricing error *ex ante* and the residual profits it claims *ex post*. Since equity ownership dictates profit sharing, share distribution is crucial to the pricing-error correction mechanism and the transaction cost saving. To fully correct the two pricing errors, Chen et al. (2017) propose that partners should follow a pricing-error rule when splitting the equity shares of the EJV. That is, to portion the equity shares of the EJV into a percentage combination that precisely matches the relative size of the two pricing errors (e.g., when the pricing error of one party is four times that of the other, the best ownership split between them is 80 percent and 20 percent). Only this version of share distribution permits dividend sharing to fully correct

the pricing error of *both* parties. Here the profit losses that flow back to each party cancel out private gains from an upward pricing error committed *ex ante*. By squashing the net gains from overpricing and under-delivery, full pricing-error correction will arguably eliminate the opportunism incentives of both parties and yield the most transaction cost savings.

Chen et al. (2017) further suggest that partners execute the pricing-error rule of share distribution through a Bayesian updating process during the life cycle of an EJV. At conception, both parties *estimate* the two pricing errors in their fees and accordingly split the equity shares. As the cooperation proceeds, inter-partner learning allows the two parties to be more familiar with each other's assets and to update their estimated pricing errors. Maintaining the optimal correction motivates both parties to adjust share distribution based on renewed estimations. This learning-updating-adjusting process repeats itself until one pricing error diminishes to an acceptable level. To save co-ownership costs, the party with a pricing error that remains significant will buy out the stake of the other party.

2.5.1 Comments

The study by Chen et al. (2017) represents the first conceptual analysis of share distribution in EJVs. The precise rule on how partners best split the equity shares are particularly valuable. As pioneering work, the pricing-error rule garners support from theoretical reasoning but has not been empirically verified. Absent empirical evidence, whether the partners indeed settle and adjust share distribution as proposed by the pricing-error rule is unknown.

2.6 Research gaps

This chapter sets out to review the literature on EJVs. The reviewed studies fall into four research streams, including EJV theories, comparative empirical analyses involving EJVs, foreign ownership in EJVs, and the debate over co-ownership design.

An EJV is a costly structure, yet widely used. This counterintuitive phenomenon fueled the search for the motivations behind forming an EJV, and seven theories have been produced

as the result. Whatever the motivations, parties to an EJV must negotiate and settle the equity split to establish the co-owned business. By fixating on the decision to build a co-owned entity, EJV theorists have omitted how firms configure the co-ownership structure.

Like EJV theorists, scholars who implemented the comparative empirical analysis on EJVs also dismissed share distribution. In these empirical studies, all EJV observations are lumped into one category and use the same dummy code (i.e., 1 = EJV, and 0 = the other mode). This operationalization fits the research objective of comparing an EJV with an alternative mode (i.e., a wholly owned subsidiary, a contractual alliance, or an acquisition); however, it omits share distribution which varies extensively across EJVs. Together, EJV theories and comparative empirical analyses have dodged the issue of share distribution – no to mention examining it.

Two research streams have alluded to ownership design of EJVs, but due to their respective limitations, neither explored share distribution. The first stream comprises studies on the ownership strategy of MNEs in their overseas EJVs. This group of studies has unilaterally concentrated on the ownership of the foreign partner, whereas share distribution is collectively settled by participating firms. The second stream probes the pros and cons of a balanced versus an unbalanced ownership structure. These studies relegate ownership design of EJVs to a choice with merely two alternatives – 50/50 or otherwise. Share distribution is much more complicated, wherein partners must select a precise percentage combination out of numerous alternatives ranging between 0/100 and 100/0.

Share distribution in EJVs has technically been kept in a black box by literature until a recent study by Chen et al. (2017). They propose a precise rule of optimal share distribution along with a Bayesian updating process through which partners put the rule in practice. Both the pricing-error rule and the Bayesian updating process has remained conceptual without empirical verification. If the rule proves to be inconsistent with reality, the prescriptions deduced from the rule could mislead practitioners.

In addition, as an important but newly recognized phenomenon, share distribution deserves more scholarly attention regarding its antecedents and consequences. When determining share distribution, both parties must factor multiple considerations in decision making.

Identifying these considerations will help explain the vast variances of share distribution across EJVs. After partners select a specific percentage combination to split the equity shares, will this decision affect the performance and stability of the EJV? If yes, how?

It is fair to observe that share distribution between EJV partners promises a significant research field. In this field, three immediate gaps in literature need to be filled: to empirically test the pricing-error rule, to identify the antecedents of share distribution, and to explore the performance implications of share distribution. As the next chapter will show, the pricing-error rule can serve as a theoretical foundation for constructing two models, one predicting share distribution and the other examining the consequences of share distribution. Verifying the two models against empirical data tests the pricing-error rule, which is accomplished in Chapter 4 and 5.

Chapter 3

3 Antecedents and consequences of share distribution

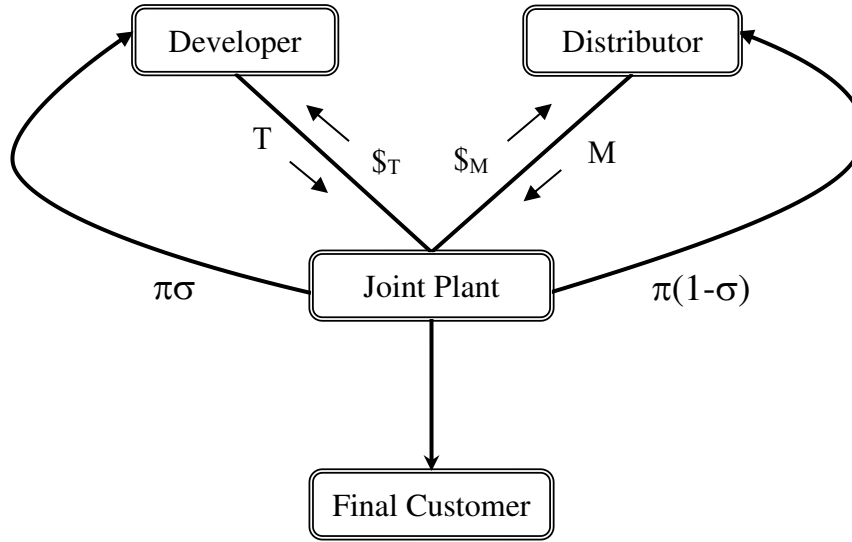
This chapter analyzes the antecedents and consequences of share distribution in EJVs. Building on the pricing-error rule, this chapter first proposes two fundamental antecedents of share distribution of an EJV, specifically the relative efficiency of the intermediate markets that partners employ to transact with the EJV and the relative pricing capabilities of the partners. Next, this chapter argues that share distribution in an EJV, if violating the pricing-error rule, will harm performance and trigger share adjustments or even termination of the EJV. This chapter ends with a summary.

3.1 Antecedents of share distribution

To aid conceptualization, I use a production EJV between a foreign technology developer and an indigenous distributor as a concrete example throughout this chapter (Figure 3.1). Through this EJV, both partners tap the strong interdependence between their expertise across national borders (Agarwal & Ramaswami, 1992; Brouthers & Hennart, 2007; Hennart, 2009). Contributing its technological know-how to the EJV, the developer gains an additional income stream from another country, while overcoming its lack of location-bound marketing knowledge and distribution channels. The local distributor, on the other hand, appreciates its marketing capabilities by carrying a competitive product made by foreign technologies.

In return for their respective contributions (T&M), both parties receive fee-cum-profit compensation. They collect an input fee *ex ante* – licensing fee for the developer ($\$T$) and agency fee for the distributor ($\$M$) – and split the residual profits of the EJV (π) *ex post* as per their equity ownership (σ for the developer and $(1 - \sigma)$ for the distributor). The payoff to the developer can be presented as $UJV_T = \$T + \pi\sigma = \$T + (R - \$T - \$M - C)\sigma$ and that of the distributor as $UJV_M = \pi(1 - \sigma) = \$M + (R - \$T - \$M - C)(1 - \sigma)$, where the residual profit ‘ π ’ is the difference between revenue (R) and operation costs (C). Since the two assets are hard to price and both parties tend to act opportunistically, the fee for each party will

deviate from the true value of the assets (V_T & V_M), causing a pricing error ($\Delta\$_T$ & $\Delta\$_M$, where $\Delta\$_T = \$_T - V_T$ and $\Delta\$_M = \$_M - V_M$).



T = Technology input; $\$_T$ = Licensing fee for the developer
 M = Marketing input; $\$_M$ = Agency fee for the distributor
 $\pi = R - \$_M - \$_T - C$; $\sigma = \Delta\$_T / (\Delta\$_T + \Delta\$_M)$; $1 - \sigma = \Delta\$_M / (\Delta\$_T + \Delta\$_M)$

Figure 3.1 The EJV structure

When designing the co-ownership structure of the production EJV, the developer and the distributor have strong incentives to follow the pricing-error rule. That is, to strive to align the equity split with the pricing error in the licensing fee and the agency fee. They opt to build the EJV in the first place because the error in pricing each other's asset is too costly to be addressed through contractual restraints in a market transaction (Chen, 2015; Hennart, 1988). The co-ownership structure helps the two parties economize the transaction costs by correcting the two pricing errors via profit sharing. Thanks to the self-enforcing correction mechanism, the two parties grab a private gain from their upward pricing error in the fee *ex ante* ($\Delta\$_T$ & $\Delta\$_M$) but later bear the profit losses that loop back from the EJV *ex post* and are weighed by their equity shares (i.e., $-\sigma(\Delta\$_T + \Delta\$_M)$ and $-(1-\sigma)(\Delta\$_T + \Delta\$_M)$). The decision to organize the inter-firm cooperation under an EJV instead of a market transaction implies that the savings on transaction costs outweigh the extra costs partners incur in negotiating, building, and co-managing the EJV. The costs of forming and

running the EJV are not trivial, and partners have a natural tendency to optimize the corrective effect of the co-ownership structure and save the most on transaction costs.

Ideally, the developer and the distributor would exactly match their relative ownership percentage with the two pricing errors to achieve a full correction for both (i.e., $\sigma / (1 - \sigma) = \Delta\$_T / \Delta\$_M$). Assuming the two pricing errors range across six levels ($\Delta\$_T$ from 0 to 5X and $\Delta\$_M$ from 0 to 5X). Table 3.1 presents the optimal share distribution for different combinations of the two pricing errors.

Table 3.1 Optimal share distribution across pricing error combinations

$\Delta\$_M \backslash \Delta\$_T$	0	1X	2X	3X	4X	5X
0	*	100/0	100/0	100/0	100/0	100/0
1X	0/100	50/50	67/33	75/25	80/20	83/17
2X	0/100	33/67	50/50	60/40	67/33	71/29
3X	0/100	25/75	40/60	50/50	57/43	62/38
4X	0/100	20/80	33/67	43/57	50/50	56/44
5X	0/100	17/83	29/71	38/62	44/56	50/50

1. In each cell is a percentage combination with two numbers. The number on the left is the equity percentage of the developer, and the number on the right is the equity percentage of the distributor.
2. *According to TCE theory, no EJV exists in this cell where both inputs have no pricing error and can be directly traded on market.
3. Cases in the shaded cells are extreme share distribution. In these cases, only one pricing error is significant while the other is negligible. The party with the significant pricing error will control full ownership of the production plant.

The argument that partners strive to maximize corrections on the two pricing errors when splitting equity shares offers an important, theoretical perspective to identify the antecedents of share distribution. Since partners seek to align share distribution with the two pricing errors, the factors that swing the relative size of these errors will reasonably shape share distribution of an EJV. With this logic, two factors become relevant to share distribution: the relative efficiency of the two intermediate markets in the formation of an EJV, and the relative capabilities of the partners in pricing each other's assets.

3.1.1 Efficiency of the two intermediate markets

Whereas previous literature has long established that an EJV evades the market partners would use to transact their respective assets with each other (Brouthers & Hennart, 2007; Hennart, 2009), Chen (2015) innovatively recognized that building an EJV actually requires the simultaneous use of two markets. When one partner sells its proprietary assets to the other, they need to negotiate one fee and use only one market. Particularly, the market of technological know-how is used if the distributor arranges a licensing deal with the foreign developer. Likewise, only the market for distributing capabilities is called for when the foreign developer hires the local distributor as a marketing agent. By contrast, both parties have to concurrently negotiate the licensing fee ($\$T$) and the agency fee ($\M) in order to transfer two assets into the co-owned business. These two transactions employ both the market of know-how and that of the distributing capabilities.

For their distinct conditions, the two intermediate markets can vary in their relative efficiency. Notably, neither market is efficient enough to permit direct trading between the two parties. Otherwise, they would not have gone so far as to build a co-owned entity (Hennart, 1988). Yet, one market may still be comparatively more efficient when it has more suppliers, the assets on the market feature higher homogeneity, and information is more dispersed (Akerlof, 1970; Hennart, 1993; Teece, 1981; Williamson, 1973, 1975); or, the two markets can reach a tie in terms of efficiency if market conditions are similar.

A relatively more efficient market will produce a smaller pricing error for an asset contributed to the EJV. Assume the market for technological know-how features higher efficiency. This market context imposes stronger discipline over the behaviors of the developer in the EJV. Overpricing is difficult as intensive market competition has driven the price of the know-how closer to its true value (Bradach & Eccles, 1989; Hennart, 1993). The room for under-delivery shrinks as the distributor bears low switching costs and the developer faces a high risk of being substituted by a market rival if it fails to deliver (Williamson, 1975). Additionally, the relatively rich and reliable information about the know-how enables the distributor to effectively verify the know-how *ex ante* and monitor its delivery *ex post* (Akerlof, 1970; Alchian & Demsetz, 1972; Stigler, 1961).

Conversely, the pricing error in the agency fee to the distributor will be larger due to less efficient market conditions of the distributing capabilities. Given the smaller number of suppliers with similar capabilities, the distributor faces less rivalry, thereby holding a relatively stronger market power to maneuver the price of its assets. The distributor is also more tempted to cheat on delivery as the developer cannot switch to another partner without incurring substantial costs (Pisano, 1989). In the meantime, handicapped by the limited information available from market, the developer confronts greater ambiguities in judging the performance of the distributor *ex ante* and *ex post*.

By affecting the relative size of the two pricing errors, conditions of both markets can significantly shape share distribution of the EJV. Noting the market for distributing capabilities is ineffective in disciplining the distributor's behaviors, the developer will have to give more equity shares to the distributor. More equity shares boost the correction over the potential pricing error in the agency fee, which incentivizes the distributor to behave cooperatively rather than opportunistically. The distributor, on the other hand, is willing to accept more ownership of the EJV. It relies less on equity ownership to hold the developer accountable given that the relatively more efficient market of know-how has already restrained the pricing error in the licensing fee. Moreover, taking a majority ownership position brings more control over the EJV, in addition to a larger share of residual dividends.

From the governance control perspective, splitting equity shares according to the relative market efficiency helps obtain optimal control over the relationship between each partner and the EJV. Partners and the co-owned entity maintain a hybrid of two types of relationships that submit to a mixture of two control mechanisms (Borys & Jemison, 1989; Chen, 2015; Ménard, 2004, 2012; Powell, 1987). The first is a buyer-seller relationship governed by price (Bradach & Eccles, 1989). Each partner and the EJV respond to price signals in the market to coordinate asset transactions. Second is a parent-subsidiary relationship that submits to hierarchical control (Hennart, 1993). As co-owners, both parties have the authority to issue hierarchical orders to direct the operation of the EJV. In an inefficient market, price provides unreliable signals and it alone is incapable of regulating transactions. Hence, between the two partners, the one from a less efficient

market faces a weaker price control over its transaction with the EJV. To regulate the relationship between this partner and the EJV, a stronger hierarchical control is necessary to compensate for the relatively weaker price control. Thus, more equity shares must be allocated to the partner with a larger pricing error, resulting in a more hierarchical relationship with the EJV. The other party relies less on hierarchical control to govern its transactions with the EJV as its market is more efficient and price control is stronger; this then leads to lower equity shares in the EJV.

3.1.2 Pricing capabilities of the two partners

Besides the efficiency of the two intermediate markets, pricing capabilities of the two partners are also consequential to the size of the pricing errors in the two input fees and, in turn, share distribution. Fundamentally, negotiating and enforcing input fees occur within the context of the two markets but also come down to the actions of the partners. In other words, the two intermediate markets exert external influences over the two pricing errors, and the partners' pricing capabilities serve as the internal drive of the errors.

As an umbrella concept, pricing capabilities of partners encapsulate their ability to determine a fee for the assets contributed by the other *ex ante* and enforcing the fee *ex post*. When determining input fees, pricing capabilities of a partner are related to how well it undertakes such tasks as conducting market-wide searches for relevant information (Alchian & Demsetz, 1972; Coase, 1937), drawing useful references from past experience (Lee, Hoetker, & Qualls, 2015; Sampson, 2005), and verifying the assets through direct exposure (Hamel, 1991). After the fee is settled in the contract, partners will also need to leverage their pricing capabilities to hold each other accountable for their promises by monitoring the contribution process and ensuring that the other partner faithfully delivers the assets that are worth the payment (Gomes-Casseres, 1989; Hennart, 2006; Klein, Crawford, & Alchian, 1978).

Intuitively, both partners' pricing capabilities dictate the error each commits in pricing the other's assets. In the negotiation stage, the partner with stronger pricing capabilities can better estimate the value of the other's assets by comprehending intricacies of the assets or seeing through the fraudulent presentation of information (Balakrishnan & Koza, 1993;

Khanna et al., 1998). This permits identifying a more accurate fee. After an EJV commences, the more capable partner will also be more adept at predicting the behaviors of the other (Gulati, 1995a) and enforcing the already accurate fee in the duration of the EJV. This then squeezes the room for shirking and forces the other to act in good faith. By contrast, the other ill-equipped party tends to fall victim to price exaggerations at the formation and/or be unable to impose effective enforcement measures *ex post*. A larger pricing error supposedly looms.

The pricing capabilities of each partner influence their dependence on the corrective effect of equity ownership and, in turn, their decisions in dividing the equity shares. The more capable partner will likely control a higher percentage of equity shares. It faces less need to correct the pricing error in the other's assets since it has already managed to drive down the error. Relying less on the correction mechanism empowers this partner to bargain for more equity shares in order to gain governance control and to augment its claims of residual profits from the EJV. The pricing error facing the other partner remains large, even if it has attempted to reduce it; therefore, this partner has to relinquish more equity shares to boost the corrective effect over the other even at the cost of trading off control and residual profits.

3.2 Consequences of share distribution

Based on the pricing-error rule, the previous section argues that share distribution in EJVs varies with the relative efficiency of the two intermediate markets and the relative pricing capabilities of the partners. The pricing-error rule also offers a framework to explore the consequences of share distribution. The theory is that the *optimal* share distribution prescribed by the pricing-error rule provides a benchmark against which the *actual* share distribution can be validly assessed. Indeed, this insight can help explain how share distribution impacts all the outcomes in the EJV context, including EJV performance (Brouthers, 2002; Gong, Shenkar, Luo, & Nyaw, 2007; Luo, 2002; Yan & Gary, 1994), ownership adjustments between partners (Blodgett, 1992; Inkpen & Beamish, 1997; Iriyama & Madhavan, 2014), EJV buyout (Hennart et al., 1998; Reuer & Miller, 1997;

Steensma, Barden, Dhanaraj, Lyles, & Tihanyi, 2008), and EJV dissolution (Park & Russo, 1996; Park & Ungson, 1997).

3.2.1 Share misallocation

As much as partners desire to align share distribution with the two pricing errors, it is unrealistic to expect this to occur to all EJVs. Share distribution may be close to or at the optimal percentage combination in some EJVs, but significantly off in others. Whenever the actual share distribution diverges from the optimal settlement prescribed by the pricing-error rule, equity shares are misallocated between partners. Share misallocation transforms the two partners into an over-owner and an under-owner of the EJV. The over-owner is the party that controls more equities than it should, and the other partner becomes the under-owner because its equity level is lower than the optimal allocation. In the developer-distributor example, the equity shares are misallocated by 30 percent if the partners hold equal ownership (50/50), but the pricing error of know-how is four times that of distributing capabilities, which justifies an 80/20 percent split. In this case, the developer is the under-owner and the distributor the over-owner.

For several reasons, share misallocation can occur right at the beginning of an EJV. To start with, the odds of locating the optimal share distribution is numerically lower than the odds of identifying the suboptimal share distribution. Specific to an EJV at a point in time, only one percentage combination on the 0 to 100 continuum can produce a full correction for both parties, whereas all the remaining alternatives cannot. Second, partners have no way to directly measure and instead only estimate the pricing errors (Chen, Pun, & Wang, 2017). Estimating tends to be inaccurate, especially at the formation of an EJV when both parties have yet to start collaborating. The mis-estimated pricing errors will then lead to share misallocation. Third, competitive bargaining for goals (e.g., ownership control or dividends) other than maximizing pricing-error correction can dominate share negotiations in some EJVs. Share distribution in these EJVs will mirror the relative bargaining power of partners but not their relative pricing errors (Fagre & Wells Jr, 1982; Inkpen & Beamish, 1997; Lecraw, 1984; Yan & Gary, 1994). Lastly, the optimal share distribution may not be viable due to regulatory institutions (e.g., the cap over the equity ownership of foreign

partners in some countries) (Gomes-Casseres, 1990). With the optimal distribution formally prohibited, partners have no other option but a suboptimal settlement.

Even if partners manage to achieve optimal share distribution at the outset of an EJV, share misallocation can still arise during the operation periods of the EJV. There is a high probability that the two pricing errors will drift out of the alignment with share distribution. The reason is that the external and internal factors that shape the two pricing errors are in constant flux over time. The two intermediate markets can evolve to be more or less efficient as suppliers enter or exit the market (Hennart, 1993; Williamson, 1973). The relationship between the parties can improve or deteriorate over time, thereby deterring or fueling the overcharging or under-delivering within the cooperation (Bradach & Eccles, 1989; Das & Teng, 2001; Das & Teng, 1998a; Ertug, Cuypers, Noorderhaven, & Bensaou, 2013; Madhok, 1995; Ring & Van de Ven, 1992; Yang, Zheng, & Zaheer, 2015). In addition, organizational learning inside and outside the EJV can shape the pricing capabilities of the partners and, in turn, the accuracy in pricing each other's assets (Cui et al., 2011; Doz, 1996; Hamel, 1991; Khanna et al., 1998; Parkhe, 1991).

3.2.2 Share misallocation and EJV performance

Contingent on its degree, share misallocation can dampen the performance of EJVs. This is fundamentally because share misallocation causes mis-correction over the two pricing errors and distorts incentive alignment of the two partners.

Whenever equity shares are misallocated, mis-correction over the two pricing errors follows. In particular, the under-owner will receive an under-correction. For this partner, only a fraction of the pricing error in its fee will be offset by the profit reduction that flows back. By contrast, over-correction occurs to the over-owner as it will receive a profit reduction that is greater than its pricing error. Suppose the developer and the distributor both commit an upward pricing error for \$5 million in their input fee. The overpayment to the two parent firms will trim the profitability of the EJV by \$10 million. Ideally, this profit reduction will be split evenly, which fully corrects both pricing errors if both parties hold equal ownership (i.e., $-10 \times 50\% = -5$). However, if the developer controls 10 percent ownership (i.e., under-owning the EJV for 40 percent), it will only bear \$1 million losses

from the EJV ($-10 \times 10\% = -1$) and pocket a net gain of \$4 million from overcharging *ex ante*. The distributor, on the other hand, over-owns the EJV for 40 percent, which results in more profit reduction than its pricing error ($-10 \times 90\% = -9$).

Mis-correction over the two pricing errors yields asymmetrical incentives for both parties to choose between cooperating and cheating within the partnership. The over-owner, in principle, has no incentive to act opportunistically, since it will receive no economic gains from an upward pricing error besides taking on such potential risks as reputation damages. It has strong reasons to cooperate in pricing and delivery processes and to incite the other party to follow suit. When both partners altruistically underprice or over-deliver and the two pricing errors are downward, profit increases of the EJV that flow to the over-owner outweigh its upfront losses in the fee; that is an overcorrection of its downward pricing error. To the under-owner, the net gains from an upward pricing error represent constant temptation to put its own interests above the EJV.

By triggering incentive misalignment between partners, share misallocation can sabotage the inter-firm cooperation in more than one way. The transaction costs of running the EJV will inevitably rise. To confine the self-serving attempts of the under-owner, the over-owner must institute and enforce increasingly more contractual restraints. The profitability of the EJV can be whittled down, in that under-delivery from the under-owner undercuts the supply of inputs to the EJV, while overpricing increases procurement costs of the EJV. In addition, frequent self-serving incidents from one party and excessive restraints from the other will likely erode trust, stir up disputes, and hinder the development of problem-solving routines and processes (Das & Teng, 1998a; Dyer & Singh, 1998; Madhok, 1995; Ring & Van de Ven, 1994). Without these relational developments, partners can hardly reconcile their organizational and cultural differences, let alone capitalizing on the synergy of their complementary assets (Beamish & Banks, 1987; Das & Teng, 2001; Das & Teng, 1998a; Ertug et al., 2013; Gulati, 1995a; Lioukas & Reuer, 2015; Madhok, 1995). So, the EJV can easily become a frustrating project for both parties.

3.2.3 Share misallocation and share adjustments

As long as equity shares are misallocated, its adverse effect on EJV performance will persist. Share distribution in an EJV, nonetheless, is not permanent (Blodgett, 1992; Inkpen & Beamish, 1997; Iriyama & Madhavan, 2014). Instead, during cooperation periods, partners enjoy the flexibility to adjust the co-ownership structure (Chung & Beamish, 2010; Geringer & Hebert, 1989). Substantial transaction costs of enduring share misallocation and the negative performance feedback from the EJV provide a strong impetus for share adjustments.

It is plausible to expect that rectifying share misallocation would motivate the over-owner to transfer equities to the under-owner. Depending on its degree, an increase in equity ownership of the under-owner reduces the incentive to cheat by shrinking the gap between the profit reduction *ex post* and the private gains from the pricing error *ex ante*. As the other partner is more self-regulated to behave, the burden of imposing contractual restraints will be lessened for the over-owner. As expected, transaction costs can be reduced and the performance of the EJV improved. If the equity transfer goes the other direction, share misallocation will be exacerbated.

Nevertheless, share adjustment is not cost-free (Madhok, Keyhani, & Bossink, 2015). By taking over more equities, the under-owner loses potential gains from opportunistic engagements and has to shoulder more bureaucratic costs of managing the EJV (e.g., dispatching more board representatives and managers to the EJV). From the perspective of the over-owner, ceding equity shares inevitably means relinquishing some control power. Its ability to safeguard proprietary assets will be weaker, and pushing its own agenda in the decision-making process will be more difficult, especially when there are conflicting interests (Gatignon & Anderson, 1988; Li et al., 2009; Mjoen & Tallman, 1997; Yan & Gary, 2001). Besides, both parties have to pay implementation costs for share adjustments. These include the resources and time invested to negotiate share reallocation, obtain approval from government authorities, restructure the governance and management system (e.g., reassignment of board seats), withstand organizational and cultural upheavals, and

build new working routines (Bakker, 2016; Blodgett, 1992; Chung & Beamish, 2010; Madhok et al., 2015).

Since partners can only eliminate the costs of share misallocation by incurring another set of implementation costs, the decision to initiate a share adjustment rests on the trade-off between the two costs. Reasonably, the likelihood of a share adjustment increases with the degree of share misallocation. In EJV's with optimal share distribution, partners will have little reason to modify the co-ownership structure. In this ideal scenario, both pricing errors are fully corrected and a strong interest alignment binds the partners and the EJV. Co-ownership structure only needs to be fixed when broken. The greater the degree of misallocation, the higher the costs of sustaining the status quo, and the more attractive it is to initiate a share adjustment.

Share adjustments triggered by share misallocation will be piecemeal so long as the two pricing errors remain significant. In this case, addressing share misallocation motivates the over-owner to transfer a portion of its existing equities to the other (Iriyama & Madhavan, 2014; Iriyama et al., 2014). After this piecemeal adjustment, the relative ownership position of the partners changes (e.g., a majority owner becomes a minority owner or vice versa), but the EJV perpetuates and the identity as the co-owners remains. Both partners reserve equities in the EJV to maintain two correction mechanisms over the two still-unbearable pricing errors. For example, in the production EJV, share misallocation is clear when the ratio of the equity shares of the developer and the distributor is 90 to 10 percent but their pricing error is one to one. Both pricing errors are still substantial even though they are mismatched with the equity split. Installing the optimal share distribution requires transferring 40 percent ownership from the developer to the distributor.

Throughout its duration, an EJV can experience multiple piecemeal adjustments meant to tackle share misallocation. One reason is that partners may not be able to address a *given* share misallocation at once. They may not be able to identify the two pricing errors due to their unobservable nature, or to flexibly redistribute equity shares because of extensive implementation costs (Bakker, 2016; Chung & Beamish, 2010). As such, partners may have to repeat adjustments via a trial-and-error process until achieving optimal distribution,

provided implementation costs are justified. Suppose the developer and the distributor operate an equally-owned EJV, but the pricing error of the know-how is nine times that of the distributing capabilities. The distributor – now the over-owner – may agree to transact 20 percent equity to the under-owner as one attempt to mend the ill-fitted ownership structure. Share misallocation still persists after this round of adjustment, albeit to a lesser degree. Share distribution will not be optimal until the over-owner relinquishes another 20 percent ownership through one or more adjustments. In addition, repetitive piecemeal adjustments can also stem from the fact that share misallocation can occur multiple times in the life cycle of an EJV. Even after both parties manage to adjust share distribution to the optimal level in one period, the two pricing errors can evolve in the subsequent period, causing share misallocation once again. This forces partners to engage the adjustment process to keep abreast of the shifting reality.

Because of the evolution of external market conditions and the learning of partners about the value of each other's assets, the pricing error of a partner can diminish to a tolerable level during the course of an EJV which causes a special version of share misallocation (Chen et al., 2017). In this case, the partner whose input still contains a significant pricing error needs to continue holding equity ownership in the production plant, but the other partner does not. Its input is now easy to price and the negligible pricing error no longer requires correction. Correspondingly, the optimal share distribution between the partners becomes 100 and 0 percent, which makes the co-ownership structure an unnecessary, expensive arrangement to carry on.

Rectifying this unique share misallocation calls for an extreme share distribution – buyout. The party with still hard-to-price assets – now the under-owner – will be incited to acquire all the equity shares of the other that has no interest in continuing holding any equity. This buyout deal transforms the EJV into a wholly owned subsidiary of the acquirer (Blodgett, 1991; Chen et al., 2017; Reuer et al., 2002; Reuer, 2001; Steensma et al., 2008). The full owner now benefits from a full correction over the transaction with its subsidiary, and both parties are exempted from co-ownership and co-management costs. In the example, the developer will buy out the EJV if the pricing error of the distributing capabilities is low,

but that of the technological input remains high. Otherwise, the distributor will be the acquirer.

The buyout prompted by share misallocation cuts the co-ownership relationship but not necessarily the cooperation between the two partners. After a buyout, not only does the acquirer (now the full owner) continue injecting its assets into the formerly co-owned entity, the other party will also likely do so as an arm's length supplier. There are two reasons for both parties to sustain their cooperation as opposed to exploring new partners. For one, they still need each other because the buyout does not eradicate the interdependence between the two parties. During the cooperation, the acquirer of the EJV only learns the value of the assets from the other but not the assets *per se* (Chen et al., 2017). For another, it is usually more efficient for the two previous co-owners to contract with each other than with a new party. Thanks to the immediate experience of collaborating within an EJV, the two parties usually develop a deep understanding about each other's operation and organization (Lioukas & Reuer, 2015; Liu & Ravichandran, 2015), and cultivate relationship-specific forbearance, routines, and processes (Delios & Beamish, 1999; Madhok, 1995; Ring & Van de Ven, 1992; Sampson, 2005). The knowledge and relational advantages effectively reduce behavioral uncertainties and complexities in designing and enforcing a contractual arrangement for future collaborations (Gulati, 1995a; Lee et al., 2015). In the developer-distributor EJV example, the developer after buying out the EJV will be inclined to hire the distributor as an independent agent to continue pushing the output from the production plant; or the distributor can sustain the licensing arrangement after it acquires all the equities from the developer.

Another special case of share misallocation eliminates the rationale of the co-owned business, let alone the co-ownership relationship. This is when both pricing errors concurrently become negligible. Both partners can now efficiently profit from their assets via market transactions, trading either with each other or with a third party. Neither party needs correction, which makes their existing equity ownership – however small – unnecessary. Both have the incentive to withdraw all their equity participation from the EJV. In addition, for both the developer and the distributor, operating a venture in a non-

core, production function becomes a liability, provided that the diversification benefits of controlling two supply chain functions are less than the costs.

Dissolving the co-owned business becomes a suitable adjustment that handles share misallocation with two insignificant pricing errors (Park & Russo, 1996; Park & Ungson, 1997). After divesting from the production plant, the developer and the distributor can refocus on their specialized function (i.e., development and distribution). One way to dissolve the co-owned business is to sell it to a third party or to the management team of the EJV (Gomes-Casseres, 1987). After sell-off, the developer and the distributor may still transact inputs into the plant as arm's length suppliers. Perhaps more drastically, partners can liquidate the EJV outright and supply their assets to other independent production plants. Sell-off or liquidation, the dissolution of the co-owned business here is not a failure. On the contrary, both parties exit the cooperation gracefully and separation is amicable.

To summarize, the *occurrence* of share misallocation triggers share adjustment, and the *types* of share misallocation determine the adjustment approach. The relationship between share misallocation and the adjustment approaches is summarized in Table 3.1. When share misallocation occurs but both pricing errors remain high, piecemeal adjustments are likely. In this scenario, the equity ownership of one party will be higher than optimal (e.g., $\sigma > \Delta\$_T / (\Delta\$_T + \Delta\$_M)$), making it an over-owner of the EJV. The other party, in comparison, is the under-owner as its equity shares are lower than what it should hold (e.g., $(1 - \sigma) < \Delta\$_M / (\Delta\$_T + \Delta\$_M)$). To rectify share misallocation, the under-owner will then buy some, but not all equity shares, from the over-owner. After a piecemeal adjustment, the two parties still require two correction mechanisms and the EJV continues. In an operation period, one of the two pricing errors may decline below a negligible level (e.g., $\Delta\$_T \approx 0$) because of changes in external market conditions or the relentless learning of partners. Since the partner with the negligible pricing error no longer needs correction, its existing ownership in the EJV becomes excessive, making it an over-owner. The other party whose pricing error remains significant should control full ownership of the EJV. In this case, the most effective adjustment is a buyout, in which the under-owner acquires all the equity shares from the over-owner and fully internalizes the EJV. If the pricing error of know-

how remains high (i.e., $\Delta\$_T > 0$ & $\Delta\$_M \approx 0$), the developer will acquire the EJV and collaborate with the distributor through a contractual arrangement. Alternatively, the distributor assumes full ownership and strikes a licensing contract with the developer when the pricing error of the marketing input is significant (i.e., $\Delta\$_T \approx 0$ & $\Delta\$_M > 0$). Buyout terminates the EJV. In a special case where both pricing errors become negligible ($\Delta\$_T \approx 0$ & $\Delta\$_M \approx 0$), neither partner needs to correct its pricing error or to own equity shares. In other words, both become over-owner of the EJV. Saving on co-ownership costs will tempt the parties to withdraw their equity investments and dissolve EJV by selling off or directly closing the business.

3.3 Summary of the chapter

This chapter analyzes the antecedents and consequences of share distribution based on the pricing-error rule of share distribution. According to this rule, partners will seek to align share distribution with the two pricing errors in their input transaction with the EJV. This helps them save on transaction costs of their cooperation. Share distribution of EJVs will, therefore, vary with two antecedents that shape the size of the pricing errors. The first is the relative efficiency of the intermediate markets partners use to transact with the EJV, and the second is the pricing capabilities of the partners. A partner will control more equity shares than the other if it is from a relatively less efficient market or its pricing capabilities are stronger.

The insight that, specific to an EJV, there is an optimal share distribution offers a useful perspective to evaluate the performance implications of share distribution. Equity shares are misallocated when the actual share distribution departs from the optimal percentage combination proposed by the pricing-error rule. Share misallocation causes additional transaction costs of running the co-ownership relationship and undermines the performance of the EJV. In response, partners have an incentive to correct share misallocation by adjusting the equity split between them. At a point one or both pricing errors become insignificant, partners will engage in extreme adaptations to the co-ownership structure through buyout, sell-off to a third party, or liquidation.

Table 3.2 Share misallocation and adjustment in the developer-distributor EJV

Size of the two pricing errors	Share misallocation scenario	Identity of the two partners		Adjustment actions of the two parties		Adjustment approach	Implication on EJV survival
		Developer	Distributor	Developer	Distributor		
$\Delta\$_T > 0;$ $\Delta\$_M > 0$	$\sigma > \Delta\$_T / (\Delta\$_T + \Delta\$_M)$ $(1 - \sigma) < \Delta\$_M / (\Delta\$_T + \Delta\$_M)$	Over-owner	Under-owner	Sell	Buy	Piecemeal	Survive
$\Delta\$_T > 0;$ $\Delta\$_M > 0$	$\sigma < \Delta\$_T / (\Delta\$_T + \Delta\$_M)$ $(1 - \sigma) > \Delta\$_M / (\Delta\$_T + \Delta\$_M)$	Under-owner	Over-owner	Buy	Sell	Piecemeal	Survive
$\Delta\$_T \approx 0;$ $\Delta\$_M > 0$	$\sigma > 0$ $(1 - \sigma) < 100$	Over-owner	Under-owner	Sell off	Buy out	Buyout	Terminated
$\Delta\$_T > 0;$ $\Delta\$_M \approx 0$	$\sigma < 100$ $(1 - \sigma) > 0$	Under-owner	Over-owner	Buy out	Sell off	Buyout	Terminated
$\Delta\$_T \approx 0;$ $\Delta\$_M \approx 0$	$\sigma > 0$ $(1 - \sigma) > 0$	Over-owner	Over-owner	Sell off	Sell off	Dissolution	Terminated

Chapter 4

4 Antecedents of share distribution

Drawing on the pricing-error rule, the preceding chapter proposes two antecedents of share distribution, specifically the relative efficiency of the two intermediate markets and the relative pricing capabilities of the two partners. This chapter empirically verifies these two antecedents. To this end, the following section identifies factors that act as proxies for these two antecedents and hypothesizes how these factors predict share distribution of an EJV. The hypotheses are then verified on a sample of two-party EJVs in the U.S. The empirical method and findings are presented before a summary of the chapter.

4.1 Hypothesis development

4.1.1 The relative efficiency of the intermediate markets

In a two-party EJV, partners use two intermediate markets to transact assets into the co-owned business (Chen, 2015). The efficiency of the two intermediate markets influences the error in the partners' input fee and, based on the estimate of the pricing errors, both parties accordingly split the equity shares. It is, thus, reasonable to expect share distribution to align with the relative efficiency of the two intermediate markets, all else being constant. Specifically, a partner operating in a less efficient market will be allocated more equity shares to correct the relatively larger error in its fee. To test this proposition, I identify four factors that affect the relative market efficiency of the two intermediate markets and link them to share distribution. These include the relative volatility and breadth of the intermediate markets and the relative technological and advertising intensity of partner assets.

Market volatility. The relative efficiency of the two intermediate markets varies with their volatility, which is defined as the degree of change in a market (Das & Teng, 1996; Reuer & Leiblein, 2000). In particular, a more volatile market is considered to be less efficient. First, the evaluation criteria over the assets tend to be ill-defined if the market is in flux (Das & Teng, 1996; Reuer & Leiblein, 2000; Shan, 1991). Assets traded in a volatile

market exhibit heterogeneous features, which result from relentless adaptations firms undertake to remain responsive to a dynamic, uncertain market environment. This means a set of uniform performance criteria does not apply. Further, constant changes in the assets can easily render any pre-determined performance criteria in a deal obsolete, which makes monitoring *ex post* difficult (Grossman & Hart, 1986; Klein et al., 1978; Williamson, 1985). Second, relevant information about assets is scarcer in a volatile market compared to a stable one. The partner coming from a volatile market will hold more private information about its idiosyncratic assets (Balakrishnan & Koza, 1993; Raju & Roy, 2000; Stigler, 1961). In addition, its historical records may also be limited, due to frequent exits from and entries into the market, and the indirect inference of asset performance is, therefore, lacking (Chi & Roehl, 1997). By contrast, a market with low volatility experiences slow and incremental modifications in the assets. So, the performance of the assets will be well-defined and stable, and the rich information available permits more accurate pricing and monitoring.

Expectedly, the partner coming from a more volatile market will have a larger pricing error in its fee. This partner is liable to overprice and under-deliver to a greater extent in order to exploit the ambiguities of performance specifications and private information. Regulating the behaviors of this partner requires allocating more equity shares. The other partner demands fewer equity shares as its market is relatively more stable and efficient. Thus,

Hypothesis 1a. The equity percentage in an EJV is higher for the party whose input market is more volatile.

Market breadth. The breadth of the two intermediate markets, which rests on the number of suppliers with the same assets, also impacts efficiency. Between the two markets in which partners deal with an EJV the broader one is more efficient. A broader market features more suppliers of the assets, thereby creating more intense competition (Agarwal, Cockburn, & Zhang, 2015; Pisano, 1989). Market competition serves as a powerful, self-enforcing mechanism which drives price close to the real value of the assets (Hayek, 1945; Hennart, 1993). The existence of numerous suppliers also means information about the

assets is widely dispersed and accessible (Akerlof, 1970; Alchian & Demsetz, 1972; Stigler, 1961). Market competition and information availability restrain the market power of the suppliers from manipulating price. The switching costs are also low in a broader market, which forces suppliers to live up to their promises in a transaction (Akerlof, 1970; Pisano, 1989; Williamson, 1975). By contrast, in a narrow market, qualified suppliers are scarce, competition is low, information is concentrated, and the buyer's switching costs are high. Not only does a supplier hold a stronger power to exaggerate the price, it is also incited to under-deliver *ex post* because the risks of being substituted are low.

Since a narrower market is less efficient, the partner from this market will see a larger pricing error in its input fee. To this partner, more equity shares will be assigned to boost the correction over its relative larger pricing error. The other partner from a market with a greater breadth needs less correction as market competition already limits the pricing error in the fee *ex ante* and also imposes effective discipline in the delivery *ex post*. This suggests:

Hypothesis 1b. The equity percentage in an EJV is lower for the party whose input market is relatively broader.

Technological contents. Previous literature has long established that the efficiency of an intermediate market significantly depends on the proprietary contents of the assets being traded (Agarwal & Ramaswami, 1992; Anderson & Gatignon, 1986; Brouthers, 2002; Brouthers & Hennart, 2007; Buckley & Casson, 1976; Hill et al., 1990). The most frequently cited type is technological content, including technological components or know-how (Agarwal et al., 2015; Hennart, 1988; Teece, 1981). There are reasons to expect that the market will be less efficient when a partner's assets feature more technological contents. Verifying technological assets *ex ante* can be difficult. Accurately assessing know-how and its applications demands at least some working knowledge about the related technical mechanisms (Caves et al., 1983; Lippman & Rumelt, 1982). Even this working knowledge can be incomprehensible for the other partner, which often specializes in a different business area (Liu & Ravichandran, 2015; Mowery et al., 1996; Wang & Zajac, 2007). Moreover, since high-tech assets are usually proprietary to the owner, information

about the assets is not readily accessible in the market (Agarwal et al., 2015; Hennart, 1988; Madhok, 1997; Stigler, 1961). Worse still, many technological inputs are in the form of information, which discourages the owner from disclosing it for verification because doing so risks giving the information away for free (Arrow, 1962).

Ex post monitoring over the delivery of technological inputs can also be ineffective. Monitoring challenges stem from the fact that the performance of high-tech inputs varies widely (Alchian & Demsetz, 1972; Blodgett, 1991; Teece, 1998). In addition, the lack of sufficient understanding of the technological intricacies also deters the other, low-tech partner from instituting effective monitoring (Klein et al., 1978). The challenges in *ex ante* verification and *ex post* monitoring leave ample opportunities for the partner with the high-tech assets to overprice and under-deliver, causing a larger pricing error in its fee.

Conversely, the market for assets with limited technological contents is more efficient. Low-tech assets are usually tangible, such as land and warehouses, and the value of these assets tends to be explicit to verify *ex ante* and *ex post*. Also, little variation in the performance of low-tech assets makes monitoring easy. Subsequently, the partner contributing the relatively low-tech inputs will then have limited opportunities to exaggerate its price or to shirk. The pricing error in its fee will consequently be smaller.

Since the input with more technological content can be subject to a larger pricing error, the partner that contributes this input will need more equity shares to strengthen the correction effect. The other party whose input is relatively low-tech already receives a fair compensation from the fee and, thus, deserves a lower portion of equity shares for correction purposes. Some empirical findings support this prediction, showing that American (Blodgett, 1991) and Japanese (Delios & Henisz, 2000) MNEs hold a higher level of ownership in their overseas EJV if their assets are highly technological. Therefore,

Hypothesis 1c. The equity percentage in an EJV is higher for the partner whose input is relatively more technology-intensive.

Advertising contents. Similar to technology assets, advertising-related assets, for their proprietary nature, can also undermine market efficiency (Chen & Hennart, 2002; Chi,

1994; Hennart, 1991; Simonin, 1999). Advertising assets such as brand reputation and marketing expertise are intangible and, thus, difficult to accurately measure (Arrow, 1962; Hennart, 1988; Khanna et al., 1998). In principle, the value of a brand manifests in the price premium customers are willing to pay for the product bearing the brand (i.e., brand equity), but this brand-specific premium has proven challenging to isolate (Simonin, 1999). Consequently, the partner that contributes advertising assets into an EJV will have more leeway to inflate its fee. In the delivery process, the performance variations of advertising assets are wide, which, coupled with their intangibility, renders monitoring difficult. It is often expensive to verify the efforts a partner commits in pushing the EJV's products in the field or the quality of after-sale services. Due to the difficulty to measure and monitor the performance of advertising-intensive input, the party contracted to provide such input is constantly tempted to overprice and/or undersupply (e.g., incomplete transfer of marketing knowledge and skills to the EJV). To correct the potentially larger pricing error demands more equity shares be allocated to this partner. Therefore,

Hypothesis 1d. The equity percentage in an EJV is higher for the partner whose input is relatively more marketing-intensive.

4.1.2 Pricing capabilities of the partners

In addition to the relative efficiency of the two intermediate markets, the pricing capabilities of two partner also have a significant bearing on the two pricing errors as well as share distribution (Chapter 3). A partner with stronger pricing capabilities tends to err less in determining the fee for the assets of the other. This enables it to claim more equity ownership in share negotiations. Along with this line, I argue that share distribution in an EJV varies with four variables that shape the pricing capabilities of the partners. These variables entail the partners' EJV experience, the alliance experience of partners in each other's industry, the partners' diversification level, and the business relatedness of partners with the EJV.

Prior EJV experience. Like many other firm capabilities (Barney, 1999; Wang & Rajagopalan, 2015), pricing capabilities are experiential, to a large extent. The accumulated experience of forming EJVs is an important way to learn pricing capabilities for two

reasons. First, a partner that has formed many EJVs before has gained ample opportunities to cultivate and hone its pricing capabilities (Anand & Khanna, 2000). Whenever a firm forms an EJV, it must repeat the process of negotiating and enforcing input fees. More repetitions reveal more issues and intricacies associated with the pricing process, which prompts a firm to develop effective solutions, necessary organizational routines, and to hire competent personnel (Baum & Ingram, 1998; Cui & O'Connor, 2012; Lee et al., 2015; Parkhe, 1991; Wang & Rajagopalan, 2015). By contrast, a firm with limited EJV experience is at the early stage of the learning curve where it has yet to acquire sufficient lessons and nurture organizational and human resources for pricing. Its pricing capabilities are inevitably weaker.

Second, having formed more EJVs in the past can expose a firm to more diverse partners and their specialized assets and practices (Delios & Henisz, 2000; Kale & Singh, 2007; Sampson, 2005). Working with partners in the past expands the references from which a firm can draw to infer what and how well its current partner will perform. A partner with limited EJV experience lacks these points of reference and has to rely on the information available at present to determine the price of the other's assets. This, in turn, cripples its pricing capabilities.

Given the strong link between past EJV experience and the pricing capabilities of a partner, the seasoned partner is likely to determine an accurate fee upfront and is more capable of regulating the behaviors of the other party *ex post*. The novice partner will not be able to do the same. As such, the pricing error in the input fee to an experienced partner is presumably higher. To compensate for its weaker capabilities of pricing the other's assets, the inexperienced partner will have to relinquish more equity shares.

Hypothesis 2a. The equity percentage in an EJV is higher for the party with relatively more EJV experience.

Prior alliance experience in the other's industry. Besides general EJV experience, another type of experience that also influences the pricing capabilities of EJV partners is the prior experience of building alliances in each other's industry. Alliances in one industry deepen a firm's exposure to industry-specific assets, allowing it to better recognize the

value of the assets from that industry (Delios & Beamish, 1999). From these past alliances, a firm also sizes up industry conditions such as norms, rules, and competitive dynamics, which regulate the behaviors of players in that industry (Erramilli, 1991). In addition, allies in the past can serve as indirect ‘referees’ from which the firm collects information about the behavioral pattern, credibility, and reliability of the partner in the present EJV (Gulati, 1995b). As such, in an EJV, the partner with more alliances in the other’s industry will have an informational advantage over the other partner, and thanks to this advantage, this partner can accurately price the other’s input at the outset and easily control opportunistic attempts ex post. If a partner has little or no partnership experience in the other’s industry, it is ill-equipped to drive down the pricing error on the input of its EJV partner. To achieve the optimal correction, the party that has formed fewer alliances in its partner’s industry will have to relinquish more equity shares.

Hypothesis 2b. The equity percentage in an EJV is higher for the party that has relatively more alliance experience in the other’s industries.

Business diversification. Pricing capabilities of partners are also affected by their business diversification defined as the span of unique industries in which each partner is involved (Palich, Cardinal, & Miller, 2000). For two reasons, the more diversified firm is likely to have weaker capabilities to price the assets from its less diversified partner.

First, a more diversified partner tends to have less specialized knowledge about the operation of the EJV. Negotiating the fee for the input from a partner demands certain familiarity of performance criteria of the inputs, the operation technologies of the EJV, and even the partner itself (Contractor, 1985; Teece, 1998). A more diversified firm is more likely to lack such knowledge. When a firm expands its scope to multiple businesses, it is increasingly infeasible to maintain expertise in all the business lines under the corporate umbrella (Chi & Zhao, 2014; Palich et al., 2000). By contrast, the other partner with a focused corporate strategy is more likely to have in-depth knowledge about the business of the EJV. This party can then leverage its knowledge about the business of the EJV to drive the price of the input from the other closer to its real value and to subsequently prevent shirking.

Second, a more diversified partner may have inadequate resources to invest in the pricing process in an EJV deal. Although diversification can potentially create such important benefits such as market power and synergy (Su & Tsang, 2015), it inevitably stretches organization resources and managerial attention thin. Moreover, expanding a business portfolio is also accompanied by ballooning costs of coordinating decision making, routines, conflicting demands, and staffing across businesses (Palich et al., 2000). In addition, they must manage the complex relationship with a diverse body of external stakeholders (Su & Tsang, 2015). As the diversified firm may have to spread its resources across a wide spectrum, its capabilities to price the assets into a specific EJV will be weaker.

Consequently, between the two partners, the one with a greater level of diversification will be less familiar with the EJV operation and invest insufficient resources into determining the input fee upfront and in the ongoing enforcement of the fee afterward. With knowledge and resource constraints, the diversified firm is predisposed to weaker capabilities in evaluating and monitoring the contributions from the other, leading to a larger pricing error in the fee to the less diversified partner. To address the greater potential for pricing errors, more ownership is likely to be assigned to the party whose diversification level is lower.

Hypothesis 2c. The equity percentage in an EJV is higher for the party with relatively lower business diversification.

Business relatedness with the EJV. The dyadic relationship between partners and their EJV demonstrates various relatedness patterns. While some EJVs operate in the core business of a parent, others may be in businesses quite distant from that of the parent (Das & Teng, 2000b; Harrigan, 1986; Kogut, 1988; Tsang, 2000). Depending on their business relatedness to the EJV, the pricing capabilities of the partners and share distribution of the EJV will vary.

Business relatedness determines the relevance of the knowledge that a partner possesses toward the co-owned business. To the extent an EJV is in a related business, its inputs, technologies, management processes, and markets overlap with those of its parent (Chen & Hennart, 2002; Hennart, 1991). All else being constant, the party whose business

overlaps more with the EJV will have a clearer understanding of EJV operation, including the input or processes contracted to the other party. This understanding equips the partner with strong capabilities to constrain price manipulation by the other party in negotiations and curb shirking ex post. As the co-owned business moves away from the core the firm-level knowledge becomes increasingly irrelevant and inaccurate. This knowledge deficiency suffered by the less related partner dampens the effectiveness of evaluating and monitoring the input from the other. This leaves ample opportunities for the other party to overcharge and/or under-deliver.

As a result, the party with more related business is more adept at reducing the pricing error of the other party while increasing its own. The pricing error for the inputs from this party will be relatively larger. To correct for that error requires more equity ownership. The above argument leads to:

Hypothesis 2d. The equity percentage in an EJV is higher for the party that has higher business relatedness to the EJV.

4.2 Method

4.2.1 Sample and data

The EJV samples in this study come from the Alliance and Joint Venture database in Thomson Reuters' SDC Platinum (hereafter SDC). SDC is the most extensively used data source for research on EJVs and other forms of alliances (Georgieva et al., 2012; Mccann et al., 2016; Reuer & Ragozzino, 2012; Schildt, Keil, & Maula, 2012; Schilling, 2009). SDC compiles alliance information on a daily basis from a comprehensive set of public sources, including SEC filings and its international counterparts, business news, media wires, etc. Cross-reference checks in previous studies confirmed that alliances listed in SDC closely represent alliances announced in public and the information features high accuracy (Anand & Khanna, 2000; Schilling, 2009; Tong & Li, 2013). Sampling frame spans from 1990 to 2016. Observations prior to 1990 are omitted because the information is fragmented, incomplete, and unreliable (Sampson, 2004a).

I applied multiple criteria to screen the SDC sample. First, I excluded one-shot joint projects and deals that were announced but later aborted. Further, I selected EJVs with two partners. Bilateral EJVs, compared with multilateral EJVs, are much more prevalent in the business world (Pangarkar, 2009; Parkhe, 1993; Reuer & Ragozzino, 2012; Schildt et al., 2012; Tong & Li, 2013). The two-party focus also rules out unique coordination complexities associated with multilateral alliances, ensuring a tightly-controlled setting for verifying the hypotheses (Gong et al., 2007; Li et al., 2012). In addition, the two partners need to be public, business firms. EJVs involving non-business entities – e.g., governments, universities, or nonprofit organizations – are excluded for their non-economic motivations and unique institutional restrictions on equity holdings (Adegbesan & Higgins, 2010; Parkhe, 1993; Pisano, 1989). Public status of partners permits extracting sufficient firm-level data (Oxley, 1997). Of these two party setups, the equity shares of every party are above 5% – a threshold most often used to define an EJV (Gatignon & Anderson, 1988; Hennart, 1991). Share distribution across the EJV samples, therefore, varies between 5/95 and 95/5. All EJVs are located in the U.S.; this single-country design holds country-level environmental parameters constant.

Based on the screened EJV samples, I then sourced the information about partner firms from COMPUSTAT Fundamental and industry-level data from COMPUSTAT Segment and U.S. Economic Census. The dependent variable lags behind all independent variables for one year. As such, the sampling frame for firm- and industry-level data spans from 1989 to 2015. The final sample consists of 325 EJVs across 158 four-digit, Standard Industrial Classification (SIC) industries.

4.2.2 Variables and measures

4.2.2.1 Dependent variables

Relative equity ownership between the partners (EO). The dependent variable – relative equity ownership between the two parties – is measured as the ratio of the equity percentage of one party to that of the other in an EJV. Studies have used this ownership ratio to proxy the power balance between partners in EJVs (Steensma & Lyles, 2000; Yan & Gary, 1994).

Log transformation is applied to account for skewness and improve normality (Delios & Beamish, 1999; Delios & Henisz, 2000; Reuer & Ragozzino, 2012).

4.2.2.2 Independent variables

Relative volatility of the two intermediate markets (MKVL). I adopted the forecasting-error approach to gauge the volatility of a market, which has been frequently employed in research (Li & Li, 2010). This approach assumes an underlying stable trend in market demand across years and measures market volatility in a given year as the deviation of the actual market demand from the underlying trend. Obtaining the measure took three steps. First, I aggregated the sales of all firms in one industry (four-digit SIC) to proxy the overall demand of a market for every year from 1989 to 2016. Second, I used a linear regression to predict market sales in one year based on the actual sales in this year and the previous four years (e.g., predicting the sales in the year 1994 by the regression the sales data from 1990 to 1994). Third, I took the absolute difference between the actual and the predicted market sales of a year and weighed the difference with the actual sales of that year to derive the measure of market volatility. After obtaining the forecasting error for the market of each partner, I took the ratio of the two values to represent their relativity. A higher ratio means the input market of one partner is more turbulent than that of the other partner.

Relative breadth of the two intermediate markets (MKBR). The concentration ratio of the top 50 participants in one industry at four-digit SIC level is used to measure the breadth of the market for one partner's input (Chen, 2008; Chen & Hennart, 2004; Hennart, 1991; Li et al., 2009). In less concentrated industries, market shares are dispersed evenly among all firms that supply more or less the same assets. As an industry becomes more concentrated, the asset market shrinks, and only a limited number of firms are qualified to supply the industry-specific contributions to the EJV. Again, the ratio of the concentration of one partner's industry to that of the other measures their relativity. A higher value of the variable means the input market of one partner is narrower (i.e., the concentration ratio of its industry is higher) than that of the other. Data for industry concentration are drawn from the U.S. Economic Census. Since the Census is conducted every five years, concentration data for industries from each Census covers adjacent years. Specifically, Census 1992

covers the year 1989 to 1994, Census 1997 the year 1995 to 1999, Census 2002 the year 2000 to 2004, Census 2007 the year 2005 to 2009, and Census 2012 the year 2010 to 2015.

Relative technological intensity of the assets (RD). A firm's R&D intensity of a firm has been the most widely used indicator of the technological input it brings to an alliance (Brouthers & Hennart, 2007; Chen & Hennart, 2002; Hennart, 1991; Lu, 2002; Meyer & Wang, 2015). The higher the ratio, the more technologically intensive the input of one partner relative to that of the other. A low R&D partner does not have much technology to bring to the table. To measure the technological intensity of the assets, I first calculate the R&D intensity of each partner (i.e., R&D investments to total revenue), and then take the ratio of the two values. Data for R&D investments and revenues of each partner come from COMPUSTAT Fundamental.

Relative advertising intensity of the assets (ADV). Similar to technological intensity, the relative advertising intensity of the assets is measured by the ratio of the advertising intensity of one partner (i.e., advertising expenditure to total revenue) to that of the other (Gatignon & Anderson, 1988; Hennart, 1991; Lu, 2002). The higher the value for this variable, the more marketing intensive the input from one partner over that of the other.

Relative prior EJV experience of the partners (JVEXP). Following previous research (Lee et al., 2015; Sampson, 2005; Tong & Li, 2013; Wang & Zajac, 2007), I measured the EJV experience of the two partners by first counting each partner's EJVs in the SDC database in the five years prior to a particular EJV and then taking the natural log of one plus the count. The ratio of these two values captures the relativity of EJV experience. The higher the ratio, the more seasoned one partner is to the other in forming EJVs.

Previous alliances of one partner within the other's industry (INDAL). To measure this variable, I first counted all alliances (including both EJVs and non-equity alliances) each partner builds in the other's industry five years prior to a focal EJV. For the skewness and issue with zero value, I then took the value of the natural log of one plus the count of the alliances by each partner. The ratio of the two logged counts was used to measure the asymmetrical differences in the alliances each partner forms in the other's industry.

Relative business diversification of the partners (DIV). Corporate diversification of each partner is gauged with the entropy measure at the four-digit SIC level (Su & Tsang, 2015). The advantage of this entropy measure is that it considers not only the number of unique industries under one firm but also the weight of the sales in each industry segment. The formula is:

$$E_{mt} = \sum_{i=0}^n S_{it} \ln 1/S_{it}$$

Where E_{mt} refers to the entropy value of firm m in year t and S_{it} is the percent of firm sales in the ith industry in the total sales in the year t .

After calculating the diversification level of each firm, I then took the ratio of the two entropy values to get the relative diversification level between them.

Relative business relatedness with the EJV (REL). The business relatedness of each partner with the EJV is calculated as the ratio of the overlap to the possible overlap between the four-digit SIC code of the partner and that of the EJV (Wang & Zajac, 2007). The value ranges from 0 to 1 with the higher value meaning higher relatedness (4-digit overlap = 1, 3-digit overlap=0.75, 2-digit overlap=0.5, 1-digit overlap=0.25, 0-digit overlap=0). Counting the overlap in SIC digits provides a more fine-grained measure of business relatedness than a binary dummy indicating whether the four-digit SIC code is the same between the entities (Chen & Hennart, 2002; Li, 1995; Lu, 2002).

4.2.2.3 Control variables

I included several control variables in the model to rule out alternative explanations to share distribution in EJVs.

Relative size of the partners (SIZE). Firms of different scale exhibit distinctions in numerous accounts including resource endowments, organizational routines, strategic aspirations, and decision-making structure. Research has shown that scale differences between partners significantly impact the structure as well as outcomes of an alliance (Bakker, 2016; Yan & Gary, 1994). To control for the size effect on share distribution, I

captured the size of each partner with its total assets (logged in millions USD) and then obtained the ratio between them.

Relative net incomes of partners (NTINC). The partners' resource slack may affect the affordability of equity ownership in the EJV and thereby share distribution decisions (Gatignon & Anderson, 1988; Pan, 1996, 2002; Shan, 1991). A firm with more resources at its disposal is able to retain more ownership of an EJV than the other resource-strained partner. Following Cui (2012), I measured the resource slack of each party by their logged net income (in million dollars) and took the ratio of two net incomes.

Relative EJV significance to partners (SIG). Following prior research (Bakker, 2016; Reuer et al., 2002), I summed up all alliances formed by a partner and then reversed the number to measure the significance of an EJV to a partner. The rationale is that "an alliance that is part of a larger alliance portfolio is on average likely to be less salient to the firm than an alliance that represents a firm's sole project" (Bakker, 2016, p. 1929). The lower the value for this variable, the less significant an EJV is to a partner. After that, I then took the ratio of the two values to measure the relative significance of the EJV to the two partners.

Global industry (GIND). Ownership is an important mechanism for partners to exercise control over an EJV (Gatignon & Anderson, 1988; Geringer & Hebert, 1989; Mjoen & Tallman, 1997). An important contingency influencing a partner's desire for ownership control is the nature of the industry, in particular, whether the industry is global or not (Kim & Hwang, 1992; Luo, 2001a; Porter & Fuller, 1986). Following previous studies (Pan, 2000), I first used a dummy variable to measure whether the partners operate in a global industry (1= petrochemicals, electronics, telecommunications, transportation, or pharmaceuticals sectors; 0 = otherwise) and then subtracted the value of one party from that of the other (1= partner A in global industry while B is not, 0 = both partners are in or not in global industry, and -1= partner B in global industry but A is not).

Relative firm financial risks (DEBT). The financial risks facing partners reasonably influence equity investments in a project. The attempt to reduce financial risks may motivate a firm to control lower equity ownership in an EJV (Reuer & Leiblein, 2000). To

account for this possibility, I measured the financial risk of each partner with their ratio of long-term debt to total assets. The higher this ratio, the higher the financial risks of a firm. I then took the ratio between the financial risks of the two partners to measure the relativity.

Relative age of the partners (FAGE). A partner's age matters to share distribution in an EJV as it relates to the overall operational experience of the partner. Age may also indicate the availability of each partner's past record (Reuer & Ragozzino, 2012). A firm with a longer operating history tends to leave more proven record about its performance and capabilities, which signals the quality and reliability of its operation and assets. A younger firm, like an entrepreneurial startup, is likely unknown to others, and its inputs may be harder to price. Ideally, firm age in a year is best captured by the gap between that year and the founding year; however, the founding date is difficult to obtain and missing in the COMPUSTAT database. An often-used alternative is one plus the gap between a given year and the year that a firm first appears in the COMPUSTAT Fundamental database. After calculating the age of each firm, I then took the ratio of the age of one partner to that of the other.

Year dummies. Other unobserved founding situations may also affect equity split between the parties. Given the long temporal span in the data and rapid changes in the economy, institutions, and technology, EJVs formed in different years may situate in sharply distinct environments (Pangarkar, 2009). Variations in founding conditions across years may lead to heterogeneous ownership design in EJVs. I, therefore, include year dummies in the regression to control for these unobserved founding conditions. All variables and measures are summarized in Table 4.1.

4.2.3 Modeling approach

Since the DV is a logged ratio of two integer numbers and does not follow a normal distribution, ordinary least square (OLS) regression will produce biased estimates. Through a two-step transformation (see below), the original relationships can be fitted into a generalized linear model with distribution from the exponential family (Hardin & Hilbe, 2003). As equation (3) shows, the logged ownership of partner A becomes the DV and that of partner B becomes an offset function (McCullagh & Nelder, 1989).

Table 4.1 Variables, measures, and data

	Variables	Measures	Data source	Expected sign
DV	Relative equity ownership	Ratio of the equity percentage of one partner to the equity percentage of the other	SDC	
H1	Relative market volatility	Ratio of the forecasting errors in industry sales of one partner to the forecasting errors in industry sales of the other partner	COMPUSTAT Segment	–
H2	Relative market breadth	Ratio of the industry concentration ratio of one partner to the industry concentration ratio of the other partner	US Census Bureau Sector Data	+
H3	Relative technological contents in partners' assets	Ratio of the R&D intensity of one firm to the R&D intensity of the other	COMPUSTAT	+
H4	Relative advertising contents in partners' assets	Ratio of the advertising intensity of one firm to the advertising intensity of the other	COMPUSTAT	+
H5	Prior EJV experience of the partners	Ratio of the number of EJVs by a firm in the previous five years to the number of EJVs by the other partner in the previous five years	SDC	+
H6	Concurrent alliances within the other's industry	Ratio of the count of alliances one firm forms within the other's industries	SDC	+
H7	Diversification of the partners	Ratio of the diversification of one partner (measured by the entropy value) to the diversification of the other	COMPUSTAT	–
H8	Business relatedness with the EJV	Ratio of the overlap in the 4-digit SIC code between one parent and the EJV to that between the other parent and the EJV	COMPUSTAT	+
	Relative size of the partners	Ratio of the total assets of one partner to the total assets of the other	COMPUSTAT	
	Relative net income of the partners	Ratio of the net income of one partner to the net income of the other	COMPUSTAT	
	Asymmetrical significance of the EJV to the parties	Ratio of the reversed number of alliances of one partner to the reversed number of alliances of the other partner	SDC	
	Global industry of partners	Difference in the dummy that indicates whether a firm is in a global industry	COMPUSTAT	
	Financial risk of partners	Ratio of the debt of one partner to the debt of the other	COMPUSTAT	
	Asymmetrical age of the partners	Ratio of the number of years since the founding of each firm	COMPUSTAT	

$$\text{Log}(Ea/Eb) = \beta_0 + \beta X \quad (1)$$

$$\text{Log}(Ea) - \text{Log}(Eb) = \beta_0 + \beta X \quad (2)$$

$$\text{Log}(Ea) = \beta_0 + \beta X + \text{Log}(Eb) \quad (3)$$

Where Ea is partner A's equity ownership, Eb is partner B's ownership, β_0 is the intercept, X is the vector of independent variables.

The exploration of the data suggests a strong over-dispersion problem. The variance of the DV (i.e., 58.8) is larger than its mean (i.e., 51.1), the deviance-to-DF ratio of a Poisson regression model is 7.1119 – much greater than one, and the Lagrange Multiplier Statistics is also significant ($\chi^2 = 319.346$, $p < .0001$). The over-dispersion concern persists even with Negative Binomial regression (deviance-to-DF ratio=1.2219). In comparison, the generalized linear model with Gamma distribution is much more rigorous (deviance-to-DF ratio = 0.2655). For these reasons, I chose the model with Gamma distribution to estimate the proposed relationships.

4.2.4 Results

Table 4.2 presents the bivariate correlation between variables. Surprisingly, the relative equity ownership of partners (EO) only correlates with the relative net income (NTINC), but not with any other independent or control variables. All the correlations fall within the acceptable range with the strongest correlation between relative size and previous EJV experience of partners ($r = 0.589$).

Table 4.3 presents the results of the regressions. On the full sample, Model 1 estimates the effects of control variables, Model 2 adds market efficiency variables, Model 3 adds pricing capabilities variables in addition to controls, and Model 4 includes all the independent variables. Variation inflation factor (VIF) for variables in all models is below 10, suggesting the absence of the multicollinearity threats.

Table 4.2 Descriptive statistics and Pearson correlation

	Variable	Mean	Std Dev	1	2	3	4	5	6	7
1	EO	0.057	0.383	1.000						
2	MKVL	0.009	2.064	-0.026	1.000					
3	MKBR	0.038	0.474	0.014	-0.106†	1.00000				
4	RD	29.658	475.692	-0.009	-0.004	-0.030	1.000			
5	ADV	1.027	0.597	-0.012	0.000	-0.188**	-0.006	1.000		
6	JVEXP	0.020	1.276	0.013	-0.060	0.118*	-0.019	-0.007	1.000	
7	INDAL	0.024	0.838	0.036	-0.004	0.144*	-0.009	-0.012	0.433**	1.000
8	DIV	1.151	0.834	-0.017	-0.010	0.079	-0.013	-0.005	0.254**	0.090
9	REL	1.062	0.513	-0.046	0.047	-0.089	-0.007	-0.045	-0.239**	-0.287**
10	SIZE	-0.054	2.972	0.049	-0.102†	0.307**	-0.077	-0.169*	0.589**	0.347**
11	NTINC	3.648	46.923	0.117*	-0.018	0.026	-0.004	-0.022	0.000	-0.001
12	SIG	-0.061	1.636	-0.019	0.053	-0.081	0.017	0.003	-0.868**	-0.411**
13	GIND	0.009	0.338	0.013	0.003	0.106†	-0.001	-0.003	-0.127*	-0.036
14	DEBT	-0.001	0.119	0.023	0.022	0.053	-0.047	-0.101†	-0.087	-0.004
15	FAGE	-0.003	1.323	0.016	-0.118*	0.221**	-0.071	-0.041	0.394***	0.289**
	Variable	Mean	Std Dev	8	9	10	11	12	13	14
8	DIV	1.151	0.834	1.000						
9	REL	1.062	0.513	-0.129*	1.000					
10	SIZE	-0.054	2.972	0.263**	-0.221**	1.000				
11	NTINC	3.648	46.923	-0.010	-0.075	0.050	1.000			
12	SIG	-0.061	1.636	-0.226**	0.139*	-0.525**	0.001	1.000		
13	GIND	0.009	0.338	0.007	0.102†	-0.087	-0.002	0.036	1.000	
14	DEBT	-0.001	0.119	-0.023	-0.044	0.114*	0.138*	0.204**	-0.058	1.000
15	FAGE	-0.003	1.323	0.241**	-0.175*	0.564**	-0.004	-0.331**	0.002	0.080

N=325, †p<0.1, *p<0.05, **p<0.001

Table 4.3 Regression results

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.
Intercept	0.099*	0.044	0.187*	0.057	0.338**	0.082	0.341**	0.099	0.692**	0.187	0.501***	0.142
SIZE	0.074*	0.030	0.036*	0.014	0.033*	0.013	0.035*	0.014	0.066*	0.027	0.056*	0.020
NTINC	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.000	0.001
SIG	0.010	0.019	0.026	0.021	0.018	0.034	0.020	0.034	0.010	0.068	0.044	0.051
GIND	0.015	0.085	0.044	0.087	0.053	0.087	0.063	0.088	0.232	0.199	0.088	0.141
DEBT	0.291	0.256	0.211	0.263	0.208	0.260	0.206	0.261	0.293	0.526	0.207	0.387
FAGE	-0.042†	0.024	-0.054*	0.027	-0.050†	0.027	-0.050†	0.027	-0.103†	0.057	-0.079†	0.042
MKVL			-0.007	0.014			-0.006	0.014	-0.014	0.042	-0.012	0.019
MKBR			-0.056	0.068			-0.056	0.068	-0.192	0.136	-0.115	0.115
RD			0.000	0.000			0.000	0.000	-0.001	0.001	0.000	0.000
ADV			0.002	0.048			-0.002	0.048	-0.021	0.066	-0.009	0.058
JVEXP					-0.002	0.047	-0.002	0.047	-0.033	0.104	0.006	0.074
INDAL					-0.005	0.039	-0.002	0.040	0.045	0.079	0.014	0.063
DIV					-0.063†	0.034	-0.062†	0.035	-0.126†	0.077	-0.080†	0.048
REL					-0.076	0.060	-0.077	0.060	-0.160	0.117	-0.108	0.093
Year dummy	Included		Included		Included		Included		Included		Included	
JV industry dummy	Included		Included		Included		Included		Included		Included	
Goodness of Fit												
Deviance	83.350		83.388		82.525		82.302		69.1859		76.510	
χ^2	387.634		371.329		360.976		358.415		231.691		288.247	
Full Log Likelihood	-1522.077		-1522.154		-1520.395		-1519.936		-777.7061		-1014.848	
AIC	3060.153		3068.308		3064.79		3071.872		1587.4122		2061.695	
BIC	3090.424		3113.714		3110.196		3132.413		1636.2099		2115.096	
N	325		325		325		325		156		208	

†p<0.1, *p<0.05, **p<0.001

Based on the results in Model 1, the relative firm size (SIZE) is positively and significantly related to the relative equity shares of the partners ($\beta = 0.074, p < .05$). Hence, the larger a partner is compared with the other, the more equity shares it will control in an EJV. The relative age of the parties (FAGE) is negatively related to the relative equity shares ($\beta = -0.042, p < .10$), suggesting that the younger partner controls more equity shares. Other control variables, specifically the relative net income of the partners (NTINC), the relative significance of the EJV to the partners (SIG), the differences in the global industry (GIND), and the relative financial risks of the parties (DEBT), show no significant impact on share distribution.

In Model 2, adding the market-efficiency variables does not improve model fit (deviance difference (4) = 0.038, $p > .05$), and the AIC value slightly goes up. None of the market efficiency variables is significantly related to share distribution. Hypothesis H1a, 1b, 1c, and 1d are not supported. Market volatility (MKVL) ($\beta = -0.007, p > .10$), market breadth (MKBR) ($\beta = -0.0056, p > .10$), R&D intensity of the partners (RD) ($\beta = -0.000, p > .10$), and advertising intensity of the partners (ADV) ($\beta = 0.002, p > .10$) do not matter to share distribution in EJVs.

Compared with Model 1, Model 3 does not fit better (deviance difference (4) = 0.825, $p > .05$). Its AIC value is also relatively higher, suggesting a poorer model fit. Only one out of the four pricing capability variables shows a marginally significant and expected relationship with share distribution. Inconsistent with Hypothesis 2a, 2b, and 2d, previous EJV experience (JVEXP) ($\beta = -0.002, p > .10$), prior alliances in the other's industry (INDAL) ($\beta = -0.005, p > .10$), business relatedness with the EJV (REL) ($\beta = -0.076, p > .10$) are not significantly related to share distribution. Consistent with Hypothesis 2c, the relative diversification of the partners (DIV) negatively relates to relative equity shares ($\beta = -0.063, p < .10$). As such, the more diversified partner controls less equity shares than the other whose business is more focused.

Model 4 sees no improvement in model fit compared with Model 1 (deviance difference (8) = 1.048, $p > .10$), Model 2 (deviance difference (4) = 1.086, $p > .10$), and Model 3

(deviance difference = 0.223, $p > .10$). The AIC value for Model 4 is the highest. All the effects remain stable in Model 4 with all variables included. Overall, relative firm size (SIZE) and firm age (FAGE) still positively ($\beta = 0.035$, $p < .05$) and negatively ($\beta = -0.05$, $p < .10$) influence the relative equity shares of the partners. The diversification level of the partners (DIV) also shows a negative impact ($\beta = -0.062$, $p < .10$). The non-significant impacts of all other variables remain the same.

Additional analysis

Out of the eight hypotheses, only the one involving business diversification of partners received support from the empirical findings. To explore why the models failed to find evidence for other variables of interests, I carried out further analysis. First, over-presentation bias may be the cause of the insignificant findings, given that 84 percent of the sample adopts equal ownership structure (i.e., 52 observations with unequal ownership structure while 273 observations with equal ownership). To rule out this bias, I followed previous studies to match the unequal ownership structures (N=52) with the randomly-selected, equal structures in a ratio of 1 to 2 (making the N=156) and 1 to 3 (making the N= 208) respectively and then re-ran the full model on the two matched samples (Model 5 and 6) (Zhelyazkov & Gulati, 2016).

Overall, reducing equal ownership sample does not alter the pattern of the regression results from Model 4. The relative firm size (SIZE) positively relates to the relative equity shares between parties ($\beta = 0.066$, $p < .05$ in Model 5 and $\beta = 0.056$, $p < .05$ in Model 6). The relative age of partners (FAGE) remains negatively related to equity split ($\beta = -0.103$, $p < .10$ in Model 5 and $\beta = -0.079$, $p < .10$ in Model 6) as does the relative diversification level of the partners (DIV) ($\beta = -0.126$, $p < .10$ in Model 5 and $\beta = -0.080$, $p < .10$ in Model 6). The effects of all the remaining variables are still insignificant.

The generalized linear regression assumes independence among observations (Hardin & Hilbe, 2003). This assumption can be violated by the two types of potential interdependence in this sample. For one, two or more EJVs can be formed by the same pair of partners, namely repeated partnerships (Gulati, 1995a; Holloway & Parmigiani, 2016;

Kogut, 1989; Xia, 2011). The same parents led by their routines, processes, and cultures will likely structure their EJVs in a similar manner (Kim & Hwang, 1992; Lu, 2002; Meyer, 2001; Rosenweig & Singh, 1991). Moreover, EJVs that operate in the same industry sector can be more alike in ownership design than those in different sectors. EJVs exposed to the same industry-specific conditions (e.g., regulations, rivalry, and customer preferences) may accordingly adopt similar co-ownership structure (Baum & Ingram, 1998; Pisano, 1989; Tong & Reuer, 2010).

To investigate possible biases of the interdependence among observations, I created a new variable to code the pair of parents that formed EJVs in the sample. If two or more EJVs are under the same two partners, these EJVs were assigned the same parent code. I used the EJVs' four-digit SIC industry code to identify their industry sector. I then added the *random effect* of the parent pair and that of the EJV industry group to the generalized linear modeling (Model 7 to 10). Table 4.4 presents the results.

Table 4.4 Regression results with two random effects

	Model 7		Model 8		Model 9		Model10	
	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.
Intercept	0.192*	0.063	0.193*	0.061	0.353*	0.131	0.357*	0.130
SIZE	0.035*	0.018	0.038*	0.019	0.035†	0.021	0.037†	0.022
NTINC	0.001*	0.000	0.001*	0.000	0.001†	0.000	0.001†	0.000
SIG	0.026	0.038	0.028	0.038	0.016	0.094	0.019	0.093
GIND	0.038	0.048	0.048	0.050	0.058	0.050	0.068	0.052
DEBT	0.370	0.399	0.362	0.398	0.367	0.445	0.358	0.444
FAGE	-0.065	0.040	-0.065	0.039	-0.059†	0.034	-0.059†	0.034
MKVL			-0.010	0.006			-0.009	0.006
MKBR			-0.061	0.042			-0.060	0.042
RD			0.000*	0.000			0.000†	0.000
ADV			0.002	0.012			-0.002	0.016
JVEXP					-0.006	0.108	-0.005	0.108
ALIND					-0.016	0.060	-0.012	0.060
DIV					-0.063†	0.036	-0.062†	0.036
REL					-0.084	0.057	-0.085	0.057
Fit Criteria								
QIC	2895.561		2887.020		2987.005		2970.830	
QICu	2902.515		2901.771		2997.760		2989.413	

N=325, †p<0.1, *p<0.05, **p<0.001

In model 10, the relative firm size (SIZE) is still positively related ($\beta = 0.037, p < .10$), while the relative firm age (FAGE) ($\beta = -0.059, p < .10$) and the relative diversification level of partners (DIV) ($\beta = -0.062, p < .10$) are negatively related to the equity shares of one party to the other. In this model, the relative net income of partners (NTINC) shows a significant positive effect ($\beta = 0.001, p < .10$) whereas the relative R&D intensity (RD) shows a significant negative effect ($\beta = -0.000, p < .10$). It seems the partner with a higher net income or a higher R&D intensity tends to control more equity shares, but these two findings should be interpreted with caution in that their significance is not stable through the models.

4.3 Summary of the chapter

Based on the pricing-error rule, this dissertation proposes that share distribution varies with the relative efficiency of the two intermediate markets and the pricing capabilities of the partners. Nevertheless, this theoretical prediction receives largely no support from the regression results on a sample of 325 EJVs. None of the variables that supposedly indicate the relative market efficiency shows a significant impact on share distribution. Whether the market of a partner is more volatile or concentrated than that of the other has no effect on how they split the equity shares; the relative R&D and advertising intensity of their assets also have no bearing on share distribution. In addition, four variables were used to indicate the pricing capabilities of the partners, but only one significantly affected share distribution as predicted. The partner with a higher business diversification tends to control fewer equity shares in the co-ownership structure. Share distribution does not vary significantly with partners' relative EJV experience, industry-specific alliance experience, or industry relatedness with the EJV. Since partners do not split equity shares as per the relative efficiency of the two markets or their pricing capabilities, the pricing-error rule does not predict share distribution of EJVs.

Chapter 5

5 The consequence of share distribution: EJV termination

The previous chapter tests the two antecedents of share distribution which are derived from the pricing-error rule. This chapter switches focus to the consequences of share distribution. Among various organizational consequences that share distribution can theoretically affect (see Chapter 3), this chapter centers on the termination of EJVs. Not only is EJV termination an important, ongoing concern to practitioners and scholars alike, it is also a one-off event that can be objectively measured. This chapter verifies a core argument from Chapter 3 that share misallocation increases the likelihood of EJV termination. In the following sections, I distinguish between two types of share misallocation and hypothesize how they are related to EJV termination. Information about the sample, variables, and regression method are then provided. The results are presented at the end.

5.1 Hypothesis development

Share misallocation at EJV formation. Even though partners endeavor to install the most efficient co-ownership structure, they can still misallocate equity shares at the beginning of an EJV. As Chen et al. (2017) argue, partners in a newly-formed EJV estimate the errors they commit in pricing each other's assets and then accordingly design the co-ownership structure. The estimation itself is subject to inaccuracy in that the two pricing errors are inherently ambiguous and immeasurable, and the two partners have yet to gain direct exposure to the assets they will pool into the EJV (Balakrishnan & Koza, 1993; Reuer & Ragozzino, 2012; Reuer et al., 2013). Subsequently, share distribution based on inaccurate estimations can easily misalign with the *real* pricing errors.

Depending on its degree, share misallocation at EJV formation leaves adverse and lasting effects on subsequent collaboration between partners. Share misallocation distorts incentives of the two parties, wherein the under-owner is constantly tempted to cheat and the over-owner is forced to impose and enforce extra contractual restraints. The transaction costs of running the inter-firm cooperation will inevitably rise. Meanwhile, the

opportunistic engagement by the under-owner, either overpricing or under-delivering its assets, directly harms EJV performance. Furthermore, disputes and clashes will become increasingly frequent as the incentives between partners are misaligned; settling these disputes raises bureaucratic costs of operating the EJV.

With its rising costs to operate, an EJV with misallocated shares will likely turn into a disappointing investment. It is then attractive for partners to abandon the present EJV and to explore more promising market opportunities with or without a new partner (Blodgett, 1991; Greve et al., 2010; Makino et al., 2007; Yan & Zeng, 1999). By contrast, those EJVs in which equity shares are in line with the pricing errors will be on the right track for development. Strong incentive alignment motivates partners to work cooperatively toward the common goal rather than for private interests. These EJVs are more likely to succeed, reinforcing the decision to continue the co-owned entity (Dhanaraj & Beamish, 2004; Franko, 1971; Geringer & Hebert, 1989; Gomes-Casseres, 1987; Li, 1995). The above argument points to the hypothesis:

Hypothesis 1. Share misallocation at the formation of an EJV is positively related to the likelihood of its termination.

Share misallocation during the EJV's operation. Share misallocation can also occur at any time point during the operation periods of an EJV. The two pricing errors can be highly dynamic from one period to the next because of changes in external environments and learning by partners about each other's assets over time. As the inter-firm collaboration proceeds, the market for partner inputs can increase or decrease in efficiency, causing up-and-down in the two pricing errors. Within the EJV, both parties also learn about the value of each other's inputs by directly observing the exploitation of the assets or by gleaning information from indirect sources such as management, board meetings, or joint projects (Balakrishnan & Koza, 1993; Chi & McGuire, 1996; Doz, 1996; Makhija & Ganesh, 1997; Parkhe, 1991). The accumulated knowledge enables both partners to price each other's assets more accurately. Compared with fluctuating pricing errors, share distribution between partners is much more rigid. Share distribution is fundamental to the governance structure of an EJV, and any renegotiation over equity ownership costs considerable time

and resources. Consequently, shifting pricing errors will hardly stay in line with the difficult-to-modify share distribution over time.

Share misallocation in the midlife of an EJV can prompt partners to end the co-owned entity in two ways. First, similar to share misallocation at formation, misallocation that occurs during the operation of the EJV also distorts incentive alignment between partners, raises the transaction costs of the co-ownership relationship, and eventually harms EJV performance. This leads partners to terminate the EJV and salvage investments. Second, a stronger trigger of termination stems from a special version of share misallocation, that is, at least one pricing error declines to a negligible level. This renders the co-ownership structure unnecessary since only one or no pricing error demands correction through residual sharing. To save on co-ownership and co-management costs motivate partners to terminate the EJV.

The odds of share misallocation during EJV operation can be particularly high when the product markets of the two partners overlap. Partners in overlapping markets tend to operate with similar assets. Asset similarity enables both parties to efficiently and effectively acquire knowledge about the value of each other's inputs from external sources and internal interactions (Kale & Singh, 2007; Khanna et al., 1998; Lane et al., 2001). Because of the continuous learning by partners, both pricing errors will vary extensively from one period to another, elevating the chance and the extent of share misallocation. More important, in EJVs partners feature a higher market overlap and can better learn about each other's assets and behaviors, one or both pricing errors will decline more quickly to a tolerable level. The day that the co-ownership structure becomes superfluous will come sooner. By contrast, if the product markets of partners are quite distinct, they are unfamiliar with each other's market and assets. Although they will still gathering information about each other's inputs after an EJV commences, such learning will be gradual and less effective. The pricing errors will remain significant for an extended time, forcing the two partners to maintain the co-ownership relationship. Based on the argument, I hypothesize:

Hypothesis 2. Product market overlap between partners is positively related to the likelihood of the EJV termination.

Share misallocation in the midlife of an EJV is also more probable if the partners have more *a priori* collaboration experience. The experience of working together in the past allows both parties to learn about each other's firm-specific assets, organizational routines, and behavioral patterns (Fang & Zou, 2010; Inkpen, 2000; Kale et al., 2000; Khanna et al., 1998; Yang et al., 2015). Such previous knowledge lays a foundation for the partners to swiftly understand the value of the inputs into the present EJV. Furthermore, partners that have collaborated before also tend to cultivate trust and relationship-specific routines (Gulati, 1995a; Gulati & Singh, 1998; Holloway & Parmigiani, 2016; Kale & Singh, 2007; Lioukas & Reuer, 2015). Previous relationships provide a conducive social context for mutual learning. In contrast, partners which have little or no history of collaboration face a greater unfamiliarity about each other and have to learn almost everything from the start. Such learning also has to take place in a less trustworthy environment (Gulati, 1995a; Holloway & Parmigiani, 2016; Xia, 2011). Due to less effective learning, the two pricing errors will diminish at a slower rate in EJVs in which partners lack previous collaboration experience. They then have to rely on the EJV for a longer time period. The above argument suggests the following:

Hypothesis 3. Prior collaboration experience between partners is positively related to the likelihood of EJV termination.

Concurrent alliances between a pair of partners will also increase share misallocation over the duration of the EJV and in turn the likelihood of its termination. Concurrent alliances are collaborative arrangements between the same two partners outside of an EJV. These types of alliances open up external sources of information, which facilitates the mutual learning of partners within an EJV (Lane et al., 2001; Yang et al., 2015). Through collaborating in multiple alliances simultaneously, both parties can engage in extensive and thorough information exchange. They, hence, can efficiently acquire the understanding about each other's assets and reliability. Moreover, concurrent alliances help build a more cooperative relationship, which is crucial to the learning by the partners. Firms simultaneously engaged in more alliances are less likely to act opportunistically because doing so endangers other partnerships as well as the EJV (Kogut, 1989). Conversely, if the EJV is the sole alliance between the two partners, they will lack information from sources

outside the EJV and their relationship can be less cooperative. In this EJV, the pricing errors will slowly decline and the two partners will have to keep the co-ownership relationship for an extended period. The argument above points to the following hypothesis:

Hypothesis 4. The number of concurrent alliances between partners is positively related to the likelihood of EJV termination.

5.2 Method

5.2.1 Sample and data

The sample for this study is based on the 325 EJVs from Chapter 4. I selected this sample as one key independent variable (i.e., share misallocation at the formation of an EJV) requires the prediction of the regression model in Chapter 4. Accordingly, EJVs in the sample are viable businesses formed in the U.S. by two public firms between 1990 and 2016. The termination event of interest is unexpected (Cui et al., 2011; Makino et al., 2007). EJVs that ended as planned are excluded, which entail those terminated because one party exercised its option right stipulated beforehand or because the contract expired (Heidle et al., 2014; Polidoro, Ahuja, & Mitchell, 2011). I identify the termination events – expected or unexpected – from SDC, Dow Jones’s Factiva, and LexisNexis Corporate Affiliations. Two additional EJVs were removed from the sample: one went public and no longer qualified as a two-party ownership structure while in the other, one partner divested its equities to a third, unknown party. Listwise deletion of observations with missing values on all variables leads to a final sample of 937 observations from 203 EJVs in 118 four-digit SIC industries. Among this sample, 110 EJVs experienced termination during the sampling period, while the remaining 93 EJVs lived beyond 2016 or were lost in the follow-up.

5.2.2 Variables and measures

The termination event of an EJV (TERM) is the dependent variable. It is measured by an indicator that takes the value of one if an EJV terminates in a given year or zero if otherwise. Termination occurs to an EJV when one party buys out the other, both sell the

EJV to a third party, or the EJV is dissolved (Bakker, 2016; Folta & Miller, 2002; Hennart et al., 1998; Hennart & Zeng, 2002; Park & Ungson, 1997).

Independent variables

Share misallocation at the formation of an EJV (SMF) is measured as the absolute difference between the optimal and the actual share distribution in an EJV. For example, share misallocation will be 40 if the predicted share distribution is 20/80, but the actual share distribution is 60/40. The actual share distribution of EJVs is directly observed from the data. The optimal share distribution is predicted by the generalized linear regression model from Chapter 4 using the eight variables that indicate the efficiency of the two intermediate markets and the pricing capabilities of partners. Conceptually, this predicted outcome is the share distribution the partners should adopt as per the pricing-error rule. This approach is consistent with what has been used by previous studies to predict the optimal entry mode from various theoretical perspectives (Brouthers, 2002; Brouthers & Nakos, 2004; Chen & Hu, 2002).

Product market overlap between parties (MKOL) is measured using the ratio of the overlap in the four-digit SIC code of the two partners to the maximum overlap (i.e., four). The variable will be zero if no digit overlaps in the SIC code of the two partners, 0.25 if one digit overlaps, 0.5 if two digits overlap, 0.75 if three digits overlap, and one if all four digits overlap (Kumar, 2010; Park & Russo, 1996; Yang et al., 2015). The higher the value, the greater the market overlap between the two parties.

Prior collaboration experience between partners (COEXP). To measure this variable for each EJV, I counted the number of alliances between the two parties five years prior to an EJV observation until the EJV ended (Gulati, 1995a; Lee et al., 2015; Lioukas & Reuer, 2015; Polidoro et al., 2011; Sampson, 2005; Xia, 2011). For instance, an EJV will have three repeated observations in the sample if it was created in 2000 and exited the study in 2002. Corresponding to the three repeated observations, there are three values of the prior collaboration experience between the two partners. The prior alliances for the observation in 2000 will be all the alliances between the two parties formed from 1995 to 1999, for the observation in 2001 the alliances from 1996 to 2000, and for the observation in 2002 the

alliances from 1997 to 2001. I then apply a natural log of one plus the count of the prior alliances for each observation of an EJV.

Concurrent alliances between the two partners (CONALL). I measured this variable by counting the total number of alliances the two partners formed outside of a given EJV in a year and then take the natural log of one plus the count to control for the skewness (Kogut, 1989). The higher the value, the more concurrent alliances between the two partners.

Control variables

Research has identified numerous reasons for the unexpected termination of EJVs. To account for these reasons, I include several control variables that are related to EJV properties, inter-partner relationship, and industry conditions.

Age of an EJV (JAGE) is measured by the number of years from the formation of an EJV prior to a current year. Termination of an EJV can be age-dependent for several reasons (Child & Yan, 2003; Hennart & Zeng, 2002; Park & Russo, 1996). The risks of termination will likely be low for the initial few years, but climb as time goes on. Partners are unwilling to end a new EJV during the honeymoon phase when the cooperation benefits from initial resource endowments and wishful expectations (Geringer & Hebert, 1989; Lu & Hebert, 2005). When the honeymoon is over, organizational diversities and incompatibilities can surface and cause day-to-day conflicts, prompting termination of the EJV (Parkhe, 1991; Heidt, 2014 #578). Another reason that termination risk correlates with age is that, as time goes by, one or both partners will eventually accomplish the goals that motivated the partnership and do not need to continue the cooperation (Gomes-Casseres, 1987).

R&D function in an EJV (RDFUN). A binary variable is used to indicate whether an EJV involves R&D function (1= yes; 0=no) (Oxley et al., 2009; Sampson, 2005). On one hand, EJVs with an R&D function may be subject to lower termination risks than those without. The knowledge transfer and creation required in an R&D EJV accentuate the need for unique inputs from both partners, thereby extending their cooperation (Kogut, 1989; Xia, 2011). Also, one party seeking to acquire the proprietary technology of the other usually

takes a longer time to fulfill this goal; it thus has to maintain the cooperation (Park & Ungson, 1997). On the other hand, the termination risk can also be high for R&D EJVs since they are more likely to be fraught with appropriability hazards and ensuing disputes (Gulati & Singh, 1998; Hennart, 1991).

Balanced ownership structure (BOS). A binary variable is used to indicate whether the co-ownership structure is balanced or unbalanced (1=unbalanced; 0=balanced). Termination may be more probable for EJVs with unbalanced ownership designs wherein the minority owner faces a higher risk of being overwhelmed by the other and has a stronger tendency to withdraw from the cooperation (Beamish & Banks, 1987; Bleeke & Ernst, 1991; Harrigan, 1986). Another rationale suggests balanced ownership structure is more unstable since equal ownership can cause frequent disputes and power struggles within the EJV and leads to its dissolution (Killing, 1983; Lecraw, 1984; Pearce, 1997; Yan & Gary, 1994).

Asymmetrical scale of partners (ASCALE). Firms of different sizes can diverge in numerous aspects such as strategic aspirations, decision-making routines, organizational cultures, etc. These organizational differences can be sources of conflicts and disagreements within an EJV and, in turn, cause its discontinuation. Studies have shown that asymmetrical sizes of partners have an ongoing effect on the performance and survival of an alliance (Yang, Zheng, & Zhao, 2014). To account for the effect of the size difference, I calculated the absolute difference in the total assets between firms and then took a log transformation to account for skewness (Bakker, 2016).

Asymmetrical age of partners (AAGE). This variable is measured as the difference between the age of the partners when an EJV was formed. This difference remains invariant throughout the duration of an EJV. Along with age differences, many other aspects will also diverge between the partners, which leads to disagreements and triggers termination (Heidle et al., 2014).

Asymmetrical scope of partners (ASCOPE). This variable is measured as the difference in the number of unique four-digit SIC codes between the two firms. An EJV formed between a diversified partner and operationally-focused partner may have a higher risk of

internal clashes and dissolution. Frequent internal conflicts result from the usual differences between diversified and focused firms in operational routines, decision-making processes, and performance goals (Palich et al., 2000; Su & Tsang, 2015).

Combined alliance experience of partners (COMEXP). Following Pangarkar (2009), I gauged the combined alliance experience of the two partners by counting the total number of alliances formed by both parties in the five-year period prior to an observation and then dividing the sum by two to get the average value. Thanks to the learning effect (Baum & Ingram, 1998; Fang & Zou, 2010; Inkpen, 2000; Khanna et al., 1998; Yang et al., 2015), partners with rich alliance experience can identify effective ways to settle differences and tap potential complementarity in their assets. This, in turn, helps extend the duration of an EJV. Novice partners, on the other hand, tend to lack the skills and knowledge to establish effective routines and processes within their collaboration.

Uncertainty of EJV industry (UNCIND). I measured industry uncertainty with the forecasting-error approach used in Chapter 4 (Li & Li, 2010). For the industry in which an EJV operates, I first predicted a five-year trend in sales using a linear regression, calculate the absolute departure between the predicted sales and the actual sales of the industry in a year, and then weighted the departure with the actual sales. The higher the value of this variable, the more uncertain the industry. Industry uncertainty is expected to have a U-shaped relationship with EJV termination. As an industry becomes more uncertain, the likelihood of termination declines since as partners increasingly rely on partial ownership structure to share the risks. Yet, when uncertainty is exceptionally high, partners will be more likely to end the EJV to salvage their investments (Chi & McGuire, 1996; Cuypers & Martin, 2007; Kogut, 1991; Reuer & Tong, 2005).

5.2.3 Modeling approach

In this study, I employed the standard survival analysis to examine the likelihood of EJV termination (Allison, 2010; Dhanaraj & Beamish, 2004; Hennart et al., 1998; Park & Ungson, 1997; Polidoro et al., 2011; Xia, 2011). I selected the Cox Proportional Hazard Model to estimate the proposed relationships; the equation of the model is as below:

$$H_i(t) = H_0(t)\exp(\beta_1 X_{i1} + \dots + \beta_n X_{in})$$

Using the partial likelihood estimation method, the Cox Model predicts the termination hazard of firm i in year t through the product of a baseline hazard function, $H_0(t)$, and an exponentiated linear function with a set of predictors, $\exp(\beta_1 X_{i1} + \dots + \beta_n X_{in})$. Here the baseline, $H_0(t)$, can be regarded as the hazard function of a firm with the value of zero for all predictors.

I choose the Cox model for its three important advantages (Allison, 2010). First, the Cox model retains information of the right censored cases in the estimation process up to the point of censoring, making it a particularly attractive approach for a small sample. Second, it can include both time-invariant and time-varying covariates. Third, it does not require pre-specifying the probability distribution of event time, thereby enhancing the robustness of the estimation method.

In the present data, autocorrelation poses a potential bias over the estimation, given that multiple EJVs can be built by the same pair of parents or within the same industry. Following previous studies (Mohr et al., 2016; Polidoro et al., 2011), I clustered the standard error to EJV level to mitigate potential autocorrelation biases.

5.2.4 Results

To obtain a preliminary understanding of termination events in the sample, I first plotted the distribution of time to the exit in Figure 5.1. It shows that the majority, about 75 percent of EJVs in this sample, end within eight years after formation. The survival probability chart in Figure 5.2 further confirms that an EJV has less than a 30 percent chance of living beyond eight years. The longevity of EJVs in the present sample, which is comparable to that of previous studies (Chung & Beamish, 2010; Hennart et al., 1998), attests to the notion that EJVs are essentially a transient arrangement for inter-firm cooperation (Blodgett, 1991; Contractor, 1990; Harrigan, 1986; Yan, 1998).

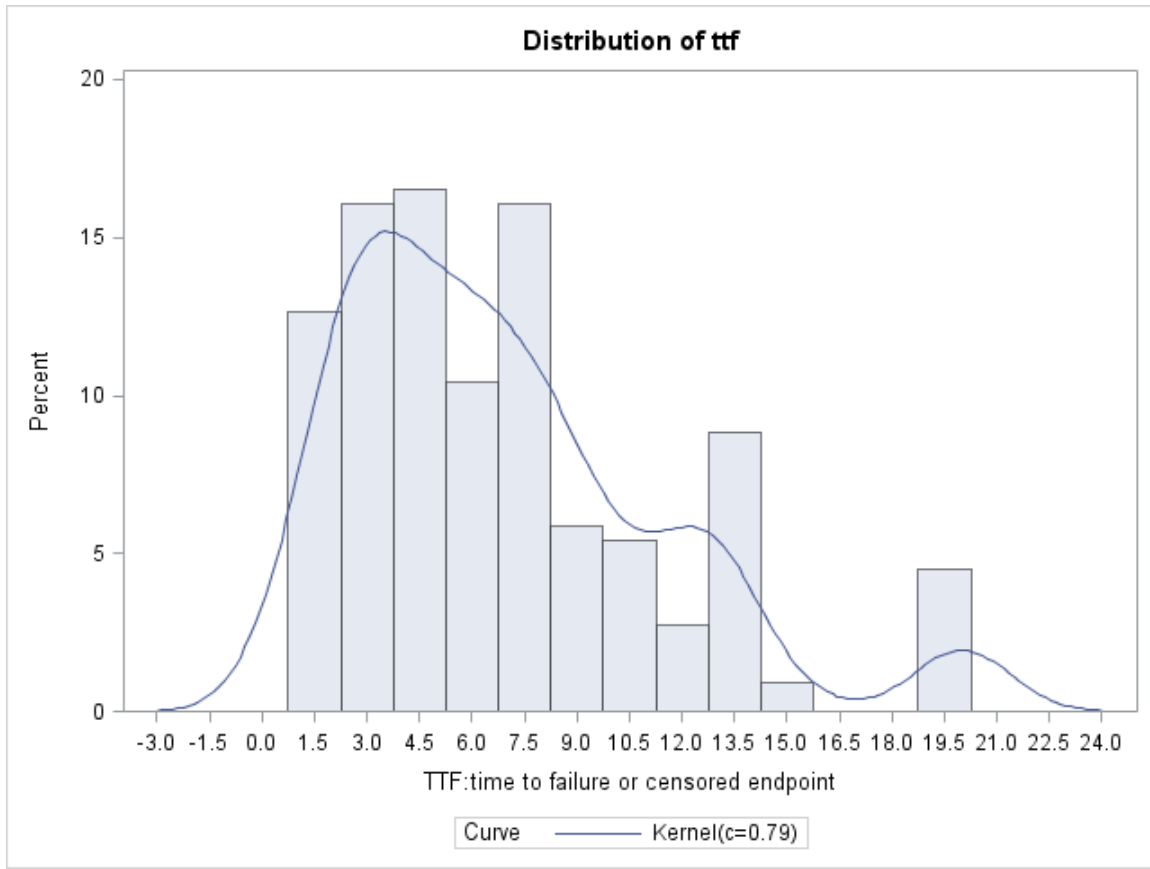


Figure 5.1 Distribution of time to failure

Table 5.1 presents the descriptive statistics of all variables and the binary Pearson correlation. The correlation between the uncertainty of EJV industry (UNCIND) and its square term is high ($UNCIND^2$) ($r=0.865$), which is understandable. Correlations among all other variables fall within an acceptable range.

I estimated six Cox models to verify the four hypotheses. Model 1 estimated the effects of control variables. Model 2, 3, 4, and 5 each added an independent variable of interest, and Model 6 includes all control and independent variables. According to the deviance test, all six models fit significantly better than an empty model or a model with no predictors. Table 5.2 reports the results.

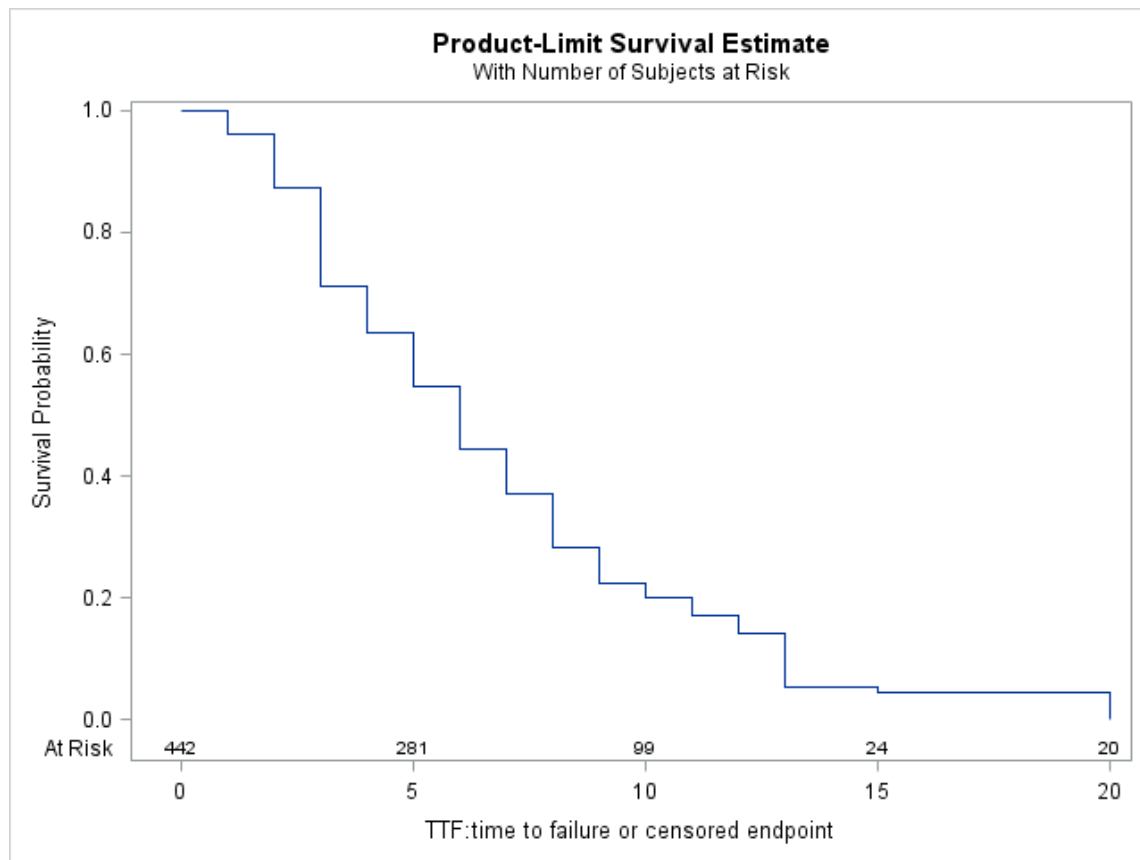


Figure 5.2 Survival probability

Based on Model 1, four control variables significantly affect the likelihood of EJV termination. The coefficient of EJV age (JAGE) is significantly negative ($\beta = -0.16$, $p < .001$), suggesting that an older EJV is subject to a lower risk of termination. Since the hazard ratio of EJV age is 0.852, the hazard of termination declines by about 14.8 percent for one year increase in age (which is derived from the equation $(0.852-1)*100=-14.8$). The coefficient of R&D function (RDFUN) is positive and significant ($\beta = 0.135$, $p < .001$). According to the hazard ratio, EJVs with R&D function will be 14.4 percent more likely to terminate than those without. Whether the co-ownership structure is balanced or not (BOS) has a positive and significant coefficient ($\beta = 0.712$, $p < .001$), suggesting that the likelihood of termination is higher for EJVs with an unbalanced co-ownership structure than with a balanced structure. In fact, the termination hazard of unbalanced co-ownership structures is more than double that of balanced ones (hazard ratio=2.039).

Table 5.1 Descriptive statistics and Pearson correlation

	Variable	Mean	Std Dev	1	2	3	4	5	6	7
1	TERM	10.161	6.978	1.000						
2	SMF	13.701	13.031	-0.132**	1.000					
3	MKOL	0.371	0.356	-0.049	0.042	1.000				
4	COEXP	0.573	0.412	-0.386**	0.049	0.087*	1.000			
5	CONALL	0.038	0.195	-0.026	-0.063†	0.040	0.239**	1.000		
6	JAGE	4.095	4.703	0.650**	-0.116**	-0.041	-0.610**	-0.058†	1.000	
7	RDFUN	0.305	0.941	-0.117**	-0.061†	0.006	0.078*	0.071*	-0.064*	1.000
8	BOS	0.142	0.349	-0.207**	0.522**	0.005	0.071*	-0.057†	-0.172**	-0.083*
9	ASCALE	9.087	2.432	0.163**	-0.012	-0.113**	-0.104*	0.070*	0.226**	0.008
10	ASCOPE	0.802	0.653	0.234**	-0.182**	-0.157**	-0.199**	0.010	0.203**	-0.039
11	AAGE	15.547	15.522	-0.019	0.037	-0.214**	-0.005	-0.037	-0.013	0.030
12	COMEXP	2.671	1.317	-0.073*	-0.004	-0.149**	0.387**	0.256**	-0.160**	0.241**
13	UNCIND	0.113	0.231	0.016	-0.036	0.027	0.020	-0.032	-0.009	-0.050
14	UNCIND2	0.066	0.804	0.013	-0.022	0.010	0.044	-0.013	-0.035	-0.021
	Variable	Mean	Std Dev	8	9	10	11	12	13	14
8	BOS	0.142	0.349	1.000						
9	ASCALE	9.087	2.432	-0.080*	1.000					
10	ASCOPE	0.802	0.653	-0.086*	0.446**	1.000				
11	AAGE	15.547	15.522	-0.055†	0.000	-0.104*	1.000			
12	COMEXP	2.671	1.317	-0.063†	0.330**	0.083*	0.065*	1.000		
13	UNCIND	0.113	0.231	-0.036	0.071*	0.028	-0.081*	-0.052	1.000	
14	UNCIND2	0.066	0.804	-0.025	0.020	0.009	-0.039	0.002	0.865*	1.000

N=937, †p<.10, *p<.05, **p<.001

Table 5.2 Regression results

	Model1		Model 2		Model 3		Model 4		Model5		Model6	
	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.
JAGE	-0.160**	0.016	-0.160**	0.016	-0.161**	0.016	-0.172**	0.019	-0.160**	0.016	-0.176**	0.019
RDFUN	0.135*	0.044	0.135*	0.044	0.133*	0.044	0.130*	0.044	0.141*	0.044	0.132**	0.045
BOS	0.712**	0.121	0.687**	0.135	0.702**	0.121	0.712**	0.121	0.729**	0.121	0.681**	0.136
ASCALE	-0.106**	0.023	-0.109**	0.024	-0.100**	0.023	-0.110**	0.024	-0.104**	0.023	-0.108**	0.024
ASCOPE	-0.073	0.087	-0.062	0.090	-0.062	0.088	-0.079	0.087	-0.067	0.087	-0.050	0.092
AAGE	0.004	0.003	0.004	0.003	0.006†	0.003	0.004	0.003	0.004	0.003	0.006†	0.003
COMEXP	0.046	0.046	0.048	0.046	0.060	0.047	0.069	0.050	0.029	0.047	0.083	0.052
UNCIND	-0.230	0.481	-0.222	0.482	-0.247	0.472	-0.203	0.482	-0.265	0.484	-0.236	0.477
UNCIND ²	-0.035	0.168	-0.038	0.169	-0.031	0.166	-0.041	0.169	-0.024	0.167	-0.028	0.167
SMF			0.002	0.004							0.002	0.004
MKOL					0.412*	0.137					0.417*	0.140
COEXP							-0.201	0.175			-0.293†	0.174
CONALL									0.430*	0.229	0.387†	0.232
Industry fixed effect	Included		Included		Included		Included		Included		Included	
Model Fit statistics												
-2 LOG L	2934.263		2934.08		2925.428		2932.911		2931.155		2920.269	
AIC	2952.263		2954.08		2945.428		2952.911		2951.155		2946.269	
SBC	2989.085		2994.993		2986.341		2993.824		2992.068		2999.456	

N= 937, †p<.10, *p<.05, **p<.001

Asymmetric scale of partners (ASCALE) is significantly and negatively associated with the likelihood of EJV termination ($\beta = -0.106, p < .001$). For every one-unit increase in the asymmetrical scale between partners, the hazard of termination goes down by 10.1 percent. The remaining control variables are insignificantly associated with the termination likelihood of an EJV, including asymmetrical scope of the partners (ASCOPE) ($\beta = -0.073, p > .10$), asymmetrical age of the partners (AAGE) ($\beta = 0.004, p > .10$), and combined prior alliance experience of the partners (COMEXP) ($\beta = 0.046, p > .10$). Uncertainty of the EJV's industry shows a negative, simple main effect (UNCIND) ($\beta = -0.230, p > .10$) and a negative, curve-linear effect (UNCIND²) ($\beta = -0.035, p > .10$). Neither is significant.

Model 2 to 5 test the four hypotheses. After including share misallocation at EJV formation, Model 2 does not fit better than Model 1, $-2\Delta LL(1) = 0.183, p > .10$. Share misallocation at formation (SMF) is positively, but insignificantly related to the termination of the EJV ($\beta = 0.002, p > .10$). Inconsistent with Hypothesis 1, the degree that partners misallocate the equity shares at the beginning does not impact the eventual termination of the EJV.

Model 3 tests the effect of market overlap of the two partners. This model fits significantly better than Model 1, $-2\Delta LL(1) = 8.84, p < .05$, and the smaller value of AIC concurs. Consistent with Hypothesis 2, the coefficient of market overlap (MKOL) is significantly positive ($\beta = 0.412, p < .05$), suggesting that the more the market of the two partners overlaps, the more likely they terminate the EJV. The hazard of termination for an EJV goes up by 51 percent per one-unit increase in market overlap between partners.

In Model 4, the coefficient of prior alliance experience of the two partners (COEXP) is negative but insignificant ($\beta = -0.201, p > .10$). This finding lends no support to Hypothesis 3 which specifies a negative relationship between prior alliance experience and EJV termination. The effect of prior alliance experience does not significantly improve the model fit over Model 1, $-2\Delta LL(1) = 1.352, p > .10$.

In Model 5, consistent with Hypothesis 4, the coefficient of concurrent alliances between partners (CONALL) is positive and significant ($\beta = 0.430, p < .05$). As such, concurrent

alliances of partners encourage termination of an EJV. For every one-unit increase in concurrent alliances, the hazard of termination goes up by 53.7 percent. With the significant effect of concurrent alliances, Model 5 also fits better than Model 1, $-2\Delta LL(1) = 3.108$, $p < .10$.

In Model 6, share misallocation at formation (SMF), market overlap of partners (MKOL), and concurrent alliances of partners (CONALL) have the same effect as when they are separately included in Model 2, 3, and 5. Still, share misallocation at formation (SMF) does not affect the likelihood an EJV is terminated ($\beta = -0.002$, $p > .10$), whereas both market overlap of partners (MKOL) ($\beta = 0.417$, $p < .05$) and their concurrent alliances (CONALL) ($\beta = 0.387$, $p < .10$) promote termination. The negative effect of prior alliance experience of partners (COEXP) becomes significant ($\beta = -0.293$, $p < .10$), even though it is insignificant in Model 4. For every one-unit increase in the previous alliance experience between partners, the hazard of termination declines by 25 percent. Given the change in significance, the negative effect of prior alliance experience may not be robust and should be interpreted with caution.

Further analysis

To explore the insignificant effect of share misallocation at formation, I consider the moderating effect of EJV age. Share misallocation at formation may influence partners' decision to terminate an EJV by adversely affecting its subsequent operation and performance. This effect is likely to be sensitive to EJV age, which may be a cause for the insignificant finding on share misallocation at formation. One possibility is the effect of share misallocation may be strongest at the early stage of an EJV but weakens with time. During the cooperation periods, partners may build trust and problem-solving routines, thereby minimizing the negative influence of share misallocation upfront (Das & Teng, 1998a; Ertug et al., 2013; Gulati, 1995a; Lioukas & Reuer, 2015; Madhok, 1995). The other possibility is the impact of share misallocation at formation can be insignificant early on, but gradually becomes stronger. This prediction comes from the rationale that the two parties initially experience a honeymoon phase (Hennart et al., 1998; Park & Russo, 1996), and the costs of share misallocation accumulate to a level high enough that both parties

take notice at a later stage. To verify whether EJV age attenuates or strengthens the effect of share misallocation, I mean-centered EJV age and share misallocation at formation and included them and their two-way interaction into the Cox model (Model 7). Table 5.3 reports the results from Model 7.

Table 5.3 Regression results from additional analyses

	Model7		Model 8 Buyout vs. other cases		Model 9 Dissolution vs. other cases	
	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.
JAGE	-0.175**	0.019	-0.132**	0.024	-0.232**	0.031
RDFUN	0.136*	0.045	0.133†	0.070	0.149*	0.059
BOS	0.686**	0.136	0.930**	0.189	0.400*	0.201
ASCALE	-0.109**	0.024	-0.018	0.037	-0.201**	0.033
ASCOPE	-0.048	0.092	-0.481**	0.138	0.351*	0.128
AAGE	0.006†	0.003	-0.017*	0.005	0.021**	0.004
COMEXP	0.085	0.052	-0.022	0.076	0.106	0.073
UNCIND	-0.226	0.475	2.357†	1.368	-0.305	0.654
UNCIND ²	-0.031	0.166	-4.196†	2.541	0.043	0.191
SMF	0.007†	0.004	-0.004	0.005	0.003	0.006
MKOL	0.428*	0.140	0.191	0.209	0.434*	0.197
COEXP	-0.297†	0.174	-0.205	0.243	-0.314	0.261
CONALL	0.372	0.232	-0.648	0.547	0.951**	0.263
JAGE*SMF	0.003*	0.001				
Industry fixed effect	Included		Included		Included	
Model Fit statistics						
-2 LOG L	2915.905		1558.236		1710.673	
AIC	2943.905		1584.236		1736.673	
SBC	3001.184		1627.562		1781.139	

N= 937, †p<.10, *p<.05, **p<.001

Compared with Model 2, Model 7 fits the data significantly better, $-2\Delta LL(1) = 18.275$, $p < .001$, and the smaller AIC value concurs. Notably, with the interaction term added into the regression, the direct effect of share misallocation at formation and EJV age will be specific to the situation when the other interacting variable is zero (i.e., at the mean of each variable). EJV age (JAGE) is still negatively related to termination hazards of EJVs with mean share misallocation ($\beta = -0.175$, $p < .001$). As such, these EJVs are less likely to be

terminated as they age. The effect of share misallocation at formation (SMF) becomes significant at $p < .10$ level for EJVs at the mean age ($\beta = 0.007, p < .10$). For these EJVs, the greater the misallocation at formation, the higher the termination hazards. The interaction effect of the two variables (JAGE*SMF) is significant ($\beta = 0.003, p < .05$), supporting that the positive effect of share misallocation grows stronger with EJV age. As shown in the results, share misallocation at formation on average does not affect EJV termination; however, its effect becomes significant when an EJV reaches the mean age and continues to strengthen afterward.

Thus far, the analysis has not distinguished the types of EJV termination. In the sample, EJVs were terminated via buyout (N=46), closure of the business (N=48), or sell-off to a third party (N=12). It is possible that share misallocation may not uniformly affect all these termination types. For instance, Chen et al. (2007) argued that consecutive attempts to correct share misallocation over time will eventually lead to a buyout of an EJV. To derive more nuanced insights into the influences of share misallocation, I implement two Cox Models, Model 8 and 9, with competing termination outcomes (Allison, 2010).

In Model 8, I singled out buyouts while treating all other events as censoring (i.e., dissolution, sell-off to a third party, the lost observations, and those living beyond the last observation period). As shown in the results, share misallocation at formation (SMF) has an insignificant impact on the likelihood of buyout ($\beta = -0.004, p > .10$). No variable that acted as a proxy for share misallocation in the midlife of an EJV showed a significant impact on the likelihood of buyout ($\beta = 0.191, p > .10$ for product overlap (MKOL), $\beta = -0.205, p > .10$ for prior inter-partner alliances (COEXP), and $\beta = -0.648, p > .10$ for concurrent alliances (CONALL)).

Model 9 focuses on the dissolution of EJVs (closing of the co-owned business and sell-off to a third party) while treating other events as censoring. The impact of share misallocation at formation (SMF) on EJV dissolution is insignificant ($\beta = 0.003, p > .10$). But two of the three variables indicating share misallocation in the duration of an EJV show a significant effect. Both product market overlap (MKOL) ($\beta = 0.434, p < .05$) and concurrent alliances (CONALL) ($\beta = 0.951, p < .05$) increase the hazards of dissolution of an EJV. The prior

collaboration alliances (COEXP) have no significant effect ($\beta = -0.314, p > .10$). The results from Model 8 and 9 suggest that share misallocation in the midlife of an EJV triggers dissolution but not buyout of EJVs.

5.3 Summary of the chapter

This chapter seeks to test the consequences of share distribution by focusing on the relationship between share misallocation and EJV termination. For various reasons, share misallocation can occur at the formation of an EJV as well as in its midlife. These two types of share misallocation have a divergent effect on the termination of an EJV. Share misallocation at formation is overall inconsequential to the possibility that an EJV ends. As additional analysis shows, this insignificant result may stem from the fact that the effect of share misallocation at the outset varies with EJV age. The effect is initially insignificant but becomes significant as the EJV matures. Evidence suggests that EJVs formed by partners with a higher market overlap or more concurrent alliances are subject to a higher risk of termination. This supports the conceptual argument that share misallocation in the duration of an EJV significantly increases its termination likelihood.

Chapter 6

6 Discussions on the empirical findings

This chapter provides further discussion on the findings of the two tests in the previous chapters. I elaborate on the implications of these findings and explore potential explanations for the insignificant results. I also acknowledge limitations with the design of the two empirical models and point out directions for future research.

6.1 Findings on the antecedents of share distribution

Evidence largely failed to support the model that predicts share distribution from the perspective of the pricing-error rule. According to the rule, share distribution should vary with two antecedents: the relative efficiency of the intermediate markets partners use to transact their respective assets into an EJV and the relative pricing capabilities of the partners. I used four variables as the proxy of the relative market efficiency and, surprisingly, none of these variables significantly affected share distribution in an EJV. Furthermore, I hypothesized four variables shape share distribution by influencing the relative pricing capabilities of partners. Among these four, only one variable – the relative diversification level of partners – expectedly predicted share distribution whereas the other three had no effect. A more diversified partner controls fewer equity shares than the other, more focused partner.

With only one out of eight variables having a significant effect, the pricing-error rule does not predict share distribution at the formation of an EJV. The insignificant findings may stem from conceptual gaps of the rule, flaws of the empirical design, or both. Conceptually, five issues could undermine the validity of the pricing-error rule. First, share distribution at the formation of an EJV may simply be arbitrary without any regularity. In the full model, not only did the variables that proxy pricing errors have no significant bearing on share distribution, most control variables except firm size and age also failed to affect share distribution. This indicates that share distribution follows no clear rule; in this case, the pricing-error rule will certainly receive no empirical support.

Second, the development of the rule gives no consideration to implementation costs. To put the rule in practice, partners must first estimate the two pricing errors and then negotiate the equity split accordingly (Chen et al., 2017). The inherent ambiguities of the two pricing errors dictate that accurately estimating the errors will consume resources. Extra bargaining costs are also inevitable to reconcile the divergent estimates between the parties. In addition, implementation costs will likely weigh more in decision making by the partners as the costs must be paid immediately, while the benefits of optimal share distribution take time to materialize and are uncertain. On the other hand, partners must simultaneously negotiate many issues to form an EJV, thereby limiting the resources they can spare for settling share distribution. As a result, the implementation costs may reach a level that renders the pricing-error rule unviable, even if it points to the share distribution that yields the most transaction-cost savings. In this sense, share distribution prescribed by the pricing-error rule becomes a desired but impractical outcome.

Third, determining share distribution may be more of a competitive bargaining game than a cooperative process assumed in the pricing-error rule. The pricing-error rule relies heavily on collaboration between partners, where they share the goal of achieving full correction and prioritizing the outcome of the EJV. This often means both parties have to make necessary concessions for the sake of optimally dividing the equity shares since share distribution that maximizes the results of the EJV may not suit a partner seeking to advance its private interests. Whereas cooperation can hypothetically produce the best collective outcome, partners often end up putting their own interests above the EJV (Hill, 1990; Parkhe, 1993; Zeng & Chen, 2003). It is not uncommon for partners to use ownership design as a way to compete for control or future profits (Fagre & Wells Jr, 1982; Inkpen & Beamish, 1997; Lecraw, 1984; Yan & Gary, 1994). This competitive view regarding equity ownership naturally incites partners to leverage their bargaining power to grab as many equity shares as possible. Share distribution settled through this competitive process will then reflect the relative bargaining power of the two parties but not their relative pricing errors.

Fourth, in the governance structure of an EJV, equity ownership may play a more complex role than what is conceived in the pricing-error rule. The pricing-error rule holds equity

ownership exclusively as the determinant of residual profits to each partner. This is not strictly incorrect as partners in many EJVs base the dividend-sharing arrangement on share distribution (Kumar, 2010). Yet, the rule dismisses another important governance role of equity ownership – ownership control (Chi & Zhao, 2014; Das & Teng, 1998a; Gatignon & Anderson, 1988; Geringer & Hebert, 1989; Kumar & Seth, 1998; Makhija & Ganesh, 1997; Mjoen & Tallman, 1997; Schaan, 1983; Yan & Gary, 2001). Not only does equity ownership of a partner dictate its governance control over strategic decisions, it also influences management control over the daily operation of the co-owned business. Realistically, the concern for ownership control and residual sharing are intertwined in shaping share distribution (Chi & Zhao, 2014). In EJVs parties value more on ownership control, they will look how much control each should hold over the EJV when splitting equity shares. As far as ownership control dominates, the pricing error in each other's asset contributions will be marginalized in share negotiations.

Fifth, share distribution may be driven more by social equality than operational efficiency, which can also undermine the pricing-error rule. Built within the TCE framework, the pricing-error rule assumes that partners seek efficiency and look to maximize economic return. Nonetheless, research from sociology perspective has proposed that partners also strive for equality in an inter-organizational relationship (Lioukas & Reuer, 2015; Oliver, 1990; Ring & Van de Ven, 1992; Ring & Van de Ven, 1994; Zhelyazkov & Gulati, 2016). In the EJV context, there is no better manifestation and assurance of equality than equal ownership. Holding the same amount of equity shares, the partners have equal decision-making power, which guarantees that no party will be overwhelmed by the other. They will also have equal profit sharing, which builds a strong bond between them and the EJV. Indeed, empirical evidence supports the dominance of balanced ownership structure among all EJVs. Majority EJVs in the sample of this research feature a 50/50 share distribution – about 85 percent of all EJVs. This pattern is not unique to the final sample in this research but characterizes the entire EJV population documented in the SDC Platinum database. This clear predominance of balanced co-ownership structures implies that the social concern for equality in the inter-firm cooperation can be a more powerful force in shaping share distribution than economic consideration of efficiency.

Besides conceptual gaps in the pricing-error rule, potential empirical flaws can be responsible for some insignificant findings. The model that predicts share distribution could be subject to endogeneity bias (Shane, 1998). One distinctive feature of forming an EJV is that it is a self-selection outcome (Martin, 2013). Firms that join forces in an EJV will likely carry distinctive characters, compared with those without any cooperation relationship and those that collaborate via equity-free alliances. In other words, the decision of distributing equity shares and partner characteristics are not exogenous, and independent variables in regressions are correlated with the error term. This endogeneity issue could well be the cause of the insignificant findings, which has yet to be empirically accounted for.

The finding on market volatility is subject to measurement bias. Given data for measuring the volatility of the two asset markets were unavailable, I used the volatility of their output market (i.e., industry revenues) as a proxy. The justification for using this proxy is that fluctuations in firms' assets will trigger fluctuations in their outputs. Fluctuations in the output and asset market, however, do not perfectly correlate. Besides firms' assets, many other factors can also cause shifts in an output market including industry policies, output demands, and input market. So the results regarding the link between market volatility and share distribution may change if market volatility is directly measured with data from asset markets.

The results regarding R&D intensity and advertising intensity could be biased from using firm-level variables to indicate the alliance-level, asset contributions (Meyer & Wang, 2015). Intuitively, it is true that a company investing heavily in R&D or advertising activities will have accumulated more technological assets or advertising capabilities, but the assets contributed from this company to all its EJVs do not necessarily contain highly technological or advertising contents. Not every EJV is formed for the purpose of exploiting the assets developed at the firm level; many are to explore and develop new assets (Kogut, 1988; Madhok & Tallman, 1998). In reality, technological or advertising contents in the asset contribution to an EJV may influence share distribution as the pricing-error rule predicts. This effect cannot be captured in the model using firm-level R&D and advertising intensity as the proxy.

Measurement issue may also explain the insignificant effect of prior EJV experience on share distribution. For two reasons, previous EJV experience of the two partners may not be a valid measure of their pricing capabilities. First, the accumulated experience of forming EJVs in the past creates learning opportunities but does not guarantee learning effectiveness. How well firms can learn from previous alliances depends on a combination of several factors, ranging from opportunities to learn, learning intent and capabilities of a firm, to learning-related resource commitments (Baum & Ingram, 1998; Hamel, 1991; Inkpen, 2000; Khanna et al., 1998; Lane et al., 2001; Parkhe, 1991; Yang et al., 2015). Since learning effectiveness can be confounded by many factors, the validity of using previous EJV experience to gauge the pricing capabilities of a partner can be weak. Second, previous EJV experience of partners can be too crude to capture their pricing capabilities. Repeatedly forming EJVs exposes a firm to various complex issues throughout the process and, thereby, allows it to acquire and hone a diverse set of capabilities. The accumulated EJV experience may not accurately reflect the development of pricing capabilities since such capabilities are merely one of many competencies partners can obtain from past experience.

Compared with previous EJV experience, past alliances in each other's industry seem to be more relevant to cultivating capabilities of pricing each other's assets. The insignificant finding regarding these alliances stems more from conceptual reasons rather than empirical. As explained, one conceptual reason is that partners simply do not follow the pricing-error rule. In this case, the pricing capabilities accumulated from prior alliances in the other's industry are irrelevant to share distribution. Another subtler reason might be that the repeated alliances in the other's industry can have two conflicting effects on share distribution. One, the alliances in an industry enhance a partner's pricing capabilities by providing industry-specific information. The more alliances a partner has built in the other's industry, the stronger the capabilities to price the other's assets, and the more equity shares it can control. Two, repeatedly forming alliances in the other's industry, in fact, can be associated with weaker pricing capabilities. A partner consecutively allies with firms in one industry exactly because it cannot reduce the price uncertainty of accessing the unique assets from that industry. Conversely, a partner may have fully understood the value of the

assets from an industry, and so stopped using alliances to gain access to the assets. According to this reasoning, the partner with more alliances in the other's industry is the one with weaker pricing capabilities and needs to relinquish more equity shares of the present EJV. Since previous alliances in the other's industry can have a positive and negative impact on equity shares of a partner, these two conflicting effects may cancel each other out in predicting share distribution, yielding an overall insignificant effect.

Unlike most variables informed by the pricing-error rule, two control variables stand out for their consistently significant effects throughout all the estimated models. These are the relative size and age of the two partners. The results show that the larger a partner is relative to the other, the more equity shares it controls. This finding is consistent with the bargaining power rationale that the larger partner is usually more resourceful and, thus, wields more power to claim more equity shares in ownership negotiations (Inkpen & Beamish, 1997; Lecraw, 1984; Yan & Gary, 1994, 2001). The positive link between the size of a partner and equity ownership in an EJV could also reflect the tendency of larger partners to dominate an alliance and conveniently exploit smaller partners (Katila, Rosenberger, & Eisenhardt, 2008; Yang et al., 2014).

The relative age of the two partners, on the other hand, is negatively related to share distribution. That is, the older partner holds fewer equity shares than the younger one. Multiple factors can give rise to this effect. From a control perspective, an experienced partner is likely to have acquired more ways to keep a grip on the EJV, whereas the younger partner may lack the means aside from ownership to assert control (Chi & Zhao, 2014; Folta, 1998; Kumar & Seth, 1998; Schaan, 1983). Thus, to close the negotiations, the experienced partner is willing to relinquish more ownership to the other. The pricing-error rule offers an alternative explanation to the effect of firm age. It is possible that the pricing error of the older partner is smaller and justifies a relatively lower level of equity ownership. The smaller pricing error can be a selection result. Research has shown that opportunistic engagements will tarnish the image of a firm and make it difficult to attract future allies (Gu & Lu, 2014; Zhelyazkov & Gulati, 2016). Over time, those habitual cheaters will be crowded out of the pool of candidate allies. Subsequently, the older partner, which has survived more rounds of selection, is more likely to be faithful in a partnership.

Furthermore, a partner that has been in operation longer has a longer track record, which can be used to infer the value of its assets and trim down the pricing error. It is for future investigations to tease out the control and pricing-error implications on the negative link between the relative age of partners and share distribution.

6.2 Findings on the consequences of share distribution

The second empirical model examines the consequences of share distribution by focusing on the termination of EJVs. It distinguishes between two types of share misallocation namely share distribution at the formation of an EJV and during its midlife. Evidence shows that these two types of share misallocation have a disparate effect on the likelihood that an EJV terminates.

For various reasons, partners can misallocate the equity shares at the beginning of an EJV, but this type of share misallocation has no significant main effect on the likelihood it will terminate. On average, share misallocation at onset is irrelevant to the decision of ending the EJV. This insignificant effect does not vary with the specific approach partners select to terminate an EJV, which ranges from buyout, to liquidation, and to sell-off of the EJV. These findings reject the postulation that upfront share misallocation distorts the pricing-error correction mechanism, impairs the subsequent operation of an EJV, and eventually increases the risk that partners end their cooperation.

Yet, share misallocation at formation affects termination of an EJV in a subtler way than the insignificant main effect suggests. In the model with the interaction term of share misallocation at formation and EJV age, the simple main effect of share misallocation becomes significant. As such, for those EJVs that lived to the mean age of the sample, the more the equity shares were misallocated at formation, the more likely the EJV will be terminated. This positive effect becomes stronger as the EJV continues, given the positive interaction between share misallocation and EJV age. This evidence points to an upward trend in the effect of share misallocation at formation along EJV age. Share misallocation at onset is inconsequential to the likelihood of termination when an EJV is young, but can develop into an important trigger of termination as the EJV matures.

The effect of share misallocation at formation on the termination of the EJV is, therefore, age-dependent. Multiple explanations for this finding exist. In the initial years of an EJV, partners may not realize share distribution settled with extensive effort is actually suboptimal. The miscorrection over the two pricing errors becomes more salient gradually over time, which incites opportunism within the EJV and eventually dismantles the cooperation. Moreover, the honeymoon period that many EJVs experience also alleviates the effect of share misallocation at formation. Partners to an EJV enter a honeymoon in its early few years when the inter-firm cooperation is blessed with abundant capital endowments, amicable attitudes of partners, and a harmonious atmosphere. With the EJV starting off well, the costs of share misallocation at formation can easily be obscured. This phase ends once the initial capital outlay is depleted, and the inter-partner differences begin to strain the relationship. Against this background, the costs of share misallocation that have been hidden but constantly accumulated over time may reach a level so high that sustaining the cooperation becomes difficult.

In fact, the moderating effect of EJV age sheds important light on the null main effect of share misallocation at formation. As the results show, share misallocation at formation does not significantly impact the termination of an EJV unless it reaches at least the mean age. In other words, share misallocation at formation only shortens the duration of mature or older EJVs. Only a small portion of EJVs in the sample reach that point; most failed in their early years before the effect of share misallocation materialized. With the effect of share misallocation at formation only significant for a small subsample, it is unsurprising to observe that this effect is insignificant once the model runs on the whole sample.

In comparison, share misallocation that occurs in the midlife of an EJV has a much more straightforward influence on share distribution. The empirical findings suggest an EJV is more likely to be terminated if its partners have a greater overlap in their product market or have more concurrent alliances. These results attest to the pricing-error argument that share misallocation during the operation of an EJV triggers termination. Both market overlap and concurrent alliances enhance partners' learning about the value of each other's assets. This effective learning causes the two pricing errors to quickly decline and misalign

with the share distribution set in previous periods. This, in turn, prompts the termination of the EJV.

The effects of market overlap and concurrent alliances, however, are not uniform across different termination approaches. After differentiating between EJV buyout and dissolution (i.e., closing of the EJV business and sell-off to a third party), the competing odds model shows that market overlap and concurrent alliances are positively related to the likelihood of dissolution but not buyout. As such, when pricing errors drift out of alignment with share distribution in an operating EJV, neither party decides to escalate commitments to fully internalize this EJV; instead, both opt to withdraw all their equity commitments. This preference for dissolution over buyout supports the pricing-error prediction that partners select the *specific approach* to terminate an EJV based on the *form* of share misallocation. For a buyout to occur, one party's pricing error should decline to a negligible level, whereas the other error remains considerable. All else being constant, market overlap and concurrent alliances cause the pricing errors of both parties to decline at the same rate and become negligible at the same time. The reason is that both market overlap and concurrent alliances are shared by the two parties and equally promote the learning effectiveness of both. With their pricing errors simultaneously becoming tolerable, *both* parties will find it burdensome to maintain equities in the EJV, let alone to acquire more from the other. Dissolving the EJV becomes a natural way out.

In Chapter 4, previous collaborations between the two parties are also argued to promote share misallocation in the midlife of an EJV and, in turn, termination; this variable turns out to diminish the likelihood of termination. This result counters the pricing-error prediction but is consistent with the relational view in the alliance literature. Studies have revealed that past collaboration experience can potentially generate two types of benefits: informational benefits and relational benefits (Lioukas & Reuer, 2015). The pricing-error prediction that prior collaborations increase termination of an EJV builds on the informational benefits. That is, partners with more collaboration experience beforehand acquired more information about each other's assets and operations, and such an informational advantage facilitates learning in the present EJV. Subsequently, share misallocation is more likely to occur in the mid-life of the current EJV, significantly

increasing the chance of termination. The perspective emphasizing the relational benefits of past collaborations, on the other hand, suggests a reverse argument. Partners with more alliances in the past tend to cultivate trust, mutual forbearance, and collaborative routines (Dyer & Singh, 1998; Kale et al., 2000; Lioukas & Reuer, 2015; Madhok & Tallman, 1998; Ring & Van de Ven, 1992). The relational benefits developed serve to stabilize the inter-firm cooperation, improve EJV performance, and eventually enhance the survival of an EJV. The empirical results favor the relational argument.

Collectively, results of the second test revealed that share misallocation in midlife is a stronger contributor to the termination of EJVs than share misallocation at formation. This pattern can be interpreted as empirical support for the pricing-error rule. It is plausible to expect that share misallocation at formation and during the midlife of an EJV differ in degrees. When share misallocation occurs at the initial stage of an EJV, both pricing errors are still significant. Hence, both parties have a reason to adjust share distribution in a piecemeal fashion, but not to abandon the co-ownership structure (see Chapter 3). By contrast, share misallocation in the midlife of an EJV is more likely to be drastic as one or both pricing errors disappear. This eradicates the rationale for keeping the co-ownership structure, and termination becomes a more suitable approach to address share misallocation.

6.3 Limitations and future extensions

Several limitations characterize the design of the two empirical models, and addressing these limitations offers promising avenues for future research. First, by predicting share distribution at the formation of EJVs and examining their termination, the empirical models of this dissertation focus on the beginning and the ending of EJVs (Yan, 1998; Yan & Zeng, 1999). In between, partners often adapt the co-ownership structure through piecemeal equity transactions (Bakker, 2016; Chung & Beamish, 2010). Each shake-up to the co-ownership structure consumes substantial resources and usually introduces wide-spread changes to the inter-firm cooperation. It is beyond the scope of this dissertation to build an empirical model on share adjustments in the midlife of an EJV, but this dissertation has theorized on the motivation, degree, frequency, and direction of these adjustments (Chapter

3). In fact, modeling how partners adjust equity shares of an operating EJV could be a more direct way of verifying the pricing-error rule. Reasonably, partners to an EJV are most unfamiliar with each other at the onset of their inter-firm cooperation, which leads them to misallocate the equity shares. Working together within the EJV over time, they have a chance to better comprehend the pricing error over each other's assets and, as a remedy, reallocate the equity shares to correct the errors. Subsequently, share distribution will gradually conform to the pricing-error rule after several rounds of adjustment. To test this possibility represents a promising extension in the future.

Second, the sample used for the two tests contains EJVs with only two partners. Two-party EJVs dominate the EJV population and have been the subject of most studies (Chen, 2015; Franko, 1971; Gomes-Casseres, 1987; Hennart, 1988; Kogut, 1988). However, a significant number of EJVs are formed by more than two partners, which are referred to as multilateral EJVs. Research has shown that more partners increase the diversity of the resources pooled into an EJV, but this creates additional communication and coordination complexities (Gong et al., 2007; Li et al., 2012; Luo & Park, 2004). In the context of share distribution, reaching a consensus will plausibly be more challenging as the number of partners increases. How partners cope with the additional challenges and settle share distribution in multilateral EJVs represents another valuable opportunity for future research.

Third, to hold nation-level environment constant, the sample is constrained to EJVs located in the U.S. Countries vary dramatically in their economic, cultural, social, political, geographical, and legal environments. By conditioning the perceptions and behaviors of managers through formal and informal mechanisms, the country-level environment exerts powerful influences on the ownership structure of EJVs. A typical example is the ownership cap for foreign partners in some countries (Contractor, 1990; Gomes-Casseres, 1990). Thus, replicating the two empirical tests in other national environments will produce additional insights as to whether the findings of all the pricing-error related variables are unique to the U.S.-based EJVs. Another fruitful extension to the research is to build country-level factors into the models to predict share distribution or to examine the consequences of share distribution. This inquiry calls for a cross-country research design

and also opens a window to introduce other theoretical perspectives, such as institutional theory, into the research on share distribution.

Fourth, this dissertation looks at the termination of EJVs as one consequence of share distribution. Beyond termination, research has measured EJV performance through other dimensions, including subjective satisfaction with the cooperation, goal attainment, as well as objective measures of productivity and profitability (Child & Yan, 2003; Geringer & Hebert, 1989; Luo et al., 2001; Woodcock et al., 1994; Yan & Gary, 1994). Share distribution is such a fundamental issue in the structure of an EJV that it could have a significant bearing on all these performance dimensions (Chapter 3). More empirical investigations are needed to explore and verify the link between share distribution and outcomes other than termination.

Fifth, the sample for the two tests consists of EJVs formed only by public firms. Focusing on public firms is understandable as it permits collecting complete data for a sample with sufficient size. This is particularly important for estimating the models in this dissertation, which demand data from both partners to measure the variables. This approach inevitably excludes the EJVs involving private firms. Compared with their public counterparts, private firms are unique in numerous aspects, ranging from governance structure, and management practices, to institutional regulations. It would be interesting to explore whether the private status of partners shapes share distribution and in what ways.

Despite the insignificant findings and the limitations of the research design, this dissertation generates meaningful insights for scholars and practitioners. The following chapter turns to these insights before concluding the whole dissertation.

Chapter 7

7 Contributions and conclusion

To advance research on share distribution, this dissertation builds and tests two empirical models. One is on the antecedents of share distribution and the other on the consequences. The pricing-error rule serves as the theoretical foundation for both models, and the evidence from testing the two models verifies the pricing-error rule.

The first model verifies the proposition that share distribution of an EJV systematically varies with the relative efficiency of the intermediate markets and the relative pricing capabilities of the two partners. Market efficiency and pricing capabilities predict share distribution since they determine the relative sizes of the two pricing errors and partners seek to align share distribution with the two pricing errors to save transaction costs. This model, however, is largely unsupported by empirical evidence. Neither the market efficiency nor the pricing capabilities are significantly related to share distribution in EJVs. As such, partners do not follow the pricing-error rule in splitting equity shares when they form an EJV.

The second model focuses on termination of EJVs as the specific consequence of share distribution. Here, the argument is that that share distribution of an EJV, to the extent it deviates from the optimal solution prescribed by the pricing-error rule, increases the likelihood of termination. Share misallocation can occur at the formation and during the operation of an EJV. The empirical findings suggest that share misallocation at formation does not affect the likelihood of termination, except for mature or older EJVs. By contrast, share misallocation in the midlife of an EJV significantly increases the probability that it is terminated. Evidence from the second test supports the share distribution conforming to the pricing-error rule is indeed optimal in terms of sustaining the EJV. EJVs with equity shares allocated according to the rule outlive those with equity shares not allocated as such.

By testing the two empirical models built on the pricing-error rule, this dissertation is the first empirical study on share distribution in EJVs. The theoretical arguments and empirical

findings of this dissertation provide meaningful implications for multiple research streams in EJV literature.

7.1 Scholarly contributions

This dissertation extends the research on the ownership design of EJVs in more than one way. First, it highlights share distribution as a central issue in ownership design. When exploring optimal ownership design of EJVs, previous research merely distinguished between a balanced and an unbalanced structure. This dichotomous view, however, oversimplifies the reality wherein partners have to distribute the equity shares of an EJV into a specific percentage combination. Share distribution is clearly more complicated than choosing between two options, given that partners will face numerous alternatives. The critical issue to ownership design of EJVs is to understand how partners weigh a multiplicity of alternatives and arrive at a final percentage combination to split the equity shares. Second, this dissertation identifies and verifies specific factors that shape share distribution in EJVs. Based on the results from the first model, partners largely do not consider those factors related to pricing errors when determining share distribution. Instead, they look to the most visible characteristics of each other to inform the decision, including each other's size, age, and diversification level.

The implications of this dissertation on the research of EJV termination are also noteworthy. First, by identifying an additional trigger for termination – share misallocation, this dissertation contributes to an ongoing line of research that investigates why many EJVs are built to last but often prematurely disband (Baum & Ingram, 1998; Franko, 1971; Li, 1995; Steensma & Lyles, 2000; Xia, 2011; Yan & Zeng, 1999). The results show that while many reasons lead EJVs to end in their early years, the unexpected termination of mature or even older EJVs can be triggered by share misallocation at inception. In addition, share misallocation that arises from the dynamics of the two pricing errors during the operation of an EJV also significantly increases the hazard of termination.

Second, this dissertation develops the first framework in literature that integrates all the usual approaches of terminating an EJV. In reality, partners can end an EJV through a buyout, closing the business, and selling off to a third party. Previous research has

examined these termination approaches separately. All can actually be viewed as a form of adjustment to share distribution. Which approach is more likely to be chosen depends on the types of share misallocation an EJV witnesses. Buyout of an EJV will be observed when the pricing error of one partner declines to a negligible level, whereas that of the other partner is still substantial. When both pricing errors simultaneously become bearable, dissolution is expected.

Third, this dissertation challenges a prevalent view regarding the nature of EJV termination. A widely observed phenomenon is that many EJVs are unexpectedly terminated. Numerous studies have equated these unexpected events with failure (Bakker, 2016; Cui et al., 2011; Heidle et al., 2014; Makino et al., 2007; Park & Russo, 1996), but these events are not all failures. As this dissertation has argued and verified, termination in some EJVs, though unexpected, is actually a graceful culmination of partners' efforts to reduce pricing errors. When either or both pricing errors are driven down to a tolerable level, the co-ownership structure is no longer needed and terminating it marks a success.

This dissertation advances the two-party view in EJV research by considering both parties in theoretical arguments and empirical testing. When exploring the equity ownership of partners, studies have predominately focused on the preferences or bargaining power of one party as if the ownership decision is unilaterally made (Luo et al., 2001). Consistently, most empirical models incorporate data from only one partner. The one-party centric approach is flawed because EJVs, in essence, are co-built and co-managed. Decisions to settle and adjust the co-ownership structure are decided by both parties through negotiations; hence, a complete understanding of ownership design in EJVs requires considering the perspectives of both parties. In alliance research, this two-party view is necessary to examine issues that involve participation and interactions of both parties.

The findings and arguments of this dissertation also extend the pricing-error rule in empirical and theoretical fronts. Empirically, the two tests in this dissertation are the first to verify the rule. Evidence fails to support that the pricing-error rule predicts share distribution, which means partners do not follow the rule to determine share distribution when establishing a new EJV. The second test supports the rule by revealing EJVs with

share distribution consistent with the rule will outlive those that do not follow it. Thus, in terms of stabilizing the inter-firm cooperation and extending the longevity of the EJV, share distribution prescribed by the rule is indeed optimal. An interesting observation emerges from the two tests: partners do not follow the pricing-error rule to split equity shares, but not doing so shortens the duration of the EJVs.

Theoretically, this dissertation has two meaningful implications for the pricing-error rule. First, it speculates about the conceptual gaps in the pricing-error rule, pointing out directions for future refinements. In particular, the original development of the rule only considers the benefits of aligning share distribution with the two pricing errors (i.e., transaction-cost saving), but ignores implementation costs. Moreover, share distribution portrayed by the pricing-error rule is a cooperative process; however, it may be more competitive in nature. The rule focuses exclusively on ownership as a determinant of residual sharing, thereby dismissing the role of ownership as a control mechanism and how this role influences share distribution. Since the rule is developed within TCE, it gives no consideration to partners' pursuit of equitable relationships in designing the co-ownership structure. In other words, the pricing-error rule in its present form may be overly positive, overly cooperative, narrow in its view about equity ownership, and oblivious to the social considerations in EJV formation.

Second, this dissertation expands the forms of share misallocation as well as share adjustment approaches beyond what the rule has originally suggested. In proposing the Bayesian updating process, in which partners adjust share distribution over time, Chen et al. (2017) argued that an EJV will eventually be bought out by one partner. In this study, the only termination approach considered is buyout, and the trigger is when one pricing error becomes negligible while the other remains considerable. Beyond this trigger, another form of share misallocation can also cause termination. That is when both pricing errors become negligible in the same period. In this case, partners will likely opt to dissolve the EJV. Hence, the pricing-error rule explains both buyout and the dissolution of EJVs.

7.2 Practical implications

Besides contributions to the literature, the arguments and findings of this research provide useful insights for practitioners. At the formation stage, partners to an EJV should align share distribution with the pricing errors in their assets. Doing so helps optimize the correction over the two pricing errors and stabilizes the inter-firm cooperation. It takes time and resources to estimate the pricing errors and negotiate the equity share allocation accordingly, but the costs of misallocating the shares can prove to be higher. Although share misallocation at the outset will be too subtle to cause immediate problems, it can later morph into a dire threat to the survival of the EJV. Aligning share distribution with pricing errors requires partners to resist evenly splitting the equity shares. A balanced co-ownership structure appears to be an easy path but can lead to share misallocation and sow the seeds of a premature breakup unless the two pricing errors also happen to be equal.

During the operation of an EJV, it is important to monitor the two pricing errors and check their alignment with share distribution on a continuous basis. The two pricing errors can evolve along with the shifting, external environment and the learning by the two partners about each other's assets. With two pricing errors being highly dynamic, share misallocation can occur in any operation period, which necessitates share adjustment. Depending on the specific form of share misallocation, partners should vary adjustment approaches. Piecemeal transactions of equity shares are appropriate if the two pricing errors are still significant. If in one period, one or both pricing errors decline to a negligible level, buyout or dissolution should be initiated. Sustaining the co-ownership structure beyond this point is unwarranted.

7.3 Conclusion

In forming EJVs, there is hardly another issue that is as central and complex as share distribution. How partners split the equity shares could considerably impact the organization, operation, and eventually the performance and survival of an EJV. Meanwhile, due to its zero-sum nature and the existence of numerous decision alternatives, share distribution is particularly challenging to settle.

Despite its clear importance and complexity, share distribution has remained largely unnoticed in research. Theories of EJVs have kept share distribution in a black box. So have the comparative analyses that have dominated the empirical studies on EJVs. Even those studies that specifically aim to explore ownership design of EJVs have neglected share distribution as they have been preoccupied with either the dichotomous choice between a balanced and unbalanced ownership structure or the equity ownership of only one party. So far, the only noticeable study on share distribution is the development of the pricing-error rule.

This dissertation sets out to fill three immediate literature gaps on share distribution. First, as the only conceptual guideline of share distribution, the pricing-error rule is based purely on theoretical reasoning but lacks empirical evidence. Second, no study has explored the antecedents of share distribution. Subsequently, the vast variances of share distribution across EJVs have been left unexplained. Third, how share distribution affects the performance and survival of EJVs has not been theoretically or empirically examined.

Regarding the antecedents of share distribution, the principal finding is that variables related to pricing errors do not predict share distribution in EJVs, with the exception of the partners' diversification level. By contrast, the relative size and age of partners exert a consistently significant impact on share distribution. A partner controls more equity shares if it is larger, younger, or less diversified than the other partner. On the consequences of share distribution, the results suggest that equity shares, if misallocated, can cut short longevity of EJVs. Share misallocation at formation significantly increases the likelihood of termination once the EJV becomes mature, even though it does not matter in the early years. In EJVs where the pricing errors are more likely to misalign with share distribution during their operation, the probability of termination increases. A more fine-grained analysis shows that partners are more inclined to dissolve rather than to buy out an EJV when share misallocation is caused by the fact that both pricing errors become bearable in the same period.

The empirical findings lend mixed support to the pricing-error rule of share distribution. On one hand, partners do not follow the pricing-error rule to settle share distribution, but

rather they base this critical decision on visible firm characteristics including size and age. On the other hand, the violation of the pricing-error rule, as indicated by the degree of share misallocation, triggers the termination of EJVs. As such, share distribution prescribed by the pricing-error rule is indeed optimal in terms of stabilizing the inter-firm cooperation and extending the longevity of the EJV. The pricing-error prediction that partners tailor their share adjustment approaches to the specific forms of share misallocation is also consistent with the empirical evidence.

As an important but newly discovered phenomenon, share distribution in EJVs raises many research opportunities to advance the understanding of the co-ownership structure. Since no evidence was found to support the pricing-error rule in predicting share distribution, it is necessary to replicate the empirical model on samples with EJVs located in countries other than the U.S., with those involving private partners, or those formed by more than two partners. These replications will show whether the pricing-error rule is context-dependent. Modeling share adjustments in the midlife of an EJV represents another promising avenue for future research.

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