Embracing Complexity: Learning from Minority, 50-50, and Majority Joint Venture Experience

Dorota Piaskowska

University College Dublin

School Of Business

Carysfort Avenue, Blackrock Co. Dublin

Tel: +353 1 7168820, dorota.piaskowska@ucd.ie

Anna Nadolska

Department of Strategic Management & Entrepreneurship
Rotterdam School of Management
Erasmus University Rotterdam
P.O. Box 1738
3000 DR Rotterdam
anadolska@rsm.nl

Harry Barkema

Department of Management
London School of Economics and Political Science
Houghton Street
London WC2A 2AE
AND
Department of Strategic Management & Entrepreneurship
Rotterdam School of Management
Erasmus University Rotterdam
P.O. Box 1738
3000 DR Rotterdam
h.g.barkema@lse.ac.uk

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Learning from joint venture (JV) experience is commonly viewed as a way to improve JV performance. However, many JVs are complex and difficult to learn from. How can firms embrace this complexity to realize the learning potential of their JV experience? To answer this question, we consider how minority, 50-50, and majority JVs differ in terms of complexity stemming from the interdependencies between the JV partners and between the JV and its parent organizations. We theorize that the relatively limited complexity of minority JV experience facilitates learning from more complex experience with majority and 50-50 JVs. However, the same facilitating effect is not expected between two forms of complex experience. We test these predictions on a comprehensive set of equity JVs formed by Dutch listed companies between 1966 and 2005, using JV survival and abnormal stock market returns as complementary JV performance measures.

Keywords: complex experience, joint ventures, organizational learning

Introduction

Recent data indicates that JVs are on the rise, presenting a serious alternative to mergers and acquisitions as a means of corporate growth (PwC 2014, Rinaudo and Uhlaner 2014). Ironically, despite their popularity, as many as 40–60 percent of JVs are considered to be failures (Chao et al. 2014, KPMG 2009). Hence, one question that has long occupied academics and practitioners alike is back on the agenda: how can firms be more successful with their JVs?

Prior research suggests that, to become successful with JVs, companies need to develop various types of routines and skills: they need to learn how to manage the JV, they need to learn about their JV partner, and they need to gain insight into how to learn with and from an alliance partner (Inkpen and Tsang 2007). Our paper focuses on learning about JV management, that is, "learning and acquiring knowledge useful in the design and management of other alliances" (Inkpen and Tsang 2007, p. 481). In contrast to learning about, from, and with JV partners, which is partner or technology specific (Inkpen and Tsang 2007, Reuer et al. 2002b), learning about JV management is parallel to learning about the partner and technology, and allows firms to develop more general routines and skills that carry forward to subsequent JVs.

To develop general JV management routines and skills, like choosing partners, selecting appropriate governance mechanisms, and effectively implementing and managing JVs, companies should accumulate JV experience (Anand and Khanna 2000, Beamish and Lupton 2009,Christoffersen 2013, Heimeriks and Duysters 2007, Heimeriks et al. 2007, Kale et al. 2002, Kale and Singh 2009, Reuer et al. 2002a, 2002b, Schreiner et al. 2009). Despite these positive prospects of JV experience, some studies have indicated that previous experience may have either no effect or a negative effect on performance of future JVs (Anand and Khanna 2000, Kumar 2011, Merchant and Schendel 2000, Reuer et al. 2002a, Simonin 1997). Consistent with these findings, a recent survey of company CEOs reported that only a few firms used standardized procedures or resources such as "playbooks" to encapsulate experience and to share best practices across their JVs (Rinaudo and Uhlaner 2014). Hence, there is an important question that has not yet been definitively answered by the JV literature or in practice today: why is it so difficult to learn about JV management and in what ways can firms enhance their learning from JV experience to improve the management and, ultimately, the performance of their JVs?

To address this question, we zoom in on the properties of experience from which firms learn how to manage their JVs (cf. Argote and Miron-Spektor 2011, Inkpen and Tsang 2007). In this regard, organizational learning literature indicates that the effectiveness of learning depends on the characteristics of experience, such as its complexity or diversity (Argote and Miron-Spektor 2011, March 2010, Reuer et al. 2002a). In a nutshell, this literature predicts that performance improvements are more easily achievable when learning from experience with well-defined, repetitive tasks than when learning from experience with more complex or diverse tasks (Argote and Miron-Spektor 2011, Delios and Beamish 2004, March 2010). Prior research has investigated the diversity of experience, suggesting, for example, that creativity accruing from heterogeneous experiences is helpful for novel JVs that are exploratory in nature (Reuer et al. 2002a). More generally, prior research has suggested that firms need to develop both experience that allows for exploitation of existing skills, as well as experience that introduces variation needed to develop new skills (Hoang and Rothaermel 2010, March 1991).

Despite these significant advances in the literature on experience diversity, we know comparatively less about the effects of experience complexity on learning, especially in the context of JVs. On the one hand, complexity of experience increases the difficulty of interpretation of the observed causes and effects, as well as the difficulty of application of the learned insights afterwards (March 2010). On the other hand, complex experience may provide rich, often unique lessons (Anand and Khanna 2000, Haunschild and Sullivan 2002, Mulotte 2014, Sampson 2005, Schilling et al. 2003). This indicates that a key challenge in organizational learning lies in the ability to derive and apply lessons from complex experience. In our paper, we address the question of when firms can learn from complex JV experience successfully by considering differences in learning from experience with different types of equity JVs.

Specifically, we focus on the differences between minority, 50-50, and majority JVs in terms of interdependencies implied by the governance modes of the JVs. Prior research has observed that the complexity of JVs depends on their governance structures, which determine how the JV activities are coordinated between the JV partners (Gulati and Singh 1998, Killing 1988). We build on this research by considering the governance mode of a JV, as implied by the equity structure, and its impact on the interdependencies between JV partners within the JV, and on the interface of the JV and the parent

organizations. These interdependencies influence the complexity of the JV experience, where experience with minority JVs is relatively less complex than experience with 50-50 and majority JVs.

We contribute to organizational learning theory in two ways. First, we provide a new answer to the question of why and when (complex) experience has positive or negative effects on performance. While we have learned from previous research that, to understand experiential learning, it is vital to zoom in on the properties of that experience (Argote and Miron-Spektor 2011, Reuer et al. 2002a), we still know very little about what kind of experience is a good "teacher" and how firms may structure and choose the experiences to improve the effectiveness of experiential learning (Argote and Miron-Spektor 2011, Levitt and March 1988). We theorize that experience with different types of equity JVs differs in the level of its complexity, which presents companies with difficulties when learning from some forms of JV experience. Therefore, to increase the positive performance effects from learning from JV experience, firms need to accrue both lower- and higher-complexity experience. We expect lower- and higher-complexity experiences to have a reinforcing effect on each other. In contrast, we do not expect a similar reinforcing effect between two forms of highly complex experience, as complexity of experience increases the difficulty of drawing and applying correct lessons from it (March 2010).

Second, by distinguishing between minority, 50-50, and majority JVs, we also contribute to the literature concerned with learning from JV experience specifically (e.g., Anand and Khanna 2000, Heimeriks and Duysters 2007, Kale et al. 2002, and see Table 5 in the Appendix for a summary of prior studies). While previous literature has studied the differences between equity JVs and other forms of alliances (e.g., Anand and Khanna 2000, Gulati 1995), or JVs and wholly owned subsidiaries (e.g., Delios and Beamish 2004), it has left equity JVs as a homogenous category and clustered experience with different forms of equity JVs under a single heading of "general" partnering experience (e.g., Hoang and Rothaermel 2005, Reuer et al. 2002b, Zollo et al. 2002). In this paper, we tackle the differences between three types of equity JVs and consider explicitly how experience with each of them differs in complexity, providing a new explanation for why JV experience does or does not lead to improvement in JV management and, ultimately, better JV performance.

We tested our hypotheses on all the minority, 50-50, and majority JVs established between 1966 and 2005 by firms listed on the Amsterdam Stock Exchange. We followed the companies and

their JVs over a period of 40 years from the beginning of a substantial growth period for Dutch firms (de Jong 1988). To demonstrate the performance effects of experience with minority, 50-50, and majority JVs, we used two complementary measures of JV performance: abnormal stock market returns realized upon new JV announcements, and JV survival. This dual approach allowed us to consider the research implications of differences and similarities in the results of the two sets of analyses we conducted and offer recommendations for future empirical research into the relationship between organizational experience and performance, in the context of JVs and beyond. The sample sizes were 911 JVs in survival analyses and, after accounting for confounding events and missing data, 359 JVs in abnormal returns analyses.

Theory and hypotheses

An important insight from previous research on learning from alliance and JV experience is that firms learn by observing and interpreting associations between actions and outcomes, embedding the new lessons in organizational rules and routines, and applying them in future situations such as equity JVs (Anand and Khanna 2000, Argote and Miron-Spektor 2011, Huber 1991, Kale and Singh 2009, Levitt and March 1988). Hence, a key to improved JV management skills and, consequently, better JV performance lies in correctly interpreting and applying prior JV lessons. This is challenging to the extent that JVs differ from one another in multiple ways, for instance in terms of goals, managerial processes, command structures, authority and incentive systems, standard operating procedures, and dispute resolution mechanisms—all depending on a governance structure of a JV in which the division of equity ownership plays an important role (Anand and Khanna 2000, Choi and Beamish 2004, Chung and Beamish 2010, Gulati and Singh 1998, Zollo et al. 2002). Associated with different governance structures are different levels of involvement and coordination in the JV by the JV partners (Dhanaraj and Beamish 2004, Geringer and Hébert 1991, Gulati and Singh 1998, Killing 1988). The higher the level of a firm's involvement in the JV and the more coordination is required, the more complex is the JV (Gulati and Singh 1998, Killing 1988, Phene and Tallman 2012). Therefore, different types of equity JV differ in how complex they are and how complex the experience drawn from them will be (cf. Killing 1988).

In this paper, we define JV experience complexity as a property of JV experience resulting from: (1) interdependencies between the JV partners within the JV; and (2) interdependencies of the JV with its respective parent organizations. We suggest that the more linkages between the partners in a JV and/or between the JV and the parent organization, the more difficult it is to disentangle them to understand the underlying processes and relationships and their impact on JV performance.[1] Thus, the more interdependencies a firm needs to deal with while in a JV, the more complex the resulting JV experience will be.

Let us first consider how minority, 50-50, and majority JVs differ with respect to interdependencies between partners within the JV. We define interdependencies between partners within the JV as the extent to which the flow of financial, physical, and managerial inputs and outputs is required among the tasks performed by the partners in the JV (Gulati and Singh 1998). In that regard, the more equally involved the partners are in the JV, the greater the JV complexity (Killing 1988). Thus, if we take only interdependencies between the JV partners into account, JVs with a dominant partner, i.e., minority/majority JVs, are relatively less complex than 50-50 JVs due to the fact that JV partners in minority and majority JVs tend to focus on their respective areas of expertise (cf. Makino and Beamish 1998, Mjoen and Tallman 1997, Killing 1988). This focus on specific areas, in turn, limits the need for extensive coordination between the JV partners (Gulati and Singh 1998, Killing 1988), implying a relatively low level of interdependence between the partners in typical minority and majority JVs. For example, when Starbucks expands through minority JVs, it focuses on areas in which it has expertise, such as the supply of coffee beans and codified outlet operation knowledge, while leaving the actual operational responsibilities to a majority JV partner (Davila et al. 2009). Similarly, in JVs in emerging markets, one partner focuses typically on local marketing and personnel management, whereas the other (foreign) partner tends to focus on product and process technology (Blodgett 1991, Choi and Beamish 2004), implying relatively low levels of partner interdependence within such JVs.

The nature of interdependencies between partners within 50-50 JVs is different to the extent

[1] In so doing, we add to prior research that has considered interdependencies among JV activities (e.g., Choi and Beamish 2004, Gulati and Singh 1998, Killing 1988) but has not specifically addressed interdependencies resulting from the governance mode.

that the balanced ownership in 50-50 JVs implies a shared fate between the JV partners and motivates them to consult, communicate, and collaborate across multiple JV tasks (Blodgett 1992, Li et al. 2009, Steensma and Lyles 2000). Such collaboration and coordination may involve cross-company teams, steering committees, joint marketing and R&D, and a JV board with equally powerful representatives from both parent firms. When decision making is shared in such boards, this increases the need for less routine communication, making the process more time consuming and complex (Killing 1988). Also, the need for consensus resulting from a balanced ownership structure of 50-50 JVs increases the managerial complexity of coordinating the JV tasks, may result in conflict, and slow down decision making in the JV (Chung and Beamish 2010, de Man 2014). Thus, the more the JV partners interact within a JV, the more complex such a JV is (Killing 1988, Schreiner et al. 2009). Partner interaction is particularly high in shared-control JVs in which partners exercise joint control over all the JV tasks (Choi and Beamish 2004, Killing 1988). This indicates relatively high levels of partner interdependencies in 50-50 JVs over and beyond what is seen in typical minority and majority JVs. These high partner interdependencies within a JV render 50-50 JV experience particularly complex.

Let us turn now to the interdependencies between the JV and its parent organizations. Despite the relatively low level of partner interdependence within the JV, majority JVs are interdependent with their majority-holding parent organizations beyond what would be experienced in other types of equity JVs. Majority JVs typically pose higher resource demands on the parent organization and, therefore, implicate higher involvement in the management of the JV (Child et al. 1997, de Man 2014, Dhanaraj and Beamish 2004, Liu et al. 2014, Schaan 1988). For instance, a majority equity position in a JV implies formal control over issues covered by the board of directors, including the JV's major strategic and financial decisions (Blodgett 1991, Child 2002, Child et al. 1997, Dhanaraj and Beamish 2004, Mjoen and Tallman 1997, Schaan 1988). The majority partner is also more likely to be involved in a broader range of day-to-day operations, particularly if the JV involves technology or other resources requiring close supervision over a production process and/or quality control, for example (Child 2002, Child et al. 1997). Often, majority JVs are also financially consolidated with the parent firm (de Man 2014, Dhanaraj and Beamish 2004) and display strategic, operational, and transactional interdependence with it (Child et al. 1997, Park and Kim 1997). Where financial, physical, and

managerial inputs and outputs are exchanged reciprocally between the JV and the parent firm, extensive interaction between the JV and the majority-holding parent firm and a flexible approach are required, implying a particularly high level of interdependence (Gulati and Singh 1998, Killing 1988, Thompson 1967, Schreiner et al. 2009). The multifarious nature of such flows and interactions increases the difficulty of distilling causal effects and hampers learning. Thus, the high interdependence of such JVs with their majority-holding parent firm makes the resulting experience relatively complex.

In sum, experience with minority and majority JVs is characterized by a relatively low level of interdependence between the partners within the JV. In contrast, such interdependence is higher in 50-50 JVs. The interdependencies between the JVs and the parent organizations are the lowest when parent firms hold minority stakes, and the highest in the case of majority stakes. Because increasing interdependence makes JVs and the resulting experience more complex, it follows that the complexity of experience with majority and 50-50 JVs is higher than the complexity of minority JV experience. These insights are summarized in Table 1 below.

Insert Table 1 about here

Complexity and learning from JV experience

As mentioned earlier, on the one hand, complexity of experience impedes learning by increasing the difficulty of drawing and applying lessons learned (March 2010). On the other hand, complex (JV) experience is rich in potential lessons (Anand and Khanna 2000, Haunschild and Sullivan 2002, Mulotte 2014, Rothaermel and Deeds 2006, Schilling et al. 2003). A key question now is: how and when can firms improve their learning from experience with JVs of varying levels of complexity, and thereby improve their JV performance? We argue that, in order to increase the positive performance effects of JV experience, firms need both the lower-complexity experience (as with minority JVs) and the higher-complexity experience (as with 50-50 and majority JVs), because lower-complexity experience facilitates learning from higher-complexity experience.

Specifically, we argued earlier that, in minority JVs, interdependence with the majority partner within the JV as well as interdependence with own parent organization is relatively low. Hence, the minority JV partner observes a limited range of causes and effects that are not clouded by the more

extensive interdependencies typical of 50-50 and majority JVs (cf. Gulati and Singh 1998, Killing 1988, Schreiner et al. 2009). This implies a relatively simple causal structure of minority JV experience that facilitates its comprehension. A relatively simple causal structure increases the likelihood of making accurate inferences about what affects JV performance, leading to improvements in performance when engaging in subsequent JVs (cf. Haunschild and Sullivan 2002, March 2010, March and Olsen 1975). Thus, while any type of JV experience provides insights into the choice of partners, selection of appropriate governance mechanisms, and effective implementation and management of JVs (Beamish and Lupton 2009, Heimeriks and Duysters 2007, Kale and Singh 2009, Schreiner et al. 2009), the limited complexity of minority JV experience suggests that at least some of these lessons may be learned most accurately from minority JVs.

Once learned, such lessons limit the effort required to identify the already known causal relationships in subsequent JVs (cf. Anderson 1987, Killing 1988). In particular, such prior lessons provide a shortcut when making inferences from more complex experience, thereby facilitating learning from it, and ultimately improving JV performance. For example, one type of lesson firms may learn from minority JV experience concerns the influence on the JV's operations or direction in an informal way. The ability to exert influence through informal governance arrangements, diplomacy, "expert power," and key appointments is particularly important for minority JV partners as they may not be in a position of formal control through board membership (Child 2002, Schaan 1988). Such lessons from minority JV experience help learning from other types of JV experience. Majority partners who have experience using informal control mechanisms as a minority partner may be able to delegate some critical authority to the minority partners in order to incentivize and bring them on board while remaining in control through informal means. Similarly, lessons about informal control and influence learned from minority JV experience may help learning from experience with 50-50 JVs in which partners do not have a dominant position and need to learn how to compromise and coordinate. Such lessons from minority JV experience, when applied to other, more complex types of JV experience, allow firms to focus learning on fewer sources of variance in JV performance. This makes it easier to identify causal effects and helps to contain the complexity of subsequent majority or 50-50 JV

experience.[2]

One example of how learning from minority JV experience helps improve the performance of majority and 50-50 JVs is Heineken, a highly successful brewing company from our sample. Over the sample period, Heineken had initially shown a preference for minority investments, with increasing numbers of 50-50 and majority JVs appearing on its expansion record over time. This pattern of different JVs over time and Heineken's performance record illustrate our arguments about learning from experiences of different levels of complexity.

In sum, the relatively accurate lessons learned from minority JV experience may serve as shortcuts and free up cognitive resources to extract new lessons about other sources of variation in outcomes of JV actions (cf. Robertson 2001). In this sense, learning from complex experience with majority and 50-50 JVs is facilitated by lessons from lower-complexity minority JV experience. Thus, we predict the following:

> HYPOTHESIS 1. There is a positive interactive effect between minority JV experience and majority JV experience on JV performance.

> HYPOTHESIS 2. There is a positive interactive effect between minority JV experience and 50-50 JV experience on JV performance.

However, the same positive reinforcing effect is not expected between majority and 50-50 JV experiences, since they are both complex. Complex experience not only requires more information processing and interpretation (Haunschild and Sullivan 2002), but is also more likely to produce incorrect interpretations of what happened before, and why (Levinthal and March 1993, March 2010). This leads to poorer fixes for problems than those resulting from an analysis of less complex experience (Haunschild and Sullivan 2002). Furthermore, when experience is complex, it is difficult to identify specific lessons to learn and which ones to apply when learning from another type of complex experience. This may have at least two potential negative effects on learning derived from, and

[2] Theoretically, it is possible that a minority partner may derive lessons normally available from majority JV experience through vicarious learning. However, such learning from second-hand experience tends to be more superficial and prone to biases than learning from first-hand experience.

transferred between, the complex experiences, and on the performance of subsequent JVs.

First, experience from one type of complex JV may hamper learning from another type of experience from a complex JV when prior lessons are incorrect or misapplied. Experiences with 50-50 and majority JVs differ substantially from one another in terms of the lessons that can be drawn from them. For example, a firm in a majority position gains experience on how to rely on formal control mechanisms, such as board membership, and how to take a leading role while limiting counterproductive partner interactions (Child et al. 1997, Killing 1988). Additionally, since majority JVs are more highly interdependent with the parent organization than 50-50 JVs are, they foster the learning of ways to establish fruitful interaction between the parent organization and the JV. In contrast, experience with 50-50 JVs provides lessons on consensual, joint decision making and extensive partner communication (Blodgett 1992). This suggests that important lessons about governance learned from majority JV experience may not apply when learning from 50-50 JVs (and vice versa), even if accurate. When applied, they are likely to hamper subsequent learning from JV experience and performance.

To illustrate this point, let us consider the case of a 50-50 JV described by Ariño and de la Torre (1998) in which both the partner companies had prior experience with majority JVs but not 50-50 JVs. Crucially, the partners lacked the experience of consensual decision making and conflict resolution required in JVs in which partners have equal roles (cf. Chung and Beamish 2010, Killing 1988). The new 50-50 JV had the right governance structure and incentives at the outset. However, a series of unilateral, non-consensual actions changed the nature of the designed partner interdependence and ultimately led to JV failure. This illustrates that important lessons from experience with majority JVs do not necessarily apply to 50-50 JVs and, therefore, do not facilitate learning from experience with 50-50 JVs (and vice versa). Moreover, when inapplicable or erroneous lessons from a complex experience are applied and used to simplify learning from another (complex) JV experience, resultant errors will be carried through the next lessons learned and applied in subsequent JVs, ultimately diminishing JV performance.

Second, when learning from two types of complex experience with various linkages between the partners in a JV, or between the JV and the parent organization, it is difficult to disentangle them to understand the underlying processes and relationships and their impact on JV performance. For

example, given the typical lessons developed based on the majority and 50-50 JV experience, it may not be clear whether a JV succeeded due to partner interaction or well-structured involvement of the parent organization. Therefore, isolation of the effects on JV performance will be more difficult. This will diminish learning from complex experience and consequently lower the performance of a JV.

In summary, complexity of experience with majority and 50-50 JVs decreases the accuracy of lessons drawn from both types of experience and hampers the understanding of the causal structure. Even if accurate, lessons from one type of complex JV experience may not apply to the other and will make learning from the other type of experience more difficult. Consequently, performance of subsequent JVs will also be negatively impacted. This leads us to expect a negative interactive effect between majority and 50-50 JV experiences:

> HYPOTHESIS 3. There is a negative interactive effect between majority JV experience and 50-50 JV experience on JV performance.

Sample and methods

Our hypotheses required data about minority, 50-50, and majority JVs that could be traced over time to capture a firm's JV experience, its subsequent JVs, and JV performance. For these reasons, we selected a longitudinal database of Dutch listed companies originally developed at Tilburg University (Barkema et al. 1996), and complemented it with additional data. The database covers Dutch non-financial companies from the Main Funds Segment of Amsterdam Stock Exchange. The companies and their JVs were traced over a period of four decades: from 1966, a year which marked the beginning of a period of substantial growth of Dutch companies (de Jong 1988), to 2005. The dataset covers 25 firms, two of which went bankrupt during the sample period, hence the sample does not suffer from survival bias. The four largest firms—Akzo, Philips, Royal Dutch Shell, and Unilever—were not included since they differed considerably from the other firms in terms of experience, scope, and size.

This dataset is uniquely suitable for testing our hypotheses as it traces all 936 minority, 50-50, and majority JVs reported in annual reports by the Dutch firms during the sample period. Unlike other firms, Dutch listed companies report all their substantive, active engagements, providing a reliable,

consistent source of JV experience data over time, starting from the early stages of the sample firms' experiential learning about joint venturing. In addition, the long sample period makes it possible to study the JVs through all the stages of economic cycles.

Among the sample JVs, 30 percent were majority-held by the Dutch firms, while 50-50 and minority JVs constituted 33 percent and 37 percent of the sample, respectively.[3] The JVs were active in a wide variety of industries, with 55 percent operating in the core industries of the parent firms (for example, chemicals, pharmaceuticals, food, retail, and paper industries) and 22 percent operating in unrelated industries. The majority of JVs involved expansion of the parent firms into a foreign country (68 percent were international) or a new product market, rather than investments in which the firms adopt the role of "sleeping partners" (Child 2002), making the empirical setting particularly suitable for our study. The average firm value increase upon announcement of the JVs was 0.21 percent (€2.89 million; $p < 0.05$). During the observation window, 41 percent of the JVs were terminated.

Our hypotheses focus on JV performance. Prior research used a variety of JV performance measures, ranging from JV survival and stability in ownership stakes (e.g., Blodgett 1992, Dhanaraj and Beamish 2004, Gaur and Lu 2007) to financial measures such as return on investment or assets and stock market reaction to announcements of newly formed JVs (e.g., Anand and Khanna 2000, Kale et al. 2002, Luo 2002) and survey-based indicators of managerial satisfaction with JV outcomes (e.g., Mjoen and Tallman 1997). Each of these measures, while having unique advantages, has received its fair share of criticism (for a review, see Christoffersen 2013). For instance: accounting-based measures may reflect firm performance in areas other than the JV alone; stock market reaction reflects *ex ante* investor expectations; JV long-range survival may be a consequence of the JV goals not being realized in the time originally provided; and managerial satisfaction with a JV may differ between partners.

While the above measures are correlated (Kale et al. 2002, Koh and Venkatraman 1991), they have produced divergent empirical results. For example, in Kale et al.'s (2002) study, the effect of partnering experience has been positive in a survey-based evaluation of performance of biotechnology

[3] Annual reports were the source of data for new JVs formed each year. The reports typically indicated whether a JV was minority, 50-50, or majority-held without providing exact ownership share. We collected exact ownership data from press releases through LexisNexis. This data was available for 802 of the sample JVs. Average share in majority JVs was 67 percent, and in minority JVs it was 31 percent.

alliances but it has been non-significant in stock market reaction analyses. One reason for such divergence may be that the measures capture JV performance from different angles. For example, the measures differ with respect to *whose* evaluation of JV performance they reflect, e.g., investors vs. managers. The measures also differ according to *when* performance is evaluated. Stock market effects capture JV performance expectations at the time of JV formation, while measures such as survival and managerial satisfaction reflect JV performance at later stages.

In this paper, we use two complementary measures of JV performance to capture it at the JV formation and termination stages, and to reflect evaluations of both the investors and managers. To measure JV performance at the formation stage, we use event-study methodology to calculate abnormal returns realized upon new JV announcements. This measure reflects investors' expectations as to the firm value-creation potential of the JV. To measure JV performance at termination stage, we use event-history modeling to estimate JV survival. This measure reflects managerial decision about the continuation of the JV.

To gain more insight into JV survival as an indication of JV success, we compared JV survival rate with an additional measure of success. It was sometimes indicated in the annual reports of the sample firms whether the management considered a JV to be a success or a failure. This information was coded into a binomial variable—success or failure—for 205 of the sample JVs. We then estimated a JV survival model including this binary variable. The parameter estimate (-1.9, $p<0.000$) indicated that the JVs regarded as successes had a failure rate 85 percent lower than JVs considered to be failures. These results support the notion that, for the sample equity JVs, their survival is an indication of success as evaluated by the firms' management.

Collectively, abnormal returns and JV survival capture JV performance from different angles, thereby alleviating the shortcomings of single measures and enabling us to consider the robustness of our findings. We explain both measures in further detail below.

JV performance: Abnormal returns

Event-study methodology makes it possible to quantify the expectations of stock market investors regarding a firm's ability to create value with a new JV. This approach builds on the assumption of

semi-strong stock market efficiency, i.e., a change in share price following a corporate announcement reflects the economic consequences of the firm's decision (McWilliams and Siegel 1997). The event-study method has been widely used to research the financial impact of strategic, marketing, and other corporate decisions. Following this approach, we first collected stock price and benchmark index data from DataStream, which makes both available from 1973 onwards. Then, via LexisNexis, we reviewed a number of business news sources, such as the Dutch financial daily *Het Financieele Dagblad*, to determine when JVs were first announced. We found sufficient information about 431 JVs. We eliminated 50 of these JVs to avoid contamination of the JV announcement effect with another new venture formation announced by the same firm on the same day.[4] The last step was to verify that we had the same relevant data for all JVs. This led to a sample of 359 JVs for this part of the empirical analysis, representing 38 percent of all the JVs reported in the focal firms' annual reports.

Like most prior research, we used the market model to calculate abnormal returns associated with the announcement of a new JV (McWilliams and Siegel 1997). For each JV, we regressed daily stock returns of the sample firms on the Amsterdam Stock Exchange (AEX) index over a period from $d = -136$ to $d = -16$, where $d = 0$ was the new JV announcement day.[5] Abnormal returns were the difference between returns predicted by the market model and actual share prices on focal trading days. We cumulated abnormal returns over the days $d = -1$ and $d = 0$ and winsorized them at 1 percent, i.e. replaced 1 percent of the most extreme values with the next inward values to reduce the influence of outliers. The cumulative abnormal returns were then used as the dependent variable in an ordinary least squares regression framework with robust standard errors clustered by parent firm (StataCorp 2010).

JV performance: Survival

Having measured JV performance at the time of JV formation, we then analyzed JV survival. JV survival is particularly relevant in dynamic settings, as managers tend to factor in the length of time

[4] Additional analyses that eliminated a further 35 JVs that were potentially contaminated with other new venture announcements on the previous or the following day rendered results similar to those we report later.

[5] Since the AEX index was only initiated in 1983, for JVs formed between 1973 and 1982, we used an AEX-equivalent index calculated by DataStream. Stock returns were adjusted for capital changes (e.g., stock splits, buybacks, regular capital issues, takeovers) and for dividend payments. Stock returns and benchmark returns were calculated in logarithmic terms.

needed to recover the investment costs when taking JV termination decisions. As with all performance measures, survival must be interpreted carefully, but it can be an important indicator of financial performance and of other aspects that are relevant to shareholders, managers, and employees (Geringer and Hébert 1991, Pan and Chi 1999). As mentioned before, we have also been able to confirm that, for the sample JVs, their survival is an indication of success as evaluated by the firms' management—JVs regarded as successes had a failure rate 85 percent lower than JVs considered to be failures. After accounting for missing data, our analyses for this part were based on 911 JVs, representing 97 percent of all JVs reported in the focal firms' annual reports.

To test the survival models, we estimated a proportional hazard model using Cox's partial likelihood approach. We decided against parametric estimates of the hazard rate as they require assumptions about the effect of the age of the JV on the probability of termination, while some of our explanatory variables, such as experience with JVs, increase with the age of the firm.[6] Cox partial likelihood is a semi-parametric model and it does not require assumptions about this effect (Allison 1995). We also chose the Cox model because of its flexibility. Unlike discrete time models, such as the log-normal or Weibull models, the Cox model does not require the identification of a specific distinct hazard function (Allison 1995). To assess the proportional hazard assumption, we tested all the predictors for proportionality by considering the interactions of the predictors and time (as well as its natural logarithm). All the variables that vary continuously with time were insignificant. The likelihood ratio test performed was also insignificant, further supporting our choice of model specification.

For each JV, an event was registered upon JV termination. The termination information was obtained from annual reports. In each case, there was a note in the report about discontinued operations of a JV and it was verified with the list of active subsidiaries. The dependent variable in this type of analysis is the instantaneous rate of JV termination, which indicates whether the JV was still part of the sample firm's portfolio. All analyses are performed in terms of time since becoming "at risk." The effects in a Cox model reflect the relative effect of each covariate on the survivor function. The estimates are a logarithmic likelihood. Proportional hazard models are quasi-parametric because they

[6] As a robustness check, we also used parametric models for the survival analysis and we obtained similar results.

rank different durations so that the rank order of all JVs represents the dependent variable. A positive parameter estimate means that this variable is positively related to JV termination. We allowed the explanatory variables to vary over time, resulting in multiple observations for each JV. We modeled the possible dependence of observations of the same JV by allowing for clustering, which treats the observations as independent across JVs, but does not require different observations on the same JV to be independent. Finally, we estimated a robust coefficient covariance matrix and stratified our observations by firm to control for firm-specific effects that are stable over time.

JV experience

To calculate the experience of sample firms with different types of JVs, we counted all of their prior minority, 50-50, and majority JVs over the eight years preceding the focal JV, up to and including year $t = -2$. Prior research has usually taken an arbitrary number of years over which experience is counted, often dictated by data availability. We took a different approach and considered the average time over which at least two members of the firms' top management teams (TMTs) served together and took part in decisions and learning associated with the JVs. We did so because shared experiences, such as those associated with JVs, have a powerful impact on strategies by reinforcing beliefs and perceptions among decision makers (Carroll and Harrison 1998, Finkelstein and Hambrick 1990). Hence, JV experiences shared by on average at least two TMT members are more likely to be reflected in JV performance. Such an approach has merit, considering that few firms encapsulate their JV experience in standardized procedures or "playbooks" (Rinaudo and Uhlaner 2014). We also did sensitivity analyses with experience calculated over alternative periods of time (as discussed in the section detailing sensitivity analyses). We counted JVs up to and including year $t = -2$ to account for the fact that it takes time for firms to reflect upon experience and only then can it become part of the firms' repository (cf. Cohen and Levinthal 1990).

Control variables

We took into account a number of potentially relevant factors specific to the firm, the JV, and its setting. All time-varying control variables were lagged by one year. JV-specific controls included four binary

indicators. The first two captured whether the JV was a minority or a 50-50 JV, with the majority JV being the baseline category. We also captured whether the JV was international and whether it was in an industry unrelated to the core business of the parent firm as both may impact JV learning and performance (Barkema et al. 1997, Lu and Beamish 2006).

Parent firm-specific control variables included firm size, operationalized as a natural logarithm of the number of employees, as larger firms may have more resources with which to enhance JV performance (Kale et al. 2002). We also controlled for profitability, using the parent firm's return on assets, and financial leverage measured as the ratio of total liabilities to assets, as these may affect the inclination and ability to invest in JVs (Jensen 1986). To account for the potential effect of parent firm product scope on performance (Hoskisson and Hitt 1990), product diversity was controlled for using the number of four-digit Dutch standard industry codes in which the firm operated prior to entering a JV. Finally, we controlled for the number of years since the previous JV using a count of years, as this indicates the time during which experience could be assimilated (Amburgey et al. 1993).

JV setting-specific variables included cultural distance between the parent firm's home country and the country in which the JV was located, as JVs between culturally distant partners may encounter more difficulties than JVs between culturally proximate partners (Barkema et al. 1996, Lu and Beamish 2006). We used Kogut and Singh's (1988) cultural distance index based on Hofstede's original four dimensions of culture. We also controlled for GDP growth in the host country, as the country's economic situation may influence JV performance (Barkema et al. 1997).

In addition, in the abnormal return models, we controlled for the potential confounding effects of other relevant news around the time of the announcement of the JV (Brown and Warner 1980). We screened the press releases of the parent firms during a six-week period around each new JV announcement and coded four different types of potentially value-relevant information as binary variables: (1) profitability related, e.g., profit warnings; (2) expansions within the six-week period but outside of the event day (those being on the event day may have contaminated announcement of the focal JV and any such JV was excluded from the sample); (3) changes in ownership of non-focal ventures; and (4) other types of information, for instance large orders or new contracts, capacity expansions or decreases, and job cuts or creation. The first three types of announcement had significant

effects on abnormal returns and were retained in our models. We also controlled for time-specific effects using dummy variables, also retaining the significant ones for reasons of parsimony.

The means, standard deviations, and correlation coefficients of the variables are presented in Table 2. The statistics indicate that the three key independent variables—experience with minority, 50-50, and majority JVs—are significantly correlated. To test our hypotheses, we used multiplicative terms of these variables. This may raise collinearity concerns. To alleviate them, we used mean centering (Aiken and West 1991). We also tested the variance inflation factors (VIFs) among all the independent and control variables. The mean VIFs among the variables featuring in full models were equal to approximately 2. All individual VIFs were below the critical value of 10, with the highest of 4.94 and 4.05 for the interactive term of majority and 50-50 JV experiences in abnormal return and survival model samples, respectively. The VIFs indicate that collinearity is unlikely to be an issue in our models.

Insert Table 2 about here

Results

We present our empirical results in Table 3 (abnormal return models 1a–4a) and Table 4 (survival models 1b–4b). In the abnormal return models, a positive coefficient indicates that a variable increases the firm value created with a new JV. In the survival models, a positive effect indicates that a variable increases the risk of JV termination and, hence, decreases the probability of JV survival. Models 1a and 1b include control variables and the main terms of experience with minority, 50-50, and majority JVs. Models 2–4 (a and b) add the interactive terms of minority, 50-50, and majority JV experiences.

Insert Tables 3 and 4 about here

In Models 1a and 1b, the estimates of the main terms of minority, 50-50, and majority JV experiences are consistent with the mixed empirical findings about JV experience reported in prior studies. The results show that 50-50 JV experience marginally positively impacts abnormal returns and that minority JV experience increases JV survival ($p<0.01$). These are interesting results in light of our argument that there is heterogeneity across different types of equity JVs and the resulting JV experience. Clearly, there

are also differences between different JV performance measures.

Hypothesis 1 predicted a positive interactive effect of minority and majority JV experiences on JV performance. Estimation results provide support for this prediction in JV survival Models 2b ($p<0.001$), 3b ($p<0.05$), and 4b ($p<0.01$), and Model 4a, explaining abnormal returns ($p<0.1$). The coefficient in Model 4a implies, for instance, that for firms with an average level of majority JV experience, an increase in minority JV experience by one standard deviation above the mean boosts the market value created with a new JV announcement by approximately €2.88 million. The evidence in Model 4b (a full model of JV survival including the three hypothesized effects) and Figure 1, which is based on it, shows that for firms with a high level of minority JV experience (one standard deviation above the mean) the multiplier of JV termination *decreases* from 0.82 to 0.01 as experience with majority JVs increases. This indicates a *decrease* by close to 80 percent in the likelihood of JV dissolution as the experience with majority JVs increases and when the experience with minority JVs is high. At the same time, for companies with minority JV experience at low levels (one standard deviation below the mean), the multiplier of JV dissolution rate *increases* from 1.22 to 9.59 as majority JV experience increases, suggesting a close to ninefold increase in the rate of JV dissolution.

Hypothesis 2 predicted a positive interactive effect of minority and 50-50 JV experiences on JV performance. This hypothesis is also supported by some of the estimation results. Model 4a shows that the interactive term of minority and 50-50 JV experience has a positive effect on abnormal returns ($p<0.05$). The coefficient implies that, for firms with an average level of 50-50 JV experience, an increase in minority JV experience by one standard deviation above the mean improves the market value created with a new JV announcement by approximately €2.94 million. The respective coefficient has the correct sign though it is insignificant in partial Model 3a. Models 3b and 4b support Hypothesis 2 at the 10 percent and 5 percent levels, respectively. The interactive effect of minority and 50-50 JV experiences on JV survival is illustrated in Figure 2. The multiplier of JV termination for firms with more minority JV experience (one standard deviation above the mean) *decreases* from 0.84 to 0.02 with growing 50-50 JV experience. This indicates that the JV dissolution rate *decreases* by close to 80 percent. At the same time, for firms with less minority JV experience (one standard deviation below the mean) the multiplier of JV dissolution rate *increases* from 1.19 to 2.02 as 50-50 JV experience increases,

indicating an approximately 80 percent increase in the dissolution rate of the JVs.

Finally, Hypothesis 3 predicted a negative interactive effect between experience with majority JVs and 50-50 JVs. This prediction is confirmed in both Models 4a and 4b at the 1 percent level. The coefficient in Model 4a implies that, for firms with an average majority JV experience, an increase in 50-50 JV experience by one standard deviation above the mean decreases the market value created with a new JV announcement by approximately €3.17 million. Figure 3 presents the estimated interactive effect graphically, based on Model 4b. The multiplier of JV termination for firms with more 50-50 JV experience (one standard deviation above the mean) *increases* from 0.91 when majority JV experience is low to 5.67 when the majority JV experience is high, indicating a significant increase in the JV dissolution rate. At the same time, the multiplier of JV dissolution rate *decreases* from 1.09 to 0.08 as experience with majority JV increases, indicating a nearly 100 percent decrease in the rate of JV termination for firms with less 50-50 JV experience (one standard deviation below the mean).

Insert Figures 1, 2, and 3 about here

Sensitivity analyses

As a sensitivity test of the findings, we re-estimated our models using alternative specifications of minority, 50-50, and majority JV experiences. First, we considered alternative lengths of time over which JV experience was counted. In the main results reported above, we measured "experience" by a count of all JVs a firm established over the eight years preceding the focal JV. As we explained before, eight years is the average second-longest TMT tenure in the sample, representing experience shared by at least two TMT members, as TMT are the key learners in major investment decisions and shared TMT experience has a powerful impact on performance (Carroll and Harrison 1998, Finkelstein and Hambrick 1990, Nadolska and Barkema 2014). We checked to see if our results would hold for JV experience over longer or shorter windows. For the shorter window, we chose five years, the average number of years of TMT tenure across our sample. Five years is also the standard window for measuring experience in prior research that relies on data available from commonly used databases. For the longer window, we chose thirteen years, the average longest TMT tenure in the sample.

The abnormal return models using experience counts over 5 and 13 years, rather than 8, supported Hypothesis 2, while other relevant estimates had the correct signs. Survival models using experience counts over 5 or 13 years rendered additional support for Hypotheses 1 and 2, respectively, with other relevant estimates having the correct signs.

We also considered two potential effects the passage of time may have on experience. First, considering that it takes time to digest experience and only then can it be applied to a subsequent JV, we examined the interactive effects of minority, 50-50, and majority JV experience variables lagged by two years rather than one year. Second, we checked for the possibility that earlier JV experience may have stronger or weaker learning effects than later experience by transforming the JV experience variables logarithmically. The results of these additional analyses were also in line with the patterns seen earlier.

In addition to the analyses reported above, we considered whether experience with one type of JV might have a stronger effect on performance of subsequent JVs of the same type than performance of JVs of the other types. We tested for such a possibility by testing three-way interactions between a categorical variable capturing the JV governance mode and the three focal JV experience variables. Neither the event-study nor the survival model confirmed this prediction, which indicates that similar experience alone is not enough to learn from complex experience with JVs. We then considered whether the strength of the hypothesized relationships may differ across JV types. Subsample analyses indicated that the effect of the interaction of prior minority JV experience with 50-50 JV experience (Hypothesis 2) is particularly strong for 50-50 JVs. This suggests that there are important lessons from minority JV experience that support learning of lessons from 50-50 JV experience specific to subsequent 50-50 JVs. This finding is consistent with our earlier arguments that minority JV experience provides lessons about informal control mechanisms that can be useful when learning about consensus building and cooperation in 50-50 JVs specifically, leading to a more significant effect on performance of subsequent 50-50 JVs.

Discussion and conclusion

Prior research has long suggested that learning from JV experience is key to improving JV management

skills and, ultimately, JV performance (Anand and Khanna 2000, Heimeriks and Duysters 2007, Inkpen and Tsang 2007, Kale et al. 2002). Yet, managing JVs remains a challenge, with up to 60 percent of them not meeting their performance goals (Chao et al. 2014). Hence, in this paper we asked how firms can enhance their learning from experience to improve their JV management skills and, ultimately, performance of their JVs. In answering this question, we focused on the properties of JV experience, specifically its complexity (cf. Argote and Miron-Spektor 2011, Killing 1988, March 2010, Reuer et al. 2002a). In this regard, prior organizational learning literature provided two contrasting views. On the one hand, complexity of experience makes learning inefficient and challenging because it increases the difficulty of interpretation of the observed causes and effects, as well as the difficulty of application of the learned insights afterwards (March 2010). On the other hand, complex experience is rich in potential, often unique lessons that, if harnessed, may lead to superior performance (Anand and Khanna 2000, Haunschild and Sullivan 2002, Mulotte 2014, Sampson 2005, Schilling et al. 2003).

This raised an important question of how firms could embrace complexity and learn from complex JV experience in order to improve performance of their subsequent JVs. In answering this question, we proposed that firms need to acquire JV experience characterized by different levels of complexity, as lower-complexity JV experience facilitates learning from higher-complexity experience. We argued that the complexity of JV experience depends on the interdependencies between the partners within the JV and interdependencies between the JV and its parent organizations, as implied by the JV governance mode. While prior research recognized that interdependence between partners within the JV increases JV complexity (Gulati and Singh 1998, Killing 1988), interdependence between the JV and the parent organizations has received less attention, and neither have been considered as a source of experience complexity.

In this paper, we proposed that the relatively limited interdependencies experienced by minority JV partners make minority JV experience less complex than experience with 50-50 and majority JVs. This distinction is crucial in explaining learning from JV experience. We argued that the lower-complexity experience with minority JVs provides lessons that are relatively easy to comprehend and that facilitate learning from more complex experience with 50-50 and majority JVs, ultimately leading

to improved JV management and performance.[7] At the same time, such an enhancing effect does not exist between two forms of complex experience, because complex experience is difficult to learn from, and firms are more likely to make mistakes when using it as the basis for comprehending new lessons (cf. March 2010).

Our arguments concerning the facilitating role of lower-complexity experience (with minority JV) for learning from higher-complexity experience (50-50 and majority JV) indicate that different types of experience may be complementary. In this respect, prior research showed that partnering experience from domestic JVs combined with international experience from wholly owned subsidiaries to enhance international JV survival (Barkema et al. 1997). Other research found that JVs performed better (and survived longer) when firms had JV experience, however a similar beneficial effect was not found when considering wholly owned subsidiary experience (Delios and Beamish 2001, 2004). In another context, experiential learning was found to facilitate vicarious learning (Posen and Chen 2013). These findings suggest that different types of experience may provide lessons not available, or available to a lesser extent, from other types of experience. The theory developed in our paper suggests in addition that while any JV can perform well if the firm has learned from experience, firms learn differently from experiences with different levels of complexity.

Empirical results of analyses of more than 900 JVs were consistent with our predictions. A particularly interesting finding is that equity JV experience may not always have a positive effect on performance. This is in contrast to prior research, which clustered the experience with different types of JVs or alliances under a single heading of "general" partnering experience (or skills needed to manage alliances; cf. Inkpen and Tsang 2007), and expected an overall positive effect on performance (e.g., Hoang and Rothaermel 2005, Reuer et al. 2002, Zollo et al. 2002). Our study provides a more nuanced explanation of the equity JV experience–performance relationship, focusing on learning how to manage JVs. We find that, when firms learn from complex experience with 50-50 and majority JVs, they benefit from the less complex minority JV experience, but not from another type of complex

[7] This logic is consistent with different resource commitments typically required by minority, 50-50, and majority JVs. Higher resource commitments, as in many majority JVs, may imply more learning opportunities than would be associated with lower resource commitments, as in minority JVs (cf. Blodgett 1991). Our theory suggests that minority JV experience helps to unlock the learning opportunities associated with higher resource-commitment JVs. We thank an anonymous reviewer for raising this point.

experience. By showing the different impacts that various types of JV experience have on learning and performance, these findings highlight the need to more precisely distinguish various types of JVs and other hybrid organizations (Zollo and Reuer 2010) and help to reconcile prior inconsistent empirical findings.

Our study resonates with the literature on development of organizational capabilities in general and alliance capabilities in particular (e.g., Heimeriks and Duysters 2007, Kale et al. 2002, Wang and Rajagopalan 2015, Zollo and Winter 2002). A possible extension of our study could focus on how learning through low- and high-complexity experience may facilitate the development of capabilities needed at different stages of the joint-venturing process. This may include capabilities for establishing connections and identifying partnering opportunities (Ahuja 2000, Gulati 1998), designing governance mechanisms (Gulati and Singh 1998), and managing and terminating partnerships (Pangarkar 2009).

Another interesting extension would be to examine the impact of relational factors in JVs—and other types of collaborations for that matter (see Ahuja 2000, Lavie 2006)—on the complexity of experience. One such factor is trust (Gulati 1995). In JVs, trust may be built through prior experience with the same partner (Christoffersen 2013, Gulati 1995, Zollo et al. 2002). Once developed, trust may substitute governance mechanisms that would otherwise be needed to ensure coordination within the JV (Gulati 1995, Gulati and Singh 1998). Trust may, thus, influence partner interdependence in a JV and help to realize the learning potential of complex JV experience.

In this study, we used two measures of JV performance: abnormal returns upon new JV announcements, and JV survival. These measures complement one another in that, together, they capture the starting and ending points in a JV life from the perspectives of an outsider (the stock market investor) as well as an insider (the decision maker). This overcame the inherent weaknesses of these common JV performance measures when used in isolation, and enabled us to consider the consistency of the empirical results between them. The results gave more significant support for our predictions in the JV survival analyses than in the abnormal return models. It is possible that investors focus on recent histories and more proximate outcomes than managers do, and pay more attention to recent experience or experience with the initial stages of the joint-venturing process when making their initial evaluation of a new JV, as captured through abnormal returns. JV survival may reflect learning more holistically,

over the entire joint-venturing process and from longer in the past, as experienced by the decision makers. It would be interesting for future research to consider the specific skills and abilities that firms and decision makers learn through different types of JV experience and which JV performance measures may best reflect this learning (cf. Christoffersen 2013, Delios and Beamish 2001, 2004).

Beyond the differences in the complexity of JV experience studied in this paper, it is possible that there are other ways in which JV experiences may differ from one another and, therefore, differ in their impact on JV performance. For example, it would be conceivable that a firm's track record of success and failure in prior JVs might play a role in investors' assessments of new JVs.[8] It is also likely that prior successes and failures in JVs may contribute distinct insights into JV management skills and, therefore, have a differential impact on firms' abilities to ally and perform in future JVs (cf. Hu et al. 2017, Sitkin 1992). Hence, the question of which types of JV experience—successful or unsuccessful—have more predictive power would be an important avenue for future research.

It would be also interesting for future research to investigate the impact of experience complexity on speed of learning. One could possibly argue that lower-complexity experience may be digested and learned from more rapidly than higher-complexity experience, and that learning from complex experience would be speedier if firms have already learned lessons from earlier, possibly less complex experience. We believe theorizing and testing the impact of experience complexity and the speed and effectiveness of learning would offer an important contribution to research.[9]

Our study is not without limitations. First, our combined theory and evidence suggest that gains from experience depend on the stock and type of previous experience. This implies that it matters how organizational experience is measured and that more granular measures are needed to understand the learning from experience of varying levels of complexity. In this regard, prior research has considered some nuances in experience with different types of alliances. For example, there are differences in learning from: equity JVs and non-equity alliances; positive and negative experiences; own experiences vs. the experiences of others; and experiences with international vs. domestic JVs (Anand and Khanna 2000, Barkema et al. 1997, Heimeriks and Duysters 2007, Zollo and Reuer 2010). Our theory indicates

[8] We thank an anonymous reviewer for this suggestion.
[9] We thank an anonymous reviewer for this suggestion.

that these types of experience may differ in terms of complexity and, consequently, the accuracy of learning from these alternative types of experience may also differ. While our logic can explain the divergent effects of different types of equity JV (and other types of alliance) experience, data limitations prevented us from testing all of them. Future research may prove fruitful in doing so.

Second, data limitations prevented us from exploring how differences between shared and split-control JVs may matter for learning from JV experience (cf. Choi and Beamish 2004). It is conceivable that partner interdependencies are higher in shared-control JVs than in split-control JVs, resulting in differences in JV experience complexity. More detailed data on how control is shared and split could provide additional insights into how firms may most efficiently learn from their JV experience.

Third, due to the nature of our data, we have not been able to observe the actual learning from JV experience. Much of organizational learning literature has been built on the assumption that experience leads to learning, also termed "learning by doing," which can be observed by improved performance, in the spirit of the traditional learning-curve argument (Epple et al. 1991; Levitt and March 1988). Some studies have gone deeper to understand the mechanisms of learning (e.g., Flores 2012, Tippins and Sohi 2003). We believe more studies are needed to understand the mechanisms of learning from experiences of varying levels of complexity. In order to do so, alternative research designs such as surveys, interviews, and in-depth case analyses would be called for.

Four, vast literature on JVs and alliances more broadly has delved into the problems of learning from an alliance partner (e.g., Khanna et al. 1998) as well as with an alliance partner (e.g., Lubatkin et al. 2001). The majority of our sample JVs involved expansions of the parent firms into a foreign country (68 percent of the JVs were international) or a new product market. This indicates limited possibilities for learning about an alliance partner and transferring that learning from one JV with that partner to another JV with the same partner. Moreover, while we studied two types of performance indicators (*ex ante* short-term abnormal returns and *ex post* long-term survival), we do not know whether firms have learned about, with, and from their partners—that would have required a different research design. As such, it would have been difficult to disentangle the effects of learning about, from, and with a JV partner within our research design (cf. Inkpen and Tsang 2007). This is a limitation of our paper.

Finally, we examined the JVs of firms from one home country, the Netherlands. Obviously,

such homogeneity has methodological advantages but, on the other hand, firms rooted in different national cultures may differ in their ownership and control preferences (Child et al. 1997, Hennart and Larimo 1998). It would be interesting to investigate to what extent the findings from our study can be generalized to other national and cultural settings.

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Table 1 Relative Differences in Typical Interdependencies and the Complexity of JV Experience

	Within-JV partner interdependencies	**Interdependencies between the JV and respective parent organization**	**JV experience complexity**
Minority JV partner	Lower	Lower	Lower
50-50 JV partner	Higher	Medium	Higher
Majority JV partner	Lower	Higher	Higher

Table 2 Descriptive Statistics[a]

	Mean[b]	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Abnormal returns	0.20%	0.02															
2. Minority JV experience	4.83	4.83	-0.01														
3. 50-50 JV experience	3.45	3.88	0.06	0.63*													
4. Majority JV experience	2.93	3.57	-0.02	0.65*	0.43*												
5. Minority JV dummy	0.37	0.48	-0.03	0.01	-0.04	0.01											
6. 50-50 JV dummy	0.33	0.47	0.01	-0.05	0.07*	-0.11*	-0.54*										
7. International JV dummy	0.68	0.47	0.03	0.12*	0.04	0.11*	0.02	-0.11*									
8. Unrelated JV dummy	0.21	0.41	0.04	0.15*	0.24*	0.03	0.02	0.08*	-0.20*								
9. Firm size	9.35	0.93	-0.01	0.46*	0.21*	0.43*	0.03	-0.06	0.11*	0.02							
10. Profitability	0.05	0.07	0.02	0.11*	0.03	0.10*	-0.01	-0.08*	0.09*	-0.03	-0.04						
11. Leverage	1.96	1.16	-0.01	0.12*	0.21*	0.02	-0.07*	0.09*	0.01	0.13*	0.12*	-0.20*					
12. Product diversity	16.07	9.13	0.02	-0.02	0.01	0.15*	-0.05	-0.03	-0.02	0.03	0.21*	-0.21*	0.15*				
13. Years since last JV	0.01	0.30	0.00	-0.02	-0.03	-0.03	-0.03	-0.03	0.03	-0.02	0	0.01	-0.05	-0.01			
14. Cultural distance	1.99	1.83	0.02	0.15*	0.04	0.16*	0.02	-0.12*	0.75*	-0.24*	0.13*	0.07*	-0.04	-0.07*	0.01		
15. GDP growth	3.53	3.42	0.01	0.01	0	-0.05	0.01	-0.01	0.15*	-0.04	-0.04	0.03	-0.05	-0.06	0.01	0.30*	
VIFs (N=359)[c]				3.05	2.14	3.14	1.50	1.55	2.25	1.35	1.85	1.17	1.35	1.32	1.03	2.73	1.24
VIFs (N=911)[c]				3.34	2.37	2.57	1.55	1.63	2.75	1.14	1.58	1.16	1.28	1.21	1.15	2.87	1.04

[a] N=911 except for abnormal returns where N=359. Starred pairwise correlation coefficients are significant at the 5 percent or lower level.

[b] Mean values are for raw (non-centered) variables. Centering has no impact on standard errors and correlation coefficients.

[c] Highest post-estimation variance inflation factors based on regression models including all three interactive terms. We thank an anonymous reviewer for requesting this addition to Table 2.

Table 3 The Impact of Minority, 50-50, and Majority JV Experience on Abnormal Returns[a]

	Model 1a	Model 2a	Model 3a	Model 4a
Minority JV experience	-0.18	-0.18	-0.24	-0.52
	(0.34)	(0.33)	(0.32)	(0.37)
50-50 JV experience	0.57†	0.53†	0.40	0.62†
	(0.29)	(0.28)	(0.34)	(0.36)
Majority JV experience	0.15	-0.09	-0.02	0.07
	(0.35)	(0.42)	(0.44)	(0.51)
Minority JV experience		0.06	0.03	0.15†
x Majority JV experience		(0.08)	(0.08)	(0.08)
Minority JV experience			0.05	0.13*
x 50-50 JV experience			(0.06)	(0.05)
Majority JV experience				-0.20**
x 50-50 JV experience				(0.07)
Minority JV dummy	-2.02	-2.14	-1.94	-1.92
	(1.86)	(1.95)	(1.88)	(1.86)
50-50 JV dummy	-0.57	-0.68	-0.30	0.04
	(2.81)	(2.91)	(3.05)	(3.04)
International JV dummy	2.14	1.87	1.82	1.68
	(2.90)	(2.94)	(2.92)	(2.97)
Unrelated JV dummy	3.55	3.72	3.17	2.93
	(3.59)	(3.74)	(3.74)	(3.80)
Firm size	0.22	0.56	0.96	1.04
	(1.68)	(1.87)	(1.83)	(1.90)
Profitability	2.11	2.79	2.13	2.56
	(15.27)	(15.38)	(15.42)	(15.25)
Leverage	-0.37	-0.27	-0.45	-0.83
	(1.00)	(1.00)	(1.11)	(1.17)
Product diversity	0.05	0.03	0.02	0.10
	(0.14)	(0.15)	(0.15)	(0.15)
Years since last JV	0.03	-0.11	-0.19	-0.14
	(0.40)	(0.48)	(0.51)	(0.49)
Cultural distance	-0.21	-0.17	-0.11	0.01
	(1.20)	(1.19)	(1.19)	(1.18)
GDP growth	0.12	0.13	0.13	0.15
	(0.32)	(0.32)	(0.33)	(0.34)
Intercept	-2.01	-5.74	-9.20	-11.81
	(16.52)	(17.90)	(17.27)	(18.68)
Time and confounding	Included	Included	Included	Included
F-statistic	14.13***	18.32***	16.78***	21.16***
R-squared	0.088	0.090	0.092	0.103

[a] N = 359. The estimated coefficients and robust standard errors (in parentheses below coefficients) are multiplied by 10^3. Clustering by parent firms.

† $p < 0.10$, *$p < 0.05$, **$p < 0.01$, *** $p < 0.001$ (two-tailed tests)

Table 4 The Impact of Minority, 50-50, and Majority JV Experience on JV Survival[a]

	Model 1b	Model 2b	Model 3b	Model 4b
Minority JV experience	-0.068**	-0.056*	-0.033	-0.026
	(0.026)	(0.026)	(0.029)	(0.028)
50-50 JV experience	-0.025	0.002	-0.010	-0.008
	(0.025)	(0.026)	(0.026)	(0.026)
Majority JV experience	-0.035	-0.043 †	-0.026	-0.036
	(0.023)	(0.025)	(0.026)	(0.025)
Minority JV experience		-0.011***	-0.008*	-0.015**
x Majority JV experience		(0.004)	(0.004)	(0.005)
Minority JV experience			-0.007 †	-0.010*
x 50-50 JV experience			(0.004)	(0.005)
Majority JV experience				0.013**
x 50-50 JV experience				(0.005)
Minority JV dummy	0.279 †	0.301 †	0.280 †	0.281 †
	(0.157)	(0.158)	(0.158)	(0.159)
50-50 JV dummy	0.306 †	0.337*	0.318 †	0.318 †
	(0.163)	(0.164)	(0.164)	(0.164)
International JV dummy	0.500*	0.500*	0.489*	0.504 †
	(0.224)	(0.228)	(0.226)	(0.226)
Unrelated JV dummy	0.495***	0.551***	0.541***	0.546***
	(0.131)	(0.131)	(0.132)	(0.131)
Firm size	0.048	0.067	0.136	0.148
	(0.211)	(0.227)	(0.231)	(0.233)
Profitability	-0.583	-1.041	-1.168	-1.243
	(0.839)	(0.941)	(0.960)	(0.954)
Leverage	0.040	0.028	0.024	0.029
	(0.053)	(0.053)	(0.054)	(0.053)
Product diversity	0.013	0.008	0.006	0.005
	(0.014)	(0.014)	(0.014)	(0.015)
Years since last JV	0.010	0.015	0.022	0.019
	(0.047)	(0.049)	(0.050)	(0.049)
Cultural distance	-0.112	-0.112	-0.112	-0.120
	(0.075)	(0.076)	(0.075)	(0.075)
GDP growth	-0.003	-0.002	-0.001	-0.001
	(0.024)	(0.024)	(0.024)	(0.023)
Log pseudo-likelihood	-891.8	-887.4	-886.0	-884.4
Wald Chi-squared	71.74***	60.98***	57.80***	60.79***

[a] N = 911. Robust standard errors in parentheses. Stratification at firm level

† p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001 (two-tailed tests)

Figure 1 Estimated Interactive Effect of Minority JV Experience and Majority JV Experience on JV Termination (reverse of survival, Hypothesis 1, Model 4b)

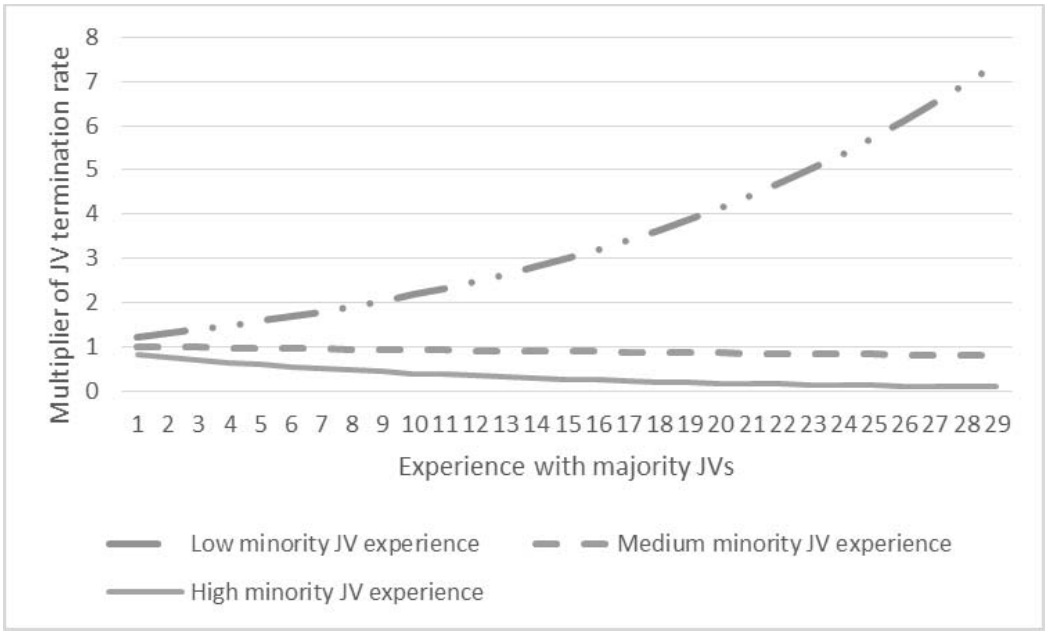


Figure 2 Estimated Interactive Effect of Minority JV Experience and 50-50 JV Experience on JV Termination (reverse of survival, Hypothesis 1, Model 4b)

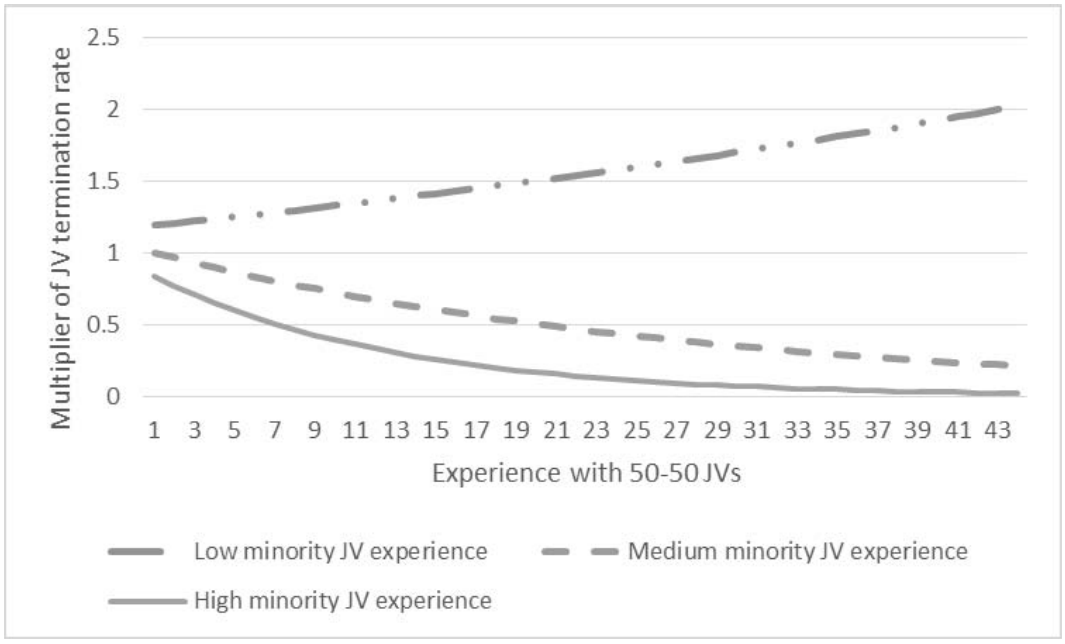
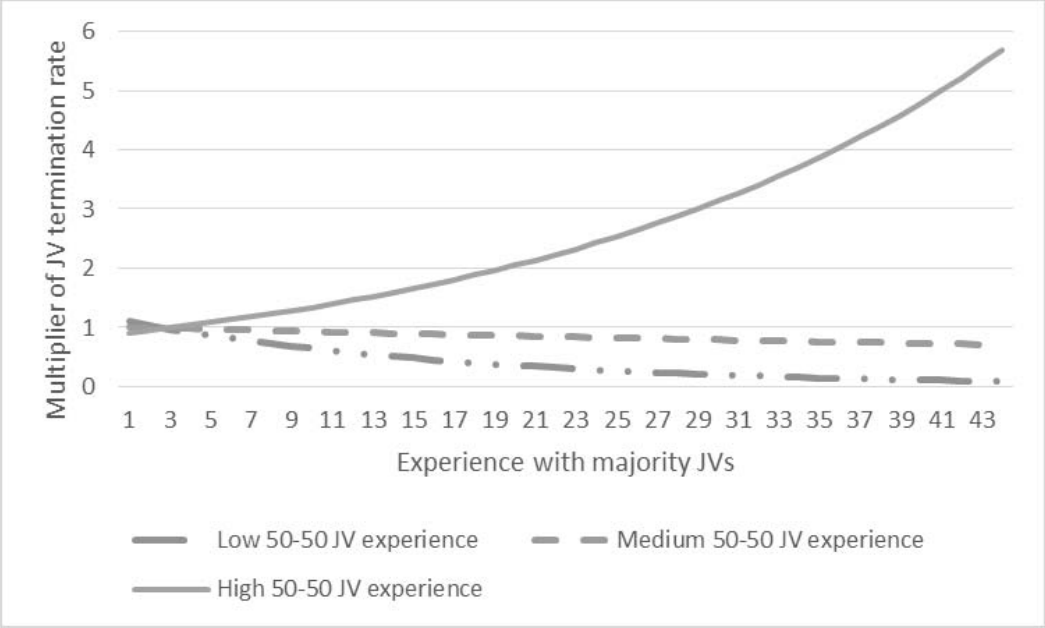


Figure 3 Estimated Interactive Effect of Majority JV Experience and 50-50 JV Experience on JV Termination (reverse of survival, Hypothesis 1, Model 4b)



Appendix

Table 5 Summary of Prior Literature on the Relationship between JV Experience and Performance

Study	Measurement of learning	Measurement of performance	Measurement of other learning mechanisms	Measurement of experience	Relevant findings
Barkema et al. 1997	Increase in survival of JVs for different levels of experience.	JV longevity.		Number of previous JVs a firm had had by the time of a new affiliate's founding.	International JV experience has no significant effect on survival; domestic JV experience has a positive effect on survival.
Anand and Khana 2000	Increase in value created in JVs and alliances for different levels of experience.	Cumulative abnormal return (CAR), -10 +3		Number of JVs entered into by the firm prior to and including JV in question within the time window of the data.	Positive effect of JV experience on wealth effects and abnormal returns in R&D JVs but not marketing JVs. Mixed evidence for production JVs.
Merchant and Schendel 2000	Increase in value created in JVs and alliances for different levels of experience.	CAR, 0 +1		Frequency of firm's participation in JVs from 1986 till the focal JV announcement.	Previous experience has no significant effect on JV value creation.
Kale et al. 2002	Increase in value created in JVs and alliances for different levels of experience.	CAR, -10 +3 Managerial assessment of success.	Dedicated alliance function.	Number of alliances over the 10-year period.	General alliance experience has a positive effect on alliance success.
Reuer et al. 2002		JV governance changes.		General alliance experience measured as the number of alliances of any type. Technology-specific alliance experience measured as the number of alliances on the same subject. Partner-specific alliance experience measured as the number of alliances with the same partner.	General alliance experience has no significant effect on JV governance changes. Technology-specific alliance experience has a negative effect on governance change. Partner-specific alliance experience has a positive effect on governance change.
Zollo, Reuer, and Singh 2002	Improvement in alliance performance for different levels of experience.	Managerial assessment of success in terms of knowledge creation and opportunities created.		Number of prior alliances categorized into general alliance experience, technology-specific alliance experience, partner-specific alliance experience.	General and technology-specific alliance experience has an insignificant effect on performance; Partner-specific alliance experience has a positive effect on performance.

Draulans et al. 2003		Perceptual measure of alliance success based on three survey items.	Alliance management mechanisms—survey based.	Number of previous alliances.	Positive relationship between alliance experience and success, with diminishing returns.
Hagedoorn and van Kranenburg 2003	Increase in the number of jointly owned patents for different experience levels.	Number of jointly owned patents.		General R&D (and patenting) experience—average number of R&D partnerships of each company in a dyad; Specific experience with R&D (and patenting)—number of partnerships between companies in a pair.	General and specific alliance experience does not have an effect on the number of jointly owned patents.
Delios and Beamish 2004		Perceived measure of subsidiary financial performance; Subsidiary exit.		Natural logarithm of the total number of years of experience a firm had in operating JVs that did not terminate.	Insignificant effect of JV experience on subsidiary exit and perceived financial performance. Interactive term indicated JV experience may have a more negative effect on termination rates of JVs than wholly owned subsidiaries.
Emden et al. 2005	Survey based—the extent to which an organization acquires, analyzes, and disseminates alliance learning throughout the organization.	Perception of financial, marketing and partnership performance.	Survey-based measure of alliance learning mechanisms.		Learning from experience has a positive effect on partnership performance and on marketing performance and, through it, on financial performance.
Hoang and Rothaermel 2005	Improvement in alliance success rate for different levels of experience.	Binary measure, 1 indicating successful completion of new drug development.		Count of alliances entered into by each firm in the dyad up to one year before the focal alliance, categorized into general alliance experience and partner-specific experience, across two industries.	Effect of general alliance experience on alliance success depends on an industry (positive in biotechnology); while partner-specific alliance experience has a positive effect on success, with diminishing effect.
Sampson 2005	Improvements in innovative performance.	Innovative performance measured by citation-weighted firm patenting in a 4-year post-alliance window.		Count of alliances of any type from 1985 up to but not including the focal alliance.	Alliance experience has a positive effect on innovative performance.

Rothaermel and Deeds 2006	Improvements in the number of new product developments.	New product development measured as the total number of new biotechnology products.	Alliance management capability measured as the number of alliances managed productively in a simultaneous fashion.	Alliance years—cumulative sum of alliance duration for each of firm's alliances; alliances are categorized into general, upstream, downstream and horizontal.	Curvilinear relationship (U or inverted U, depending on category of alliances) between age of alliances and the number of new products developed.
Heimeriks and Duysters 2007	Alliance capability survey measure based on 30 items.	Percentage of alliances in which the original goals were realized.		Number of previous alliances.	Experience has positive effect on performance of alliances.
Heimeriks et al. 2007	Alliance capability building mechanism built on a survey.	Perceptual measure of alliance portfolio performance; alliance experience.	Alliance capability building mechanisms (integrating and institutionalizing).	Number of alliances that a firm has established over a five-year period, using a five-point scale.	Alliance experience has a positive effect on alliance portfolio performance.
Kale and Singh 2007	Survey-based measures of articulation, codification, sharing, and internalization.	Managerial assessment.	Dedicated alliance function.	Count of all alliances within the window of the data.	Experience has a positive effect on alliance performance.
Chang et al. 2008	Increase in value created in JVs and alliances for different levels of experience.	CAR, Tobin's q		Number of previous alliances.	Experience has a positive effect on value creation.
Teng and Das 2008		Alliance structure choice.		Alliance management experience as a total of previous alliances two firms had, prior to the focal alliance.	Alliance management experience has a negative impact on the choice of minority equity alliances and JVs, and a positive impact on the contractual structure choice.
Gulati et al. 2009	Increase in value created in JVs and alliances for different levels of experience.	CAR, -10 + 3		General alliance experience (count of all previous alliances); Partner-specific alliance experience (number of alliances with the same partner).	General partnering experience has no effect on alliance performance; in some models, partner-specific alliance experience has a positive effect on performance.
Pangarkar 2009	Increase in alliance survival for different values of experience.	Alliance survival.		Average number of alliances of the two partners.	Alliance-formation experience has a positive effect on alliance survival.

Reuer et al. 2002a	Increase in value created in JVs and alliances for different levels of experience.	CAR -2 +2		Number of JVs formed by a firm in the previous 10 years.	JV experience has a negative effect on JV performance.
Schreiner et al. 2009	Survey-based alliance management capability.	Extent of joint action to assess how closely partners work together (survey-based). Assessment of fulfillment of alliance goals.	Survey-based alliance management capability along coordination, communication and bonding dimensions.		Alliance management capability has a positive impact on joint performance, customer knowledge, firm performance and status in network.
Schilke and Goerzen 2010		Perception of alliance performance.	Survey-based alliance management capability.	Number of previous alliances.	Alliance experience does not have a significant relationship with portfolio performance; alliance experience has a positive impact on alliance management capability which affects performance of a portfolio.
Zollo and Reuer 2010	Performance improvements for different levels of experience.	Accounting performance measure.		Number of alliances completed.	Alliance experience has a U-shaped impact on performance in some models and no relationship in others.
Kumar 2011		CAR, -1 0		Number of prior JVs undertaken by a firm listed in the SDC Database.	JV experience of alliance partner with more valuable resources is positively related to collaborative value creation, but not JV experience of partners with less valuable resources within an alliance.
Heimeriks et al. 2015		Alliance portfolio performance measured as percentage of alliances in which the firm's goals were realized.	Codification, Alliance department.	Number of strategic alliances formed by the firm over the period 1997–2001 using a categorical variable (0–5, 6–15, 16–25, 25–40, > 40).	Alliance experience has no effect on alliance portfolio performance.

Lee et al. 2015		Dummy variables accounting for whether alliance was equity or non-equity, and whether an alliance included pooled R&D activities or not.		Number of alliances the firm had initiated in the last five years. Equity-sharing experience of the target (client) firm by the number of alliances initiated in the last five years in which the target (client) firm used equity sharing.	Firms with more alliance experience are better able to protect their interests under any given alliance structure.
Kavusan et al. 2016	Knowledge acquisition for different levels of experience.	Knowledge acquisition across alliance partners measured by their reciprocal patent citations. Complementary specialization.		Total number of alliances established by each partnering firm during the five years preceding a focal alliance.	Alliance experience has a positive effect on knowledge acquisition and a negative effect on complementary specialization.