

A Theory of Joint Venture Formation and Break-up*

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(May 2016)

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Abstract

The MNC is often observed to enter a host country by forming a joint venture (JV) with a local firm, then within a short period it snaps the relation and opens its subsidiary. The paper explains the reasoning behind such formation and breakup of the JV relation. To be more general, we discuss the evolution of optimal form of business organization over time by means of synergy and learning. We consider learning of both variable cost synergy and entry cost and have shown that JV break up occurs if learning effect is stronger than synergy effect.

Keywords: International joint venture; synergy and learning; joint venture break-up; subsidiary.

JEL classifications: F23; L13.

I Introduction

In business there are various forms of inter-organization cooperation. These range from a simple or informal contract like technical training or start-up assistance to a sophisticated contract like technology transfer or patent licensing agreements to a very complex contract leading to merger and acquisitions and takeovers.¹ Business alliances in the form of joint ventures (JVs) are intermediate forms of cooperation. This is the case when two or more legally independent cooperating firms agree on a project and jointly share business risks, returns and control, but, in contrast to merger and acquisition, the distinctive feature of joint ventures is that the parent firms retain their identity. In case of international joint ventures (IJVs) at least one partner has its parent organization headquartered outside the JV's country of operation. Therefore, JVs or similar alliances allow the partners to perform complex mutual tasks without acquiring one another, and if the joint projects fail, they can dissolve the alliance possibly at least expense. Hence IJVs are considered to be a flexible mechanism allowing the domestic and foreign partners to form business entities which operate in a single or multiple countries.

Last three decades or so have witnessed formation of a large number of cross-border JVs particularly between foreign multinationals and developing country-based firms.² One reason is that almost all developing countries, including India and China, after following a protective policy for a long time have opened up and liberalized their economies and are inviting foreign capital and technology and encouraging equity investment. Second, the developing countries are seen to grow at a faster rate than the industrialized countries and this trend is likely to continue. Hence the interests of the foreign multinationals in these economies are growing fast and direct investment flows have been accelerating. The local government restriction on foreign equity holding in the initial phase of liberalization has also prompted the foreign firms enter these economies by means

¹ See various articles in Contractor and Lorange (1988) for details on this issue.

² Pekar and Allio (1994) observed the rate of alliance formation in the United States to grow over 25% annually since 1985. In China, out of one hundred seventy-five thousand foreign investment projects approved during 1979 and 1993, about 75% took the form of a joint venture between a local firm and a foreign multinational (Almanac of China's Foreign Relations and Trade, 1994). In India, in the post-liberalization period most of the foreign investments have come through JVs (Gupta and Chawla, 1995). Moskalev and Swensen (2007) have provided a comprehensive study on IJVs for the period 1990-2000.

of partial equity investment.³ In the recent years, although the rate of JV formation has declined but the overall spree is continuing.⁴

The strongest argument behind forming cross-border JVs is that under JVs the partners can exploit the mutual advantages of each. For instance, foreign firms have money, superior technology and managerial and marketing skill - areas in which developing country firms are strictly at a disadvantage. On the other hand, local firms have better knowledge of the local environment, prospective buyers, and labor conditions and better ties with local government officials. Through JVs, firms can combine their complementary advantages leading to 'synergies'. The foreign firms can minimize the financial risk and uncertainties due to imperfect information. In fact, incomplete information on either side is an important factor behind formation of international joint ventures. Balakrishnan and Koza (1993) have shown that the joint venture is an efficient mechanism for pooling complementary assets. Gomes-Casseres (1989) demonstrates that MNCs choose JVs with host country firms rather than wholly-owned subsidiaries if the local firms' assets complement those of the MNCs.

But in spite of the growing importance of JVs, one important fact is that such a relationship is very fragile and unstable, and this has been a rule rather than an exception. JVs once formed operate few years and then the partners terminate their relationship. Either one partner sells out its stake to the other or they mutually break up their relationship and compete independently. The average life of a JV is observed to be five to seven years only.⁵

³ See an analysis on this issue in Falvy and Fried (1986) and Gangopadhyay and Gang (1993).

⁴For the theoretical literature on formation of IJVs one may look at, for instance, Svejnar and Smith (1984), Chan and Hoy (1991) Al-Saadon and Das (1996), Das (1998), and Marjit et al. (2004).

⁵ Break ups of JVs are widely documented in the literature. For instance, Killing (1982) surveyed 37 international JVs and found that 36% of these performed unsatisfactorily and ultimately the relations were wound up. The study of US based JVs by Kogut (1989) shows that by the sixth year about one half of the JVs in the sample of 92 JVs had been terminated. The Mckinsey consultancy firm has provided a thorough world-wide study of more than 200 alliances (JVs). The study shows that the median life span is only seven years. In more than 80% of the cases, it ends in one partner selling its stake to the other (see Bleake and Earnst, 1995). The International Finance Corporation (World Bank) conducted a study of seventy JVs in six developing countries (viz., India, Brazil, Mexico, Argentina, Turkey and the Philippines) and come up with the similar findings (Miller et al., 1996). The break-up of Hero-Honda JV in India is still fresh in the mind of everyone.

Therefore, a JV is not a once for all relation. As it operates, partners identify each other's strength and weakness and set strategies accordingly. The relation continues so long as the partners sustain comparative advantages in the relationship. So maintaining organizational complementarities between the partners is the most important factor to keep up the relation for a longtime. It is therefore important to understand the dynamics of the relationship. Most of the existing literature studies the issues of JV formation and JV break-up separately. By contrast, in the present paper we present a unified framework to simultaneously analyze the dynamics of formation and break-up of JVs. In our complete information model, the break-up of a JV relation, if it does occur, is entirely foreseen at the time of formation of the JV itself.

We consider a market with two domestic firms and one potential foreign entrant. The foreign firm can choose to enter either through a fully owned subsidiary, or by forming a JV with one of the local firms. It may also decide not to enter the market. If it does enter in period one it may either choose to continue independently or through a JV or even change its mode of operation (form a JV or break it up) in period 2.⁶

There are already a number of works that discuss formation of IJVs and subsequently breakdown of the relationships. But most of these works are in the framework of one foreign firm and one domestic firm. So when they form a JV, the JV emerges as a monopolist in the market. Therefore, even without any 'synergy' the JV is profitable for the partners who get to share the monopoly profits which are greater than the sum of their profits under duopoly. Further, the incentive to breakup is absent and these papers cannot capture the strategic interaction of the players in the post-JV period of operation. For instance, in a two-firm model Roy Chowdhury and Roy Chowdhury (2001) have discussed the JV life cycles based on synergy and organizational learning (and moral hazard). By contrast, in our paper there are more than one domestic firm, hence even when a JV is formed between the MNC and one domestic firm, the market never becomes a monopoly. This not only removes the bias in favor of the JV but makes the analysis easily generalizable to markets with more firms.

Sinha (2001a) assumes that initially IJV is formed because of the local government restrictions on the foreign equity holding, but then instability in the form of share adjustment arises as government

⁶ If it chooses not to enter in period 1, it is not likely to enter in period 2.

policy undergoes a change and the local partner comes up with the imitative technological innovation. In Sinha (2001b) buy-out occurs in the second period because the local government allows 100% foreign subsidiary. Mukherjee and Sengupta (2001) analyze the outcome of attempts by the foreign partner to raise its stake in the JV by threatening to open fully owned subsidiaries (FOS) once these are permitted. It shows that the outcome is influenced by reversibility of the investment, the number of potential entrants and managerial independence between the JV and the FOS. Marjit and Roy Chowdhury (2004) have also focused on synergy and asymmetric access to capital. Since only the foreign firm is assumed to have access to capital, it uses subsidiary opening as the threat to buy the domestic firm out. Kabiraj and Roy Chowdhury (2008) have constructed a dynamic two period model when a JV is formed in the first period between an MNC and a local firm to gain in synergy. There is one-sided learning by the local firm but the MNC has access to a new technology. If the new technology is adopted by the JV, it continues; otherwise, the JV breaks up and the MNC opens up its subsidiary. The paper focuses on the role of bargaining, control and discounting factor. Kabiraj et al (2005) on the other hand, consider three firm-structure with two local firms and one foreign firm, but here the IJV break-up occurs due to cultural mismatch or partner asymmetry. Synergy or learning has no role to play. More importantly, formation of JV is not modeled.

The present paper in some sense is close to Kabiraj (1999) which has similar structure as the present paper. Here the foreign MNC enters the domestic economy by forming a JV with one of the two local firms, but the JV relation breaks up in the future due to learning of the third firm which is not a JV partner. By contrast, in the present paper learning accrues to the constituent partners only. Recently, Banerjee and Mukherjee (2010) have studied IJV instability induced by the entry of a new firm in the industry. It is shown that a varieties of instability can arise depending on the parameter values. Partners may just adjust their equity shares; one firm may completely buy out the other; one firm may open its subsidiary which then competes with the existing JV; or, the partners may break up their relation and decide to compete independently.

The present paper has several features in respect of entry cost, synergy, and learning which are not considered in any other work.

First consider synergy. In this paper a 'synergy' between the domestic firm and foreign entrant is a crucial motivation to induce them to form a JV (in addition to the reduction in entry cost), as the

presence of other firms ensure that the creation of JV does not lead to monopoly profits. This synergy – which is characterized by a reduction in (variable) costs – exists only between a foreign entrant and a domestic firm due to the complementary nature of their competence. There are no synergies between two domestic or two foreign firms.

Next comes learning. Learning here is of two kinds. Variable cost learning means that the partners learn, at least partially, the knowledge contained in other partner's input or contribution. Hence when JV breaks up, the constituent partners come up with a lower unit cost compared to the initial cost. In addition, we introduce learning of entry cost by the foreign firm. Entry cost when entering in the form of opening a subsidiary, comprises of various components, viz.,

- (i) cost of doing business in a foreign country (e.g., cost of licensing/political lobbying etc.),
- (ii) cost of setting up plant and equipment,
- (iii) cost of building business networks (e.g., supply chains, distribution, recruitment),

These costs can be avoided if the foreign firm enters through a joint venture. However, if the JV breaks up and then the foreign firm wants to open an independent subsidiary, it will have to incur the cost of setting up plant and equipment, although some of the other costs may be partially or totally avoided. Therefore, we may reasonably assume that a foreign firm that had already entered through a joint venture, faces only a fraction of the total entry cost for subsequent independent entry in the form of subsidiary.

By this the foreign firm, after snapping the JV relation, can open its own subsidiary at a lower cost and hence can save a fraction of the entry cost. Hence both variable cost learning and entry cost learning together gives the overall learning for the foreign firm, although the local firm has only the variable cost learning. With this formulation if either synergy goes up or the usual entry cost goes up, automatically learning is enhanced.

Therefore, the purpose of the present paper is to analyze the reasons for formation and subsequently break-up of the JV relation in a unified framework. In a market with other domestic producers, where the JV does not lead to a monopoly, existence of synergies provides an important incentive to form JVs. However, JVs may also be formed to gain from the learning that allows the firms to partially or wholly endogenize the synergy after the breakup of the JV relation. Existence

of a third firm, besides the partners of the JV, often gives a strategic advantage to the MNC which can manipulate the terms and conditions of the contract in its favor.

We focus on the fact that in a JV the partners retain their separate identities. Hence when they find it profitable to snap the relation, they can do it at a lower cost and then compete in the market independently. In case of merger such a flexibility does not exist, or at least it is too expensive. We have also drawn attention to the fact that by entering through a JV the MNC can save a portion of cost of opening a subsidiary in the future. We have shown that in view of synergy and learning, there is a strict advantage of the MNC to enter by means of forming a JV with a local partner; however, whether the foreign firm will like to continue the JV or not depends on the complex relation between synergy and learning. In particular, we show that the JV relation will continue only when synergy is stronger than learning, otherwise, break-up of the JV relation will occur. It is also shown that if synergy is strong, then entry through subsidiary will never occur. The possibility of entry through subsidiary may arise only when the synergy effect is critically weak.

Finally, we have studied the comparative static effect of the change of the parameters underlying synergy and learning on the decision of formation and continuation of the JV relation. One interesting result is that as entry cost falls, the possibility of entry through a JV and subsequently break-up of the JV goes up. Hence, initially JV occurs to acquire the future benefit of learning.

The paper is organized as follows. In section 2 we describe the analytical framework. Then in section 3 we study the evolution of the form of business organization over time based on synergy and learning effect and derived the results under all possible assumptions. Section 4 provides a comparative static analysis. Finally, section 5 concludes.

II Analytical Framework

Initially, there are two domestic firms in the market with identical unit costs of production, $c_d > 0$, and their entry or set up costs, if any, are already sunk and hence out of consideration. Firms compete in quantities.

There are two periods. In period 1, presumably just after the economy opens up, a foreign firm ventures into this market. It can enter either directly by forming a fully owned subsidiary, or by

forming a joint venture with a local firm. It pays an entry cost $E > 0$ if it decides to enter through its subsidiary. This includes not only the cost of setting up plant and machinery, but also the cost of building business network, establishing supply chain as well as the cost of licensing and political contacts, etc. On the other hand, if it has already entered through a JV but now, after breaking up the JV relation, wants to form a subsidiary, it is assumed the costs other than setting up of plant and equipment can be saved. Hence in such a situation its net cost of opening a subsidiary will be βE where $0 \leq \beta \leq 1$.

The foreign firm has cost function $C^F(q) = c_f q$. For simplicity we assume that⁷ $c_d = c_f = c$. This is despite (or perhaps because of) the fact that they have different costs for the various inputs. For example, the local firm may face lower labor costs as they hire mostly from the relatively low wage local labor market while the MNC must recruit a large portion of its technical and managerial cadre at much higher wages. By contrast, the MNC has access to capital from international capital markets at much lower rates than the local firms.

Now assume that a joint venture formed between a domestic and a foreign firm (but not between two local firms) leads to *variable cost synergies* in the sense of cost reduction. This is due to the better (low cost) technology of the foreign firm coming together with the superior (low cost) local knowledge and distribution channels of the local partner. With synergy the JV faces a unit cost of $c' = (c - \varepsilon)$ where $\varepsilon > 0$ is the extent of cost saving due to synergy.

In the presence of other competing firms, cost synergy in the JV does not automatically imply that the profit of the JV would be larger than the constituent partners. Here JV is like a horizontal merger; then, without cost synergy, such a JV formation would lead to a lower profit compared to the sum of the profits of the partners under competition. Thus it is only when synergy is strong enough that a JV is profitable. Hence we define:

Def 1: Overall Cost Synergy: *The cost synergy is said to be strong (weak) if the JV profits exceed (falls short of) the profits of the constituent units, i.e.*

⁷Subject to some change in parametric values, every result derived here will go through (albeit with more complicated conditions) provided costs of the local and foreign firms are not so different that one/more competitors are forced to exit.

$$A \equiv \Pi_{JV}(c', c) - 2\Pi(c, c, c) \geq 0 \quad (1)$$

where $\Pi_{JV}(c', c)$ is the profit of the JV with (post-synergy) costs c' in the presence of a domestic competitor which has cost c , while $\Pi(c, c, c)$ is the profit of each of two participating firms with cost c under three-firm Cournot competition.

Note that positive synergy simply means that there exists $c' < c$ or $\varepsilon > 0$. Now, following the result of Salant, Switzer and Reynolds (1983), let us assume $\Pi_{JV}(c, c) < 2\Pi(c, c, c)$, so that without synergy JV formation is not profitable. But $\exists c^* < c \mid \Pi_{JV}(c', c) > 2\Pi(c, c, c)$ if and only if $c' < c^*$. Equivalently, $\exists \varepsilon^* \mid \varepsilon > \varepsilon^* \Leftrightarrow \Pi_{JV}(c - \varepsilon, c) > 2\Pi(c, c, c)$.

In a usual one-period set up it is clear that whether a JV is formed or not depends on whether the synergy is 'strong' or 'weak'. Now we introduce *learning*. The partners forming the JV are assumed to learn from each other after the first period. Thus if they break up the JV after one period of continuing relationship, they do not revert to their initial (pre-JV) costs but start as new entities with cost lowered (at most) up to that of the JV. We say that there is *learning/endogenization with respect to variable cost* if the post-breakup cost of the constituent partners is lower than the initial (pre-JV) costs. The post JV break-up unit cost of the partners is $c'' = (c - \lambda\varepsilon)$, $0 \leq \lambda \leq 1$. Thus if there is learning of variable cost, we have $\Pi_p(c'', c'', c) - \Pi(c, c, c) > 0$, where $\Pi_p(c'', c'', c)$ is the profits of the firms that previously constituted the JV under three-firm Cournot competition. Note carefully that while we do indicate the degree of this (*variable cost*) *learning* by λ , $0 \leq \lambda \leq 1$, this learning is defined as a proportion of the *variable cost synergy*, and therefore it is not completely independent of synergy. Such learning accrues to both JV partners.

We consider another type of learning that may accrue to the foreign firm only due to its participation in a JV. This is the reduction in entry cost relative to the set up cost of the foreign firm that enters in period 1 through a wholly owned subsidiary. This is *learning of entry cost*. This is captured as follows. The entry cost of the foreign firm that sets up a wholly owned subsidiary after breaking up the JV is βE , with $0 \leq \beta \leq 1$. Clearly the higher the learning, the lower is β and lower is the set up cost. So we define the overall learning of the foreign firm as follows.

Def. 2. Overall Learning or Endogenization: The overall learning effect for the foreign firm is $B \equiv 2[\Pi_P(c'', c'', c) - \Pi(c, c, c)] - \beta E$ which is high (low) according as

$$B \equiv 2[\Pi_P(c'', c'', c) - \Pi(c, c, c)] - \beta E \geq 0 \quad (2)$$

Therefore, the higher the variable cost learning, the higher is the first term, while the higher the entry cost learning the lower is the second term. Again note that this is different from positive learning as defined above. While we are defining learning in terms of two parameters, viz., λ and β , but, as it is now clear, these cannot be indicated independently of variable cost synergy ε and entry cost E . For example, as synergy goes up (i.e., ε increases), automatically there is some positive learning effect in the sense that c'' falls even for unchanged λ and β .

The sequence of moves of the players in our paper is the following. In the beginning of the first period a foreign multinational is going to enter the local market, hence it decides whether it will enter by opening a fully owned subsidiary or form a JV with a local firm. In the first case it spends E . In the second case it makes a take-it-or-leave-it JV offer to one of the local firms at random. We assume that the firm will accept the offer if it is not worse off.⁸ If the offer is accepted, there are two firms in the market – one stand-alone local firm producing at cost c and the other is the JV producing at lower cost, $c' = (c - \varepsilon)$. Finally, they play Cournot game.

If JV forms in the first period, each JV partner *learns* or *endogenizes* a part or percentage (λ) of the *synergy*(ε) at the end of the period, so that if it breaks up the cost of each post break-up JV partner is $c'' = (c - \lambda\varepsilon)$. In addition, the foreign partner *learns* or *endogenizes* a part or percentage β of entry cost, E . In the beginning of the second period the foreign firm decides whether it will continue the JV relation or break it up. Similarly, if it entered via a fully owned subsidiary in the first period it can form a JV in the second period. After the second period the game ends.

With regard to notation, we do not put any subscript with the profit expression if the competing firms are identical. When the competing firm have different cost structures, we adopt the convention that the first/second cost term within the parentheses of the payoff expressions refers

⁸Since the two local firms are identical, if the firm that first receives the offer (at random) rejects it, it can never be in the interest of the firm who subsequently receives the offer to accept it since the post entry market structure is identical in both cases. Although it might happen that the stand-alone firm is more profitable in the first period compared to the one that accepts the JV offer, the latter's loss must be compensated in period 2 for the JV offer to be acceptable at all.

to the JV (if any exists), the next to the foreign firm (if the JV has not formed or broken-up), the next to the local firm connected to the JV (under the same conditions), and the last to the standalone local firm. Thus, if a JV offer is accepted, the JV obtains profits $\Pi_{JV}(c', c)$ while the other local firm obtains stand-alone profit, $\Pi_D(c', c)$. In period 2, if the foreign firm decides to break up the JV, its profits, given partial endogenization of the JV synergy, is $\Pi_P(c'', c'', c) - \beta E$ since it has to incur costs for setting up a separate establishment. The profits of the domestic partner and the standalone firm in the post breakup scenario are $\Pi_P(c'', c'', c)$ and $\Pi_D(c'', c'', c)$.

Finally, note that the possibility of entry by the foreign firm in the form of opening a 100% owned subsidiary can arise if and only if the sum of its discounted payoff from subsidiary over the length of two periods exceeds entry cost, that is,

$$(1 + \delta)\Pi(c, c, c) > E \quad (3)$$

where δ is the common discounting factor; $0 < \delta \leq 1$. However, even if this condition holds, this does not mean that entry through subsidiary is optimal and that it will continue with the subsidiary. In the next section we discuss the evolution of the different forms of business organization that would emerge under the given parametric situations, hence we discuss the subgame perfect Nash equilibrium of the game.

III The Optimal Form of Business Organization

In this section we examine whether the foreign firm will enter through subsidiary or joint venture and whether it will continue business with the same business form or switch to a different form in the second period. We discuss the problem under two scenarios, that is, when direct entry is just not possible and when direct entry possible. We discuss these in the following two subsections.

3.1 Independent Entry not Feasible, i.e., $(1 + \delta)\Pi(c, c, c) < E$

In this subsection we consider the scenario when the foreign firm cannot enter independently by opening its subsidiary, i.e. when $(1 + \delta)\Pi(c, c, c) < E$. The foreign firm will then explore whether to can enter by forming a JV with a local firm. Since the foreign firm cannot otherwise enter, each local firm has a reservation payoff $(1 + \delta)\Pi(c, c)$ which is profit in a two firm Cournot

competition. We assume that a local partner chosen arbitrarily will accept the JV contract if it gets at least its reservation payoff. Whenever the JV contract is accepted, the foreign firm may continue with the JV relation or it can terminate the relation in the beginning of the second period and then open up its subsidiary and operate independently. This possibility arises because the JV leads to synergy gain and learning. So we have the following two subcases.

3.1(a) JV Entry and Continuation

If the foreign firm enters through and continues with the JV in period 2, the second period payment to the local JV partner would be $\Pi_p(c'', c'', c)$ - its profits in the post breakup three-firm Cournot competition after the partners have learned or endogenized the synergy. Hence the minimum payoff that the local partner must have to be given in period 1 to accept the JV proposal is $\{(1 + \delta)\Pi(c', c) - \delta\Pi_p(c'', c'', c)\}$. Therefore, the amount the foreign firm gets if it makes an acceptable offer to the local partner to form the JV in period 1 and not to break it up in period 2 is given by

$$\begin{aligned}\hat{\Pi}_{JJ} &= [\Pi_{JV}(c', c) - \{(1 + \delta)\Pi(c, c) - \delta\Pi_p(c'', c'', c)\}] + \delta[\Pi_{JV}(c', c) - \Pi_p(c'', c'', c)] \\ &= (1 + \delta)[\Pi_{JV}(c', c) - \Pi(c, c)]\end{aligned}\tag{4}$$

Immediately we have the following proposition.

Proposition 1: *Entry by forming a joint venture with a local firm is always profitable for the foreign firm if cost synergy is positive.*

Proof: If $c' < c$, then $\Pi_{JV}(c', c) > \Pi(c, c)$; hence $\hat{\Pi}_{JJ} > 0$.

Note that this result holds independent of whether the synergy effect is strong or not (that is, $A \geq 0$), and whether independent entry is possible or not. In the context of the scenario of our paper the foreign firm can at least always enter by forming a JV with a local firm provided that the JV formation leads to a cost synergy due to the possible existence of complementary inputs supplied by the partners. Since there is also learning under the JV, the foreign firm will now decide whether at the end of the first period it will break up the JV relation and open its own subsidiary or continue with the JV relation.

3.1(b) JV Entry and Break-up

If the foreign firm enters through a JV and breaks it up in period 2, the payment to the domestic partner in period 1 is the same as in the previous case where the foreign firm enters through a JV and continues. But after endogenization of the synergy in period 2 the foreign partner as an independent firm will get $\Pi_p(c'', c'', c)$ in three-firm Cournot competition, but it has to pay a set up costs βE . Note that by forming a JV in the first period the foreign firm has saved a part of entry cost of opening its subsidiary in the second period. Thus the amount the foreign firm gets if it successfully forms a JV in period 1 but breaks it up in period 2 is

$$\begin{aligned}\hat{\Pi}_{JS} &= [\Pi_{JV}(c', c) - \{(1 + \delta)\Pi(c, c) - \delta\Pi_p(c'', c'', c)\}] + \delta[\Pi_F(c'', c'', c) - \beta E] \\ &= [\Pi_{JV}(c', c) - (1 + \delta)\Pi(c, c) + 2\delta\Pi_p(c'', c'', c) - \delta\beta E]\end{aligned}\quad (5)$$

Lemma 1: $\hat{\Pi}_{JJ} \geq \hat{\Pi}_{JS} \Leftrightarrow A \geq B$.⁹

This means the JV formed in the first period will break up and the foreign firm will compete independently in the second period if and only if the overall learning is larger than synergy. Here learning gives an extra incentive for entering in the form of JV. The post break-up returns can be sufficient inducement to enter the market even if synergy is small.

The result of this subsection is summarized in the following proposition.

Proposition 2: *Suppose $(1 + \delta)\Pi(c, c, c) < E$ and $c' < c$. Then,*

- (a) *If synergy is stronger than learning (i. e., $A > B$), then the foreign firm enters through a JV and continues;*
- (b) *If learning is stronger than synergy (i. e., $B > A$), then the foreign firm enters through a JV but breaks it up in the second period to form its own subsidiary.*

Note that this result is independent of whether synergy is strong or weak. As already indicated, it is always profitable for the foreign firm to enter through a JV in period 1 – when this is the only option available - and the only question is whether the JV will survive or break up in period 2. When cost synergy is strong relative to learning it is clear that continuation is preferred over

⁹ $\hat{\Pi}_{JJ} - \hat{\Pi}_{JS} = \delta(A - B)$.

breakup. A stronger cost synergy, or higher ε , indicates that both A and B are higher. However, if the synergy is high relative to learning-- as indicated by low λ and high β -- then A is high relative to B . Then the cost of opening a fully owned subsidiary is relatively high implying that the incentive to break-up is weak.

3.2 Independent Entry Feasible, i.e., $(1 + \delta)\Pi(c, c, c) > E$

Consider the scenario when the foreign firm is capable of entering independently. This is the case when the sum of its discounted two-period profits of the foreign firm in three-firm Cournot competition is greater than its entry costs, that is, $(1 + \delta)\Pi(c, c, c) > E$. This means, in this case the foreign firm can always enter either independently or through a JV. Given that the foreign firm always enters, there are four possible scenarios in this case.

3.2(a) Independent Entry and Continuation

In this case the foreign firm's net payoff taking both periods under consideration is simply given by,

$$\Pi_{SS} = [\Pi(c, c, c) - E] + \delta\Pi(c, c, c) = (1 + \delta)\Pi(c, c, c) - E \quad (6)$$

By our assumption, therefore, opening its own subsidiary and continuing is always profitable for the foreign firm.

3.2(b) Independent Entry and subsequent JV formation

In period 1 the foreign firm obtains three-firm Cournot profits minus the set up costs while in period 2 it obtains two-firm JV profits where the stand-alone domestic firm has unit cost c , but must pay the domestic firm the three-firm Cournot profits what the latter would get by rejecting the JV offer. Hence under this case the foreign firm's profit will be

$$\begin{aligned} \Pi_{SJ} &= [\Pi(c, c, c) - E] + \delta[\Pi_{JV}(c', c) - \Pi(c, c, c)] \\ &= \delta\Pi_{JV}(c', c) + (1 - \delta)\Pi(c, c, c) - E \end{aligned} \quad (7)$$

Lemma 2: $\Pi_{SJ} \geq \Pi_{SS} \Leftrightarrow A \geq 0$.¹⁰

It states that when the foreign firm enters by opening its subsidiary, in the second period it will form a JV with a local firm if the synergy effect is strong (i.e., $A > 0$), otherwise it will continue with the subsidiary.

3.2(c) JV Entry and Continuation

As formation of the JV in period 1 leads to endogenization of the synergy by each party, the domestic partner will demand $\Pi_p(c'', c'', c)$ in period 2 to stay within the JV because the local partner will get this amount if the JV breaks up. Since the local partner gets $(1 + \delta)\Pi(c, c, c)$ over the two periods by rejecting the JV offer, the minimum amount it must be given in period 1 to accept the JV proposal is: $\{(1 + \delta)\Pi(c, c, c) - \delta\Pi_p(c'', c'', c)\}$. Thus the amount the foreign firm gets if it makes an acceptable offer to the domestic partner to form the JV in period 1 and not to break it up in period 2 is given by

$$\begin{aligned} \Pi_{JJ} &= [\Pi_{JV}(c', c) - \{(1 + \delta)\Pi_D(c, c, c) - \delta\Pi_p(c'', c'', c)\}] + \delta[\Pi_{JV}(c', c) - \Pi_p(c'', c'', c)] \\ &= (1 + \delta)[\Pi_{JV}(c', c) - \Pi(c, c, c)] \end{aligned} \quad (8)$$

Note that when $A > 0$, that is the synergy effect is strong, we must have $\Pi_{JJ} > \Pi_{SJ} > \Pi_{SS}$. This gives the following result.

Proposition 3: Given $(1 + \delta)\Pi(c, c, c) > E$, entry through subsidiary can never occur in a subgame perfect equilibrium if synergy is strong (i.e. $A > 0$).¹¹

3.2(d) JV Entry and Breakup

The payment to the domestic partner in period 1 is the same as in the previous case. After endogenization of the synergy in period 2 the foreign partner will get $\Pi_p(c'', c'', c)$ in three firm Cournot competition, but it has to pay the reduced set up costs βE . Thus the amount the foreign firm gets if it successfully forms a JV in period 1 but breaks it up in period 2 is

¹⁰ $\Pi_{SJ} - \Pi_{SS} = \delta A$.

¹¹ We already know that if $(1 + \delta)\Pi(c, c, c) < E$, entry through a subsidiary can never occur. Hence the possibility of entry through a subsidiary can arise only when $(1 + \delta)\Pi(c, c, c) > E$ and $A < 0$ (see Proposition 5).

$$\begin{aligned}
\Pi_{JS} &= [\Pi_{JV}(c', c) - \{(1 + \delta)\Pi(c, c, c) - \delta\Pi_p(c'', c'', c)\}] + \delta[\Pi_p(c'', c'', c) - \beta E] \\
&= [\Pi_{JV}(c', c) - (1 + \delta)\Pi(c, c, c) + 2\delta\Pi_p(c'', c'', c) - \delta\beta E] \tag{9}
\end{aligned}$$

Lemma 3: $\Pi_{JJ} \geq \Pi_{JS} \Leftrightarrow A \geq B$.¹²

It states that if the JV occurs in the first period, it will continue or break up in the second period according as $A \geq B$, that is, whether strong synergy is larger or weaker than the overall learning. Therefore in the case when $A > 0$, we have the following result in a SPNE.

Proposition 4: *Suppose $(1 + \delta)\Pi(c, c, c) > E$ and $A > 0$. Then in the SPNE the foreign firm will enter by forming a JV with a local partner, but the JV will break up in the second period if and only if the overall learning is stronger than the synergy; otherwise the JV will continue.*

This is the situation when independent entry of the foreign firm is possible by opening its 100% owned subsidiary, but the firm enters through a JV because the synergy in case of forming a JV is strong, hence it can reap the benefit of lower production cost. But then it can break up the JV after learning the variable cost. Also the foreign firm can save a part of the entry cost after break up for opening its subsidiary. We have shown that JV break up occurs when learning is sufficiently high in the sense that it dominates synergy effect. The possibility of a high learning is another reason why the firm can enter through a JV.

Let us now consider the case when the synergy effect is weak, i.e., $A < 0$. By Lemma 2, we have, $\Pi_{SS} > \Pi_{SJ}$. Further, $(1 + \delta)\Pi(c, c, c) > E$ means $\Pi_{SS} > 0$. Then, $\Pi_{SS} > \Pi_{JJ}$ iff $A < -\frac{E}{(1+\delta)}$,¹³ and $\Pi_{SS} > \Pi_{JS}$ iff $A < -(E + \delta B)$.¹⁴ Define,

$$A_{min} = \min\left\{-\frac{E}{(1+\delta)}, -(E + \delta B)\right\}.$$

Then we have,

$$A_{min} = -\frac{E}{(1+\delta)} \text{ if } A > B, \text{ and } A_{min} = -(E + \delta B) \text{ if } B > A \tag{10}$$

¹² $\Pi_{JJ} - \Pi_{JS} = \delta(A - B)$.

¹³ $\Pi_{JJ} - \Pi_{SS} = (1 + \delta)A + E$.

¹⁴ $\Pi_{JS} - \Pi_{SS} = A + \delta B + E$.

This gives the following results.

Proposition 5: *Suppose $(1 + \delta)\Pi(c, c, c) > E$, $A < 0$ but $A < A_{min}$. Then for the foreign firm 'enter through subsidiary and continue for both periods' will be the subgame perfect equilibrium irrespective of whether synergy is larger or smaller than learning.*

Here synergy is too weak to induce JV formation over subsidiary. Small synergy also means learning effect is small. Hence subsidiary formation and continuation with the subsidiary is optimal for the foreign firm.

Corollary 1: *Given $(1 + \delta)\Pi(c, c, c) > E$ and $A < 0$, if $A > A_{min}$, entry must occur through a JV, but whether the foreign firm will continue the JV or break it up depends on whether synergy is larger than learning, or learning is larger than synergy.*

All the results derived so far can be summarized in the following table.

Table 1: The Optimal Forms of Business Organization

	$A > 0$		$A < 0$	
	$A > B$	$A < B$	$A > B$	$A < B$
$(1 + \delta)\Pi(c, c, c) < E$	<i>JJ</i>	<i>JS</i>	<i>JJ</i>	<i>JS</i>
$(1 + \delta)\Pi(c, c, c) > E$	<i>JJ</i>	<i>JS</i>	<i>SS</i> if $A < -E/(1 + \delta)$	<i>SS</i> if $A < -(E + \delta B)$
			<i>JJ</i> if $A > -E/(1 + \delta)$	<i>JS</i> if $A > -(E + \delta B)$

We can summarize the results as follows.

- Given $(1 + \delta)\Pi(c, c, c) < E$, irrespective of whether $A \geq 0$, equilibrium is JJ if $A > B$ and JS if $B > A$.

- Given $A > 0$, irrespective of whether $(1 + \delta)\Pi(c, c, c) \geq E$, equilibrium is JJ if $A > B$ and JS if $B > A$.
- Given $(1 + \delta)\Pi(c, c, c) > E$ and $A < 0$, irrespective of whether $A \geq B$, equilibrium is SS if $A < A_{min}$.
- Given $(1 + \delta)\Pi(c, c, c) > E$ and $A < 0$, the first period must be a JV if $A > A_{min}$; then the JV continues (breaks up) if $A > B$ ($B > A$).
- Finally, SJ can never occur in any equilibrium.

IV Comparative Static Analysis

We can now discuss the effect of a change in the parameter underlying the model on the subgame perfect equilibrium outcome. Note that this depends on

- (i) whether the foreign firm can directly enter or not (i.e., whether $C \equiv (1 + \delta)\Pi(c, c, c) - E \geq 0$),
- (ii) whether synergy is strong or weak (i.e., $A \equiv \Pi_{JV}(c - \varepsilon, c) - 2\Pi(c, c, c) \geq 0$), and
- (iii) whether synergy is larger or smaller than overall learning (i.e., $A \geq B \equiv 2[\Pi_P(c - \lambda\varepsilon, c - \lambda\varepsilon, c) - \Pi(c, c, c)] - \beta E$). We have $A - B = \Pi_{JV}(c', c) - 2\Pi_P(c'', c''), c) + \beta E$.

Hence, the comparative static effects are as follows:

- If δ goes up, only C goes up;
- If E goes up, then C falls and B increases, so $(A - B)$ increases;
- If learning parameter λ increases or β falls, then B increases but $(A - B)$ falls;

- If synergy increases, that is, ε goes up, both A and B increase, but the effect on $(A - B)$ depends on λ . In particular, for small λ , $(A - B)$ must go up. However, if λ is sufficiently large, $(A - B)$ can fall.¹⁵

Now we can write the final proposition of the paper.

Proposition 6 (comparative static results):

- (a) *If firms become more impatient (i.e., δ falls), the possibility of independent entry by the foreign firm will go down and entry through a JV is more likely to occur.*
- (b) *If E falls, entry through a JV along with the possibility of JV break up goes up.*
- (c) *If either λ increases or β falls, possibility of break up goes up, provided that synergy is not too small (so that $A > A_{min}$).*
- (d) *If synergy goes up, entry through a JV occurs but it breaks up in the second period when learning parameter λ is sufficiently large.*

To explain the result (b) in particular, note that lower E should generally mean that since the entry cost in the form of opening a subsidiary is small, the foreign firm should go for subsidiary. But in our set up, the firm prefers to enter by forming a JV. The reason is that by taking entry through forming a JV, the firm can not only benefit from learning variable synergy in the future, but also it can reduce the future cost of opening its subsidiary, hence in the future it will dismantle the JV structure once its learning of variable cost synergy as well as entry cost learning is complete.

¹⁵ To illustrate, consider linear demand of the form, $P = a - bQ$, $a > c > 0, b > 0$. Then, $A - B = \frac{1}{72b} [8(a - c + 2\varepsilon)^2 - 9(a - c + 2\lambda\varepsilon)^2] + \beta E$. Therefore, $\frac{d(A-B)}{d\varepsilon} = \frac{1}{18b} [2\varepsilon(8 - 9\lambda^2) + (a - c)(8 - 9\lambda)]$. Then, $\frac{d(A-B)}{d\varepsilon} > 0$ at $\lambda = 0$, and $\frac{d(A-B)}{d\varepsilon} < 0$ at $\lambda = 1$.

IV Conclusion

This paper presents a unified framework to explain the formation and breakup of international joint ventures (IJVs) between an existing domestic firm and a foreign entrant when there exist other domestic firms in the market. The presence of other firms rules out the incentive to appropriate monopoly profits. Hence the major incentive to form an IJV comes from the realization of the ‘synergy’ (leading to reduction in costs) that exists due to the complementary advantages of the foreign firm and its domestic partner. In our framework synergies lead directly to IJVs being formed and continued provided these are strong enough. However, they may also indirectly motivate the formation of IJVs when the gains are realized following the breakup of the IJV with the partners endogenizing the synergies partly or wholly through ‘learning’.

We show that the foreign firm enters through a JV if either entry cost is too high or synergy is ‘strong’. We have also shown that even when the entry cost is low, the foreign firm may prefer entry through a JV with a local firm. This is not only to gain from possible synergy and learning, but also to benefit from the lower cost of opening a subsidiary in the future after breaking up the existing JV. Whether it will continue the JV or break it up to open its subsidiary depends on the complex relation between the synergy effect and the overall learning effect. In particular, JV breaks up if the learning effect is strong enough and outweighs the synergy effect. Only when entry costs are low and synergy is ‘weak’ the foreign firm enters independently and continues. Proceeding to comparative statics, **we show that** entry through JV is more likely if entry cost or synergy increases or the discount factor falls. Higher entry cost and lower learning also make continuation of the JV more likely.

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