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*Joint Venture Instability Under Entry*

by

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# Joint Venture Instability Under Entry

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## **Abstract**

Many developing countries are liberalizing their economies to allow higher equity participation by the foreign firms. We argue that the possibility of joint venture can reduce the number of technology transfers. Hence, joint venture can reduce the welfare of a host-country by creating higher market-concentration. However, higher profit generation under joint venture encourages the foreign firm to transfer relatively better technology and may make the host-country and the firms better-off under joint venture than licensing. For sufficiently large efficiency-gain, the host-country allows fully owned subsidiary of the foreign firm.

**JEL classifications:** F21, F23

**Keywords:** Joint venture, Licensing, Welfare

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## Non-Technical Summary

A fascinating new development is the formation of international joint ventures (JVs). The amount of international JVs has increased dramatically in the last two decades. Though theoretical literature has explained several aspects of international JVs, two important empirical evidences, viz., JV instability, which implies either complete breakdown or share adjustments in the existing JV, and opening up of a wholly owned subsidiary by the foreign JV partner that competes with its existing JV, did not get enough attention.

In this paper, we construct a simple model to explain these stylised facts. We explain complete and partial buy-out or sell-out of a JV between a foreign firm and a host-country firm in presence of demand increase and entry of new firms. Under complete sell-out of the JV, which occurs for small cost differences between the JV and the other firms, the foreign JV partner opens a wholly owned subsidiary and does not hold any share in its previously formed JV. Under partial buy-out or sell-out, which occurs for moderate cost differences between the firms, the foreign JV partner opens a wholly owned subsidiary and also holds some shares in its existing JV. Under complete buy-out, which occurs for large cost differences between the firms, the foreign JV partner completely owns the JV and does not open its wholly owned subsidiary. There may also be situations with no share adjustment in the JV.

## 1. Introduction

Many developing countries are liberalizing their economies to attract foreign direct investment, and a fascinating new development is the formation of international joint ventures (JVs). The amount of international JVs has increased dramatically in the last two decades (see, e.g., Hergert and Morris, 1988, Pekar and Allio, 1994). Though theoretical literature has explained several aspects of international JVs,<sup>1</sup> two important empirical evidences, viz., JV instability, which implies either complete breakdown or share adjustments in the existing JV, and opening up of a wholly owned subsidiary by the foreign JV partner that competes with its existing JV, did not get enough attention.

The evidences for JV breakdown are enormous. In Killing (1982), out of the 37 international JVs studied, 36 were prone to breakdown. The average lifespan of a JV studied in Harrigan (1988) was only 3.5 years. About half of the 92 JVs studied in Kogut (1989) had broken up by the sixth year. Beamish (1985) and Gomes-Casseres (1987) also show the evidences of JV breakdown. Bhandari (1996/1997) and Ghosh (1996) study JV instability in India during the mid-1990s. Examples of the JV breakdown in India include JVs between Daewoo and DCM, GE and Apar, Procter & Gamble and Godrej, Suzuki and TVS, and GEC Alsthom and Triveni Engineering, to name a few. Though it is sometimes claimed that JVs in the developing countries have higher instability than those in the developed countries, there is no conclusive evidence on this. Yan and Zeng (1999) provide a nice survey on JV instability in different industries and different countries.

The evidences also show that, in many situations, foreign JV partners open their wholly owned subsidiaries that compete with their existing JVs in similar products. An earlier evidence in India shows that Warner-Lambert's wholly owned subsidiary flagged off Clorets, a product similar to Warner-Lambert's other Indian subsidiary Parke-Davis' Chiclets (Business World, 6-19 September 1995). In another case, Pepsi Foods opens a wholly owned subsidiary PepsiCo India Holdings while it has a JV with Punjab Agro Industrial Corporation virtually in the same business. Gillette opens a wholly owned subsidiary while it has a JV with Indian Savings Products Limited in the same market (Bhandari, 1996/1997). There are several other recent evidences of this phenomenon in India. Honda motor company pushed through its wholly owned subsidiary to manufacture motorcycles while it has an existing JV with Hero Motors (Business World, 13 September

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<sup>1</sup> As a representative sample of the theoretical literature on the formation of international JVs, we refer to Svejnar and Smith (1984), Marjit (1990), Chan and Hoy (1991), Purakayasthya (1993), Marjit et al. (1995), Al-Saadon and Das (1996), Chao and Yu (1996), Das (1998), Roy et al. (1999), Sinha (2001a), Mukherjee (2003) and Lin and Saggi (2004), to name a few.

1999). Expomedia – a UK based company – has an existing JV with an Indian partner in International Trade Expo Centre and has opened its wholly owned subsidiary India Exhibition Management in the same field (The Economic Times, May 11, 2006). Many foreign firms in India had hiked their shares in their existing JVs and/or had opened up additional wholly owned subsidiaries or were waiting to do so. These cases include, e.g., Cadbury-Schweppes, Ciba-Geigy, Werner-Lambert, Unilever and Procter & Gamble in food and consumer products; Pfizer, SmithKline and Beecham, Rhone Poulenc, Hoffman LaRoche and others in drugs and pharmaceuticals; GEC Alsthom, Asea Brown Bovari and many others (Mukherjee and Sengupta, 2001).

This paper provides an explanation for these stylized facts, i.e., JV instability and opening up of a wholly owned subsidiary by the foreign JV partner that competes with its existing JV. There are several definitions of JV instability in the literature. Franko's (1971) pioneering work considered JV instability as liquidation or buy-out either by the host-country partner or by the multinational. Sometimes the shift of control rights from one partner to another is also called JV instability (Franko, 1971 and Killing, 1983).<sup>2</sup> For our paper, we consider JV instability as a situation of complete or partial buy-out (or sell-out) of the JV by a JV partner (the foreign JV partner here).

We show that the threat of entry of the foreign JV partner and other firms may be responsible for JV instability. The threat of entry due to demand increase may create complete or partial buy-out or sell-out of the JV by the foreign JV partner. Under complete sell-out of the JV, which occurs for small cost differences between the JV and the other firms, the foreign JV partner opens a wholly owned subsidiary and does not hold any share in its previously formed JV. Under partial buy-out or sell-out, which occurs for moderate cost differences between the firms, the foreign JV partner opens a wholly owned subsidiary and also holds some shares in its existing JV. Under complete buy-out, which occurs for large cost differences between the firms, the foreign JV partner completely owns the JV and does not open its wholly owned subsidiary. If the threat of opening up of a wholly subsidiary by the foreign JV partner is not credible, no share adjustment occurs in the JV.

Recently, there is a growing theoretical literature on JV instability. Kabiraj (1999), Roy Chowdhury and Roy Chowdhury (1999, 2000 and 2001), and Kabiraj and Lee (2000) show JV breakdown in presence of organizational learning. After learning by one or both

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<sup>2</sup> Reuer (2000) considers five types of termination of JVs: (i) a partner acquires the international JV from the other partner(s), (ii) a partner sells its equity stakes to the other partner(s), (iii) a partner sells its equity stakes to an outside party, (iv) the partners sell the international JV to an outside party, and (v) the partners liquidate the international JV.

partners in a JV, it may be in the interest of the JV partner to break the existing JV, and operate their own wholly owned subsidiaries. Kabiraj et al. (2001) show JV instability due to the cultural differences between the JV partners. Mukherjee and Sengupta (2001) show JV instability due to sequential economic liberalization, and analyze the implications of different types of controlling structure in the JV and the degree of product market competition. Sinha (2001a, b) show the importance of sequential economic liberalization, innovation and imitation for JV instability, whereas Sinha (2006) shows private information about market demand as a reason for JV instability. Kabiraj and Roy Chowdhury (2003) and de Hek and Mukherjee (2006) show technology adoption and demand uncertainty, respectively, as the reasons for JV instability when the firms have forward-looking behavior. Unlike the present paper, de Hek and Mukherjee (2006) ignore entry of new firms. Marjit and Roy Chowdhury (2004) show that the foreign JV partner completely buys-out the international JV as demand increases and becomes sufficiently large. We use a framework similar to Marjit and Roy Chowdhury (2004) and portray a number of other possibilities that depend on the difference in the firms' cost structures. Unlike Marjit and Roy Chowdhury (2004), higher demand in our analysis not only creates the threat of entry of the foreign JV partner, it also encourages other firms to enter the market. Our paper makes an important contribution to the theoretical literature on JV instability because, in a single framework with complete information, it explains complete or partial buy-out or sell-out of the JV and the co-existence of international JV and wholly owned subsidiary of the foreign partner.

A major difference between the present paper and the previous studies, except Sinha (2006), is the inability of the previous studies in explaining the co-existence of international JV and a wholly owned subsidiary of the foreign JV partner. However, unlike Sinha (2006), we show the co-existence of international JV and the wholly owned subsidiary of the foreign JV partner in absence of informational problem, and our result depends on the trade-off between the cost difference between the firms and product market competition. For the comparable situation of complete information game, Sinha (2006) predicts complete or partial buy-out of the JV with no wholly owned subsidiary of the foreign JV partner. Moreover, there is no complete sell-out of the JV in Sinha (2006).

The regulation in India (Press Note 18, December 1998) says that a foreign company already in an Indian joint venture needs to first get a no-objection certificate (NOC) from the Indian JV partner before setting up another Indian subsidiary in the same or allied field even if the initial JV agreement is non-exclusive by its nature, thus restricting

the flexibility of the foreign firms. However, the evidences show that "...57-odd cases that have attracted Press Note 18 norms over the past one year reveals that 50 of them have been cleared by the Foreign Investment Promotion Board — thereby not jeopardising either their business plans or foreign direct investments in the country" (The Economic Times, November 06, 2004). The incentives for the Indian partners to provide NOC to their foreign JV partners are consistent with our results, which show that the co-existence of international JV and the wholly owned subsidiary of the foreign JV partner or complete sell-out of the JV by the foreign JV partner makes both JV partners better off compared to the situation with no wholly owned subsidiary of the foreign JV partner.<sup>3</sup> Hence, our results may provide support to the recent policy debate for withdrawing (or amending) the Press Note 18 (see, The Economic Times, August 05, 2003, for a discussion on this policy debate).

The remainder of the paper is organized as follows. The next section develops the basic model and shows the results. Section 3 concludes.

## 2. The Model and the results

We assume that there is a multinational firm, called firm 1, who wants to invest and sell a product in a country, called host-country. The inverse market demand function in the host-country is

$$P = a - q, \tag{1}$$

where the notations have usual meanings.

Firm 1 can open its wholly owned subsidiary and produce the product at a constant marginal cost of production,  $c$ . However, firm 1 also has the option to form a JV with a host-country firm, firm 2, which lacks the technology to produce this product.<sup>4</sup> Following Marjit and Roy Chowdhury (2004), we assume that the synergic effects help to reduce the

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<sup>3</sup> In a statement, Mr. Amit Mitra, Secretary-General, Ficci, says that "... if we look at the case of Hero-Honda and TVS Suzuki, we find that they reached amicable settlements within an orderly transition process with a win-win option for both" (rediff. Com, April, 09, 2003: " Should 'Press Note 18' be scrapped?"), which is also consistent with our finding.

<sup>4</sup> To focus on JV instability, we assume away other modes of serving the host-country, such as exporting and licensing. High trade cost may be the reason for making exporting as an unprofitable option. High resource cost of international technology transfer (see, e.g., Teece, 1977, 1981) can make technology licensing unprofitable. Technology licensing may also reduce profit of the foreign firm in its other markets due to entry of the licensee in those markets. The possibility of imitation or 'inventing around' under technology licensing may be responsible for this threat of entry (Kabiraj and Marjit, 1993), and may make licensing unprofitable to the foreign firm.



cost of production in the JV,<sup>5</sup> and assume that, in the JV, the constant marginal cost of production is  $c' < c$ . In the JV, firms 1 and 2 hold  $\alpha$  and  $(1-\alpha)$  fraction of shares respectively.<sup>6</sup>

To show the JV instability due to demand increase, which induces entry, and the cost differences between the firms, we do our analysis under the following assumption:

$$\mathbf{A1:} \quad c' < a < c.$$

**A1** implies that, given the market demand, it is not profitable for firm 1 to produce the product through its wholly owned subsidiary but JV makes the project profitable.

We further assume that there is a potential foreign entrant,<sup>7</sup> called firm 3, with a production technology corresponding to the constant marginal cost of production  $c$ . Therefore, given the assumption **A1**, firm 3 also finds it unprofitable to invest in the host-country.<sup>8</sup>

We also assume that the JV chooses its outputs to maximize profit of the JV. Hence, initially profits of firms 1 and 2 are respectively  $\alpha\pi^m(c')$  and  $(1-\alpha)\pi^m(c')$ , where  $\pi^m(c')$  is the monopoly profit corresponding to the marginal cost of production  $c'$ .<sup>9</sup>

### 2.1. The effects of demand increase

In line with Marjit and Roy Chowdhury (2004), let us now consider an exogenous demand shock that increases the market demand from  $P = a - q$  to  $P = A - q$ , where  $A$  is sufficiently higher than  $a$ . We also assume that:

$$\mathbf{A2:} \quad c' < a < c < A.$$

Assumption **A2** will imply that, under high demand, the potential entrant, i.e., firm 3, will always find it profitable to enter the market. However, whether firm 1 also finds it profitable to open a wholly owned subsidiary under high demand is not clear, and we will see that it will depend on firm 1's shareholding in the JV. So, if firm 1 does not open its wholly owned subsidiary, the market structure will be a duopoly of the JV and firm 3. But,

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<sup>5</sup> While studying British JVs in India and Pakistan, Tomlinson (1970) shows that one of the main reasons behind JV formation is the supply of local resources by the host-country partner. See also Dymsha (1988) and Miller et al. (1996).

<sup>6</sup> Share distribution in the JV may be the outcome of bargaining between the firms. Since, the process behind this share distribution is not important for our purpose, we do not go into the details of bargaining between the firms.

<sup>7</sup> It should be noted that our qualitative results hold even if we consider  $n$  other potential entrants, each with the constant marginal cost of production  $c$ .

<sup>8</sup> To convey the basic argument of this paper in the simplest way, we assume away the possibilities for other international JVs. So, we assume that there is no other host-country firm that provides enough synergic effect to make other JVs profitable.

<sup>9</sup> For simplicity, we ignore any cost of opening a wholly owned subsidiary by any firm.

in case firm 1 opens its wholly owned subsidiary, there will be three firms competing in the market: firm 3, firm 1's wholly owned subsidiary and the previously made JV (with or without the initial shareholdings).

The moves of the game are as follows. After demand increase, firm 3 enters the market, and firms 1 and 2 take decisions on share adjustment in the JV. Then, firm 1 decides whether it will open its wholly owned subsidiary or not. Then the firms compete in the product markets like Cournot oligopolists and the profits are realized. We solve the game through backward induction.

Let us consider firm 1's incentive for opening a wholly owned subsidiary. If firm 1 does not open the wholly owned subsidiary, the profits of firms 1 and 2 are respectively  $\alpha\pi_J(c',c)$  and  $(1-\alpha)\pi_J(c',c)$ , where the first and second arguments in the profit functions show the cost of the JV and the cost of firm 3 respectively.

Now, consider the profits of the firms when firm 1 opens a wholly owned subsidiary. Given that firm 1 holds  $\alpha$  fraction of share in the JV, the profit of firm 1 is  $\alpha\pi_J(c',c,c) + \pi_1(c',c,c)$ , where the first, second and third arguments in the profit functions show the cost of the JV, the cost of firm 3 and the cost of the wholly owned subsidiary of firm 1 respectively. Therefore, while choosing the output of the wholly owned subsidiary of firm 1, it will maximize the expression  $\alpha\pi_J(c',c,c) + \pi_1(c',c,c)$ , and the equilibrium output of the wholly owned subsidiary of firm 1 will satisfy:

$$P - (\alpha q_J + q_1) = c, \quad (2)$$

where  $q_J$  and  $q_1$  are the outputs of the JV and the wholly owned subsidiary of firm 1.

If firm 1 opens a wholly owned subsidiary, the equilibrium outputs of the JV and firm 3 will satisfy, respectively

$$P - q_J = c' \quad (3)$$

$$P - q_3 = c, \quad (4)$$

where  $q_3$  is the output of firm 3.

Given the demand and cost functions, and assuming that the JV, firm 1's wholly owned subsidiary and firm 3 produce positive outputs, the solutions of equations (2)-(4) show that the equilibrium outputs of the JV, the wholly owned subsidiary of firm 1, and firm 3 are respectively

$$q_J = \frac{3(A - c') - 2(A - c)}{(4 - \alpha)} \quad (5)$$

$$q_1 = \frac{(A-c)(2+\alpha) - (A-c')(1+2\alpha)}{(4-\alpha)} \quad (6)$$

$$q_3 = \frac{(A-c)(2-\alpha) - (A-c')(1-\alpha)}{(4-\alpha)}. \quad (7)$$

It should be noted that  $q_J > q_3 > q_1$ , and the reason is as follows. The JV and firm 3 maximize their own profits. If firm 1 does not hold any share in the JV, it will choose output of the wholly owned subsidiary to maximize profit of the wholly owned subsidiary only. However, since, firm 1 holds some shares in the JV, while choosing output for the wholly owned subsidiary, firm 1 considers the effect of the output of the wholly owned subsidiary on the profit of the JV. As a result, firm 1 produces lower amount of output in the wholly owned subsidiary compared to the situation where it does not hold any share in the JV. Since, the outputs are “strategic substitutes”<sup>10</sup>, this output reduction by the wholly owned subsidiary of firm 1 increases outputs of the JV and firm 3. Hence, output of the wholly owned subsidiary of firm 1 is lower than that of firm 3, which is also lower than the output of the JV, since the JV has lower cost than firm 3.

Given that the outputs in (5)-(7) are positives, the equilibrium profits of the JV, firm 1 (which is summation of its profit from the wholly owned subsidiary and the JV) and firm 3 are respectively

$$\hat{\pi}_J = \frac{[3(A-c') - 2(A-c)]^2}{(4-\alpha)^2} \quad (8)$$

$$\begin{aligned} \pi_1^{total} &= \hat{\pi}_1 + \alpha \hat{\pi}_J \\ &= \frac{[(A-c)(2-\alpha) - (A-c')(1-\alpha)][(A-c)(2+\alpha) - (A-c')(1+2\alpha)]}{(4-\alpha)^2} + \alpha \hat{\pi}_J \quad (9) \end{aligned}$$

$$\hat{\pi}_3 = \frac{[(A-c)(2-\alpha) - (A-c')(1-\alpha)]^2}{(4-\alpha)^2}. \quad (10)$$

The first expression in the right hand side (RHS) of equation (9) shows firm 1’s profit from its wholly owned subsidiary only.

<sup>10</sup> Consider two firms. The actions of the firms are called strategic substitutes, if the derivative of the marginal profit of a firm with respect to the competitor’s action is negative (see, Bulow et al., 1985).

<sup>11</sup> We use  $\hat{\pi}$  to imply the profits of the firms when shareholding of firm 1 in the JV is strictly between 0 and 1.

It is easy to check that  $\hat{\pi}_J(c', c, c) > \pi_J(c', c, c)$  and  $\hat{\pi}_1(c', c, c) < \pi_1(c', c, c)$ <sup>12</sup>, i.e., profit of the JV (wholly owned subsidiary of firm 1) is higher (lower) when firm 1 has positive shareholding in the JV than if firm 1 has no shareholding in the JV. However, it is possible to have  $\pi_1(c', c, c) + \pi_J(c', c, c) \begin{matrix} \geq \\ < \end{matrix} \hat{\pi}_1(c', c, c) + \hat{\pi}_J(c', c, c)$ ,  $\pi_1(c', c, c) + \pi_J(c', c, c) \begin{matrix} \geq \\ < \end{matrix} \pi_J(c', c)$  and  $\hat{\pi}_1(c', c, c) + \hat{\pi}_J(c', c, c) \begin{matrix} \geq \\ < \end{matrix} \pi_J(c', c)$  depending on the differences between  $c$  and  $c'$ . We will also see that the difference  $\hat{\pi}_1(c', c, c) + \hat{\pi}_J(c', c, c) - \pi_J(c', c)$  may be non-monotonic with respect to  $\alpha$ .

## 2.2. The credible threat of opening a wholly owned subsidiary by firm 1

Let us now see when the threat of opening a wholly owned subsidiary by firm 1 is credible. It is clear from (6) that the equilibrium output of firm 1's wholly owned subsidiary is positive provided

$$\alpha < \frac{(A - 2c + c')}{(A - 2c' + c)} \equiv \alpha^c, \quad (11)$$

i.e., if the shareholding of firm 1 in the JV is not very high. As firm 1's shareholding increases in the JV, it reduces firm 1's production in its wholly owned subsidiary, since firm 1 takes into account the effect of the output of the wholly owned subsidiary on the profit of the JV. If firm 1's shareholding in the JV is very high, it will prefer not to increase competition by opening a wholly owned subsidiary. Therefore, opening a wholly owned subsidiary by firm 1 is not credible if condition (11) does not hold.

**Lemma 1:** *If  $\alpha = 0$ , the total profit of firm 1 and the JV is  $\pi_J(c', c, c) + \pi_1(c', c, c)$ .<sup>13</sup> If  $\alpha = 1$ , the profit of firm 1 is  $\pi_J(c', c)$ ,<sup>14</sup> which is greater than  $\pi_J(c', c, c) + \pi_1(c', c, c)$  provided  $c \in [\frac{A + 13c'}{14}, \frac{A + c'}{2}]$ .<sup>15</sup>*

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<sup>12</sup>  $\pi_J(c', c, c)$  and  $\pi_1(c', c, c)$  correspond to the situation where firm 1 has no shareholding in the JV, i.e.,  $\alpha = 0$ . It follows immediately from (8) and (9) that  $\pi_J(c', c, c) = \frac{(A - 3c' + 2c)^2}{16}$  and  $\pi_1(c', c, c) = \frac{(A - 2c + c')^2}{16}$ .

<sup>13</sup> Like Marjit and Roy Chowdhury (2004), we assume away moral hazard problem. Hence, even if only one JV partner holds the entire shares in the JV (which will occur under complete buy-out or sell-out of the JV),

**Proof:** Given the demand and the cost conditions, we have

$$\pi_J(c', c, c) + \pi_1(c', c, c) = \frac{(A - 3c' + 2c)^2 + (A - 2c + c')^2}{16} \quad \text{and} \quad \pi_J(c', c) = \frac{(A - 2c' + c)^2}{9}.$$

We find that  $\pi_J(c', c, c) + \pi_1(c', c, c) - \pi_J(c', c) \equiv X$  is convex in  $c$  over  $[c', \frac{A+c'}{2}]$ , and  $X$  is

positive at  $c = c'$ , and zero at both  $c = \frac{A+13c'}{14}$  and  $c = \frac{A+c'}{2}$ , with a negative minimum

value. Hence,  $X$  is positive (negative) if the difference between  $c$  and  $c'$  is very small (large), which proves the result. Q.E.D.

We have already seen that if condition (11) does not hold, firm 1 does not produce anything in its wholly owned subsidiary, which trivially implies that the threat of opening a wholly owned subsidiary by firm 1 is not credible for  $\alpha > \alpha^c$ . However, it is easy to check that the threat of opening a wholly owned subsidiary by firm 1 is always credible if  $\alpha < \alpha^c$ , i.e., for a given  $\alpha < \alpha^c$ , we always get  $\hat{\pi}_1(c', c, c) + \alpha \hat{\pi}_J(c', c, c) > \alpha \pi_J(c', c)$ .<sup>16</sup>

### 2.3. JV instability

Let us now consider how entry, induced by higher demand, affects share distribution in the JV. It should be clear that share adjustment in the JV will occur provided it increases the total profit of the JV and the wholly owned subsidiary of firm 1. In this situation, share adjustment will create some surplus that can be divided between firms 1 and 2, either by affecting the share price or through side payments, to make neither of them worse off compared to no share adjustment.<sup>17</sup>

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we assume that the JV can operate at a cost  $c'$ . This happens if the inputs provided by the JV partners are contractible.

<sup>14</sup> In this situation, firm 1 produces nothing in its wholly owned subsidiary, and the market structure becomes a duopoly of the JV and firm 3.

<sup>15</sup> Note that if  $\alpha = 0$ , firm 3 produces positive output provided  $c < \frac{A+c'}{2}$ , and it creates the upper bound for  $c$ .

<sup>16</sup> Note that the threat of opening a wholly owned subsidiary by firm 1 is always credible for  $\alpha < \alpha^c$  may be the artifact of our assumption of linear demand function. However, it should be clear from Mukherjee and Sengupta (2001) that, in case of non-linear demand functions, there must be some  $\alpha \in (0, \alpha^c)$  for which the threat of opening a wholly owned subsidiary by firm 1 will be credible.

<sup>17</sup> Without any compensation, it may be possible that even if the total profit of the JV and the wholly owned subsidiary increases due to share adjustment, the profit of the host-country firm reduces under share adjustment compared to no share adjustment. Government policy may be designed to protect the host-country firm against this loss of profit. For example, as already mentioned in the introduction, in India, the "Press Note 18" says that the foreign firm needs to provide the no-objection certificate from its Indian JV partner if it

It is clear from the above discussion that there will be no share adjustment if the threat of opening a wholly owned subsidiary by firm 1 is not credible (i.e.,  $\alpha > \alpha^c$ ), and  $\pi_J(c', c)$  is greater than both  $\pi_1(c', c, c) + \pi_J(c', c, c)$  and  $\hat{\pi}_1(c', c, c) + \hat{\pi}_J(c', c, c)$ . In this situation, the total profits of the JV and the wholly owned subsidiary of firm 1 are higher if there is no wholly owned subsidiary of firm 1. Further, since there is no threat of competition from the wholly owned subsidiary of firm 1, there is no reason to adjust the shareholding in the JV. Therefore, here we neither observe JV instability nor opening up of a wholly owned subsidiary by firm 1.

Next, consider the situation where opening up of a wholly owned subsidiary by firm 1 is credible (i.e.,  $\alpha < \alpha^c$ ), and  $\pi_J(c', c)$  is greater than both  $\pi_1(c', c, c) + \pi_J(c', c, c)$  and

$$\hat{\pi}_1(c', c, c) + \hat{\pi}_J(c', c, c). \quad \text{Recall that} \quad \pi_J(c', c) = \frac{(A - 2c' + c)^2}{9},$$

$$\pi_J(c', c, c) + \pi_1(c', c, c) = \frac{(A - 3c' + 2c)^2 + (A - 2c + c')^2}{16} \quad \text{and}$$

$$\hat{\pi}_1(c', c, c) + \hat{\pi}_J(c', c, c) = \frac{[(A - c)(2 - \alpha) - (A - c')(1 - \alpha)][(A - c)(2 + \alpha) - (A - c')(1 + 2\alpha)] + [3(A - c') - 2(A - c)]^2}{(4 - \alpha)^2}.$$

We find that  $\pi_J(c', c)$  is greater than both  $\pi_1(c', c, c) + \pi_J(c', c, c)$  and  $\hat{\pi}_1(c', c, c) + \hat{\pi}_J(c', c, c)$  if  $c$  is very large compared to  $c'$ . Since, the total profits of firms 1 and 2 under JV are higher than their total profits when firm 1 opens a wholly owned subsidiary, it is clear that firms 1 and 2 will be better off if there is no wholly owned subsidiary of firm 1, and given that  $\hat{\pi}_1(c', c, c) + \hat{\pi}_J(c', c, c) < \pi_J(c', c)$  for any  $\alpha$ , firm 1 will be able to buy-out the JV completely. However, how much firm 1 needs to pay to firm 2 for buying-out the JV depends on the initial shareholding of firms 1 and 2 in the JV and their bargaining power. Given the initial shareholding of firms 1 and 2 as respectively  $\alpha$  and  $(1 - \alpha)$ , and the credible threat of opening a wholly owned subsidiary by firm 1, firm 2's dividend income is higher under share adjustment provided

$$(1 - \alpha^c)\pi_J(c', c) > (1 - \alpha)\hat{\pi}_J(c', c, c)$$

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wants to open a new venture in the same or allied field, thus tries to protect the Indian firms from this type of profit loss.

$$\text{or } \alpha > \frac{\alpha^c \pi_J(c', c) - (\pi_J(c', c) - \hat{\pi}_J(c', c, c))}{\hat{\pi}_J(c', c, c)} \equiv \bar{\alpha},^{18}$$

(12)

i.e., if firm 2's initial shareholding is very small. The term  $(1 - \alpha)\hat{\pi}_J(c', c, c)$  shows firm 2's income in the JV at the initial share distribution if firm 1 opens the wholly owned subsidiary, and the term  $(1 - \alpha^c)\pi_J(c', c)$  shows firm 2's income in the JV corresponding to its minimal shareholding that is required to eliminate the threat of a wholly owned subsidiary of firm 1. So, if the initial shareholding of firm 2 is greater than  $(1 - \bar{\alpha})$ , firm 1 needs to pay at least<sup>19</sup>  $(1 - \alpha)\hat{\pi}_J(c', c, c)$  to firm 2, i.e., firm 2's dividend income in the JV with its initial shareholding if firm 1 opens a wholly owned subsidiary. But, if firm 2's initial shareholding is lower than  $(1 - \bar{\alpha})$ , firm 1 may need to pay at least  $(1 - \alpha^c)\pi_J(c', c)$  to firm 2. This is because firm 2 can always increase firm 1's shareholding to  $\alpha^c$  to eliminate the threat of opening a wholly owned subsidiary by firm 1 and this also makes firm 1 better off if firm 1's profit is higher with  $\alpha^c \pi_J(c', c)$  than with  $\hat{\pi}_1(c', c, c) + \alpha \hat{\pi}_J(c', c, c)$ .<sup>20</sup> Therefore, in this situation, firm 1 needs to pay at least  $(1 - \alpha^c)\pi_J(c', c)$  to firm 2 for completely buying-out the JV.

Now, consider the case where  $\pi_1(c', c, c) + \pi_J(c', c, c)$  is greater than both  $\pi_J(c', c)$  and  $\hat{\pi}_1(c', c, c) + \hat{\pi}_J(c', c, c)$ , and this happens if  $c$  is very close to  $c'$ .<sup>21</sup> Here, the total profits of the JV and the wholly owned subsidiary of firm 1 are higher if firm 1 does not hold any share in the JV and operates a wholly owned subsidiary. Therefore, unlike the previous case where firm 1 buys-out the JV, here it is better for firm 1 to sell-out its share in the JV and leave the JV completely. It is interesting to note that here sell-out by firm 1 occurs irrespective of whether the threat of opening a wholly owned subsidiary by firm 1 is credible or not,<sup>22</sup> and this is different from Marjit and Roy Chowdhury (2004), where share

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<sup>18</sup> Note that the threat of opening a wholly owned subsidiary by firm 1 is not credible provided  $\alpha > \alpha^c$ , and therefore, there is no incentive for share adjustment beyond  $\alpha > \alpha^c$ .

<sup>19</sup> The amount will be more than  $(1 - \alpha)\hat{\pi}_J(c', c, c)$  if firm 2 has positive bargaining power.

<sup>20</sup> It can be shown from (8), (9) and (11) that  $\alpha^c \pi_J(c', c)$  can be greater than  $\hat{\pi}_1(c', c, c) + \alpha \hat{\pi}_J(c', c, c)$ .

<sup>21</sup> This is similar to the finding of Salant et al. (1983), which shows that if the firms produce with symmetric costs and the demand function is linear, horizontal merger that reduces the number of active firms in the industry may reduce the profit of the merged firms compared to a situation with no merger.

<sup>22</sup> The economic rationale for complete sell-out in our analysis may be related to the literature on divisionalization, which, in a different context, shows that a firm can get strategic advantage in the product

adjustment occurs only if there is a threat of competition from the wholly owned subsidiary of firm 1. The threat of opening a wholly owned subsidiary by firm 1 only affects the price at which firm 1 sells its shares to firm 2, since the reservation profits of these firms will depend on the credible threat of opening a wholly owned subsidiary by firm 1. Therefore, in this situation, we observe that firm 1 operates a wholly owned subsidiary while it does not hold any share in the JV.

Lastly, we consider the situation where  $\hat{\pi}_1(c', c, c) + \hat{\pi}_J(c', c, c)$  is greater than both  $\pi_1(c', c, c) + \pi_J(c', c, c)$  and  $\pi_J(c', c)$ . This situation can arise if the difference between  $c$  and  $c'$  is moderate. Figure 1 considers an example of this situation and plots the difference  $\hat{\pi}_1(c', c, c) + \hat{\pi}_J(c', c, c) - \pi_J(c', c)$  against  $\alpha$  for  $A = 10$ ,  $c' = 3$ ,  $c = 3.5$  and  $\alpha \in [0, \alpha^c]$ , where  $\alpha^c = .8$ .<sup>23</sup>

**Figure 1**

It follows from Lemma 1 that, for these parameter values,  $\pi_1(c', c, c) + \pi_J(c', c, c)$  is equal to  $\pi_J(c', c)$ , since, in this situation,  $\frac{A+13c'}{14} = 3.5$ . Also, note that if  $\alpha = 0$ , we have  $\hat{\pi}_1(c', c, c) + \hat{\pi}_J(c', c, c) = \pi_1(c', c, c) + \pi_J(c', c, c)$ . Firms 1 and 2 adjust their shareholdings in the JV in a way so that they can maximize the value of  $\hat{\pi}_1(c', c, c) + \hat{\pi}_J(c', c, c)$ , irrespective of the initial shareholding in the JV and the credible threat of opening a wholly owned subsidiary by firm 1. So, partial buy-out (sell-out) occurs if the initial shareholding of firm 1 in the JV is lower (higher) than the shareholding that maximizes  $\hat{\pi}_1(c', c, c) + \hat{\pi}_J(c', c, c)$ . Note that, like complete sell-out by firm 1, here share adjustment occurs irrespective of the credible threat of opening a wholly owned subsidiary by firm 1. Hence, in this situation, we observe that firm 1 operates its wholly owned subsidiary and also holds shares in the JV.

The following proposition summarizes the above discussion.

**Proposition 1:** (i) *There is no JV instability if the threat of opening a wholly owned subsidiary by firm 1 is not credible and  $c$  is very large compared to  $c'$  so that  $\pi_J(c', c)$  is greater than both  $\pi_1(c', c, c) + \pi_J(c', c, c)$  and  $\hat{\pi}_1(c', c, c) + \hat{\pi}_J(c', c, c)$ .*

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market by creating new independent competing divisions (see, e.g., Schwartz and Thompson, 1986 and Veendorp, 1991 for seminal works on divisionalization).

<sup>23</sup> We use 'The Mathematica 4' (see Wolfram, 1999) for Figure 1.



(ii) *The foreign JV partner (firm 1) buys-out the JV if the threat of opening a wholly owned subsidiary by firm 1 is credible and  $c$  is very large compared to  $c'$  so that  $\pi_J(c',c)$  is greater than both  $\pi_1(c',c,c) + \pi_J(c',c,c)$  and  $\hat{\pi}_1(c',c,c) + \hat{\pi}_J(c',c,c)$ .*

(iii) *Firm 1 sells all its share to the host-country JV partner (firm 2), irrespective of the credible threat of opening a wholly owned subsidiary by firm 1, if  $c$  is very close to  $c'$  so that  $\pi_1(c',c,c) + \pi_J(c',c,c)$  is greater than both  $\pi_J(c',c)$  and  $\hat{\pi}_1(c',c,c) + \hat{\pi}_J(c',c,c)$ .*

(iv) *If the difference between  $c'$  and  $c$  is moderate so that  $\hat{\pi}_1(c',c,c) + \hat{\pi}_J(c',c,c)$  is greater than both  $\pi_1(c',c,c) + \pi_J(c',c,c)$  and  $\pi_J(c',c)$ , firm 1 partially buys-out the JV (sells its share to firm 2) if its initial shareholding in the JV is lower (higher) than the shareholding that maximizes  $\hat{\pi}_1(c',c,c) + \hat{\pi}_J(c',c,c)$ . The decision for buying-out or selling-out occurs irrespective of the credible threat of opening a wholly owned subsidiary by firm 1.*

The reasons for the above results can be explained as follows. If firm 1 holds shares in the JV, the output of the wholly owned subsidiary of firm 1 (of the JV) is lower (higher) compared to the situation where firm 1 has no shareholding in the JV. Hence, if firm 1 holds significant amount of shares in the JV, its equilibrium output will be zero, and therefore, the threat of opening a wholly owned subsidiary by firm 1 is not credible.

Even if the equilibrium output of the wholly owned subsidiary of firm 1 is positive, if firm 1 holds shares in the JV, the total outputs of the JV and the wholly owned subsidiary of firm 1 are lower compared to the situation when firm 1 has no shareholding in the JV. Further, as firm 1's shareholding in the JV increases, it reduces the total output of the JV and the wholly owned subsidiary of firm 1. While shareholding of firm 1 in the JV helps to internalize competition between the JV and the wholly owned subsidiary of firm 1, and also increases production efficiency for these two firms by shifting production from a relatively cost inefficient wholly owned subsidiary of firm 1 to the relatively cost efficient JV, it increases output of firm 3, since the outputs are strategic substitutes. The higher market share of firm 3 does not allow the JV and the wholly owned subsidiary of firm 1 to capture the entire benefit of their output reduction.

If the costs of the firms are very much different, the shareholding by firm 1 in the JV does not increase the output of firm 3 significantly, while it provides the other two benefits such as the lower total outputs of the JV and the wholly owned subsidiary of firm

1, and production efficiency, and therefore, creates the incentive for complete buy-out of the JV. On the other extreme, if the costs of the firms are very much similar, the effect of higher market share of firm 3 dominates the effects of the lower total outputs of the JV and the wholly owned subsidiary of firm 1, and production efficiency, and encourages firm 1 to sell-out all its shares in the JV to firm 2. For intermediate cost differences, whether the effects of the lower total outputs of the JV and the wholly owned subsidiary of firm 1, and production efficiency dominate the effect of higher market share of firm 3 depend on the shareholding of firm 1. These effects balance at an intermediate shareholding of firm 1 and create the incentive for partial buy-out or sell-out of the JV.

It is interesting to note that even if, like Marjit and Roy Chowdhury (2004), we assume away moral hazard problem, there may be the possibility of partial buy-out or sell-out of the JV. This occurs because of the entry of firm 3 and the cost differences between the firms, which affect the strategic output decisions of the firms. If there is moral hazard problem, which occurs if the inputs provided by the JV partners are non-contractible, it further eliminates (or at least reduces) the possibility of complete buy-out or sell-out. Further, unlike Sinha (2006), where international JV and a wholly owned subsidiary of the foreign JV partner co-exists due to the informational problem, in our analysis, this co-existence occurs due to the trade-off between competition in the product market and the cost differences between the firms. Moreover, unlike him, we also explain complete sell-out of the JV.

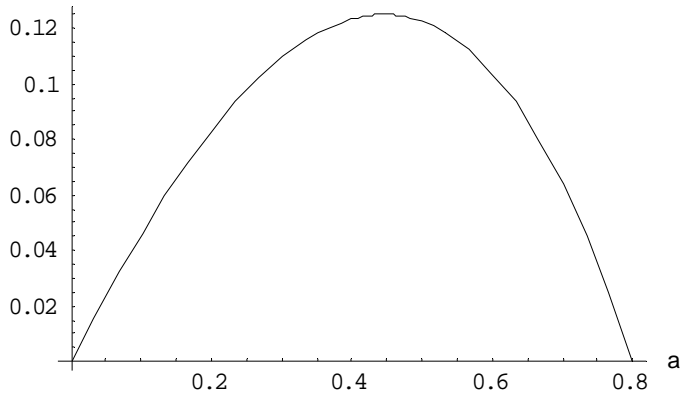
It is also worth mentioning that we have ignored the cost of opening a new subsidiary. However, opening up of a new subsidiary may involve significant cost and reduces the incentive for a new subsidiary. Hence, our results are valid when the cost of opening a new subsidiary by firm 1 is not so high that it outweighs its benefits shown in the above analysis.

### **3. Conclusion**

A fascinating new development in the international business is the formation of international JVs. While researchers have explained several aspects of JV formation, the important phenomenon of JV breakdown has been getting attention only in the recent years. We show how the threat of entry created by demand increase affects the pattern of shareholding in an existing JV and also creates the foreign JV partner's incentive for opening a wholly owned subsidiary that competes with its existing JV. Even if the recent literature has provided different reasons for JV instability, they fail to explain empirical

evidences showing that the foreign JV partners open wholly owned subsidiaries which compete with their existing JVs.

We show that the threat of entry of a new firm along with the possibility of opening a wholly owned subsidiary of the foreign JV partner may create the possibility of complete or partial buy-out or sell-out of the JV. In case of complete sell-out, the foreign firm opens a wholly owned subsidiary and does not hold any share in its previously formed JV. If there is either partial buy-out or sell-out of the JV, the foreign firm opens a wholly owned subsidiary and also holds some shares in its existing JV. In the case of complete buy-out, the foreign JV partner completely buys-out the JV and does not open a wholly owned subsidiary. There are also situations with no JV instability. Hence, in a single framework with complete information, we explain two empirical regularities, viz., JV instability and the opening up of a wholly owned subsidiary by the foreign JV partner that competes with its existing JV, and this is in contrast to the existing theoretical literature on JV instability. It is interesting to note that, for JV instability in our analysis, it is not necessary to have the credible threat of opening a wholly owned subsidiary by the foreign JV partner; rather it can be a friendly separation.



**Figure 1:** Plotting  $\hat{\pi}_1(c', c, c) + \hat{\pi}_J(c', c, c) - \pi_J(c', c)$  against  $\alpha$  for  $A = 10$ ,  $c' = 3$ ,  $c = 3.5$  and  $\alpha \in [0, \alpha^c]$ , where  $\alpha^c = .8$ .

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