

Foreign-Owned New Subsidiary and Existing Joint Venture:  
Competition Policy and National Welfare

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## Abstract

We consider a developing country that is following a policy of sequential liberalization. Initially, foreign firms were only allowed to form joint ventures with domestic firms, but subsequently the local government decides that the foreign partners would be allowed to set up fully owned subsidiaries. We examine the welfare implication of this policy shift. In this scenario we then address the following question: Is it reasonable to compel the foreign partner firm to obtain a no objection certificate (NOC) from the existing partner for setting up a new fully owned subsidiary? We motivate the analysis with a recent policy debate from India. We demonstrate that a policy allowing the subsidiary to be opened could be optimal even if the existing partner is reluctant to issue an NOC. Moreover, such a policy may not be optimal even if the NOC is actually issued. Finally, we study the consequences of different decision structures in the JV.

*Key words:* Joint venture; subsidiary; no objection certificate; welfare.

*JEL Classification Numbers:* D43, F23, L13, L5.

## 1. Introduction

Process of liberalization is not a one-step go --- reform process is gradual, not an abrupt one. Tariffs do not disappear overnight, policy against foreign investment is not drastically changed at a given instance, or, for that matter, subsidies are never driven back to the bare minimum at one stroke. Typically, 'wait and watch' or 'go slow' policy seems to be an acceptable proposition for economists and politicians. This is also the experience in Indian reform process in the recent years. As part of its development policy the Indian Government has encouraged import of foreign investment and technology. At the initial stage the foreign MNCs have been allowed entry by forming joint ventures (JVs) with the local partners subject to a restriction on the equity share holding of the foreign firms. Then in the latter phase of liberalization, restrictions on foreign share holdings have been gradually relaxed and in many sectors the foreign investors are allowed to open wholly owned subsidiaries.<sup>1</sup>

Now, as the foreign partner of a JV gets the right of running a 100% owned business, the existing JV relation becomes vulnerable. Either the foreign partner successfully raises its stake in the existing JV, or it opens a fully owned subsidiary that directly competes with the JV in the same market place. In the JV literature, this is commonly known as the problem of JV instability induced by the government policy change.<sup>2</sup>

The problem that this paper addresses to is the welfare implication of setting up a 100% foreign owned subsidiary in the presence of an already formed JV between a

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<sup>1</sup> See the manual on foreign direct investment.

<sup>2</sup> Instability and breakdown of joint ventures are documented in a number of studies. For instance, see Franko (1971), Killing (1982), Kogut (1989) Harrigan (1988), Bleak and Earnst (1995), and Miller et al. (1996). The theoretical literature on international joint ventures includes, among others, Svejnar and Smith (1984), Marjit (1990), Chan and Hoy (1991), Yu and Tang (1992), Purkayastha (1993), Al-Saadon and Das (1996), Das (1998), Marjit and Mukherjee (1998, 2001), Mukherjee and Sengupta (2001) and Marjit, Mukherjee and Kabiraj (2004). The theoretical literature on JV instability and breakdown comprises of Kabiraj (1999), Roy Chowdhury and Roy Chowdhury (1999, 2001), Sinha (2001a, 2001b), Marjit and Roy Chowdhury (2004), and Kabiraj, Lee and Marjit (2005).

foreign firm and a local firm in a similar line of business.<sup>3</sup> In particular, we derive conditions under which subsidiary opening becomes profitable for the foreign partners, and at the same time welfare goes up for the host country. We show that if the local profit share is either relatively low or relatively high, then the foreign subsidiary will be opened and will enhance domestic welfare only if the foreign technology employed in the subsidiary is more efficient than the one used in the JV. However, if the local share holding is of the intermediate level, a subsidiary formation, along with a larger domestic welfare, is possible even when the subsidiary technology is inefficient relative to the JV's technology. On the other hand, there are situations when subsidiary opening is welfare improving but not privately profitable.

We then draw attention to a policy debate recently experienced in India. The present liberalization policy enables the foreign partners of the JVs to open their subsidiary competing in the same production line. Hence the local partners and the shareholders of the JVs are adversely affected by means of loss of payoffs. Naturally, the local firms lobby against such deregulation and FDI to safeguard their interest. It seems that being succumbed to this pressure the Indian Government had in 1998 introduced Press Note 18 (henceforth PN18). This tells that an automatic FDI approval will not be available to the foreign investors who have or had previous JV relations with the local partners. Accordingly, PN18 makes it obligatory for these investors to produce a no objection certificate (NOC) from the Indian partners so as to satisfy the Foreign Investment Promotion Board (FIPB) ensuring that the foreign partners' new investment proposals do not jeopardize the interests of the existing JV partners.<sup>4</sup>

This leads to the following question. Doesn't PN18 of 1998 series contradict the government's objective of deregulation and promoting foreign investment? PN18 also gives the FIPB the sole authority to decide whether an application for foreign investment

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<sup>3</sup> Given this objective, we have not discussed the possibility of the foreign firm buying out its domestic partner in the JV instead of setting up a subsidiary. However, there are situations when 'buy out' will be a better option for the foreign firm.

<sup>4</sup> See *Appendix A* for the statement of Press Note No. 18 (1998 Series). The FIPB is a special Board set up by the Government of India to deal with matters relating to FDI as well as promoting investment into the

will be accepted or not with or without further conditions. It is observed that the FIPB has occasionally overturned this clause and allowed new firms to be set up, which in turn increased competition in the market. For instance, the FIPB waived this requirement in respect of a proposal by a Saudi Arabian business house, *Amiantit*, from Graphite India when the Indian partner refused to give the NOC to *Amiantit*. The debate evolves around whether PN18 should be necessarily overruled by the FIPB. In other words, the question is whether PN18 should be superseded by the FIPB's discretionary powers. As we feel, this boils down to a welfare comparison between two states: the initial one where we have a JV, and the new one where we have two firms, viz., the existing JV and the foreign subsidiary.

National welfare should offset the gain of consumers' surplus against the loss of the existing JV, which, in all possibility, will have a dominant group of Indian shareholders. Two issues are important here once the foreign firm chooses to enter the market with a new subsidiary. First, whether such an MNC will necessarily improve welfare, i.e., the sum of local producer's surplus in the existing JV and overall consumer's surplus. Second, whether a safeguard in terms of an NOC issued by the affected partner has any economically meaningful purpose. As we show that even if the local partner does not wish to issue an NOC, welfare can very well improve. The more interesting is the case where the local partner is willing to issue an NOC against the compensating side-payment of the foreign partner, but the quality of technology, as brought into the new venture, does not generate an increase in welfare.

Therefore, it is necessary for the regulatory authority to carefully scrutinize those contracts mutually gainful between the partners. This is an interesting case where the society as a whole suffers but the shareholders of both firms gain. Hence, even if the clause that included PN18 is respected, the FIPB needs to have a cautious approach.

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country. By a recent notification the Govt. of India has withdrawn the NOC clause, but we feel theoretically the issue generates substantial interest.

One interesting aspect of this paper is that the quality of the technology in the new venture, which induces the foreign firm to open a subsidiary, depends on the share of the local firm in the existing venture. This is what determines the incentive of the foreign firm to go for such a deal. Similarly, from a policy perspective, technologies that are useful also depend on the extent of local firm's share in the existing venture. Therefore, technology and ownership become inseparable in the whole discussion. Earlier, in a different context, Marjit and Mukherjee (1998, 2001) have explored the consequence of equity ownership on the quality of the licensed technology within the same organization. However, in the current context, the loss to the local shareholders in the existing JV has to be weighed against the gain in consumers' surplus from the newly built organization, a gain which is directly and positively related with the quality of the technology. It is reassuring to state that marginal improvements in technology are unlikely to raise welfare, and, therefore, constitute a case against the FIPB approval without the relevant clause in PN18 being satisfied.

The lone paper that is partially related to our present work is by Mukherjee and Sengupta (2001). It has the similar framework like ours. But it is concerned with the optimal strategy choice of the foreign partners. The MNCs utilize the threat of opening fully owned subsidiaries if their bids to raise stakes in the JVs are rejected by the local partners. The paper focuses on the factors like the intensity of competition (that is, the number of outside entrants under full liberalization), the reversibility of investment in the initial JVs and the owner-manager relationship to discuss the results. In contrast, we derive welfare implications of the liberalization policy and focus on the debate on whether PN18 should be superseded by the FIPB's discretionary powers.

The plan of the paper is as follows. Section 2 sets up the model and provides the results relating to the incentive for setting up of a new venture and the consequent welfare effects. Section 3 looks more closely at the issue of NOC and welfare. Section 4 provides a slight digression when management of the new venture internalizes the profits of the joint venture. Section 5 concludes. In our analyses we assume that the new venture

brings in a technology which is at least as good as that of the existing venture. The more general case, of inferior technologies, is relegated to the appendix.

## 2. Model

Consider a joint venture (JV) formed between a local firm (call firm 1) and a foreign firm (call firm 2). Initially, the JV has monopoly in the local market. The market demand for the product is assumed to be linear<sup>5</sup> and is given by

$$P = a - Q, \quad a > 0 \quad (1)$$

where  $P$  is product price and  $Q$  is industry output. The unit cost of production by the JV is  $c_1$ , constant;  $0 < c_1 < a$ . Hence, the JV's output and profits are respectively:

$$Q_0 = \frac{a - c_1}{2} \quad \text{and} \quad \Pi_J^0 = \frac{(a - c_1)^2}{4}.$$

Let  $\alpha$  be the share of the local firm in JV's profits;  $0 < \alpha < 1$ . So,  $(1 - \alpha)$  is the share of the foreign firm. This gives the profits of the local and foreign firms:

$$\Pi_1^0(\alpha) = \alpha \Pi_J^0 \quad \text{and} \quad \Pi_2^0(\alpha) = (1 - \alpha) \Pi_J^0 \quad (2)$$

Then, domestic welfare, defined as the sum of consumers' surplus and local firm's profits, is:

$$W^0(\alpha) = \frac{1}{2} Q_0^2 + \Pi_1^0 = \frac{(1 + 2\alpha)}{8} (a - c_1)^2 \quad (3)$$

Now consider opening a subsidiary by the foreign partner of the JV in the local market. When subsidiary is opened, both the JV and the foreign subsidiary are assumed to compete in quantities in a Cournot fashion. We assume that the JV and the subsidiary have their independent management, and each management is concerned with maximizing its own firm's profit.<sup>6</sup>

<sup>5</sup> While most of the results of the paper may be derived under a more general setting, for convenience of exposition and interpretation we restrict to the assumption of linear demand.

<sup>6</sup> In section 4 we discuss the case when the subsidiary management seeks to maximize the total profits of the foreign firm from both types of organizations.

Let the unit cost of production of the subsidiary be  $c_2$ . So, effectively, the subsidiary can operate at a positive output level only if  $c_2 < \bar{c}_2 \equiv (a + c_1)/2$ , because when  $c_2 > \bar{c}_2$ , it will be monopoly of the JV. On the other hand, when  $c_2 \leq \underline{c}_2 \equiv 2c_1 - a$ , the subsidiary will drive out the JV from its operation, and the subsidiary emerges as the monopoly in the market.

Let  $\Pi_s$  and  $\Pi_j$  denote subsidiary and JV profits, respectively. Then the foreign firm's total profit with subsidiary in place is given by,

$$\Pi_2 = (1 - \alpha) \Pi_j + \Pi_s$$

and the corresponding local welfare is

$$W = \alpha \Pi_j + \frac{1}{2} Q^2$$

where  $Q$  is industry output consisting of the subsidiary output and the JV output. We can easily check that when subsidiary is opened, we have

$$Q = \begin{cases} (a - c_2)/2 & \text{if } 0 \leq c_2 \leq \underline{c}_2 \\ (2a - c_1 - c_2)/3 & \text{if } \underline{c}_2 < c_2 < \bar{c}_2 \end{cases}$$

$$\Pi_j = \begin{cases} 0 & \text{if } 0 \leq c_2 \leq \underline{c}_2 \\ (a - 2c_1 + c_2)^2 / 9 & \text{if } \underline{c}_2 < c_2 < \bar{c}_2 \end{cases} \quad \Pi_s = \begin{cases} (a - c_2)^2 / 4 & \text{if } 0 \leq c_2 \leq \underline{c}_2 \\ (a - 2c_2 + c_1)^2 / 9 & \text{if } \underline{c}_2 < c_2 < \bar{c}_2 \end{cases}$$

$$W = \begin{cases} (a - c_2)^2 / 8 & \text{if } 0 \leq c_2 \leq \underline{c}_2 \\ [\alpha (a - 2c_1 + c_2)^2 + (2a - c_1 - c_2)^2 / 2] / 9 & \text{if } \underline{c}_2 < c_2 < \bar{c}_2 \end{cases}$$

Now, opening of subsidiary will be profitable to the foreign firm iff  $(1 - \alpha)\Pi_j + \Pi_s > \Pi_2^0$ , and it is national welfare improving iff  $\alpha \Pi_j + \frac{1}{2} Q^2 > W^0$ . Quite obviously, when  $c_2 \leq \underline{c}_2$ , subsidiary becomes monopoly. So subsidiary opening necessarily becomes profitable. Such a subsidiary is also welfare improving, although there is only consumer surplus and no local profits. Further, it is natural and sensible to



assume that the foreign firm brings in its new subsidiary a technology which is at least as good as that of the existing JV. Hence, we restrict to the following assumption,<sup>7</sup>

$$c_2 \in I \equiv (\underline{c}_2, c_1] \quad (4)$$

## 2.1 Incentive Constraint of the Foreign Firm

Given  $c_2 \in I$ , if a 100% foreign owned subsidiary is opened, both the JV and the subsidiary will operate at positive output levels. This does not, however, necessarily mean that the foreign firm will open its subsidiary. For the new strategy to be profitable the following incentive constraint of the foreign firm must be satisfied:

$$\Pi_2(\alpha; c_2) = (1 - \alpha) \Pi_J + \Pi_S > \Pi_2^0(\alpha) \quad (5)$$

where,

$$\Pi_2(\alpha; c_2) = (1 - \alpha) \frac{(a - 2c_1 + c_2)^2}{9} + \frac{(a - 2c_2 + c_1)^2}{9}$$

We have,

$$\frac{\partial \Pi_2^0}{\partial \alpha} < 0, \quad \frac{\partial \Pi_2}{\partial \alpha} < 0, \quad \text{and} \quad \left| \frac{\partial \Pi_2^0}{\partial \alpha} \right| > \left| \frac{\partial \Pi_2}{\partial \alpha} \right|,$$

that is, both  $\Pi_2^0$  and  $\Pi_2$  are linear and downward sloping in  $\alpha$ , with  $\Pi_2^0$  being steeper than  $\Pi_2$ . Moreover,

$$\frac{\partial \Pi_2}{\partial c_2} < 0 \quad (\text{see Appendix B}) \quad \text{and} \quad \frac{\partial^2 \Pi_2}{\partial c_2 \partial \alpha} < 0 \quad \text{for} \quad c_2 \in (\underline{c}_2, c_1),$$

that is, as  $c_2$  falls,  $\Pi_2$  shifts up and becomes even flatter. Further, we have,

$$\Pi_2^0(0) = \frac{(a - c_1)^2}{4}, \quad \Pi_2^0(1) = 0, \quad \Pi_2(0; c_1) = \frac{2(a - c_1)^2}{9}, \quad \text{and} \quad \Pi_2(1; c_1) = \frac{(a - c_1)^2}{9}.$$

Finally,

$$\Pi_2(\alpha; c_2) = \frac{(a - c_2)^2}{4} \quad \text{for} \quad c_2 \leq \underline{c}_2, \quad \text{with} \quad \Pi_2(\alpha; \underline{c}_2) = (a - c_1)^2.$$

<sup>7</sup> This does not, however, mean that the foreign technology can never be inferior to the JV technology. We ignore this possibility in the text, simply because that it will not give any additional interesting result. We have, however, fully worked out the model in the appendix for all  $c_2 \in (\underline{c}_2, \bar{c}_2)$ .

Figure 1 portrays each of  $\Pi_2^0$  and  $\Pi_2$  as a function of  $\alpha$ . Immediately, we have the following lemma.

FIGURE 1 GOES HERE

**Lemma 1:**  $\exists c^0 \in I \mid \Pi_2(0; c_2) > \Pi_2^0(0) \Leftrightarrow c_2 < c^0$ .

**Proof.** Given the domain  $(c_2, c_1]$ , the equation  $\Pi_2(0; c_2) = \Pi_2^0(0)$  has the unique solution,  $c_2 = c^0 \equiv (11c_1 - a)/10$  (see Appendix C). Then the result follows, as

$$\frac{\partial \Pi_2}{\partial c_2} < 0 \quad \forall c_2 \leq c_1. \quad \blacklozenge$$

**Proposition 1:**

- (a) *Incentive constraint of the foreign firm is necessarily satisfied if it has sufficiently low cost technology.*
- (b) *The restriction on the efficiency of foreign technology becomes gradually relaxed as the local firm's share in the JV goes up.*

**Proof.**

- (a) Given Lemma 1, the result obviously follows because  $\Pi_2(\alpha; c_2) > \Pi_2^0(\alpha) \quad \forall c_2 < c^0$ .
- (b) Consider any  $c_2 \in [c^0, c_1]$ . Then  $\exists \tilde{\alpha}(c_2) \mid \Pi_2(\alpha; c_2) > \Pi_2^0(\alpha) \quad \forall \alpha \in (\tilde{\alpha}(c_2), 1)$ , with  $\frac{d\tilde{\alpha}}{dc_2} > 0$ . In particular, we have  $\tilde{\alpha}(c_1) = \frac{1}{5}$  and  $\tilde{\alpha}(c^0) = 0$ . Let us now define the inverse function of  $\tilde{\alpha}(c_2)$  as  $\tilde{c}_2(\alpha)$ . Then,  $\frac{d\tilde{c}_2}{d\alpha} > 0$  for  $\alpha \in (0, \tilde{\alpha}(c_1)]$ . This proves the result.<sup>8</sup>  $\blacklozenge$

Intuition of the result is simple. When the foreign firm opens its subsidiary, its payoff from the JV will fall, because the competitive pressure will reduce the JV profit. Now, if the foreign share in the JV is low (i.e.  $\alpha$  is high), the loss of payoff from the JV will be low, and therefore the level of technology to be used in the subsidiary required to

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<sup>8</sup> Obviously, when  $\alpha > \tilde{\alpha}(c_1)$ , any  $c_2 \leq c_1$  satisfies the incentive constraint of the foreign firm.

compensate the loss may not be very high. The higher the efficiency (i.e. the lower the cost of production) of the foreign firm, the larger the subsidiary payoff will be. So the higher the share of the foreign firm in the JV, the larger is the efficiency required to compensate the loss of payoff from the JV and make the opening of subsidiary profitable.

## 2.2 Welfare under Foreign Subsidiary

Domestic welfare, if the foreign firm subsidiary is opened, will go up if and only if

$$W(\alpha; c_2) = \alpha \Pi_J + \frac{1}{2} Q^2 > W^0(\alpha) \quad (6)$$

where

$$W(\alpha; c_2) = \alpha \frac{(a - 2c_1 + c_2)^2}{9} + \frac{1}{2} \frac{(2a - c_1 - c_2)^2}{9}$$

Then,

$$\frac{\partial W^0}{\partial \alpha} > 0, \quad \frac{\partial W}{\partial \alpha} > 0, \quad \text{and} \quad \frac{\partial W^0}{\partial \alpha} > \frac{\partial W}{\partial \alpha},$$

that is, both  $W^0$  and  $W$  are linear and increasing functions of  $\alpha$ , with  $W^0$  being steeper than  $W$ . Moreover,

$$\frac{\partial W}{\partial c_2} < 0 \quad (\text{see Appendix D}) \quad \text{and} \quad \frac{\partial^2 W}{\partial c_2 \partial \alpha} > 0 \quad \text{for } c_2 \in (\underline{c}_2, c_1),$$

that is, as  $c_2$  falls,  $W$  shifts up and becomes less and less steep. Further, we have,

$$W^0(0) = \frac{(a - c_1)^2}{8}, \quad W^0(1) = \frac{3(a - c_1)^2}{8}, \quad W(0; c_1) = \frac{2(a - c_1)^2}{9}, \quad \text{and} \quad W(1; c_1) = \frac{3(a - c_1)^2}{9}.$$

Finally,

$$W(\alpha; c_2) = \frac{(a - c_2)^2}{8} \quad \text{for } c_2 \leq \underline{c}_2, \quad \text{with } W(\alpha; \underline{c}_2) = \frac{(a - c_1)^2}{2}.$$

Figure 2 portrays  $W^0(\alpha)$  and  $W(\alpha; c_2)$  functions. We can derive the following lemma.

FIGURE 2 GOES HERE

**Lemma 2:**  $\exists c^* \in I \mid W(1; c_2) > W^0(1) \Leftrightarrow c_2 < c^*$ .

**Proof.** The equation  $W(1; c_2) = W^0(1)$  has the unique solution  $c_2 = c^* \equiv (3c_1 - a)/2$  in the interval  $(\underline{c}_2, c_1)$ , and  $\frac{\partial W}{\partial c_2} < 0 \quad \forall c_2 \leq c_1$ . ♦

### Proposition 2

- (a) *Foreign subsidiary in the presence of the existing JV will necessarily increase domestic welfare if the subsidiary has sufficiently low unit cost of production.*
- (b) *The higher the local share in the JV, the lower the marginal cost of the foreign subsidiary is called for if domestic welfare were to go up.*

### Proof.

- (a) Given Lemma 2, obviously,  $W(\alpha; c_2) > W^0(\alpha) \quad \forall c_2 < c^*$ .
- (c) Consider any  $c_2 \in [c^*, c_1]$ . Then  $\exists \hat{\alpha}(c_2) \mid W(\alpha; c_2) > W^0(\alpha) \quad \forall \alpha \in (0, \hat{\alpha}(c_2))$ , with  $\frac{d\hat{\alpha}}{dc_2} < 0$ . In particular, we have  $\hat{\alpha}(c_1) = \frac{7}{10}$  and  $\hat{\alpha}(c^*) = 1$ . Therefore, for any  $\alpha < 7/10$  we have  $W(\alpha; c_2) > W^0(\alpha) \quad \forall c_2 \leq c_1$ . Now, we define the inverse function of  $\hat{\alpha}(c_2)$  as  $\hat{c}_2(\alpha)$ . Then,  $\frac{d\hat{c}_2}{d\alpha} < 0$  for  $\alpha \in [\hat{\alpha}(c_1), 1)$ . This completes the proof. ♦

The results can be explained as follows. When subsidiary is opened, industry output goes up, and as a result consumer surplus goes up. On the other hand, the local firm's payoff falls to the extent the JV profit falls because of the competition. As long as the local share is not very large, the loss of local firm profit is overcompensated by an increase in consumer surplus due to opening up a foreign subsidiary. Hence, domestic welfare always goes up whenever subsidiary is opened if the local share is not very large. Then, as the local share goes up, there will be a larger loss of local profits due to competition, and hence, a larger cost efficiency of the foreign subsidiary is required so that the industry output goes up sufficiently to over-compensate the loss of profits. In particular, if the local share is sufficiently large, the subsidiary must have to be much more cost efficient than the JV.

### 2.3 Welfare Implications of Allowing Foreign Subsidiary

In this section we portray situations when foreign subsidiary is opened subject to the approval of the local government, provided that the opening of a subsidiary is profitable to the foreign firm. We assume that subsidiary will be allowed if it is welfare improving. Thus foreign subsidiary will emerge when conditions (5) and (6) are satisfied simultaneously. Now given Propositions 1 and 2, immediately we have the following result.

**Proposition 3:** *Given any local share in the JV, the foreign firm will open a subsidiary, and this will lead to a higher national welfare if the subsidiary technology is sufficiently efficient.*

**Proof:** Consider any  $c_2 < \min\{c^0, c^*\}$ . Then, conditions (5) and (6) are necessarily satisfied for any  $\alpha \in (0, 1)$ .<sup>9</sup> ♦

As a special case, the following result may be noted.

**Corollary 1:** *When  $c_2 = c_1$ , new foreign subsidiary opening is profitable as well as welfare improving if and only if  $1/5 < \alpha < 7/10$ .*

The result obviously shows that there is a wide range of  $\alpha$  (including  $\alpha \geq 1/2$ ) for which new subsidiary should be allowed, because it enhances overall welfare even when the quality of the technology is the same in two firms.

It is now clear that, given any  $\alpha$ , a welfare improving subsidiary always exists if  $c_2$  is sufficiently low. Its converse is also true: given any  $c_2 \in (\underline{c}_2, c_1]$ ,  $\exists \alpha$  satisfying both the participation constraint and the welfare improving condition. As  $c_2$  falls from  $c_1$ , the relevant interval of  $\alpha$ , viz.,  $(\tilde{\alpha}(c_2), \hat{\alpha}(c_2))$  goes up, as  $\tilde{\alpha}' > 0$  and  $\hat{\alpha}' < 0$ . However, for the existence of such an  $\alpha$ ,  $c_2 \leq c_1$  is not necessary. In fact, satisfying both (5) and (6),

there exists  $\alpha$  even when  $c_2 > c_1$ , provided that  $c_2$  is below a critical level.<sup>10</sup> The following observations may be noted in the context of our model.

- If the local profit share is either very low (i.e.,  $\alpha < 1/5$ ) or very high (i.e.,  $\alpha > 7/10$ ), then, for the subsidiary to be opened and to improve welfare, it is necessary that the foreign firm employ a more efficient technology than that of the JV. In other words, in such a situation the local country can reap the benefit of a superior technology. In fact, in a country like India, one objective of allowing direct foreign investment is to encourage import or transfer of foreign superior technologies to the home country. On the other hand, if the local profit share is of an intermediate level (i.e.,  $\alpha \in [1/5, 7/10]$ ), there can be situations when foreign subsidiary is approved even when the subsidiary employs an inefficient technology relative to the JV (see results (ii) and (iii) in *Appendix D*).
- There can be situations when a new subsidiary is profitable to the foreign firm but not welfare improving; hence such a subsidiary should not be permitted. For instance, suppose  $\alpha$  is close to 1. In this case, for all  $c_2 \leq c_1$  opening a subsidiary is profitable to the foreign firm. But welfare will be larger if and only if its cost is below a critical level. In particular, welfare is reduced if  $c_2 \in (\hat{c}_2(\alpha), c_1)$ . Note that here, although the foreign firm may possess a technology superior to that of the JV, allowing subsidiary may reduce welfare. In such a situation information about the true foreign technology is important, because the foreign firm has incentives to misreport its technology. In contrast, information about foreign technology is irrelevant if  $\alpha$  is very small, because in this case the foreign firm will apply only if its cost is below a certain critical level and that definitely enhances the welfare.
- There are also situations when opening of a subsidiary is welfare improving but not profitable. For instance, suppose that  $\alpha$  is close to 0. Therefore, a new subsidiary

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<sup>9</sup> In our case, we have, in fact,  $c^* < c^0$ .

<sup>10</sup> This could be shown using the results of *Appendix B* and *D*.

will always lead to a higher welfare for all  $c_2 \leq c_1$ . But it will be privately profitable only if  $c_2 < \tilde{c}_2(\alpha)$ . Hence, opening of a subsidiary is not profitable when  $c_2 \in (\tilde{c}_2(\alpha), c_1)$ . This case might give an interesting scenario. There can be situations when subsidizing the foreign firm to open a subsidiary might be welfare improving. This will certainly be the possibility if the foreign firm has a cost  $\tilde{c}_2(\alpha) + \varepsilon$  per unit where  $\varepsilon > 0$  is very small. Thus, there are situations when providing some concessions to the foreign investors might be a reasonable decision. Again, information here plays a crucial role. If such concessions are available, the foreign firm may have incentive to understate its efficiency.

### 3. NOC Agreement and Its Implication

As the local government relaxes restrictions on equity holding of a foreign firm, the foreign partner of the JV gets an opportunity of opening an independent subsidiary that will compete with the JV. Hence the local partner and the shareholders of the JVs will suffer from the loss of payoffs. For instance, in India foreign companies, which were able to extricate themselves from the existing JVs with Indian companies and set up wholly owned enterprises of their own, were virtually destroying the business of their erstwhile Indian partners. So the policies like deregulation and opening up have come under widespread criticism. This has also created tensions in the relationship already forged between Indian and foreign companies. Hence Press Note 18 (1998 series) of Government of India, Ministry of Industry, was introduced at the behest of the Indian shareholders and promoters in a joint venture arrangement with a foreign partner. Accordingly, this has placed the Indian companies in a position where the foreign partners are to seek their support in respect of any new partnerships and ventures they wish to undertake. So PN18 in a sense effectively takes away the option of an automatic route for foreign collaborators who have or had previous ventures or tie-ups in the same or allied fields in India. The government seems to give excessive importance to the receipt of a no objection certificate (NOC) from the Indian partner as a proof to satisfy the Foreign Investment Promotion Board (FIPB) that the foreign partner's new investment proposal does not conflict with the interests of the existing JV. Thus, in

practice, furnishing of an NOC has become mandatory on a foreign company, which applies for approval to set up a new venture in India in the same or allied field. In this section we study the implication of this NOC requirement (hence PN18). We study under what situations getting an NOC will not be a problem to the foreign partner. We derive its welfare implication, that is, we study whether when subsidiary opening is mutually profitable to the JV partners, domestic welfare may or may not go up. We also study whether there are situations where the local government should waive the requirement of obtaining of an NOC.

First consider the condition for which the foreign firm can successfully strike an NOC agreement with the local partner by paying a fixed fee. We assume that if an NOC is produced, the government will approve the application. To make the scenario interesting, we further assume that if the local firm does not agree to release an NOC, there is a probability ( $0 \leq r \leq 1$ ) that the foreign firm will appear to the FIPB and the FIPB will clear the formation by exercising its discretionary powers. Obviously, if  $r = 0$ , the local firm's reservation payoff will be its initial payoff from the JV, i.e.,  $\alpha\Pi_J^0$ , whereas  $r > 0$  means that its reservation payoff will get reduced to  $\alpha[(1-r)\Pi_J^0 + r\Pi_J]$ . Then, we have the following result.

**Proposition 4:** *An NOC agreement is mutually profitable if and only if the post-subsidiary industry profit is greater than the pre-subsidiary industry profit, that is,  $\Omega^S = \Pi_J + \Pi_S > \Pi_J^0$ .*

**Proof:** See Appendix E. ♦

Clearly, in our earlier notation,  $\Omega^S = \Pi_2(0; c_2)$  and  $\Pi_J^0 = \Pi_2^0(0)$ . Hence, following the result of Lemma 1, we have

$$\Omega^S(c_2) > \Pi_J^0 \text{ iff } c_2 < c^0 \equiv (11c_1 - a)/10. \quad (7)$$

This tells that when  $c_2 < c^0$ , the foreign firm can compensate the loss of payoff of the local firm fully so that the latter will agree to give an NOC to the foreign firm to open its subsidiary.



We can now provide a welfare analysis of an NOC agreement. We assume that  $c_2 < c^0$ , so that there is an NOC agreement between the firms, that is, the foreign firm is in a position to furnish an NOC with its subsidiary application, and then the government will clear such an application. Then, in this context, the important question is: Will the local welfare necessarily go up?

First, consider the case when  $r = 0$ . Then, in our structure the answer is obviously 'yes', because the NOC clause ensures that the local partner is not worse off (that is, the local firm secures at least its pre-subsidary payoff), whereas the competition will certainly increase industry output and consumers' welfare. Thus, even if the local government does not know the exact technology of the foreign subsidiary, it can be confident about the quality of the foreign technology to be used by the subsidiary.

Now consider  $r > 0$ . In this case, while an NOC agreement will occur, the local firm will be worse off compared to no-subsidary situation. Hence there is a possibility that the increase in consumers' surplus will not outweigh the loss in domestic firm's payoff. To see this, consider the scenario as described by the foreign technology level  $c_2 \in (c^*, c^0)$ , with the local profit share  $\alpha > \hat{\alpha}(c_2)$ . Under this scenario, although the firms strike an NOC agreement, the local economy suffers from the loss of welfare. Welfare would definitely go up if  $c_2 < c^*$ .

On the other hand, it is perfectly plausible that an NOC agreement is not profitable to write, but a subsidiary leads to a higher domestic welfare. This happens if  $c_2 \in (c^0, c_1]$ . The NOC clause clearly prevents all such innovations or transfer of technologies to take place, although these appear to be socially valuable. Note that  $c_1 > c^0 > c^*$ , so that we have  $7/10 = \tilde{\alpha}(c_1) < \tilde{\alpha}(c^0) < \hat{\alpha}(c^*) = 1$ . Now consider any  $c_2 \in (c^0, c_1]$ . Then subsidiary opening would be profitable and welfare enhancing if  $\alpha$  belongs to the interval  $(\tilde{\alpha}(c_2), \hat{\alpha}(c_2))$ . Existence of an NOC clause appears to be detrimental to the spirit of competition. It is contradictory to the policy of DFI and deregulation. This calls for reviewing PN18.

#### 4. Internalization

So far we have assumed that the management of the subsidiary is concerned with maximizing the subsidiary profit. In this section we assume that the subsidiary management will maximize the total profit of the foreign firm coming from two sources – from its share in JV profits and from its subsidiary. Thus the subsidiary management will internalize the behavior of the JV while deciding the subsidiary output. However, in this section we restrict to the assumption that subsidiary has the same cost of production, i.e.,  $c_2 = c_1 = c$ .

We consider two cases: (i)  $\alpha < \frac{1}{2}$  and (ii)  $\alpha \geq \frac{1}{2}$ . When  $\alpha < \frac{1}{2}$ , we assume that the foreign firm controls the JV. Quite naturally, when it opens up its subsidiary, its optimal strategy is to set  $q_1 = 0$  and  $q_2 = q^m$ , i.e., it will produce monopoly output in its own firm, whereas it will choose 0 output for the JV. In this case, the local firm will get zero profit and all industry profits will go to the foreign firm. Since industry output in the post-subsidiary situation will be the same as the initial level, consumers' surplus will remain unchanged, but local firm's profit will drop to zero. Hence the overall welfare will fall if subsidiary is opened. Below we consider the case when  $\alpha \geq \frac{1}{2}$  so that the local firm has control over the JV output decision.

Under this situation, the problem of the local management is:

$$\max_{q_1} \alpha(a - q_1 - q_2 - c) q_1$$

and the foreign management's problem is:

$$\max_{q_2} (1 - \alpha)(a - q_1 - q_2 - c) q_1 + (a - q_1 - q_2 - c) q_2$$

The simultaneous solution of these two problems will give:

$$q_1 = \frac{a - c}{2 + \alpha}, \quad q_2 = \frac{\alpha(a - c)}{2 + \alpha} \quad \text{and} \quad Q = q_1 + q_2 = \frac{(1 + \alpha)}{2 + \alpha} (a - c) > Q_0$$

Hence consumer's surplus must go up in this case.

The foreign firm's overall profit is

$$\Pi_2 = \frac{(a-c)^2}{(2+\alpha)^2} > \Pi_2^0$$

and the local firm's profit is:

$$\Pi_1 = \frac{\alpha(a-c)^2}{(2+\alpha)^2} < \Pi_1^0$$

Thus the local profits fall, but the foreign firm's profits must go up. This is so because the foreign firm had the option to choose  $q_2 = 0$ .

Hence, given any  $\alpha$ , the foreign firm has always incentives to open a subsidiary if internalization is possible. This is distinctly different from the situation when internalization does not occur, and then subsidiary opening is profitable if and only if

$$\alpha > \frac{1}{5}.$$

Welfare, when internalization occurs, will be:

$$W = \frac{(\alpha^2 + 4\alpha + 1)}{2(2+\alpha)^2} (a-c)^2$$

Therefore, when subsidiary is formed, domestic welfare will go up if and only if  $W > W^0$ , i.e.,

$$L(\alpha) \equiv 4(\alpha^2 + 4\alpha + 1) > (2+\alpha)^2(1+2\alpha) \equiv R(\alpha)$$

Note that both  $L(\alpha)$  and  $R(\alpha)$  are increasing and concave, with  $L(0) = R(0) < L(1) < R(1)$ , and  $L'(0) > R'(0)$ .

Graphs of  $L(\alpha)$  and  $R(\alpha)$  are drawn in *Figure 3*. Further note that  $L\left(\frac{1}{2}\right) > R\left(\frac{1}{2}\right)$ . Hence

$$\exists \alpha^0, \frac{1}{2} < \alpha^0 < 1, \quad | \quad L(\alpha) > R(\alpha) \quad \forall \alpha < \alpha^0,$$

that is, given  $\alpha \geq \frac{1}{2}$ ,  $W > W^0$  iff  $\alpha \in \left(\frac{1}{2}, \alpha^0\right)$ .

FIGURE 3 GOES HERE

Summarizing the above discussion we have the following result.

**Proposition 5:** *Assume that both the JV and the subsidiary have the same technology and that the foreign firm management can internalize its decision to maximize the overall foreign firm's profits. Then, given that the local firm controls the JV by holding at least a 50% share of the JV, foreign subsidiary opening is always profitable, but it is welfare improving if and only if the local firm's share is not too large i.e.,  $\alpha \in (\frac{1}{2}, \alpha^0)$ ; otherwise it will be welfare reducing.*

## 5. Conclusion

In the recent years there has been debate on whether the FIPB should supersede PN18 and apply its discretionary powers to approve FDI and allow the foreign firms to open 100% owned subsidiary. The source of the debate is the following. On the one hand, the Indian Government is encouraging foreign direct investment and import of superior foreign technologies. On the other, PN18 has made it mandatory that the foreign firm, which has already some alliance with the local firms, will produce an NOC from the local partner if it is to apply for getting an approval from the FIPB for opening a subsidiary in the local country. If foreign subsidiary is allowed to compete with the existing JV, the interests of the local partners and that of the shareholders are jeopardized. Hence they lobby for some sort of protection. This has resulted in announcing PN18. Then obviously, PN18 contradicts the government's FDI policies. Hence it is argued that either PN18 should be scrapped, or, the FIPB should apply its discretion to approve FDI's even if the NOC is not available from the local partners.

To analyze whether subsidiary should be allowed to open, we have assumed that the local government cares for domestic welfare, which is the sum of consumers' surplus and local firms' profits. Hence we have derived welfare implication of opening a subsidiary and the NOC clause. We have shown that if the subsidiary technology is good enough, there is no contradiction between the NOC clause and welfare objective. The conflict arises when the subsidiary technology is not sufficiently good. We have shown that in such a situation opening a new subsidiary can lead to higher welfare, but the NOC

prescribed by PN18 prevents this unless the FIPB applies its discretionary power. We have also shown that there is a close association between share holdings of the foreign firms in the JV and the level of efficiency of the foreign technology needed both for the feasibility and desirability of a new subsidiary. The larger the local share in the JV, the higher the efficiency requirement is for the subsidiary to be welfare enhancing. There are also situations where foreign subsidiary is profitable and welfare improving, but the subsidiary technology is inferior to that of the JV. In particular, when the subsidiary technology is as good as the JV technology, there is a wide range of local shares for which foreign subsidiary may be approved. Hence, the NOC clause appears to be too restrictive; it discourages foreign investment and deprives the country to achieve otherwise a higher welfare.

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## APPENDIX

### A. Press Note 18 (1998 Series)

Press note 18 (1998 Series) states the following.

The government have reviewed the present Guidelines relating to approval of foreign/technical collaborations under the automatic route and after careful consideration it has been decided that foreign financial/technical collaborators with previous ventures/tie-up in India would be subjected to the following guidelines:

- (i) Automatic route for FDI and/or technology collaboration would not be available to those who have or had any previous joint venture or technology transfer/trade-mark agreement in the same or allied field in India. RBI, therefore, have to stipulate necessary declaration before applications for the automatic route are taken on record.
- (ii) Investors of technology to the suppliers of the above category therefore will have to necessarily seek the FIPB/PAB approval route for joint ventures or the technology transfer agreements (including trade-mark) giving detailed circumstances in which they find it necessary to set-up a new venture/enter into technology transfer (including trade-mark).
- (iii) The onus is clearly on such investors/technology suppliers to provide the requisite justification as also proof of the satisfaction of FIPB/PAB that the new proposal would not in any way jeopardize the interests of the existing joint ventures or technology/trade-mark partner or other stakeholders. It will be at the sole discretion of FIPB/PAB to either approve the application with or without conditions or reject in toto duly recording the reasons for doing so.

### B. Characterization of the function $\Pi_2(\alpha; c_2)$ for any $c_2 \in (\underline{c}_2, \bar{c}_2)$

We have,

$$\Pi_2(\alpha; c_2) = (1-\alpha) \frac{(a-2c_1+c_2)^2}{9} + \frac{(a-2c_2+c_1)^2}{9}$$

Therefore,

$$\frac{\partial \Pi_2}{\partial c_2} < 0 \Leftrightarrow \alpha > \check{\alpha}(c_2) \equiv \frac{5c_2 - 4c_1 - a}{a - 2c_1 + c_2}$$

Moreover,

$$\frac{d\check{\alpha}}{dc_2} > 0, \text{ with } \check{\alpha}(c_2) < 1, \text{ as } c_2 < \bar{c}_2.$$

Finally,

$$\check{\alpha}(c_2) \leq 0 \Leftrightarrow c_2 \leq \dot{c}_2 \equiv \frac{a + 4c_1}{5} > c_1$$

Therefore, for any  $\alpha \in (0, 1)$ ,  $\exists \check{c}_2(\alpha)$ ,  $\dot{c}_2 < \check{c}_2(\alpha) < \bar{c}_2$  such that

$$\forall c_2 \in (\underline{c}_2, \check{c}_2(\alpha)) \quad \alpha > \check{\alpha} \quad \Rightarrow \quad \frac{\partial \Pi_2}{\partial c_2} < 0$$

and  $\forall c_2 \in (\check{c}_2(\alpha), \bar{c}_2) \quad \alpha < \check{\alpha} \quad \Rightarrow \quad \frac{\partial \Pi_2}{\partial c_2} > 0.$

Hence,  $\Pi_2(\alpha; c_2)$  reaches minimum<sup>11</sup> at  $c_2 = \check{c}_2(\alpha)$ . Note further that  $\check{c}'(\alpha) > 0$ .

The other (limiting) extreme values are:

$$\Pi_2(\alpha; \underline{c}_2) = (a - c_1)^2 \text{ and } \Pi_2(\alpha; \bar{c}_2) = \frac{(1 - \alpha)}{4}(a - c_1)^2 = \Pi_2^0(\alpha)$$

Also the value at  $c_2 = c_1$  is  $\Pi_2(\alpha; c_1) = \frac{(2 - \alpha)}{9}(a - c_1)^2$ .

Hence, given any  $\alpha$ , we can derive the following result:

(a)  $\exists \check{c}_2(\alpha)$ ,  $\underline{c}_2 < \check{c}_2(\alpha) < \bar{c}_2(\alpha) \mid \Pi_2(\alpha; c_2) \geq \Pi_2^0(\alpha) \Leftrightarrow c_2 \leq \check{c}_2(\alpha)$ , and

(b)  $\check{c}_2(\alpha) \leq c_1$  according as  $\alpha \leq \frac{1}{5}$ .

### C. Proof of the existence of $c^0$

We have,

$$\Pi_2(0; c_2) = \frac{(a - 2c_1 + c_2)^2}{9} + \frac{(a - 2c_2 + c_1)^2}{9} \text{ and } \Pi_2^0(0) = \frac{(a - c_1)^2}{4}$$

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<sup>11</sup>  $\check{c}_2(\alpha)$  can be solved from  $\frac{5c_2 - 4c_1 - a}{a - 2c_1 + c_2}$ , i.e.,  $\check{c}_2(\alpha) = \frac{a(1 + \alpha) + 2c_1(2 - \alpha)}{5 - \alpha}$ . Hence,

$$\Pi_2(\alpha; \check{c}_2(\alpha)) = \frac{1 - \alpha}{5 - \alpha} (a - c_1)^2.$$

We can easily see that  $\Pi_2(0; c_2)$  is strictly convex, with a unique minimum at

$$c_2 = \hat{c} \equiv \frac{a + 4c_1}{5}, \quad c_1 < \hat{c} < \bar{c}_2, \quad \text{and } \Pi_2(0; c_2) = \Pi_2^0(0) \text{ for } c_2 \geq \bar{c}_2, \quad \Pi_2(0; c_2) = \frac{(a - c_2)^2}{4}$$

for  $c_2 \leq \underline{c}_2$ , and  $\Pi_2(0; \underline{c}_2) > \Pi_2(0; \bar{c}_2) = \Pi_2^0(0) > \Pi_2(0; c_1)$ . Therefore,

$$\exists c^0 \mid \Pi_2(0; c_2) > \Pi_2^0(0) \quad \text{iff } c_2 < c^0 \equiv (11c_1 - a)/10.$$

#### D. Characterization of $W(\alpha; c_2)$ function for any $c_2 \in (\underline{c}_2, \bar{c}_2)$

We have,

$$W(\alpha; c_2) = \alpha \frac{(a - 2c_1 + c_2)^2}{9} + \frac{1}{2} \frac{(2a - c_1 - c_2)^2}{9}$$

Then,

$$\frac{\partial W}{\partial c_2} < 0 \Leftrightarrow \alpha < \bar{\alpha}(c_2) \equiv \frac{2a - c_1 - c_2}{2(a - 2c_1 + c_2)}$$

Also

$$\frac{d\bar{\alpha}}{dc_2} < 0 \text{ with } \bar{\alpha}(\underline{c}_2) = \infty, \quad \bar{\alpha}(c_1) = 1 \text{ and } \bar{\alpha}(\bar{c}_2) = \frac{1}{2}.$$

Therefore, for any  $\alpha \leq \frac{1}{2}$ ,  $\alpha < \bar{\alpha} \Rightarrow \frac{\partial W}{\partial c_2} < 0 \quad \forall c_2 \in 1$ ,

and when  $\alpha \in (\frac{1}{2}, 1)$ ,  $\exists \bar{c}_2(\alpha)$ ,  $c_1 < \bar{c}_2(\alpha) < \bar{c}_2$ , such that

$$\forall c_2 \in (\underline{c}_2, \bar{c}_2(\alpha)), \quad \alpha < \bar{\alpha} \Rightarrow \frac{\partial W}{\partial c_2} < 0$$

and  $\forall c_2 \in [\bar{c}_2(\alpha), \bar{c}_2)$ ,  $\alpha > \bar{\alpha} \Rightarrow \frac{\partial W}{\partial c_2} > 0$ .

Thus  $W(\alpha; c_2)$  reaches minimum<sup>12</sup> at  $c_2 = \bar{c}_2(\alpha)$  and  $\bar{c}_2'(\alpha) < 0$ .

The extreme (limiting) values of  $W(c_2; \alpha)$  are:

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<sup>12</sup>  $\hat{c}_2(\alpha)$  is solved from  $\alpha = \frac{2a - c_1 - c_2}{2(a - 2c_1 + c_2)}$ , i.e.,  $\hat{c}_2(\alpha) = \frac{2a(1 - \alpha) + c_1(4\alpha - 1)}{2\alpha + 1}$  and  $W(\hat{c}_2(\alpha); \alpha) =$

$$\frac{\alpha}{2\alpha + 1} (a - c_1)^2.$$



$$W(\alpha; \underline{c}_2) = (a - c_1)^2 / 2 \text{ and } W(\alpha; \bar{c}_2) = \frac{(1 + 2\alpha)}{8} (a - c_1)^2 = W^0(\alpha)$$

$$\text{Also the value at } c_2 = c_1 \text{ is } W(\alpha; c_1) = \left(\frac{2 + \alpha}{9}\right) (a - c_1)^2.$$

Hence, we derive following results.

$$(a) \text{ Whenever } \alpha \in \left(0, \frac{1}{2}\right], W(\alpha; c_2) > W^0(\alpha) \quad \forall c_2 \in I.$$

$$(b) \text{ If } \alpha \in \left(\frac{1}{2}, 1\right), \exists \hat{c}_2(\alpha), \underline{c}_2 < \hat{c}_2(\alpha) < \bar{c}_2, \text{ such that}$$

$$\forall c_2 \in, (\underline{c}_2, \hat{c}_2(\alpha)), W(\alpha; c_2) > W^0(\alpha) \text{ and}$$

$$\forall c_2 \in, (\hat{c}_2(\alpha), \bar{c}_2), W(\alpha; c_2) < W^0(\alpha).$$

$$(c) \text{ Given } \alpha \in \left(\frac{1}{2}, 1\right), \hat{c}_2(\alpha) \underset{>}{\leq} c_1 \text{ according as } \alpha \underset{<}{\geq} \frac{7}{10}.$$

Combining the results of *Appendices B and D* we can derive the following results: Foreign subsidiary will be profitable and domestic welfare enhancing under the following situations.

$$(i) \quad \alpha \in \left(0, \frac{1}{5}\right) \text{ and } c_2 < \tilde{c}_2(\alpha); \tilde{c}_2(\alpha) < c_1,$$

$$(ii) \quad \alpha \in \left[\frac{1}{5}, \frac{1}{2}\right] \text{ and } c_2 < \tilde{c}_2(\alpha); \tilde{c}_2(\alpha) > c_1,$$

$$(iii) \quad \alpha \in \left(\frac{1}{2}, \frac{7}{10}\right] \text{ and } c_2 < \min \{\tilde{c}_2(\alpha), \hat{c}_2(\alpha)\}; \min \{\tilde{c}_2(\alpha), \hat{c}_2(\alpha)\} > c_1,$$

$$(iv) \quad \alpha \in \left(\frac{7}{10}, 1\right) \text{ and } c_2 < \hat{c}_2(\alpha); \hat{c}_2(\alpha) < c_1.$$

### E. Conditions for an NOC Agreement

Let  $F > 0$  be the side-payments to be made by the foreign firm under the agreement for getting the NOC from the local firm. Then, such an  $F$  must satisfy the following constraints of the local and foreign firm, respectively, that is,

$$\alpha \Pi_j + F \geq \alpha[(1 - r)\Pi_j^0 + r\Pi_j],$$

$$\text{i.e., } F \geq \alpha[(1 - r)(\Pi_j^0 - \Pi_j)]$$

and

$$(1-\alpha)\Pi_J + \Pi_S - F \geq (1-r)(1-\alpha)\Pi_J^0 + r[(1-\alpha)\Pi_J + \Pi_S]$$

$$\text{i.e., } F \leq (1-r)[\Pi_S - (1-\alpha)(\Pi_J^0 - \Pi_J)]$$

Hence,  $\exists F > 0$  if and only if

$$\alpha[(1-r)(\Pi_J^0 - \Pi_J)] < (1-r)[\Pi_S - (1-\alpha)(\Pi_J^0 - \Pi_J)]$$

$$\text{i.e., } \Pi_J^0 < \Pi_J + \Pi_S = \Omega^S.$$

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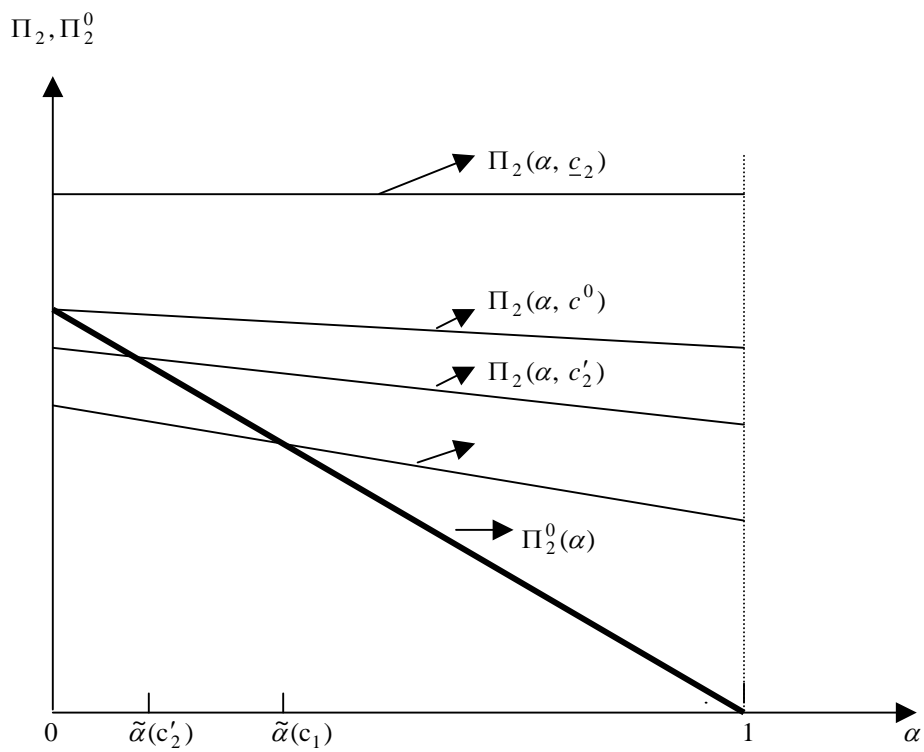


Figure 1: Conditions for subsidiary profitability

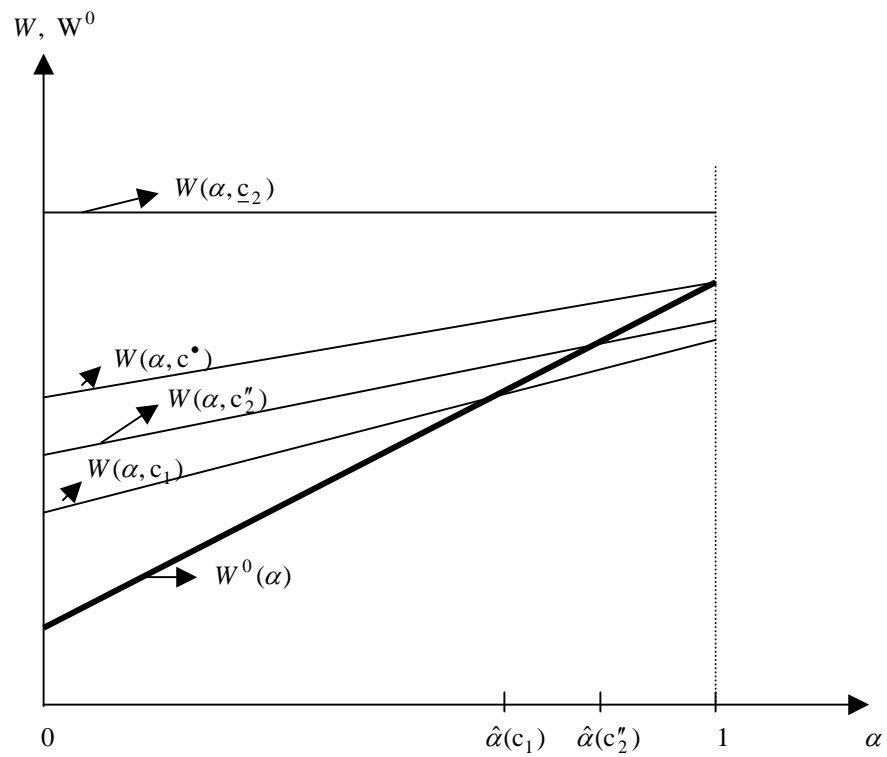


Figure 2: Conditions for welfare increase

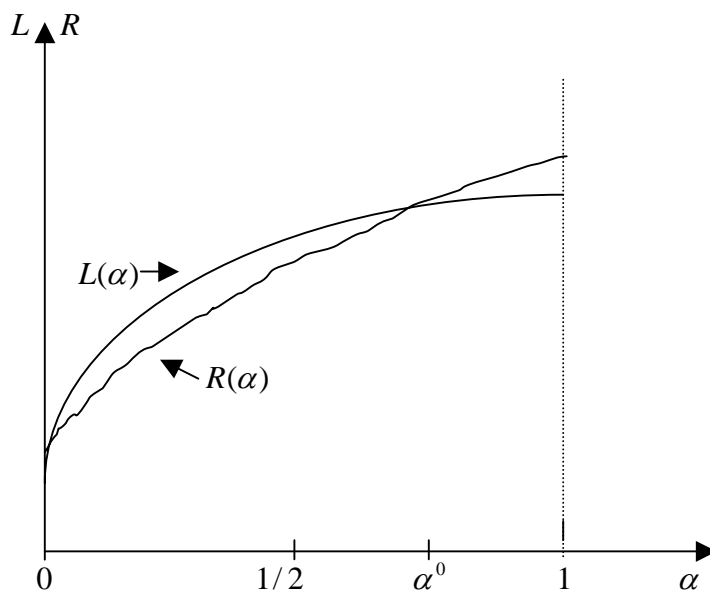


Figure 3: Subsidiary under internalization