Foreign ownership, international joint ventures and strategic investment

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Abstract

We investigate the strategic relationship between a foreign firm and a local firm in an international joint venture (IJV). We develop a simple partial equilibrium model in which a local firm invests in skills, which affects the productivity of the IJV, and the foreign firm decides whether to implement an IJV or not. In equilibrium, foreign ownership is a key factor that determines the investment level and the foreign firm's strategy. If foreign ownership is too low or too high, the foreign firm cannot induce the local partner to invest in skills, a situation that provides the lowest payoff for both agents. If it is at a medium level, the local partner invests in management skill and the foreign firm chooses the IJV strategy. In this case, both agents receive a higher payoff.

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1 Introduction

As the production market is expanding, an increasing number of firms are shifting their production to an unexplored area and to gain a larger market share. A host country can also benefit from the entry of foreign firms, which may become active its production market and provide benefits such as production spillover and infrastructure building. In particular, international joint ventures (IJVs) are common in inactive production markets or industries as the first phase of entry to local production. In some cases, foreign firms can produce in a local market only via IJV projects due to foreign equity caps or difficulty controlling local resources. We focus on two important factors which influence IJV project implementation and its performance, resource complementarity and foreign ownership.

When firms enter joint ventures, whether they perceive critical resource complementarity or not is an important key factor (Beamish, 2008; Chung, Singh, and Lee, 2000; Gulati, 1995; Inkpen and Beamish, 1997). That is, a foreign firm has good production technology (a technology related resource), while a local partner has knowledge-related resources, skills in managing a local labor force, and knowledge of marketing networks and consumers tastes. These latter two resources have a complementary relationship. In other words, the degree of complementarity between partners is critical for their IJV to profit. While multinational firms prioritize the skills of a local partner in an IJV project, a local partner or host country needs to invest in order to attract foreign firms if an IJV project will be profitable

Foreign ownership works by allocating profit between a foreign firm and its local partner determined by negotiation or restricted by government regulation or other aspects of the production environment. It affects the strategic behavior of agents in IJV projects as well as IJV performance. Local firm with lower profit have no incentive to attract foreign firms if the foreign ownership is too large. In fact, some host countries impose foreign equity caps by industry. Unrestricted foreign ownership promotes foreign direct investment (Contractor, 1991). We consider how foreign ownership affects overseas strategy based on the strategic relationship between partners.

In this paper, we construct a simple partial equilibrium model in which a local partner chooses its investment level and the foreign firm chooses its overseas strategies to serve goods. We consider the following three stage game. In the rst stage, the local partner chooses the investment level that can promote the productivity and provide a share according to the foreign ownership. In the next stage, the firm decides whether to adopt a local production strategy or not. If the firm chooses local production, they must employ a local partner whose skill level determines the productivity of the overseas subsidiary. In the third stage, firms produce goods via Cournot competition. We show the strategic relationship between agents and derive the skill level and firms decisions in equilibrium by solving the 3-stage game. The equilibrium patterns depend on the degree of foreign ownership of the IJV. When foreign ownership is too low or too high, the local partner does not invest at all and then the foreign firm chooses to export goods. When foreign ownership is at a middle level, the foreign firm decides to enter business with a local partner. In this case, there are two patterns of investment for the local partner. The local partner invests at the lowest level at which the foreign firm will choose an IJV strategy. As foreign ownership increases, the local partner chooses the investment level that maximizes its payoff in the IJV case.

In terms of relationship between foreign ownership and skill investment by the local partner, Lin and Saggi (2004) demonstrate that firm with more productive inputs should get the majority ownership. They express skepticism of policies that prohibit foreign firms from holding majority ownership based on foreign firms IJV commitment. In our paper, we consider the case in which the foreign firm has no commitment to its strategy. If foreign ownership is at a lower level, the foreign firm may not join the IJV project. We then focus on the strategic relationship between partners and show how foreign ownership affects the behavior of a foreign firm and its local partner.

The rest of paper is organized into four sections. In the first, we explain the model setting. In the second, we solve the second and third stage of the game. In third section, we solve the first stage game and characterize the property of equilibrium and analyze comparative statistics to discuss the economic implications. The final section concludes.

2 Model

In this section, describe the model and explain some assumptions. We use a simple partial equilibrium model that has a local firm in host country (firm l) and one production firm in foreign country (firm f). For simplicity, we focus only on the market in host country. To analyze the strategic relationship between the foreign firm and the local partner, we consider the following 3 stage game. Consider the following sequence of events:

> Stage 1: The local firm chooses investment level s to obtain the management skill.
> Stage 2: The foreign firm decides whether they serve the local market through local production or not.
> Stage 3: Production occurs.

In stage 1, the local partner incurs an investment cost to achieve skill s. We specify the cost function for skill investment as $A(s) = \alpha s^2$, where α is a cost parameter. We assume skill s to be a relation-specific skill that does not affect the payoff of the export strategy. Assume that s decreases in the marginal cost of production when a joint venture occurs in the next stage.

In stage 2, firm f chooses to supply produced goods in two ways: joint venture or export. If the firm chooses the export strategy, it can produce goods under the marginal cost of the home country, c_f. If the firm chooses the local production strategy, the firm establishes a joint venture the local partner to produce monopolistically (an IJV project). In this case, the productivity of the IJV project depends on the skill level of the local partner. We specify the marginal cost function of the IJV case as decreasing in s, as follows:

$$c(s) = c_0 - s \quad c_0 \text{ is constant.}$$

When firm f chooses the IJV strategy, the profits are shared in the proportion of β to $1-\beta$. Then, in the final stage, they produce goods exclusively in the host country.

When firm f exports goods to the host country, firm f obtains all of the profit it earns. We assume the marginal profit to be constant, c_f, which is independent of the level of s. In this case, firm l becomes the rival firm. In the final stage, they compete via Cournot competition.

We solve the game by backward induction. The next section begins with an analysis of the third stage.

2.1 Production

We assume that the inverse demand function in the z case ($z = JV, EX$) is linear,

$$P(Y^z) = -aY^z + b.$$

Denote Y^z as the aggregate output in the host country in case z. That is, $Y_{JV} = y^JV$ and $Y^{EX} = y_f^{EX} + y_l^{EX}$. In the IJV case, the IJV firm can produce as a monopoly firm. Then, we can derive the following equilibrium quantities and joint profit:

$$y^{JV*} = \frac{1}{2a}[b - c(s)] \tag{1}$$

$$R^{JV*} = \frac{1}{4a}[b - c(s)]^2. \tag{2}$$

In the EX case, firms produce through Cournot competition. Hence, making same calculation as the case of local production, we obtain the following equilibrium quantities and profits:

$$y_f^{EX*} = \frac{1}{3a}[b - 2c_f + c_l] \tag{3}$$

$$y_l^{EX*} = \frac{1}{3a}[b + c_f - 2c_l] \tag{4}$$

$$R_f^{EX*} = \frac{1}{9a}[b - 2c_f + c_l]^2 \tag{5}$$

$$R_l^{EX*} = \frac{1}{9a}[b + c_f - 2c_l]^2 \tag{6}$$

2.2 Second stage

Next, we analyze how firm f chooses between the IJV and EX strategy. By comparing the profit of the local production strategy with that of the export strategy, we can rewrite the difference in profit as

$$\Phi(s) \equiv \pi_f^{JV} - \pi_f^{EX} = \frac{\beta}{4a}[b - c(s)]^2 - \frac{1}{9a}[b - 2c_f + c_l]^2$$

We assume $\Phi(c_0) > 0$. From $s \geq 0$ and $\Phi(0) < 0$, there exists a unique s that satisfies $\Phi(s)$ equal to zero. This is the indifference point of profit between both strategy cases. We denote it as $\tilde{s}$ and derive it as follows:

$$\widetilde{s} = \frac{2}{3}\beta^{-\frac{1}{2}}(b - 2c_f + c_l) - (b - c_0)$$

Then, we obtain the following lemma:

Lemma 1 *When the skill level is higher (lower) than $\tilde{s}$, the IJV (export) strategy is adopted.*

3 Equilibrium: First stage

We go back to the first stage game to derive the optimal investment level of the local firm based on the threshold value derived in the second stage.

Given the IJV strategy, we can rewrite the local firms payoff as the following function with respect to s:

$$\pi_l^{JV}(s) = \frac{1}{4a}(1-\beta)[b - c(s)]^2 - \alpha s^2. \tag{7}$$

Hence, we can derive the maximal value $\hat{s}$ of $\pi_l^{JV}(s)$,

$$\hat{s} = \frac{(1-\beta)(b-c_0)}{4a\alpha - (1-\beta)}, \tag{8}$$

which satisfies the following conditions:

$$\frac{\partial \Pi^{JV}(s)}{\partial s} = 0$$

$$\frac{\partial^2 \Pi^{JV}(s)}{\partial s^2} = \frac{2(1-\beta)}{4a} - 2\alpha < 0. \tag{9}$$

If the firm adopts the export strategy, the profit of firm l is $\pi_l^{EX} = R_l^{EX*} = \frac{1}{9a}[b + c_f - 2c_l]^2 - \alpha s^2$. In this case, since the profit level is independent of skill level s, the local partner does not achieve the skill at all in equilibrium. Denote $\bar{s}$ the intersection of the profit function π_l^{JV} and π_f^{EX} for $s > 0$. Then, we can calculate it using

$$\bar{s} = \hat{s} + \frac{\sqrt{9(1-\beta)^2(b-2c_0)^2 + (4a\alpha - (1-\beta))[9(1-\beta)(b-c_0)^2 - 4(b - 2c_l + c_f)^2]}}{4a\alpha - (1-\beta)}. \tag{10}$$

Since the profit for a skill level above this level satisfies $\Pi^F < \Pi^E$, it is obvious that local partner does not invest in any skill level above $\bar{s}$. To analyze how the IJV and export strategies can arise, we assume that α is not too high. In the first stage, firm l choose the skill level s^* to maximize its payoff reflecting the choice of firm f. Thus, the payoff function switches from π_l^{EX} to π_f^{JV} at the cutoff $\bar{s}$. To solve first stage game, we compare three kinds of critical values: $\tilde{s}$, $\hat{s}$, and $\bar{s}$.

We compare these values and show that four cases can arise in equilibrium according to foreign ownership, β. Letting β_1, β_2, and β_3 satisfy $\tilde{s} = \bar{s}$, $\hat{s} = \tilde{s}$, and $\hat{s} = \bar{s}$, we obtain the following proposition[1].

Proposition 1

1. *If $0 < \beta < \beta_1$, firm l does not invest and firm f exports (Case 1).*

2. *If $\beta_1 < \beta < \beta_2$, the local partner invests to reach skill level s^* and the firm adopts the IJV strategy (Case 2).*

3. *If $\beta_2 < \beta < \beta_3$, firm l invests to reach management skill level $\tilde{s}$ (which is larger level than s^*) and firm f adopts the IJV strategy (Case 3).*

4. *If $\beta_3 < \beta < 1$, firm f does not invest and chooses to export (Case 4).*

Figure 1 illustrates the payoff of firm l in each case.

In case 1, firm f needs a high skill level to join an IJV strategy and firm l has an incentive to invest in skill due to a high profit share. Then, firm l cannot invest in a skill level above the cutoff level. In case 2, the cut off level is decreasing as the profit share of firm f increases. Then, the IJV strategy becomes an advantage and firm l invests at the cutoff level at which firm f switches from an export strategy to an IJV strategy. When foreign ownership is high enough in case 3, the cutoff point is low and firm l can choose the investment level to maximize profit in the IJV case. However, when the foreign ownership becomes too high, the local firm has a small profit share, and the IJV strategy is always less profitable for firm l at any investment level (case 4).

Next, we can obtain the realized payoff by substituting the equilibrium investment level into the payoff in each case. We illustrate the realized payoffs according to β in Figure 2.

Figure 2 shows how foreign ownership affects each firms realized payoff. For a low or high β (export case), the payoff outcome is the lowest level of all cases. This result implies that a higher profit share does not bring a higher payoff outcome and foreign ownership should be at a medium level for both firms to gain a higher payoff.

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[1] The Appendix provides the derivations for each point.

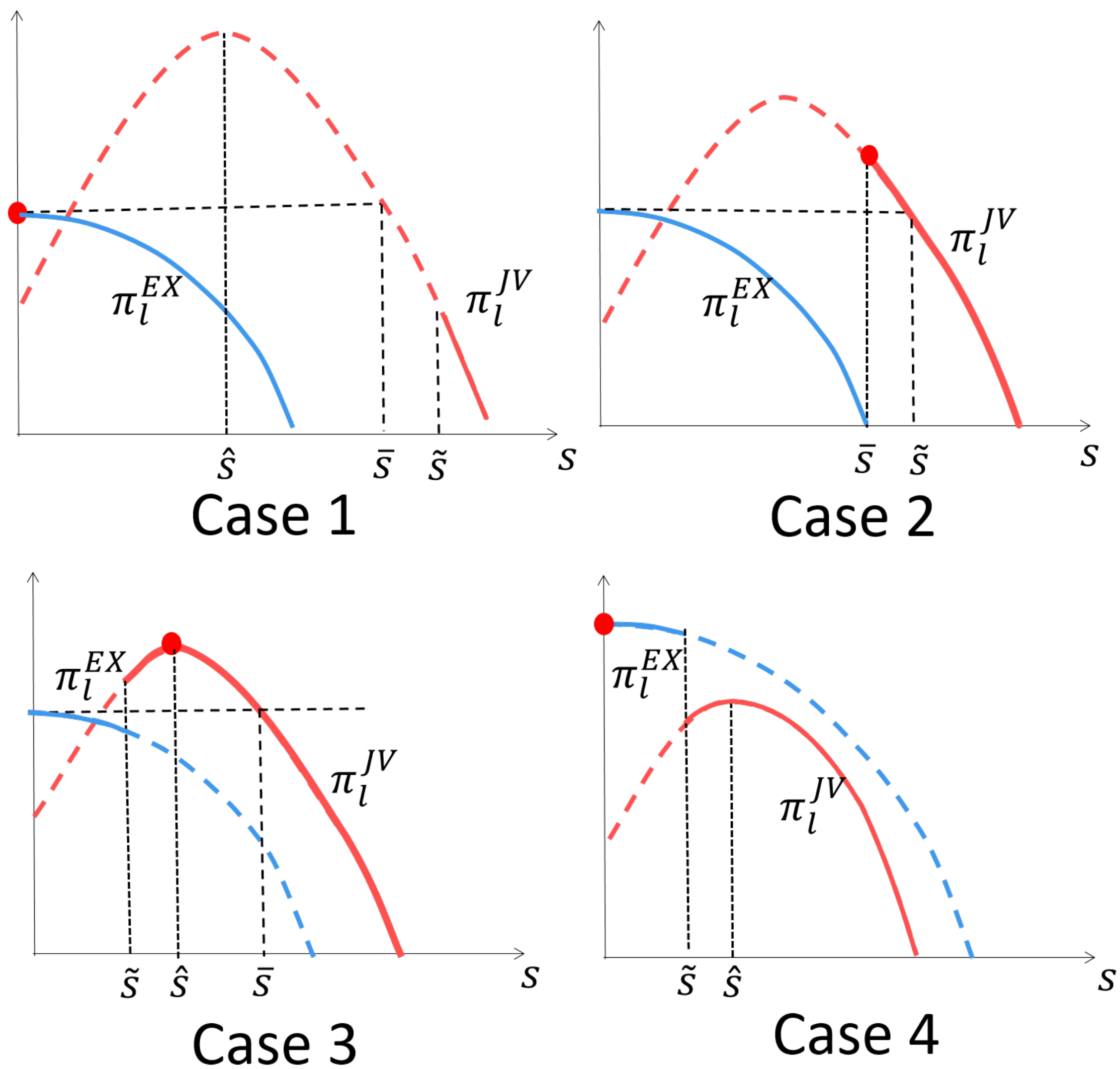

Figure 1: The profit of firm l

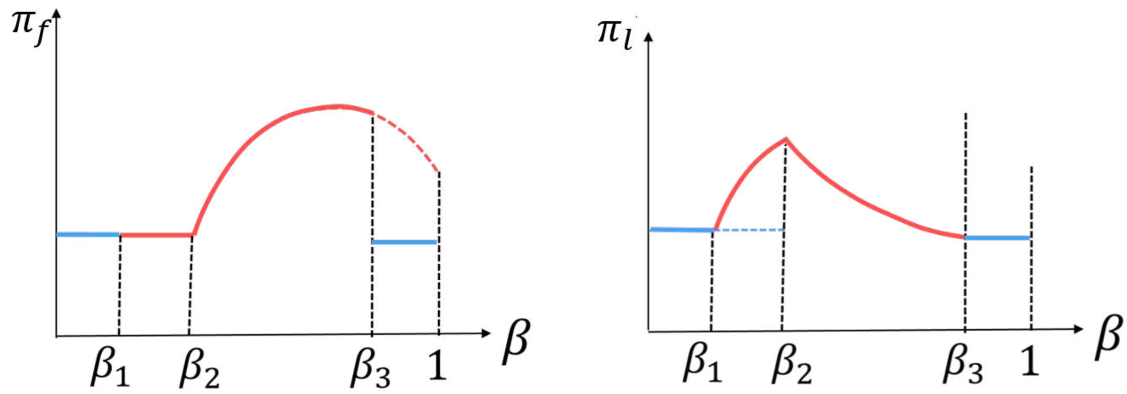

Figure 2: The profits of firms f and l

3.1 Investment subsidy from the foreign firm

Next, we consider an investment subsidy for the cost to overcome the 'hold up problem. We can derive the investment level that maximizes the total profit of firms l and f as follows:

$$s^{**} = \frac{b - c_0}{4a\alpha - 1} > \hat{s}$$

. We can describe the payoffs of both agents including the subsidy to invest in skills as follows:

$$\pi_f^{JV} = \frac{\beta}{4a}(b - c(s))^2 - \phi\alpha s^2$$

$$\pi_l^{JV} = \frac{1-\beta}{4a}(b - c(s))^2 - (1-\phi)\alpha s^2.$$

ϕ denotes the burden of the investment cost by the production firms. $\hat{s}_\phi$ maximizes the above profit of firm l under a firm subsidy. Then, we obtain

$$\hat{s}_\phi = \frac{(1-\beta)(b - 2c_0)}{4a\alpha(1-\phi) - (1-\beta)]}$$

. We can then derive $\gamma = \beta$ to satisfy $\hat{s}_\phi = s^{**}$.

Proposition 2 *The optimal share of the skill investment cost for firm f corresponds to its foreign ownership level to achieve the social optimal investment level s^{**}.*

4 Discussion: Nash bargaining

In previous sections, we assumed that foreign ownership is exogenously given. In this section, we consider the case where the profit share of the IJV project is determined through Nash bargaining in the second stage. The Nash bargaining solution is a vector of nonlinear contracts that maximize the Nash products,

$$(\beta R^{JV} - R_f^{EX})^{\gamma}((1-\beta)R^{JV} - R_l^{EX})^{1-\gamma},$$

where $\gamma \in (0,1)$ is a measure of firm f's bargaining power. We maximize this expression with respect to β, yielding the following Nash bargaining solution, β^*:

$$\beta^* = \frac{\gamma(R^{JV} - R_l^{EX}) + (1-\gamma)R_f^{EX}}{R^{JV}}. \tag{11}$$

Next, we analyze whether a local production strategy is viable or not. Comparing the profits of the IJV and export strategies, we can rewrite the difference in profit as

$$\Phi(s) \equiv \pi_f^{JV} - \pi_f^{EX} = \gamma(R^{JV} - R_f^{EX} - R_l^{EX})$$

Similar to Section 2, there exists a unique $\tilde{s}_\gamma$ that satisfies $\Phi(s)$ equal to zero. This is the indifference point of profit between both strategy cases. We can get

$$\tilde{s}_\gamma = \frac{2}{3}X^{\frac{1}{2}} - (b - c_0) \ \textit{where} \ X \equiv (b - 2c_f + c_l)^2 + (b - 2c_l + c_f)^2.$$

We go back to the first stage game to derive the optimal investment level of firm l.

We can rewrite the payoff of the local partner as the following function with respect to s:

$$\pi_l^{JV}(s) = (1-\gamma)(R^{JV} - R_f^{EX}) + \gamma R_l^{EX} - \alpha s^2 \tag{12}$$

We can obtain $\hat{s}_\gamma$, which maximizes the above function as

$$\hat{s}_\gamma = \frac{(1-\gamma)(b-c_0)}{9a\alpha - (1-\gamma)} \tag{13}$$

We show that the two cases arise in equilibrium according to the bargaining power between agents. Letting $\bar{\gamma}$ satisfy $\bar{s} = \hat{s}$, we reach the following proposition.

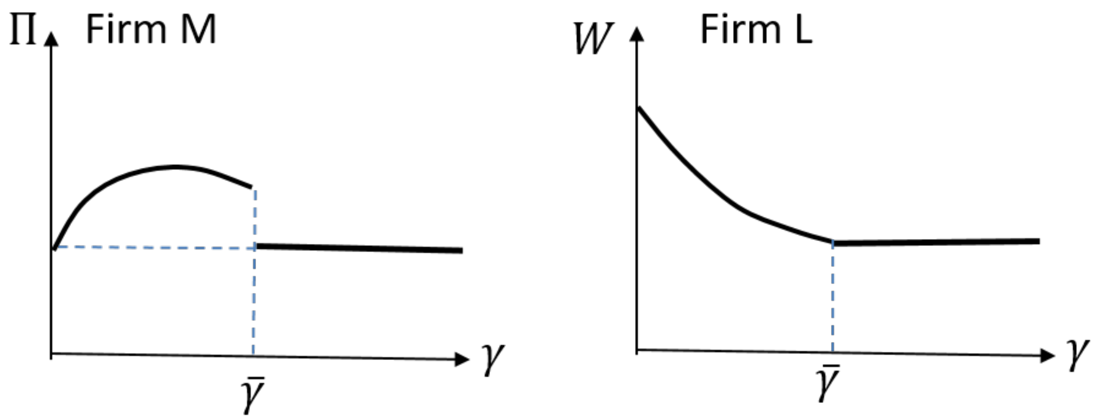

Figure 3: The profits of firms M and L

Proposition 3 *1. If $0 < \gamma < \bar{\gamma}$, then the local partner invests to achieve skill level $\hat{s}$ and the firm adopts the IJV strategy.*

2. If $\bar{\gamma} < \gamma < 1$, then the local partner does not invest and firm f exports goods to the local market.

When the bargaining power of firm f is low, the profit share of firm l is high. In this case, local firm l has an incentive to invest to attract firm f. When the bargaining power of firm f become higher, however, an IJV is always less profitable for firm l for any investment level. Hence, the joint project case does not occur. We can see that cases 1 and 2 in the previous sections disappear in the Nash bargaining setting. We calculate the realized payoff of firm f and firm l in each case by substituting the equilibrium skill level into their payoffs and illustrate the realized payoffs according to γ in Figure 3.

Firm f receive a lager profit at a certain level of bargaining power. However, as it rises above the threshold level $\bar{\gamma}$, the local firm does not invest. In this case, the profit of firm f is at its lowest level.

5 Conclusion

We investigate the effect of foreign ownership on the overseas strategy of a foreign firm and the strategic investment of local partner. To analyze this strategic relationship, we construct a 3-stage game in which a foreign firm decides to implement an IJV strategy and local partner chooses its skill level. In equilibrium, four cases arise according to the level of foreign ownership. If foreign ownership is at a medium level, the local partner invests in management skill and the barrier to the local production strategy becomes lower. In this case, they can obtain a higher payoff. On the other hand, if it is too low or too high, the foreign firm cannot extract skill investment from the local partner, which turns out to yield the lowest payoff for both agents. In this case, a local production strategy is too costly for the local firm and the investment does not occur. We also show that the optimal subsidy for the investment cost is proportional to the IJVs foreign ownership.

References

[1] Beamish, P. W. 2008. Joint Venturing. Charlotte, NC: Information Age Publishing.

[2] Chung, S., Singh, H., and Lee, K. 2000. Complementarity, status similarity and social capital as drivers of alliance formation. Strategic Management Journal, 30(5): 1-22.

[3] Contractor, F. 1991. Government policies toward foreign investment: an empirical investigation of the link between national policies and FDI flows. Annual Meeting of the Academy of International Business, Miami, FL.

[4] Gulati, R. 1995. Social structure and alliance formation patterns: a longitudinal analysis. Administrative Science Quarterly, 40(4): 619-626.

[5] Inkpen, A. C. and Beamish, P. W. 1997. Knowledge, bargaining power, and the instability of international joint ventures. Academy of Management Journal, 22(1): 177-202.

[6] Lin, P. and Saggi, K. 2004. Ownership structure and technological upgrading in international joint ventures. Review of Development Economics, 8(2): 279-294.

Appendix

A Derivation for β_1, β_2, and β_3

To compare $\tilde{s}$, $\hat{s}$. and $\bar{s}$, let two functions with respect to β, $f(\beta)$, and $g(\beta)$, respectively, satisfy

$$f(\beta) \equiv \tilde{s} - \hat{s} = \beta^{-\frac{1}{2}}(9a\alpha - 4(1-\beta)) - 9a\alpha(\frac{b - 2c_0 + c_f}{b - 2C_h + C_f}) \tag{14}$$

$$g(\beta) \equiv \bar{s} - \hat{s} = \frac{\sqrt{9(1-\beta)^2(b-2c_0)^2 + (4a\alpha - (1-\beta))[9(1-\beta)(b-c_0)^2 - 4(b-2c_l+c_f)^2]}}{4a\alpha - (1-\beta)} \tag{15}$$

By assuming $c_0 < 2c_f - c_l$, a quick calculation shows that the following condition is satisfied,

$$f(0) = +\infty$$

$$f(1) < 0$$

$$f'(\beta) \begin{cases} < 0 & (0 < \beta \leq \tilde{\beta}) \\ > 0 & (\tilde{\beta} < \beta < 1) \end{cases}$$

Hence, we can show that there exists a unique β satisfying $\tilde{s} = \hat{s}$ around 0 to 1. We also calculate $g(\beta)$ in a similar way.

$$g(0) = \frac{3\sqrt{a[\alpha(b - 2c_0 + C_f)^2 - (9a\alpha - 4(1-\beta))\tilde{W}]}}{9a\alpha - 4} > 0$$

$$g'(\beta) < 0$$

Since we can see $g'(\beta) < f'(\beta)$ is satisfied at $0 < \beta < \beta_2$, there exists a unique β_1 satisfies $f = g$; that is, $\tilde{s} = \bar{s}$. Finally, we consider the third threshold β at which $g(\beta) = 0$ is satisfied. Let its level be β_3. It is possible that β_2 is less than β_3, which implies that the local production case may disappear and the export strategy is chosen at any β. Hence, we see the case that all investment patterns occur in equilibrium; that is, $\beta_2 < \beta_3$. This inequality tends to occur when c_l is larger.