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Regulation of Foreign Direct Investment in Mixed Oligopolies

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Abstract

How should a welfare–maximizing host country regulate the entry of foreign firms into former public monopolies? We demonstrate that the two widely–adopted FDI regulations, namely, (i) mandating foreign firms to establish international joint ventures (IJVs) with local public firms; and (ii) imposing equity restrictions on the degree of foreign ownership in the IJVs; can in fact emerge as the host country's optimal choices. When equity restrictions are inapplicable and with sufficiently high degrees of foreign ownership, restricting the entry mode to export only would be optimal. Moreover, it is unlikely that greenfield investment would ever be chosen.

Keywords: international joint venture (IJV); foreign equity cap; public firm; greenfield investment; mixed market

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1 Introduction

Despite the intensification of globalization, many countries still require foreign firms conducting foreign direct investment (FDI) into former public monopolies to line up with local firms to establish international joint ventures (IJVs), and it is common to observe that these countries also impose strict equity caps on the amount of equity the foreign firms may possess in the IJVs.[1] What motivates governments to mandate foreign firms to enter only by means of IJV, and to set equity caps on foreign ownership?[2] Conversely, will completely "free" and unrestricted FDI be welfare–enhancing? These questions have been repeatedly raised and extensively discussed since in many countries, FDI still plays an important role in the breakup of public monopolies, largely due to the nonexistence of potential domestic private entrants (Mattoo et al. 2004; OECD, 2005; 2007). Our aim here is to re–examine these important questions within a simple yet standard model of mixed oligopolies where profit–maximizing

[1] There are numerous examples of such regulations. For example, the Chinese government require foreign carmakers to line up with local firms to form IJVs, in which they can only hold a maximum of 50 percent of shares. Foreign bank can only hold 20 percent of shares of Chinese banks, and combined foreign ownership of a Chinese bank cannot exceed 25 percent. Brokerages must link up with Chinese partners to form IJVs, in which they can only hold a maximum of 33 percent. Combined foreign ownerships of Chinese fund management and life insurance companies, meanwhile, are limited to 49 and 50 percent respectively. Brazil, India, Indonesia, Korea, Mexico, Thailand and some transition economies also impose similar restrictions on foreign equity participation (Mattoo et al. 2004; Karabay 2010).

[2] In reality, FDI restrictions can also be imposed based on sovereignty or national security concerns, or to achieve a particular combination of economic, political and social objectives. Nevertheless, as in Karabay (2010), to keep the analysis well focused, we restrict our attention only to economic factors.

private firms compete with publicly owned, possibly welfare–maximizing, firms.[3]

In this article, we consider the case where a foreign firm (*the potential entrant*) considers how to enter a domestic market that has so far been dominated by a monopolistic public firm (*the incumbent*).[4] In the absence of any restrictions, a profit–maximizing foreign firm faces two distinct options when serving the domestic market: either by exporting goods produced in existing plants in their home countries, or by producing locally in the domestic country via FDI. If it selects FDI, the foreign firm also needs to consider whether (i) to conduct greenfield investment by establishing a new wholly owned subsidiary, which then competes directly with the domestic firm; or (ii) to establish an IJV with the incumbent.[5]

The welfare–maximizing domestic government, on the other hand, considers whether it should maintain the public monopoly or to open the market to foreign firms. If it chooses to open the market, it then chooses one particular entry mode among export, greenfield investment, and IJV, that would maximize social welfare.

In principle, according to corporate law, IJVs should be governed by the principle

[3] There is an extensive literature on mixed oligopolies. For an excellent survey of earlier work, see De Fraja and Delbono (1990). The literature of mixed oligopoly with foreign competitors began with Corneo and Jeanne (1994) (discussion paper version in 1992), important works also include Fjell and Pal (1996) and Pal and White (1998).

[4] Prominent examples include the automobile industry and the banking industry in China, as well as the insurance sector in India.

[5] Another possibility is international mergers and acquisitions (M&A), under which the foreign firm acquires the domestic public firm. Because it replaces a public–firm–monopoly with a private firm monopoly wholly owned by foreign investors, it may violate antitrust laws in most countries and herein we do not consider such a possibility.

of the majority rule, and if the shareholders who hold a majority of voting shares have made a decision to take or not take certain action, that would be respected.[6] Nevertheless, it is common to observe that many governments provide that minority state ownership can make a difference in IJVs that involve public ownership. For example, a substantial proportion of mixed enterprises in OECD countries is under minority state ownership (OECD, 2005). The state influence can be guaranteed, for example, by stipulating in the bylaws of the IJV that either the state is given multiple votes for each share it owns, or alternatively, the state can appoint multiple representatives to the board of directors of the IJV, who can then push for management practices to take social welfare aspects into account.[7] Assuming also that the state influence increases with the degree of state ownership, it would then be natural to postulate that the IJV maximize a weighted average of profit and social welfare, with the weights reflecting the IJV's ownership structure. In other words, the IJV functions as a mixed enterprises, which has been discussed in, for example, Bös (1991); Matsumura (1998); Bárcena-Ruiz and Garzón (2003); and Matsumura and Kanda (2005).

Our paper first reveals a possible divergence of interests between the domestic

[6] When management decisions of an IJV are based on majority rules, there are two possibilities: (i) when the private investors are the majority owners, the IJV behaves like a private firm, whereas (ii) when the state is the majority owner, it behaves like a welfare–maximizing government. Both cases are examined in Section 4. Note that, however, under majority rules, minority ownership by the state would not make any sense unless the government would like to diversify its revenue risks (Long and Stähler 2009).

[7] As in many developing countries, in the early days of Chinese reform when most industries are still dominated by state–owned enterprises, to ensure the IJV could contribute to the state's objective, Chinese laws required strict approval procedures before an IJV could be established (Pearson 1991).

government and the foreign firm. When the foreign firm can choose its entry mode freely, it chooses to enter via greenfield investment when both the market size and the fixed costs are sufficiently small. Otherwise, it chooses to enter via joining an IJV. The government, on the other hand, is unlikely to allow greenfield investment. This clearly creates a basis for introducing FDI regulations that could induce the foreign firms to adopt the socially optimal entry mode. We then demonstrate that it can be optimal for the government to restrict the foreign firm to enter only by means of IJVs, with the degree of foreign ownership in the IJVs being strictly regulated. If such equity caps are inapplicable, it would be optimal to require the foreign firm to serve the domestic market by means of export.

Clearly, allowing the foreign firm to enter the domestic market produces a trade–off. On the one hand, it increases welfare through two channels (the welfare–enhancing effect), namely, (i) *increased competition* as more firms are competing in the domestic market, as in the export and greenfield investment cases, and (ii) *improved efficiency* as the more efficient technology of the foreign firm can be utilized, as in the IJV case. On the other hand, the entry of the foreign firm can also reduce welfare because it shifts profit out of the domestic economy (the profit–shifting effect). Consequently, a welfare–maximizing government's optimal mode of entry depends crucially on the comparison of the above two effects. Our analyses demonstrate that under reasonable conditions, while the welfare–enhancing effect is comparatively strong under an IJV, the profit–shifting effect is also relatively weak, rendering IJVs the socially optimal entry mode.

Our results provide a rationale for the widely–adopted FDI regulations: (i) mandatorily requiring foreign firms to line up with local firms to form IJVs (*mandatory IJVs*), (ii) imposing strict upper limits on the shares that foreign firms can hold in the

IJV (*foreign equity caps*). We believe that these new results are relevant to the public debate on how to break up public–firm–monopolies, which has recently arisen in the context of the intensification of privatization in a number of countries.

Our paper contributes to the growing literature on mixed enterprises (i.e. firms that are jointly owned by the state and the private sector) that largely starts with the seminal paper of Matsumura (1998). While most of the existing analyses take the objectives of such firms (a weighted average of the payoff of the government and its own profits, with the weight affected by the proportion of shares held by the government) as exogenously given, here we demonstrate that such an objective can in fact be a welfare–maximizing government's optimal choice when breaking up a former public monopoly. We also show that under reasonable conditions, such IJVs are also strongly preferred by foreign firms. Our findings thus offer a formal support to the use of mixed enterprise, á la Matsumura (1998). To the best of our knowledge, these results have also not been reported in the literature.

Our paper is also related to the voluminous literature that considers FDI and host country policies, where studies usually examine the setting in which foreign firms consider entering a domestic market consisting of n profit–maximizing firms. To our best knowledge, ours is the first formal analysis that examines the entry regulation of foreign firms into a former public monopoly. It has been argued that the host government can alleviate its informational constraints by using ownership restrictions to force an IJV (Karabay, 2010).[8] Elsewhere, it has been suggested that FDI restrictions can be justified to induce technology transfer or to promote technology spillovers

[8] Karabay (2010) considers the case in which the host government cannot observe a foreign firm's surplus, while an IJV partner can observe depending on its ownership share.

(Mattoo, Olarreaga, and Saggi, 2004; Müller and Schnitzer, 2006).[9] Here we demonstrate that even with complete information and without technology spillovers, IJVs can still be preferred by a welfare–maximizing government, when breaking up former public monopolies. In this sense, our result clearly extends previous work.

The rest of the paper is organized as follows. After setting up the basic model in Section 2, we discuss the choices of both the foreign firm and the government concerning the former's entry in Section 3. Section 4 then extends the discussion to the following two cases: (i) the case where the majority rule applies, and (ii) the case where the foreign equity cap can be endogenously determined by the government. Section 5 then concludes.

2 The basic model

We consider a domestic market that is served by an incumbent public firm (*firm* 0) and a potential entrant, a foreign private firm (*firm* 1). Both firms produce a homogeneous product; the quantities of output they supply to the domestic market are denoted by q_0 and q_1, respectively. As in De Fraja and Delbono (1989; 1990), the public firm is assumed to maximize domestic social welfare. The private foreign firm, on the other hand, is assumed to maximize its profit. The marginal costs of the two firms are given

[9] Mattoo et al. (2004) consider a foreign firm's choice between greenfield and acquisition when entering a domestic firm consisting of n private firms, with the degree of technology transfer being endogenously determined. They show that a welfare–maximizing government may use FDI restrictions such as a foreign equity cap to influence the foreign firm's choice between different modes of entry. Müller and Schnitzer (2006), on the other hand, identify the conditions under which a foreign firm chooses to enter via IJV even through this gives rise to technology spillovers.

by c_0 and c_1, respectively. As in Long and Stähler (2009), we focus on the non–trivial case in which the foreign firm processes a relatively more cost–efficient production technology as compared to the domestic public firm, i.e. $c_0 > c_1$. This assumption also reflects the empirical observation that the public firms tend to be less efficient than their private counterparts due to their state ownership.[10]

The inverse demand function for the domestic market is given as follows:

$$p = a - q_0 - q_1, \tag{1}$$

where p is price and $a(>0)$ is a constant that represents the size of the domestic market.

To serve the domestic market, a foreign firm would generally have three distinct options: (i) exporting goods produced in an existing plant in the foreign country (denoted by superscript e), (ii) conducting greenfield investment by setting up a wholly–owned local plant to produce locally (denoted by superscript g), or (iii) forming an IJV with the local public firm and then serving the domestic market with products of the IJV (denoted by superscript j). We assume that the foreign firm chooses to enter the domestic market only when doing so is profitable and unprofitable entry never takes place, i.e. $\pi_1^k > 0,\ k = e, g, j$, where π_1^k is the profit of the foreign firm. We also abstract from the principal agent issues at the firm–level, assuming that for example, managers are perfectly monitored, as in De Fraja and Delbono (1990) and Long and Stähler (2009). The domestic government, on the other hand, contemplates to

[10] Many empirical works suggest that the state–owned firms are less efficient than private firms (see Boardman and Vining, 1989; D'Souza and Megginson, 1999; and Boardman, Laurin, and Vining, 2002). Note also that under the current model setting, the export of the foreign firm would be zero if $c_0 \le c_1$.

maximize social welfare by deciding whether and how to regulate the entry of the foreign firm.

For the case of export, there will be two firms competing in the domestic market, with the public firm competing with exports from the foreign firm. The manager of the public firm is assumed to maximize social welfare w^e, which is a sum of firm 0's profit π_0^e, consumer surplus CS^e, and the tariff revenue tq_1^e:

$$w^e = \pi_0^e + CS^e + tq_1^e, \tag{2}$$

where t is an endogenously determined tariff rate to be chosen by the domestic government, the profit of the public firm is

$$\pi_0^e = p^e q_0^e - c_0 q_0^e, \tag{3}$$

and $CS^e \equiv \int_0^{q_0^e+q_1^e} \left(a - q_0^e - q_1^e\right) dq - \left(a - q_0^e - q_1^e\right)\left(q_0^e + q_1^e\right) = \left(q_0^e + q_1^e\right)^2 / 2$. The profit of the foreign firm is

$$\pi_1^e = p^e q_1^e - c_1 q_1^e - \tau q_1^e. \tag{4}$$

On the other hand, for the case of greenfield investment, there will be two firms that produce locally competing in the domestic market. The foreign firm can avoid tariff but have to incur a fixed cost $F\left(>0\right)$. The social welfare is given by the following equation:

$$w^g = \pi_0^g + CS^g, \tag{5}$$

where π_0^g is the public firm's profit. Firm 0 maximizes (5), and firm 1 maximizes its profit:

$$\pi_1^g = p^g q_1^g - c_1 q_1^g - F. \tag{6}$$

By contrast, under the IJV case, the public firm and the foreign firm together form

an IJV, which then monopolizes the market.[11] We assume that this entry mode allows the foreign firm to produce locally without paying the fixed costs.[12] As in Abe and Zhao (2005), the IJV is assumed to use the foreign firm's advanced technology for free and produces at the marginal cost of c_1.[13] Let $\theta\left(\in(0,1]\right)$ denote the foreign firm's share in the IJV, and $(1-\theta)$ that of its local partner.[14] As in Ishikawa, Sugita and Zhao (2011), the cost of acquiring the share θ is treated as a past sunk cost.[15] Hence, the profit of the IJV, π^j, is given by the following equation:

$$\pi^j \equiv p^j q^j - c_1 q^j . \tag{7}$$

Clearly, $\theta\pi^j$ would be the foreign firm's share of profit in the IJV, i.e. $\pi_1^j = \theta\pi^j$, whereas $(1-\theta)\pi^j$ would be that of the domestic firm. Accordingly, domestic social welfare under the IJV case is given by the following equation:

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[11] This formulation of the IJV has been examined in for example, Tomoda and Kurata (2004) and Abe and Zhao (2005). Alternative formulations of IJV include that of Raff, Ryan, and Stähler (2009), which assume that an IJV serves as a platform for cooperation so that cost–reducing investments can benefit both, with the multinational and its local partner continue to produce independently.

[12] Clearly, our results do not hinge on this assumption.

[13] Alternatively, it can also be postulated that the marginal cost of the IJV is a convex combination of the two partner firms, with the weights directly given by the proportions of stake–holding, as is in Zhong and Larihi (2009; 2010). Section 4.2 discusses how our main results modify under such a specification.

[14] For tractability, we assume that the IJV's ownership structure is exogenously given. Determination of shares in the IJVs has been considered as a Nash bargaining game (Al-Saadon and Das, 1996; Abe and Zhao, 2005); as a result of firms' investments (Raff, Ryan, and Stähler, 2009); or as a result of foreign firms' desire to extract a better tax treatment from the host government (Zhong and Lahiri, 2010).

[15] This assumption enables us to concentrate on the analysis on the foreign firm's production decisions, taking its investment decisions as given.

$$w^j = (1-\theta)\pi^j + CS^j . \tag{8}$$

We assume that the IJV respects the interests of the domestic government, as well as those of the foreign firm, with the payoffs of both parties simultaneously valued by the board of directors. As in Matsumura (1998), we assume that the objective of the IJV is captured by a weighted average of the objective functions of respective stake–holders (*profit* for the foreign firm and *social welfare* for the domestic government), with the weights given directly by the proportions of stake shares held by both the foreign firm and the domestic government:

$$v^j = (1-\theta)\left((1-\theta)\pi^j + CS^j\right) + \theta\pi^j = \left(1-\theta+\theta^2\right)\pi^j + (1-\theta)CS^j . \tag{9}$$

Clearly, under such a specification, producer surplus is being attached a heavier *de facto* weight than consumer surplus since $1-\theta+\theta^2 > 1-\theta$. Note that our formulation differs from that of Matsumura (1998), where a heavier weight is attached to consumer surplus.

Finally, if the public monopoly (denoted by superscript m) is maintained, the public firm sets its price equal to its marginal cost c_0. Its output is then $q^m = a - c_0$, and social welfare is $w^m = \left(a - c_0\right)^2 / 2$.[16] To ensure that all firms' outputs are positive under all cases, we assume that $a > c_0$.

We consider a simple three–stage game. The players are the domestic welfare–maximizing government, the public firm, and the foreign firm. The game proceeds as follows. In Stage 1, the government selects the optimal entry regulations on FDI that maximizes social welfare, i.e. whether to grant access to the foreign firm, and if the access is to be granted, how the foreign firm should be allowed to enter the domestic

[16] Clearly, $\pi_0^m = \pi_0^e = \pi_0^g = 0$.

market, viz. should it be allowed to enter via export, greenfield investment, or through an IJV? If the government chooses export, it also selects the optimal tariff rate. If it chooses IJV, it considers whether and how to impose an equity restriction on the degree of foreign ownership in the IJV. In Stage 2, given the optimal entry regulation on FDI set in the preceding stages, the foreign firm chooses whether and how it should enter the domestic market. In Stage 3, the remaining firms engage in quantity competition, á la Cournot. We employ backward induction to solve the game.

3 The outcome of the game

3.1 Equilibrium outcomes

3.1.1 The case of export

In Stage 3 firms simultaneously choose their output levels. For the case of export, firm 0 maximizes (2), and firm 1 maximizes (4). The Cournot–Nash equilibrium outputs are as follows:

$$q_0^e = a - c_0, \;\; q_1^e = \left(c_0 - c_1 - t\right)/2 .^{17} \tag{10}$$

Suppose that export is chosen in Stage 2. Then, in Stage 1, the government chooses the optimal tariff that maximizes (2), which is given by the following:

$$t^* = \left(c_0 - c_1\right)/3 > 0 . \tag{11}$$

Accordingly, firm 1's output and profit are as follows:

$$q_1^e = \left(c_0 - c_1\right)/3 > 0, \;\; \pi_1^e = \left(c_0 - c_1\right)^2/9 > 0 . \tag{12}$$

[17] It is easy to verify that the second–order conditions holds for all the cases we examine.

3.1.2 The case of greenfield investment

When the foreign firm conducts greenfield investment by setting up a firm to produce locally, the *de facto* regulation it encounters is virtually nonexistent, and the Cournot–Nash equilibrium outputs are as follows

$$q_0^g = a - c_0, \quad q_1^g = (c_0 - c_1)/2 > 0. \tag{13}$$

The foreign firm's profit is

$$\pi_1^g = (c_0 - c_1)^2/4 - F. \tag{14}$$

Clearly, $\pi_1^g > 0$, if $F < (c_0 - c_1)^2/4$. Put otherwise, greenfield investment is chosen by a foreign firm only when its fixed costs are not sufficiently high. To ensure the analysis non-trivial, hereinafter, we assume that $F < (c_0 - c_1)^2/4$.

3.1.3 The case of IJV

Finally, we consider the case of IJV. In Stage 3, the IJV maximizes (9), a weighted average of its profit and social welfare. The output and profit the IJV are as follows:

$$q^j = \frac{(a - c_1)(1 + \theta(\theta - 1))}{1 - \theta + 2\theta^2} > 0, \tag{15}$$

$$\pi^j = \frac{(a - c_1)^2 \theta^2 (1 - \theta + \theta^2)}{(1 - \theta + 2\theta^2)^2} > 0. \tag{16}$$

Note that because $\frac{\partial \pi^j}{\partial \theta} = \frac{(a - c_1)^2 \theta(\theta - 1)(\theta - 2)}{(1 - \theta + 2\theta^2)^3} > 0$, any equity cap imposed by the domestic government would be binding because the foreign firm would always chooses

the permitted upper limit of the degree of ownership. The determination of such an equity cap will be considered in Section 3.2.

3.1.4 The choice of the foreign firm

We proceed to consider Stage 2 and examine the preference of the foreign firm, which is assumed to enter the domestic market only when doing so is profitable, i.e. $\pi_1^k > 0,\ k = e, g, j.$ As to be demonstrated in the ensuing analysis, the FDI regulation chosen by the domestic government can be substantially specific, effectively depriving the foreign firm of its freedom in choosing its preferred entry mode. To reveal the true preference of the foreign firm, next we consider a hypothetical situation in which the entry regulations are non–existent and the foreign firm can choose its entry mode freely. For tractability and without loss of generality, hereinafter we normalize $c_1 = 0$.[18] It is also assumed that when making its decision concerning its entry mode, the foreign firm takes the optimal tariff t^* as given, which is chosen by a welfare maximizing domestic government.[19] We immediately note that

Lemma 1. *Suppose that the foreign firm can choose its entry mode freely. It chooses to enter the domestic market either by export, conducting greenfield investment, or joining an IJV.*

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[18] Our results are clearly not contingent on this assumption.

[19] This assumption clearly does not influence our results in any major way. As shown in (12), the domestic government has no incentive to introduce a prohibitive tariff under the assumption $c_0 > c_1$.

Proof. Evidently from (12), (14), and (16). *Q.E.D.*

Lemma 1 is obvious because the oligopolistic market structure of the newly opened domestic market clearly can sustain positive profit levels for a more efficient firm that completely or partly maximizes profit. Nevertheless, it is easy to see that the foreign firm prefers certain entry modes over others, as summarized by the following lemma. Let $\bar{\theta} \equiv 0.546319$, $\bar{F} \equiv \dfrac{\left(\left(\left(5-\left((\theta-2)\theta+2\right)4\theta\right)\theta-2\right)\theta+1\right)c_0^2}{4\left(\theta-2\theta^2-1\right)^2}$,

$\bar{a} = \dfrac{\left(1+2\theta^2-\theta\right)\sqrt{c_0^2-4F}}{\sqrt{\theta^3\left(1+\theta^2-\theta\right)}}$, and $\bar{\bar{a}} \equiv \dfrac{\left(1+2\theta^2-\theta\right)c_0}{\sqrt{\theta^3\left(1+\theta^2-\theta\right)}} > \bar{a} > c_0$, we note that[20]

Lemma 2. *Suppose that the foreign firm can choose its entry mode freely.* (i) *The foreign firm prefers greenfield investment to export when the fixed costs are sufficiently low. Otherwise, it prefers export to greenfield investment.* (ii) *The foreign firm prefers greenfield to IJV, when both the market size and the fixed costs are sufficiently small, i.e.* $c_0 < a < \bar{a}/2$ *and* $F < \bar{F}$. *Conversely, it prefers IJV to greenfield either when* (ii–a) $a > \bar{a}/2$ *and* $F \le \bar{F}$, *or when* (ii–b) $a > c_0$ *and* $\bar{F} < F < c_0^2/4$. (iii) *The foreign firm prefers IJV to export, either when* (iii–a) $\theta \le \bar{\theta}$ *and* $a > \bar{\bar{a}}/3$; *or when* (iii–b) $\bar{\theta} < \theta \le 1$ *and* $a > c_0$. *Conversely, it prefers export to IJV when* $\theta < \bar{\theta}$ *and* $c_0 < a \le \bar{\bar{a}}/3$.

Proof. See Appendix. *Q.E.D.*

[20] Note that $\bar{F} > 5c_0^2/36$ when $\theta < \bar{\theta}$, whereas $\bar{F} < 5c_0^2/36$ when $\bar{\theta} < \theta \le 1$.

Following Lemmas 2, we can then summarize the foreign firm's choices as follows:

Proposition 1. *Suppose that the foreign firm can choose its entry mode freely.* (i) *It chooses to conduct FDI as long as the fixed costs are not too large, and both the market size and its share in the IJV are not too small.* (ii) *When it decides to conduct FDI, the foreign firm chooses to enter via greenfield investment when both the market size and the fixed costs are sufficiently small. Otherwise, it chooses to enter via joining an IJV.*

Proof. Evident from Lemmas 2. *Q.E.D.*

Proposition 1 shows that the foreign firm's choice of entry mode depends crucially on the market size, the fixed costs, and its share in the IJV. As demonstrate in Figure 1, in the absence of any regulations on FDI, the foreign firm prefers to enter the domestic market as an independent profit–maximizing firm when both the market size are the fixed costs are sufficiently small, i.e. when the market is sufficiently competitive. Conversely, the foreign firm prefers to enter via an IJV when either the fixed cost or the market size, or both, are sufficiently large. Finally, it would choose export when the fixed costs are sufficiently large, and both the market size and its share in the IJV are small.[21] Next, we examine the domestic government's choices of these entry modes.

[21] Empirical studies have reported that multinational corporations in general see no advantage in engaging in an IJV, and therefore, as long as there is no outside intervention, they choose to establish wholly–owned local firms (for empirical studies using the data for U.S. multinationals, see Desai, Foley amd Hines (2004) and Contractor (1990), for Japanese multinationals, see Padmanabhan and Cho (1996).

(Figure 1 around here)

3.2 The optimal choice of the government

Finally, we consider Stage 1, in which the domestic welfare–maximizing government chooses the optimal regulations on FDI. Namely, should it allow the foreign firm to enter via greenfield investment, or IJV? Or should FDI be banned altogether, and foreign firms should only access the domestic market by means of exports?

Using the equilibrium outcomes in Stage 2 and 3, we see that the social welfare under difference cases are given as follows:

$$w^e = \left(3a^2 + 4c_0^2 - 6c_0 a\right)/6, \tag{17}$$

$$w^g = \left(4a^2 + 5c_0^2 - 8ac_0\right)/8, \tag{18}$$

$$w^j = a^2\left(1-\theta+\theta^2\right)\left(1-\theta+3\theta^2-2\theta^3\right)\Big/2\left(\theta-1-2\theta^2\right)^2. \tag{19}$$

Clearly, the government may choose to exclude the foreign firm from entering the domestic market and thereby maintain the public monopoly. However, this is not optimal from the perspective of social welfare maximization:

Proposition 2. (i) *It is always socially optimal to break up a public monopoly and to allow foreign firms to enter the domestic market by means of either export or greenfield investment.* (ii) *The foreign firm should be allowed to enter through an IJV when the*

Note that, however, the markets under consideration would differ fundamentally from that of ours in the following aspects: (i) the non–existence of public firms, (ii) the IJV does not monopolize the market, and (iii) the IJV does not maximize a linear combination of welfare and profit.

market size is not sufficiently large.

Proof. See Appendix. *Q.E.D.*

Proposition 2 suggests that allowing a foreign firm to enter the domestic market can be welfare–enhancing, as compared to the case of maintaining the public monopoly. This is because the entry of a foreign firm *increases competition* as more firms are competing in the domestic market, as under the cases of export and greenfield. Conversely, under the IJV case, although welfare can be improved because of *improved efficiency* as the more efficient technology of the foreign firm has been adopted (the welfare–enhancing effect), the foreign firm also shifts profit out of the domestic economy (the profit–shifting effect). The resultant social welfare then depends on the comparison of these two effects. Proposition 2 (ii) suggests that under moderate conditions, the IJV can be welfare–enhancing.

Lemma 3. *Restricting the foreign firm to serve the domestic market by means of export always generates a higher level of social welfare than allowing the foreign firm to conduct greenfield investment.*

Proof. See Appendix. *Q.E.D.*

The intuition behind Lemma 3 is straightforward. The social welfare under the export case is higher than that under the greenfield case because the government can use tariff to shift the foreign firm's profit to the domestic economy, whereas under the case of greenfield investment, the *de facto* regulation is nonexistent and the foreign firm is free to shift all its profit back home.

We can summarize the government's optimal choices as follows:

Proposition 3. *It is optimal to allow the foreign firms to enter by means of an IJV when its share in the IJV is relatively small. Otherwise, it is optimal to require the foreign firm to serve the domestic market by means of export. Formally, when* $\theta \in \left(0, \tilde{\theta}\right]$*, an IJV would be chosen; whereas when* $\theta \in \left(\tilde{\theta}, 1\right]$*, export would be chosen.*

Proof. See Appendix. *Q.E.D.*

Clearly, $\tilde{\theta}$ is the upper limits on the shares that foreign firms can hold in the IJV that the domestic government would ever allow. The intuition underlying Proposition 3 is simple. An IJV that respects both profit and social welfare can generate a higher level of welfare than all other options because while the welfare–enhancing effect is sufficiently high, the profit–shifting effect would also be sufficiently low as long as the shares a foreign firm can hold in the IJV are sufficiently small.

Our results predict that a welfare–maximizing government would only allow a foreign firm to conduct FDI when it chooses (i) to participate an IJV that maximizes both social welfare and profit, and (ii) to observe an equity restriction on the degree of foreign ownership in the IJV. Clearly, these regulations are not to limit foreign firms' access to the domestic market, but rather to capture the rents from them.[22] As summarized in Figure 2, for cases when such regulations are not applicable, FDI should be banned altogether and the foreign firm should be allowed to access the domestic

[22] Karabay (2010) also argues that regulations on FDI are justified because they prevent the foreign firms from shifting profits from the domestic country.

market only by export.

(Figure 2 around here)

Proposition 3 also suggests that different from the foreign firm, the host government's choice of entry mode depends crucially on the share of the foreign firm in the IJV. An immediate corollary of Propositions 1 and 3 can then be given as follows:

Corollary 1. *Suppose that the foreign firm's share in the IJV is relatively small. Then, when the market size is sufficiently large, IJV emerges as the optimal entry mode for both the host government and the foreign firm.*

Proof. Evident from Propositions 1 and 3. *Q.E.D.*

4 Discussion and extension

In this section, we discuss and extend the preceding results. We first consider the case in which the principle of majority rule, and not the minority state rule, applies to the management decisions in the IJV. We then examine the case under which the technology applied in the IJV, and hence its marginal cost, is determined by the foreign firm's share in the IJV. More importantly, we also examine the optimal foreign equity cap to be endogenously chosen by the domestic government.

4.1 The principle of majority rule

In the preceding analyses, we have assumed that the principle of minority state rule applies in the IJV. Accordingly, the IJV respects the interests of both the domestic

government and the foreign firm. In reality, it is also possible that IJVs are governed instead by the principle of majority rule, and only those shareholders who hold a majority of voting shares can make management decisions. Clearly, under such a case, an IJV behaves like a private firm if the majority ownership is with private investors. On the other hand, it behaves like a welfare–maximizing government when the majority ownership is with the state.

In this section, we assume that the rule of majority stake–holders having complete control over decision–making applies. Clearly, there would be two subcases: (a) *a welfare maximizing IJV* in which the state is the majority stake–holder, i.e. $\theta < 0.5$, and the IJV maximizes social welfare w^j defined by (8) (denoted by superscript *ja*); and (b) *a profit maximizing IJV* in which the foreign firm is the majority stake-holder, i.e. $\theta > 0.5$, and the IJV maximizes its profit π^j given by (7) (denoted by superscript *jb*). The remaining specifications are unchanged from the previous section.

Case (a): A welfare maximizing IJV

We first consider case (a), in which the state is the majority stake–holder, i.e. $\theta \le 0.5$, and the IJV maximizes social welfare. The output and profit of the IJV are as follows:

$$q^{ja} = a(\theta - 1)/(2\theta - 1) \ge 0, \tag{20}$$

$$\pi^{ja} = a^2\theta(\theta - 1)/(2\theta - 1)^2 \le 0. \tag{21}$$

We immediately note that

Lemma 4. *Under the majority rule, a foreign firm will never join a welfare–maximizing*

IJV, i.e. it will choose not to join an IJV when there exists a foreign equity cap stipulating that $\theta \leq 0.5$.

Proof. Evidently from (21). *Q.E.D.*

The intuition behind Lemma 4 is straightforward. From (8), we see that because the foreign firm's share of the IJV's profit is not included as a part of social welfare, the presence of foreign ownership decreases the *de facto* weight placed on producer surplus, while increasing that on consumer surplus. Consequently, in an effort to maximize social welfare, the social planner is willing to increase consumer surplus by even reducing the profit of the IJV to be negative.

Case (b): A profit maximizing IJV

We proceed to consider case (b), in which the foreign firm is the majority stake–holder, i.e. $\theta > 0.5$, and the IJV maximizes profit. The corresponding output, profit, and welfare of the IJV are as follows:

$$q^{jb} = a/2 > 0, \tag{22}$$

$$\pi^{jb} = a^2/4 > 0, \tag{23}$$

$$w^{jb} = (3-2\theta)a^2/8. \tag{24}$$

We immediately note that

Lemma 5. *When* $\theta > 0.5$, *the foreign firm unambiguously prefers to join a profit–maximizing IJV to a IJV that maximizes a linear combination of profit and social*

welfare.

Proof. See Appendix. *Q.E.D.*

Finally, we compare the levels of social welfare derived under the case of an IJV that maximizing profit, as well as that under the case where the IJV maximizes a linear combination of profit and welfare. We immediately note that

Proposition 4. *Given the shares the foreign firm can hold in the IJV, allowing the foreign firm to enter by means of an IJV that maximizes a linear combination of profit and welfare is unambiguously welfare–enhancing than a profit maximizing IJV.*

Proof. See Appendix. *Q.E.D.*

The intuition behind Proposition 4 is straightforward. Both output and profit are relatively high under the case where the IJV maximizes a linear combination of profit and welfare. In contrast, output is the lowest under the IJV maximizing profit case, compared with other entry modes. This explains why an IJV that maximizes a linear combination of profit and welfare can generate a higher level of welfare than a profit maximizing IJV.

Proposition 4 suggests that a welfare–maximizing government would choose to espouse the principle of minority state rule for the management decisions in the IJV, and not the principle of majority rule. Clearly, our results provide a formal rationale for partially privatized public enterprise examined in Matsumura (1998). Together with Proposition 3, Proposition 4 demonstrates that as long as the share of the foreign firm in the IJV is not too high, IJV á la Matsumura emerges as the optimal choice of the

domestic government. In this sense, Proposition 4 reinforces the results of Proposition 3.

4.2 Alternative IJV cost structure and endogenously determined foreign equity cap

As in Zhong and Lahiri (2009; 2010), we next consider the case in which that the marginal cost of the IJV is a convex combination of the two firms' share in the IJV (denoted by superscript jc). The marginal cost of the IJV is given as follows:

$$c^{jc}(\theta) = \theta c_1 + (1-\theta) c_0 . \tag{25}$$

For simplicity, here we assume that $F = 0$. The remaining specifications are unchanged from the previous section.

The output and profit the IJV, as well as the social welfare, are given as follows:

$$q^{jc} = \frac{\left(a + (\theta - 1) c_0 - \theta c_1\right)\left(1 + \theta(\theta - 1)\right)}{1 - \theta + 2\theta^2} > 0 , \tag{26}$$

$$\pi^{jc} = \frac{\left(a + (\theta - 1) c_0 - \theta c_1\right)^2 \theta^2 \left(1 - \theta + \theta^2\right)}{\left(1 - \theta + 2\theta^2\right)^2} > 0 , \tag{27}$$

$$w^{jc} = \frac{\left(a + (\theta - 1) c_0 - \theta c_1\right)^2 \left(\theta - 1 - 3\theta^2 + 2\theta^3\right)\left(\theta - 1 - \theta^2\right)}{2\left(1 - \theta + 2\theta^2\right)^2} > 0 , \tag{28}$$

Again, because

$$\frac{\partial \pi^j}{\partial \theta} = \frac{\theta\left(a + (\theta - 1) c_0 - \theta c_1\right)}{\left(1 - \theta + 2\theta^2\right)^3} \times$$
$$\left(a(\theta - 1)(\theta - 2) + \left(\left(\left(\left(9 - 6\theta + 4\theta^2\right)\theta - 8\right)\theta + 7\right)\theta - 2\right) c_0 + \theta\left(\left(7 - \left(9 - 6\theta + 4\theta^2\right)\theta\right)\theta - 4\right) c_1\right) > 0, \tag{29}$$

we see that similarly to Section 3.1.3, any equity cap imposed by the domestic

government would be binding because the foreign firm would always chooses the permitted upper limit of the degree of ownership. We immediately note that the preceding results largely hold:

Proposition 5. (i) *It is always socially optimal to break up a public–firm–monopoly and to allow foreign firms to enter the domestic market by means of either export or greenfield investment.* (ii) *The foreign firm should be allowed to enter through an IJV when the market size is not sufficiently large.* (iii) *When the foreign firm can conduct FDI freely, it chooses to enter via greenfield investment when the market size is sufficiently small, otherwise, it chooses to enter via joining an IJV.*

Proof. See Appendix. *Q.E.D.*

Finally, we consider the case where the domestic government endogenously choose the optimal share that the foreign firms can hold in the IJV, θ^*. In Figure 3, letting $a = 8$ and $c_0 = 3$, we plot the levels of social welfare under different values of θ, for the cases of IJV, greenfield investment, and export. It is easy to observe that $\theta^* = 0.3711$. We also note that

Result 1. *It is optimal to allow the foreign firms to enter by means of an IJV when its share in the IJV is in the intermediate range. Otherwise, it is optimal to require the foreign firm to serve the domestic market by means of export.*

(Figure 3 around here)

The intuition behind the Result 1 is straightforward. On the one hand, social welfare lowers with a rise in θ because of the following two channels: (i) a rise in θ can render a fall in social welfare (because the weight attached on social welfare decreases with a fall in θ), as it motivates the government to increase profit, even at the cost of social welfare; and (ii) a rise in θ also increases the dividend to be paid to the foreign firm, hence a further fall in social welfare, ceteris paribus. On the other hand, a rise in θ also improves the productive efficiency of the IJV, thereby increasing welfare. Clearly, at θ^*, the two opposite effects cancel each other out and social welfare is thus maximized.[23] Note also that when θ is sufficiently small, social welfare under IJV will be lower than those under export and greenfield investment. This is because the production cost of the IJV under such a case would be sufficiently high since the advanced technology of the foreign firm has not been effectively applied, as evident from (25).

5 Concluding remarks

It is commonly believed that a freer market is beneficial to the country. Conversely, it is said that restricting foreign firms to particular entry modes may result in under competition and decrease national welfare. In this article, we have shown that by restricting the entry modes from which foreign firms can choose when entering a former public monopoly, a government can actually increase welfare. This happens primarily because such restriction prevents the foreign firm from shifting profit out of the country. The resultant increase in producer surplus dominates the loss in consumer surplus

[23] For the trivial case under which the IJV can adopt the advanced technology of the foreign firm without

caused by the fall in output which the restriction entails, thus rendering a net increase in domestic welfare. Most interestingly, our analyses also demonstrate that under reasonable conditions, IJV can emerge as the socially optimal entry mode, and in the meantime, being strongly preferred by the foreign firm.

By necessity, our analysis imposes a number of restrictive assumptions, in light of which we must reflect upon the above results. These assumptions include: (i) a linear demand function; (ii) the principal–agent problem is absent in the IJV; and (iii) the absence of domestic profit–maximizing private firms. Further research is thus required to understand whether our basic conclusions would change when these restrictions are relaxed.

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having to pay any dividend, it would be optimal for the domestic government to set $\theta^* = 0$.

Appendix

Proof of Lemma 2. (i) By equations (12) and (14), we have the following:

$$\pi_1^g - \pi_1^e = 5c_0^2/36 - F\,. \tag{A1}$$

We see that $\pi_1^g > \pi_1^e$ when $F < 5c_0^2/36$, whereas $\pi_1^g \le \pi_1^e$ when $5c_0^2/36 \le F < c_0^2/4$.

(ii) By equations (14) and (16), we have the following:

$$\pi_1^g - \theta\pi^j = \frac{c_0^2}{4} - \frac{\theta^3 a^2\left[1+\theta\left(\theta-1\right)\right]}{\left[\left(2\theta-1\right)\theta+1\right]^2} - F\,. \tag{A2}$$

Clearly, $\pi_1^g > \theta\pi^j$ when $c_0 < a < \bar{a}/2$ and $F < \bar{F}$, whereas $\pi_1^g \le \theta\pi^j$ either (ii–a) when $a \ge \bar{a}/2$ and $F < \bar{F}$, or (ii–b) when $a > c_0$ and $\bar{F} < F < c_0^2/4$.

(iii) By equations (12) and (16), we note that

$$\theta\pi^j - \pi_1^e = \frac{\theta^3 a^2\left[1+\theta\left(\theta-1\right)\right]}{\left[\left(2\theta-1\right)\theta+1\right]^2} - \frac{c_0^2}{9}\,. \tag{A3}$$

We see that $\theta\pi^j > \pi_1^e$ either when (iii–a) $\theta \le \bar{\theta}$ and $a > \bar{\bar{a}}/3$; or (iii–b) when $\bar{\theta} < \theta \le 1$, and $a > c_0$. Conversely, we have $\theta\pi^j \le \pi_1^e$ when $\theta < \bar{\theta}$ and $c_0 < a \le \bar{\bar{a}}/3$.

Proof of Proposition 2. From equations (17)-(19), we have the following:

$$w^e - w^m = c_0^2/6 > 0\,, \tag{A4}$$

$$w^g - w^m = c_0^2/8 > 0\,, \tag{A5}$$

$$w^j - w^m = ac_0 - \frac{c_0^2}{2} + \frac{a^2\theta^3\left(\theta-2-2\theta^2\right)}{2\left(\theta-1-2\theta^2\right)^2}\,. \tag{A6}$$

Clearly, $w^j > w^m$ holds when $c_0 < a < \dfrac{\left(\theta-1-2\theta^2\right)c_0}{\theta-1-2\theta^2+\sqrt{\left(1+\theta\left(\theta-1\right)\right)\left(1-\theta+3\theta^2-2\theta^3\right)}}$.

Proof of Lemma 3. From equations (17) and (18), we have the following:

$$w^e - w^g = c_0^2/24 > 0. \tag{A7}$$

Proof of Proposition 3. From equations (17) and (19), we have the following:

$$w^j - w^e = \frac{a^2\theta^3\left(\theta-2-2\theta^2\right)}{2\left(\theta-1-2\theta^2\right)^2} + ac_0 - \frac{2c_0^2}{3}. \tag{A8}$$

Because $\dfrac{\partial}{\partial\theta}\left(w^j - w^e\right) = \dfrac{a^2\theta^2\left(\left(\left(\left(3-2\theta\right)\theta-4\right)\theta+3\right)\theta-3\right)}{\left(\left(2\theta-1\right)\theta+1\right)^3} < 0$ when $\theta\in\left(0,1\right]$, we see that $w^j - w^e$ attains its minimum when $\theta=1$. We note that $w^j - w^e\big|_{\theta=1} = -\left(3a-4c_0\right)^2/24 < 0$, while $w^j - w^e\big|_{\theta=0} = ac_0 - 2/3c_0^2 > 0$ for all $a > c_0$. Hence, there must exist an $\tilde{\theta}\in\left(0,1\right]$ such that $w^j - w^e\big|_{\theta=\tilde{\theta}} = 0$. In summary, (i) when $\theta\in\left(0,\tilde{\theta}\right]$, $w^j \geq w^e$; (ii) when $\theta\in\left(\tilde{\theta},1\right]$, $w^j < w^e$.

Proof of Lemma 5. From equations (16) and (23), we have the following:

$$\theta\pi^{jb} - \theta\pi^{j} = \frac{a^2\left(\theta-1\right)^2\theta}{4\left(\theta-1-2\theta^2\right)}. \tag{A9}$$

Clearly, $\theta\pi^{jb} > \theta\pi^{j}$ as long as $\theta > 1/2$.

Proof of Proposition 4. From equations (19) and (24), we have the following:

$$w^j - w^{jb} = \frac{a^2\left(1+\theta^2-2\theta^3\right)}{8\left(\theta-1-2\theta^2\right)^2}. \tag{A10}$$

Clearly, $w^j \geq w^{jb}$ for all $\theta \in (0,1]$.

Proof of Proposition 5. (i) Evident from (A4) and (A5). (ii) Because

$$w^{jc} - w^m = \frac{1}{6}\left\{6ac_0 - 3a^2 - 4c_0^2 - \frac{3\left(\theta^2-\theta+1\right)\left(2\theta^3-3\theta^2+\theta-1\right)\left[a+\left(\theta-1\right)c_0\right]^2}{\left(2\theta^2-\theta+1\right)^2}\right\}, \tag{A11}$$

we see that $w^{jc} > w^m$ holds when

$$c_0 < a < \frac{c_0\left(\sqrt{\left(1+\theta\left(\theta-1\right)\right)\left(1-\theta+3\theta^2-2\theta^3\right)}\left(1-\theta+2\theta^2\right)+1-\theta\left(1-3\theta+\theta^2\right)\left(2-\theta+2\theta^2\right)\right)}{\theta^2\left(2\theta^2-\theta+2\right)}.$$

(iii) By equations (12) and (27), we have the following:

$$\theta\pi^{jc} - \pi_1^e = \frac{\theta^3\left(a+\left(\theta-1\right)c_0\right)^2\left[1+\theta\left(\theta-1\right)\right]}{\left[\left(2\theta-1\right)\theta+1\right]^2} - \frac{c_0^2}{9}. \tag{A12}$$

Clearly, we see that $\theta\pi^{jc} > \pi_1^e$ when $a > \overline{\overline{\overline{a}}} \equiv \left(\sqrt{\frac{\left(1-\theta+2\theta\right)^2}{\theta^3\left(1-\theta+\theta^2\right)}}\frac{1}{2}+\left(1-\theta\right)\right)c_0$.

Conversely, we have $\theta\pi^{jc} \leq \pi_1^e$ when $a \leq \overline{\overline{\overline{a}}}$.

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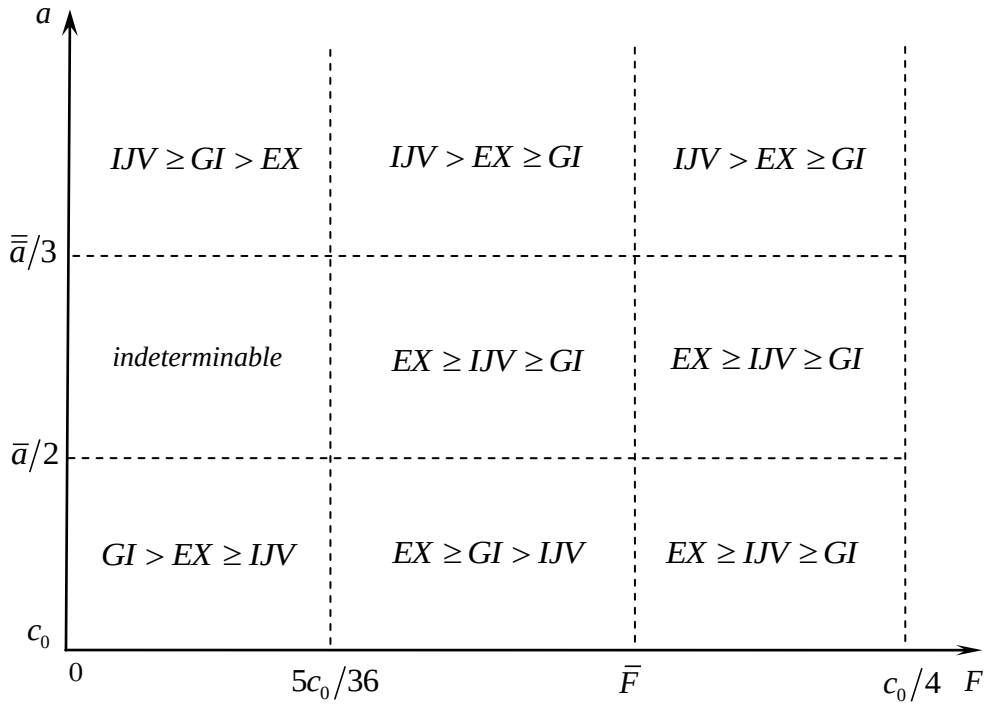
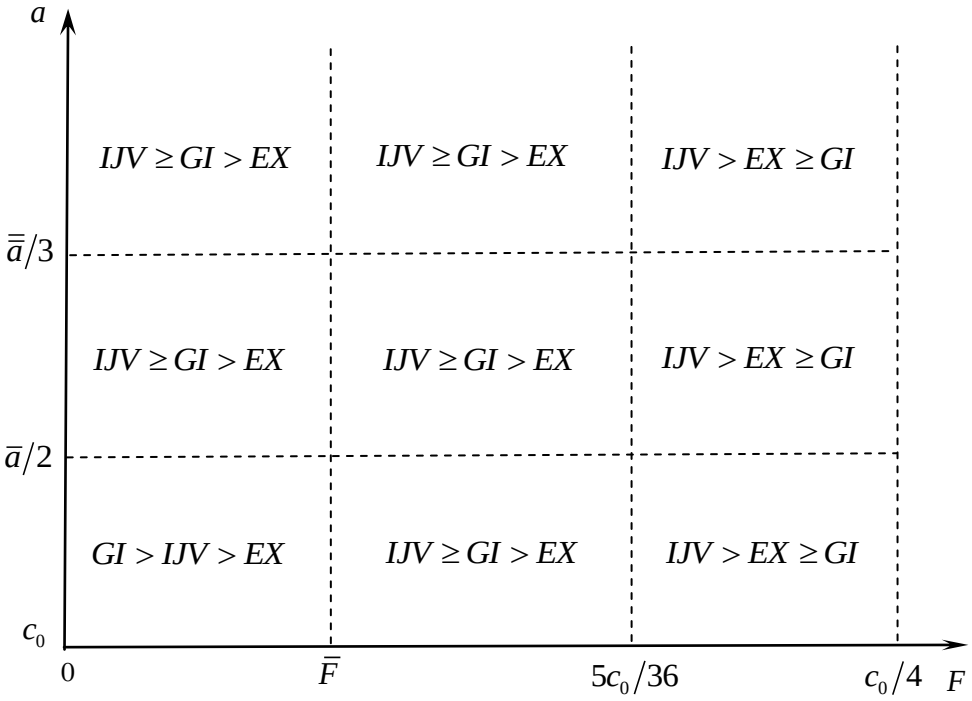


Case 1*: when* $\theta < \bar{\theta}$



Case 2*: when* $\bar{\theta} < \theta \leq 1$

Figure 1. The foreign firm's preference for entry modes
(Note: "GI" stands for "Greenfield investment, and "EX" stands for "Export.")

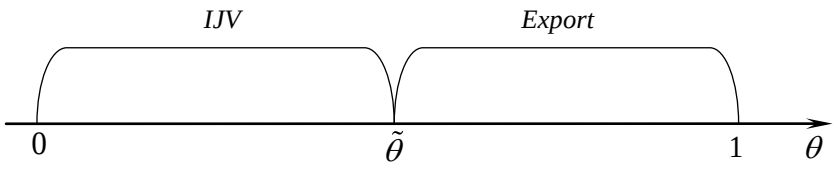


Figure 2. The host government's optimal choice of entry mode

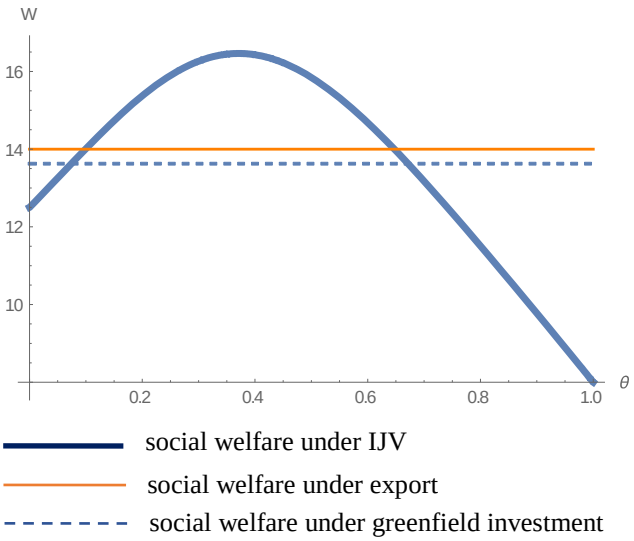


Figure 3. Social welfare under different values of θ