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Foreign Entry, Acquisition Target, and Host Country Welfare

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A B S T R A C T

We analyse the optimal mode of entry of a foreign multinational enterprise into a local market where two local firms with differing productivities are competing initially. We show that greenfield investment is chosen when the cost of setting up subsidiary and the cost asymmetry between the local firms are small, and exporting is optimal when both trade cost and technology gap are low; otherwise acquisition is preferred. We further show that under acquisition equilibrium the less efficient firm is acquired unless the cost of technology transfer to the integrated firm is large enough. We focus on the *process of selection* of the target firm under acquisition by constructing sequential offer game, bidding game and repeated offer game. In the analysis the externality effect of Cournot competition is internalised. In all the cases, however, the MNC's entry reduces the host country welfare.

Key words: *Entry strategy; Multinational firm; Greenfield investment; Exporting; Merger and acquisition; Bidding game; Sequential offer game; Welfare.*

JEL Classifications: D43; F12; F23; L13.

1. Introduction

In a globalised world it is important for a multinational company (MNC) to decide on the mode of serving any domestic market. Different entry modes generally discussed in the literature are direct export, licensing and foreign direct investment (FDI), and FDI can be in the form of 100% owned foreign subsidiary, partial equity holding or cross-border merger and acquisition (M&A). Opening up a subsidiary, that is, setting up a new firm in a foreign country is rhetorically called greenfield investment.[1] In an environment of liberalization it is, however, observed that greenfield investment has been more a popular choice than partial equity holding and licensing. But the last two decades have witnessed a growing importance of mergers and acquisitions (M&As) over greenfield investment. For instance, the UNCTAD (2000) study has recorded FDI in the form of M&A to be over 80%. In the study by Head and Ries (2008), for the period 1987-2001 FDI under M&A has two-third share. Hennart and Park (1993) and Calderon et al. (2002) study also provides the similar support.[2]

In this backdrop a number of papers are prepared highlighting the MNC's choice between acquisition and greenfield investment.[3] The existing literature has mainly analysed the outcomes when there is only one host firm, and if there are many host firms they are generally assumed identical in nature. However, the problem becomes complex in the presence of more than one host firm with differing efficiency levels, because now the MNC has to decide not only whether to enter a host market by merging with a host firm but also which host firm to merge with. Clearly, firm asymmetry would play an important role in the MNC's entry decision. The purpose of the present paper is to explicitly analyse the MNC's choice between acquisition and greenfield investment when there are two host firms in the market with differing productivities. And in the analysis we focus on the process of selection of a target firm under acquisition. Our main result is that merger is the preferred entry mode

[1] For the literature on different entry strategies of the MNC see, for instance, Horstmann and Markusen (1987), Tang and Yu (1990), Buckley and Casson (1998), Mattoo et al. (2004), Sinha (2010).
[2] The UNCTAD publishes the World Investment Report annually since 1991. It describes the trends of FDI in different forms for various countries and analyses different dimensions of the problems involved.
[3] The choice broadly depends on the set up cost, market structure, acquisition price, extent of integration, size of the firm, technological efficiency levels of the host firms etc. A subset of the literature comprises of Buckley and Casson (1998), Bjorvatn (2004), Gorg (2000), Nocke and Yeaple (2007, 2008), Muller (2007), Kim (2009), Raff, Ryan and Stahler (2009, 2012), Zhao(2011), and Stepanok (2012).

of the foreign firm over subsidiary provided that the subsidiary set up cost and productivity differences of the host firms are not too small. By merging with the host firm the MNC, in fact, saves the set up cost of subsidiary. More importantly, we show that merger occurs with the less efficient host firm. This happens because the acquisition price to acquire the less productive firm is less compared to acquiring the high productivity firm.

We extend the analysis to see whether there is any effect on the partner choice if there is a cost of transferring the MNC technology to the merged firm or the transfer is incomplete in the sense that the merged firm cannot utilise the full benefit of the technology. We show that the existence of such a cost may tilt the partner choice in favour of the efficient firm.

Since exporting is an important entry option, as mentioned in the beginning, we have included exporting when it is a credible threat over subsidiary. We have derived the relevant condition. Interestingly, merging with the inefficient host firm remains to be optimal even when we allow exporting as an alternative mode of serving the host market except in the case when the trade cost and technology asymmetry are both very low. We have also provided a welfare discussion, given the choice of the optimal entry mode. Interestingly, in our framework entry of the MNC always reduces welfare of the host country.

There are two closely related papers, namely Gorg (2000) and Zhao (2011), which also discuss the choice between greenfield investment and acquisition. Gorg, following the footstep of Buckley and Casson (1998), introduces an additional entry cost in the form of marketing and adaptation cost. Then based on simulation exercise for different values of marketing and adaptation cost he concludes that "the foreign entrant will in most cases be best off by acquiring an existing indigenous high technology firm". Zhao, on the other hand, decides selection of the target firm based on comparing the MNC's payoff under merger net of acquisition price, and he has assumed that the acquisition price is the payoff of the acquired firm under greenfield investment.[4] However, whether acquisition is at all profitable vis-à-vis greenfield investment is not fully examined. Hence welfare comparison in the paper under different modes of entry is questionable. In the presence of multiple target firms the main problem of the MNC is to decide which firm to acquire and at what price. The problem is somewhat complex when we take into consideration the host firms' strategic interactions.

[4] In Zhao (2011), acquisition of the high productivity firm occurs when the ability of integration is sufficiently weak and the technological gap is relatively large. If the ability to integrate is strong and the gap of technology is sufficiently small, then the MNC acquires the low-productivity firm.

To elaborate more on this, when there are three firms in a Cournot competition and two of them merge, it is typically the non-integrated firm (which does not participate in the merger) would gain due to the reduction in the number of competing firms in the market.[5] We explicitly analyse the externality effect that benefits the outsider firm under M&A in a Cournot competition and show that this strategic aspect plays an important role in acquisition process in the presence of multiple target firms.

To focus on the process of merger and to understand the strategic aspect, we construct a number of alternative games. While take-it-or-leave-it offer is analytically convenient and popular, in reality rarely the offer is once-for-all. Moreover, a host firm's payoff as an outsider is larger than its payoff under greenfield investment, hence each firm has incentives to see the other firm accepting the MNC's offer. We first discuss this issue by constructing two sequential offer games based on which host firm to be offered first, given that two host firms have different efficiency levels. We study the subgame perfect Nash equilibrium (SPNE) of such sequential offer games. However, we restrict to one round of offers to each host firm.[6]

Next we construct a bidding game. There are examples in real life where partner selection occurs by means of auction. In our model each host firm will bid in a sealed envelope for merger with the MNC and the highest bidder will win. Finally we consider the scenario where there is always the possibility that if the present offer of the MNC is rejected by both host firms, there will be a new offer by the MNC. Since no offer is the last offer in absolute sense, therefore the present repeated offer game appears to be more practical. This game fully captures the positive externality effect of merger for the outside firm. While the MNC's payoff differs from game to game, but, we show, target under acquisition remains invariant, that is, acquiring the low-productive firm is always optimal under acquisition. This clearly contrasts with the results of the other papers discussed in the literature.

Contributions of two other papers, namely Nocke and Yeaple (2007) and Raff et al. (2009), are worth mentioning in our context. Nocke and Yeaple (2007) have constructed a general equilibrium model to analyse the foreign entry modes involving export, greenfield investment and cross-border M&A taking into account firms heterogeneity and country

[5] Follows from Salant et al.(1983).
[6] In a sense the sequential offer games provide a mental or behind-the-scene calculation for the best take-it-or-leave-it offer.

specific characteristics. They have distinguished between mobile and non-mobile capabilities of the firms and that these capabilities differ internationally. Then cross-border mergers lead to synergic gains due to complementarities of assets. Hence if firms differ in respect of their mobile capabilities, the most efficient firms are likely to engage in cross border M&A, but if the firms differ in respect of their country-specific non-mobile capabilities, cross-border M&A should involve the least efficient active firms. However, strategic interactions of the players are missing in their model since they have a competitive market for acquisition.[7] The Raff et al. (2009) paper is another interesting contribution; it has included joint venture as an alternative mode of entry. However, there are synergic gains both under joint ventures and mergers. The paper examines the interactions of different foreign entry modes with two host firms, like ours, and explores the interplay of credibility of greenfield investment and export in shaping the preference over merger and joint venture. However, in their model host firms are symmetric and as a result the selection of target and the process of acquisition are not important dimensions of their analysis.

To summarize, our main analysis focuses on merger versus the subsidiary option of the foreign MNC for entering a domestic market. We then discuss the implications of export as an additional option. We also explore the effect of technology transfer cost in the merger decision. These extensions are useful to provide a deeper insight into the problem considered in the paper.

The plan of the paper is as follows. Section 2 describes the model. Then we study the optimal entry decision and partner choice under merger and acquisition in section 3. Our main analysis is extended to include export option and costly and incomplete technology transfer in two subsections in section 4. Section 5 provides a welfare discussion and section 5 concludes the paper.

[7] Nocke and Yeaple (2008) is another interesting contribution. It analyses the choice between greenfield investment and M&A based on general firm heterogeneity. Each firm consists of a set of tangible and intangible assets and complementarities of assets generate profits. Then the efficient firms are more prone to engage in greenfield investments as compared to cross-border mergers. Their findings are also validated by data of U. S. multinationals involved in outward foreign direct investment. On the other hand, in Raff et al. (2012) the entry decision is analyzed in a setting with one MNC and multiple heterogeneous host firms where a specific firm is the acquisition target. Though the model highlights some features such as productivity and market concentration as being the important factors behind the choice of different modes, but it does not focus on the selection of target firm as an explicit decision variable. With firm level Japanese data on FDI in 21 developed countries the paper establishes a link between the firm productivity and the likelihood of a mode choice.

2. Model

We consider the set-up where two domestic firms, firm 1 and firm 2, are competing in the home market, and a foreign firm, call MNC, is entering the domestic market either by setting up a 100% owned subsidiary (i.e., greenfield investment) or by acquiring one of the two domestic firms.[8] In any case, the operating firms compete in quantities in a Cournot fashion.

The marginal costs of the MNC, firm 1 and firm 2 are, respectively, c_f, c_1 and c_2. We assume that the MNC and firm 1 are equally efficient but firm 2 is less efficient compared to them; therefore, $c_f = c_1 < c_2$.[9] However, if the MNC enters with opening a subsidiary, it will have to incur a set up cost, $F > 0$. We further assume that in case of acquisition the integrated firm has access to the least cost technology. This means we assume that full technology transfer to the merged firm is possible without any additional cost. Later (in section 4) we introduce costs of technology transfer and see the consequence if there is an additional cost to transfer the technology or if technology transfer is not complete in the sense that the merged firm may not be successful to produce at the least possible cost.

Therefore, assuming that subsidiary as the credible threat, we first examine whether the MNC will merge with the efficient or inefficient firm whenever such a merger is profitable, compared to the case of subsidiary. We call subsidiary, merger with the efficient firm (firm 1) and merger with the inefficient firm (firm 2) as regimes S, $M1$, and $M2$, respectively. In our analysis we focus on the process of selection of the target firm.

Let the market demand for the homogeneous good be linear and in inverse form given by

$$P = \max\{0, a - Q\};\ a > c_2 \qquad (1)$$

[8] Here we actually consider the scenario where subsidiary dominates export from the MNC's perspective. We introduce `export' in the analysis in section 4 and derive conditions for subsidiary to be the credible threat over export.

[9] In Zhao, the high cost firm, the low cost firm and the MNC are each at a same distance in terms of their unit cost of production, so $c_2 - c_1 = c_1 - c_f$, but Gorg assumes the MNC's unit cost to be very close to that of the low cost local firm, that is, $c_2 - c_1 > c_1 - c_f \cong 0$. In our model even if we take $c_f < c_1$, our all results will go through for c_f close to c_1.

where $Q = \sum_i q_i$ is industry output, q_i is supply of output by firm i, and P is the market price for the product. We denote by π_j^z the payoff of firm j under regime z $(z = S, M1, M2)$, and by Π_{jf}^{Mj} the payoff of the merged firm when firm j and the MNC merge.

2.1 Subsidiary or Greenfield investment (S)

We assume that under subsidiary of the foreign firm all firms operate at positive output levels, hence we assume:

(A1) $c_2 \in I \equiv (c_1, \bar{c})$ where $\bar{c} = \frac{a + 2c_1}{3}$

(A2) $F \leq \frac{(a - c_1)^2}{16}$

Assumption (A1) states that if firm 2's marginal cost of production is above a critical level $\bar{c}$, it cannot operate at a positive output level. On the other hand, assumption (A2) ensures that the foreign firm can enter by opening its subsidiary in the host country because its set up cost is not too large. Given these assumptions, the payoffs of the firms under S regime are:

$$\pi_f^S = \frac{(a - 2c_1 + c_2)^2}{16} - F \; ; \; \pi_1^S = \frac{(a - 2c_1 + c_2)^2}{16} \text{ and } \pi_2^S = \frac{(a - 3c_2 + 2c_1)^2}{16} \qquad (2)$$

2.2 Merger between the MNC and the efficient firm (M1)

Given the assumption on technology, if merger occurs with firm 1, the merged firm's marginal cost is c_1 and that of the outsider (firm 2) is c_2. Hence the payoffs of the merged firm and firm 2 are:

$$\Pi_{1f}^{M1} = \frac{(a - 2c_1 + c_2)^2}{9} \text{ and } \pi_2^{M1} = \frac{(a - 2c_2 + c_1)^2}{9} \qquad (3)$$

It can be easily checked that $\pi_2^{M1} > \pi_2^S$, that is, firm 2 as an outsider firm gains under merger between the MNC and firm 1 due to externality effect of merger. Then merger with the efficient firm will be profitable if and only if,

$$\Pi_{1f}^{M1} > \pi_1^S + \pi_f^S \tag{4}$$

This leads to the condition

$$\text{(C1)} \qquad \frac{(a-c_1)^2}{16} \geq F > R_1(c_2) \equiv \frac{(a-2c_1+c_2)^2}{72}$$

Since $R_1(c_2)$ is increasing in c_2, with $R_1(c_2) = \frac{(a-c_1)^2}{72}$ at $c_2 = c_1$, and $R_1(c_2) = \frac{16}{9}.\frac{(a-c_1)^2}{72}$ at $c_2 = \bar{c}$, we can write the following lemma.

Lemma 1: *Given any* F, $\frac{(a-c_1)^2}{72} < F < \frac{16}{9}\frac{(a-c_1)^2}{72}$, $\exists c_2^*(\mathrm{F}) < \bar{\mathrm{c}}$ *such that,* $\forall \mathrm{c}_2 \in (c_1, c_2^*(F))$ *condition (C1) is satisfied.*

Then, (i) if $F \leq \frac{(a-c_1)^2}{72}$, merger under regime M1 is never profitable; (ii) if $\frac{(a-c_1)^2}{16} \geq F \geq \frac{16}{9}.\frac{(a-c_1)^2}{72}$, merger between the MNC and the efficient firm is always profitable; and (iii) if $\frac{(a-c_1)^2}{72} < F < \frac{16}{9}.\frac{(a-c_1)^2}{72}$, such a merger is profitable if and only if $\mathrm{c}_2 \in (c_1, c_2^*(F))$. We define,

$$\Delta_1 = \{(c_2, F) \,|\, \mathrm{c}_2 \in I \text{ and Condition (C1) holds}\} \tag{5}$$

2.3 Merger between the MNC and the inefficient firm (M2)

Given the assumption that technology transfer (to the merged firm) is free of cost and complete, if merger between the MNC and the inefficient firm occurs, the payoffs of the merged firm and the outsider (firm 1) are:

$$\Pi_{2f}^{M2} = \frac{(a-c_1)^2}{9} \text{ and } \pi_1^{M2} = \frac{(a-c_1)^2}{9} \tag{6}$$

The efficient firm as an outsider will gain, due to externality, if merger occurs between the MNC and firm 2. Then, merger with the inefficient firm will be profitable if and only if,

$$\Pi_{2f}^{M2} > \pi_2^S + \pi_f^S \tag{7}$$

This leads to the condition

$$\text{(C2)} \qquad \frac{(a-c_1)^2}{16} \geq F > R_2(c_2)$$

where

$$R_2(c_2) = \frac{(a-2c_1+c_2)^2}{16} + \frac{(a-3c_2+c_1)^2}{72} - \frac{(a-c_1)^2}{9}$$

Here $R_2(c_2)$ is U-shaped with $R_2(c_2) = \frac{(a-c_1)^2}{72}$ at $c_2 = c_1$, and $R_2(c_2) = 0$ at $c_2 = \bar{c}$.

Lemma 2: *Given any* F, $0 < F \leq \frac{(a-c_1)^2}{72}$, $\exists c_2^{**}(\mathrm{F}) < \bar{\mathrm{c}}$ *such that* $\forall \mathrm{c}_2 \in (c_2^{**}(F), \bar{c})$ *Condition (C2) is satisfied.*

Thus, (i) if $F \geq \frac{(a-c_1)^2}{72}$, merger under regime M2 is always profitable; and (ii) if $0 < F < \frac{(a-c_1)^2}{72}$, then such a merger is profitable if and only if $\mathrm{c}_2 \in (c_2^{**}(F), \bar{c})$. Define,

$$\Delta = \{(c_2, F) \mid \mathrm{c}_2 \in I \text{ and Condition (C2) holds}\} \tag{8}$$

We have the following observations follows from Lemma 1 and 2.

(1) If the set up cost is too large (i.e., $\frac{(a-c_1)^2}{16} \geq F \geq \frac{16}{9}.\frac{(a-c_1)^2}{72}$), merger with both the efficient and the inefficient firm is always profitable.

(2) If the set up cost is low (i.e., $0 < F \leq \frac{(a-c_1)^2}{72}$), merger with the efficient firm is never profitable, but merger with the inefficient firm is profitable only if the inferior technology is relatively inefficient (i.e., $c_2 > c_2^{**}(F)$). If, however, the inferior technology is close to the efficient technology (i.e., $c_2 < c_2^{**}(F)$), no merger is profitable, and in this case subsidiary will be the outcome.

(3) If the set up cost is of the intermediate level (i.e., $\frac{(a-c_1)^2}{72} < F < \frac{16}{9}.\frac{(a-c_1)^2}{72}$), merger with the inefficient firm is always profitable, but merger with the efficient firm is profitable only if the inferior technology is close to the efficient technology (i.e., $c_2 < c_2^{*}(F)$).

In Figure 1, Δ_1 is the area ABCD and Δ is given by the area ABEGD. Then, $\Delta_2 = \Delta - \Delta_1$ is the area CEGD that contains all combinations of (c_2, F) for which merger between the MNC and the inefficient firm is profitable but not between the MNC and the efficient firm. Therefore, ABCD ($= \Delta_1 \cap \Delta$) is the area where both mergers are profitable. Finally, the area DGH ($\equiv \Delta_3$) contains all combinations of (c_2, F) for which no merger is profitable (hence subsidiary is the preferred option).

[FIGURE 1 HERE]

Note that in a three-firm Cournot market the profitability of merger is driven by the asymmetry of the two host firms. Given our assumptions, merger with firm 2 generates a cost efficiency gain for the merged firm. On the other hand, merger with firm 1 does not result in any cost-saving. Hence the profitability condition for merger with firm 2 is satisfied for a larger parameter zone.

3. Optimal Partner Choice

In this section we discuss the choice of the target partner under acquisition equilibrium. In the following subsections we construct sequential offer games, bidding game and repeated offer game, respectively.

3.1 Sequential Offer Game

Consider the situation where the MNC gives offers sequentially to the host firms, but assume that the MNC can commit not to give any further offer once one round of offers is completed. In Game 1, the MNC's first offer goes to firm 1 and if it is rejected the second offer goes to the second firm. In Game 2, the first offer goes to firm 2 and the second offer to firm 1 if the first offer is rejected. Whenever a firm gets an offer, it decides whether to accept (A) or reject (R) the offer (i.e., $d_i = \{A, R\}$). Such an offer is accepted if the firm under the offer gets at least as much as its next best alternative payoff. If both offers are rejected, greenfield investment occurs. Finally, we see which game yields the highest possible payoff to the MNC. Figure 2 portrays Game 1 and Game 2.

[FIGURE 2 HERE]

To solve the games the following two conditions are useful (along with (C1) and (C2)).

(C3) $\Pi_{2f}^{M2} - \pi_2^S \geq \Pi_{1f}^{M1} - \pi_1^{M2}$

(C4) $\Pi_{2f}^{M2} - \pi_2^{M1} \geq \Pi_{1f}^{M1} - \pi_1^S$

Note that (C3) holds for all $c_2 \in (c_1, \bar{c})$. But $\exists \tilde{c} \in (c_1, \bar{c})$ such that condition (C4) holds if and only if $c_2 \in (\tilde{c}, \bar{c})$.

Let x_i^* be the MNC's optimal acquisition price offer to firm i, and d_i^* is the optimal decision of firm i in response to the MNC's offer. When the MNC likes the offer to be

rejected by firm i, we assume, for convenience, $x_i^* = -\infty$. We summarize the results of Game 1 and Game 2 in the following two lemmas, and the proofs are relegated to the *appendix.*

Lemma 3: *The subgame perfect equilibrium outcome of Game 1 is:*

(i) $[(x_1^* = -\infty, x_2^* = \pi_2^S), (d_1^* = R), (d_2^* = A)]$ *if condition (C2) holds; and*

(ii) $[(x_1^* = -\infty, x_2^* = -\infty), (d_1^* = R), (d_2^* = R)]$ *otherwise.*

Lemma 3 states that when (C2) holds (i.e., when both mergers are profitable), firm 1 will reject the MNC's first offer but firm 2 will accept the second offer. The MNC will target the high cost firm. When (C2) does not hold, no merger is profitable; this means the MNC will make an unacceptable offer. Therefore, when (C2) holds, the MNC gets a payoff $(\Pi_{2f}^{M2} - \pi_2^S)$, otherwise its payoff will be π_f^S .

Lemma 4: *The subgame perfect equilibrium outcome of Game 2 is:*

(i) $[(x_2^* = \pi_2^{M1}, x_1^* = \pi_1^S), (d_2^* = A), (d_1^* = A)]$ *if (C1) holds and* $c_2 \in (\tilde{c}, \bar{c})$ *(i.e. (C4) holds),*
(ii) $[(x_2^* = -\infty, x_1^* = \pi_1^S), (d_2^* = R), (d_1^* = A)]$ *if (C1) holds and* $c_2 \in (c_1, \tilde{c})$ *(i.e. (C4) does not hold),*

(iii) $[(x_2^* = \pi_2^S, x_1^* = -\infty), (d_2^* = A), (d_1^* = R)]$ *if (C1) does not hold but (C2) holds, and*

(iv) $[(x_2^* = -\infty, x_1^* = -\infty), (d_2^* = R), (d_1^* = R)]$ *if neither (C1) nor (C2) holds.*

The corresponding payoffs of the MNC are respectively: (i) $(\Pi_{2f}^{M2} - \pi_2^{M1})$, (ii) $(\Pi_{1f}^{M1} - \pi_1^S)$, (iii) $(\Pi_{2f}^{M2} - \pi_2^S)$, and (iv) π_f^S. Note that this game gives the possibility that acquisition of the efficient firm can occur. This happens when both (C1) and (C4) hold.

Now to examine whether the MNC will choose Game 1 or Game 2 to maximize its payoff, note that we have always

$$\Pi_{2f}^{M2} - \pi_2^S > \Pi_{1f}^{M1} - \pi_1^S \quad \forall c_2 \in (c_1, \bar{c}) \tag{9}$$

Then to compare the payoffs of the MNC in Game 1 and Game 2, we note the following:

(i) If only (C2) holds but (C1) does not hold, both games yield a payoff of $\Pi_{2f}^{M2} - \pi_2^S$.

(ii) If both (C1) and (C2) hold, Game 1 generates a payoff of $\Pi_{2f}^{M2} - \pi_2^S$, whereas Game 2 yields a payoff: $\Pi_{2f}^{M2} - \pi_2^{M1}$ if $c_2 \in (\tilde{c}, \bar{c})$, and $\Pi_{1f}^{M1} - \pi_1^S$ if $c_2 \in (c_1, \tilde{c})$. Clearly in this case Game 1 generates a larger payoff (in view of (C3) and (C4)).

Hence under sequential (one round) offer game, the MNC will select Game 1, and $\forall (c_2, F) \in \Delta$ merger will occur with the inefficient firm 2. But if $(c_2, F) \in \Delta_3$, there will be no acquisition and the outcome will be subsidiary of the foreign firm. Hence we have the following result.

Proposition 1: *Under sequential offer game, the MNC will select the merger game, Game 1, and* $\forall (c_2, F) \in \Delta$ *acquisition of the inefficient firm will occur. If, however,* $(c_2, F) \in \Delta_3$, *the outcome will be greenfield investment.*

The implication of the above results is that under a take-it-or-leave-it offer game (that is, if the offer is once for all), the MNC will offer π_2^S targeting the high cost firm, and only firm 2 will accept the offer. Note that the outcomes of the two games are the results of externality effect which increases the payoff for the outsider party in a merger. Two games provide the optimal offer in the second stage using subsidiary as the credible threat. Now comparing the payoffs it is clear that the acquisition price is lower for firm 2 leading to higher payoff for the MNC. Hence, the MNC chooses Game 1 to implement this better outcome for it. The advantage of acquiring firm 2, as opposed to firm 1, is stemming from the fact that firm 2 is less efficient than the MNC, and merger bridges that technological gap fully. In section 4 we will show that this result may be reversed.

3.2 Bidding Game

Sometimes we observe that the acquisition problem is resolved by means of a bidding game where the potential target firms submit their bids in a sealed envelope for being merged with the MNC and the highest bidder wins the race. In the context of our problem, the

maximum that firm i can offer to the MNC in a bidding game is $(\Pi_{if}^{Mi} - \pi_i^{Mj})$. But since we have

$$\Pi_{2f}^{M2} - \pi_2^{M1} > \Pi_{1f}^{M1} - \pi_1^{M2} \quad \forall c_2 \in (c_1, \bar{c}) \tag{10}$$

therefore, whenever both mergers M1 and M2 are profitable (i.e., $(c_2, F) \in \Delta_1 \cap \Delta$), firm 2 will win the bid by offering a little more than that of firm 1; hence merger with the inefficient firm will occur in equilibrium. Note that the bidding game in our model generates a lower payoff for the MNC compared to the above sequential offer games (or take-it-or-leave-it offer game) because, $\Pi_{2f}^{M2} - \pi_2^S > \Pi_{1f}^{M1} - \pi_1^{M2}$.

3.3 Repeated Offer Game

Consider the possibility of having a new offer by the MNC if the earlier offer is rejected. If the host firms perceive this, then given the externality in Cournot framework, each firm will have an incentive to reject the MNC's offer unless it gets a payoff weakly greater than outsider payoff. In such a situation firm 1 would accept an offer if it is not less than π_1^{M2} and firm 2 would accept a payoff not less than π_2^{M1}. Realizing this when both mergers are profitable, the MNC will offer a payoff of π_2^{M1}, and such an offer will immediately be accepted by firm 2 (firm 1 will not accept because $\pi_1^{M2} > \pi_2^{M1}$). Consider the following strategies of the players. The MNC will offer π_2^{M1} every time, and firm i will accept any payoff if it is not less than π_i^{Mj} $(i, j = 1,2; i \neq j)$; otherwise it will reject. Note that these strategies are optimal, given the strategies of the other players. Therefore the MNC will offer π_2^{M1} at the beginning, and the offer will immediately be accepted by firm 2 only. The MNC's net payoff under this situation is $(\Pi_{2f}^{M2} - \pi_2^{M1})$. On the other hand, if $(c_2, F) \in \Delta_2$, so that merger only with firm 2 is possible, the MNC will offer a payoff of π_2^S, and again only firm 2 will accept the offer (firm 1 will not accept because $\pi_1^S > \pi_2^S$); in this case the MNC's net payoff is $(\Pi_{2f}^{M2} - \pi_2^S)$.

Proposition 2: *Consider repeated offer game. Given externalities, the MNC's optimal offer of merger is* π_2^{M1} *if* $(c_2, F) \in \Delta_1 \cap \Delta$, *and* π_2^S *if* $(c_2, F) \in \Delta_2$. *In either case, firm 2 will accept the MNC's offer immediately and merger between the MNC and the inefficient firm will occur in equilibrium. There will be no merger if* $(c_2, F) \in \Delta_3$.

While the MNC gets under repeated offer game a (weakly) lower payoff compared to sequential or take-it-or-leave-it offer game, but whenever merger occurs, it occurs with the low productivity firm.

To sum up the main analysis of this section, we find that the MNC prefers merger over greenfield investment provided that the subsidiary set up cost and the technological gap between the host firms are not small enough. And whenever merger occurs it is always optimal to merge with the less efficient host firm. The possibility of merger with the efficient firm arises only in the context of Game 2 in the above analysis. But for the case where acquisition is preferable to subsidiary, the MNC always prefers Game 1 to Game 2, therefore the more efficient local firm is never acquired. Given subsidiary as the credible threat, the MNC has to pay a lower acquisition price under merger with the inefficient firm, as a result the MNC's net payoff from merger is larger if merger occurs with the inefficient firm.[10] Finally, through merger the MNC can save the set up cost, therefore if the set up cost is relatively large, merger will dominate subsidiary.

4. Extensions

In this section we consider two extensions in the context of the previous analysis. First, in subsection 4.1 we consider costly and incomplete technology transfer to the merged firm in turn, and study its consequence to the choice of the MNC's optimal entry strategy. In particular, we show that the MNC's partner choice may be tilted towards the efficient firm. Then in section 4.2 we consider the scenario when export is preferred over subsidiary (that is, export is the credible threat) and examine whether merger be still the dominant strategy for the MNC.

[10] However, if technology transfer to the integrated firm is incomplete or costly, merger with the efficient firm may arise (see section 4.1).

4.1 Costly Technology Transfer

Our previous analysis is based on the assumption that the technology transfer to a host firm is costless and complete. We now extend the analysis to incorporate costly and/or incomplete technology transfer to the host firm under merger. First, note that this will have no effect if the MNC merges with the efficient host firm because by assumption the technical efficiency level is the same for both the MNC and the efficient firm, hence there will be no need for technology transfer. In case of merger with the inefficient firm, the technology transfer from the MNC to the merged firm is a possibility and both costly and/or incomplete technology transfer would have an effect on the decision of technology transfer, which in turn will determine the available amount of surplus from merger. We interpret that the costly technology transfer is associated with a fixed cost of transfer. This fixed cost can be the cost of installing the technology or training the personnel to operate with the transferred technology. On the other hand, we interpret incomplete technology transfer to mean that the marginal cost of production of the merged firm would be higher when the technology is transferred to the merged firm.[11]

4.1.1 *Fixed Cost of Technology Transfer*

First consider costly technology transfer and assume that there is a fixed cost, $T > 0$, of transferring the MNC's technology to the inefficient host firm. Then the MNC's payoff from merger with the inefficient host firm would be reduced by the amount T. Now, assuming that subsidiary is the best alternative option to merger, the MNC's payoff from

[11] Let c' be the marginal cost of the merged firm under merger with the inefficient firm (firm 2) if the foreign technology is transferred. Then by incomplete technology transfer we mean $c' > c_1$. Here we are not ruling out the possibility of $c' > c_2$. In this case in fact the MNC's technology will not be transferred and the merged firm will operate with firm 2's technology. Hence in general the merged firm's marginal cost under merger with the inefficient firm will be $\hat{c} = \min\{c', c_2\}$.

merging with the inefficient firm is $[(\Pi_{2f}^{M2} - T) - \pi_2^S]$ and that with the efficient firm is $[\Pi_{1f}^{M1} - \pi_1^S]$. Now we have,

$$[\Pi_{2f}^{M2} - T - \pi_2^S] - [\Pi_{1f}^{M1} - \pi_1^S] = \frac{1}{18}[(c_2 - c_1)(5a + 6c_1 - 11c_2) - T \qquad (11)$$

Hence the MNC will earn a higher payoff from merging with the inefficient firm provided that $T \leq \frac{1}{18}[(c_2 - c_1)(5a + 6c_1 - 11c_2) \equiv T^*$ and condition (C2) is satisfied. Otherwise, for $T > T^*$, the merger with the efficient firm takes place provided that condition (C1) holds. However, subsidiary occurs when $T > T^*$ and neither of the conditions (C1) and (C2) is satisfied. Interestingly, with a fixed cost of technology transfer we are able to show that merger with the efficient firm can be optimal when the cost of technology transfer is large (i.e., $T > T^*$) and (C1) holds. The existence of high transfer cost actually reduces the benefits of paying a smaller acquisition price to the inefficient firm.

4.1.2 *Incomplete Technology Transfer*

When technology transfer is incomplete due to some rigidities or complexities in transferring the knowledge, the full benefit of the transferred technology is not possible. The marginal cost of production will then be higher after technology transfer (compared to that of the efficient technology) in the merged firm. Incorporating the idea of incomplete technology transfer, let the marginal cost of the merged firm under merger with the inefficient firm be $\hat{c}$, and $\hat{c} = c_1 + \varepsilon$ with $\varepsilon \in [0, c_2 - c_1]$. Now taking subsidiary as the alternative option, merger with the inefficient firm is preferred to that with the efficient firm if and only if

$$[\Pi_{2f}^{M2}(\hat{c}) - \pi_2^S] - [\Pi_{1f}^{M1} - \pi_1^S] \geq 0$$

We have,

$$[\Pi_{2f}^{M2}(\hat{c}) - \pi_2^S] - [\Pi_{1f}^{M1} - \pi_1^S] = \frac{1}{18}[(c_2 - c_1)(5a + 6c_1 - 11c_2) + \frac{4\varepsilon(\varepsilon - (a - c_1))}{9} \qquad (12)$$

Clearly, if $\varepsilon = 0$, we have the usual result, that is, merger with the inefficient firm dominates that with the efficient firm. On the other hand, when $\varepsilon = c_2 - c_1$, we have

$[\Pi_{2f}^{M2}(\hat{c}) - \pi_2^S] - [\Pi_{1f}^{M1} - \pi_1^S] = -\frac{1}{6}[(c_2 - c_1)(a - 2c_1 + c_2) < 0$, given (A1). This means, at least for large values of ε, merger with the efficient firm is preferred over merger with the inefficient firm.[12]

Thus, this extension clearly reveals the significance of costly and incomplete technology transfer and highlights that merging with the efficient firm might be possible if the technology transfer is either very costly or far from complete. This outcome also validates the "cherry picking" behaviour in the context of international merger where typically the more efficient firms are chosen as targets.

4.2 Exporting Option

In this subsection we extend our analysis to include export from the MNC's home country to the host country as another option apart from merger and subsidiary options. We assume that there is an additional cost of exporting for the MNC. The cost includes a transport cost, a tariff imposed by the host country and also a higher labour cost of the home country of the MNC (if any). We subsume all these costs and assume that there is a trade cost $t \geq 0$ per unit of output for exporting to the host country. For the MNC this t is over and above the marginal cost of production c_f assumed in the main analysis. Thus the marginal cost of supplying the good in the host market is $c_f + t$ under exporting option. To keep the focus of the paper intact we introduce the exporting option as an alternative to subsidiary operation and derive the condition for which exporting is a credible threat. We then study the MNC's optimal choice between export and merger.

If the MNC enters the host country by means of export (E), given the trade cost t, then the payoffs of the different firms are:

$$\pi_f^E = \frac{(a - 2c_1 - 3t + c_2)^2}{16},\ \pi_1^E = \frac{(a - 2c_1 + c_2 + t)^2}{16} \text{ and } \pi_2^E = \frac{(a - 3c_2 + 2c_1 + t)^2}{16} \quad (13)$$

[12] The results with incomplete technology transfer to the merged firm in our paper are similar to those under weak integration in Zhao (2011). On the contrary, in both Nocke and Yeaple (2008) and Raff et al. (2012) the merged firm has access to even a lower cost of production due to synergy and complementarities of assets of the merging partners. The synergy effect is likely to be higher when the firms are close in terms of costs in the pre-merger situation.

Therefore, if $t \geq \bar{t} \equiv \frac{a - 2c_1 + c_2}{3}$, export option would just not be available to the MNC. Hence we restrict to the assumption that $t < \bar{t}$.

When both export and subsidiary options are available to the MNC, the MNC will choose export over subsidiary if and only if $\pi_f^E > \pi_f^S$, that is,

$$F > \frac{3t(2a - 4c_1 + 2c_2 - 3t)}{16} \equiv F^*(t, c_2) \tag{14}$$

Then, our main analysis (where subsidiary is assumed to be the credible threat) will go through for all $F \leq F^*(t, c_2)$. Note that $F^*(t, c_2)$ is an increasing function of c_2, with $F^*(t, c_1) = \frac{(a - c_1)^2}{16}$ at $t = t^* \equiv \frac{(a - c_1)}{3}$; further, $F^*(t, c_2)$ is increasing $\forall t < \bar{t}$, given c_2. Then for $t \geq t^*$, we have $F^*(t, c_2) \geq \frac{(a - c_1)^2}{16} \forall c_2 \in I$, and since by assumption (A2), $F < \frac{(a - c_1)^2}{16}$, subsidiary will dominate export and our previous analysis will hold as usual. Therefore, in order to see if exporting option has any effect on our previous analysis, we consider $t < t^*$.

Now given any $t < t^*$, we shall have an upward sloping curve $F^*(t, c_2)$ passing through the area ABEH (such as the dotted line) in Figure 1 such that the outcome below that curve will have the same characterization as before because for such an outcome subsidiary is the credible threat. But for the outcome above that curve export is the credible threat, hence we need to examine whether merger still remains the best choice of entry mode and whether merger with the inefficient firm will dominate that with the efficient firm.

Lemma 5: *Whenever export is the credible threat, the MNC's payoff under merger with the inefficient firm is larger than that with the efficient firm.*[13]

Now given the result underlying Lemma 5, the optimal entry strategy of the MNC will be merger (with the inefficient firm) or export according as to which entry mode yields a

[13] The result holds because, $[\Pi_{2f}^{M2} - \pi_2^E] - [\Pi_{1f}^{M1} - \pi_1^E] = \frac{1}{18}(c_2 - c_1)(5a + 6c_1 - 11c_2 + 9t) > 0 \; \forall c_2 \in I$.

larger profits to the MNC. Therefore, export would be the optimal entry mode if and only if $\pi_f^E > \Pi_{2f}^{M2} - \pi_2^E$, that is,

$$\frac{(a-2c_1-3t+c_2)^2}{16} > \frac{(a-c_1)^2}{9} - \frac{(a-3c_2+2c_1+t)^2}{16} \qquad (15)$$

It is easy to check that when t tends to zero and c_2 tends to c_1, the above inequality (15) necessarily holds. Hence we can write the following proposition.

Proposition 3: *Export is the chosen entry mode of the MNC if both t and c_2 are small, otherwise merger with the inefficient firm is optimal.*

Thus it is interesting to observe that there are parameter ranges for which merger is preferred over export and subsidiary, and whenever merger occurs, the optimal selection of partner remains the same. When the trade cost is low and the subsidiary set up cost is relatively large, exporting option is to be preferred over subsidiary. Then if c_2 is large enough, under merger with the inefficient firm the MNC will have to pay a lower price for acquisition, hence merger with the inefficient firm will be the outcome.

5. Welfare Analysis

In this section we derive welfare implications for the home country if entry of a foreign firm occurs, hence we compare welfare levels of the home country in the pre- and post-entry scenarios. In an environment of liberalization generally the developing countries are seen to encourage entry of the foreign multinationals, because such an entry is associated with inflow of foreign investment and superior technologies. In our framework, however, foreign entry does not lead to higher home country welfare. In fact, as we see below, the home country suffers from a loss of welfare, given the optimal entry strategy of the foreign firm.

In our paper the MNC enters either by means of direct export, or by setting up a new plant in the host country, or by acquiring a host firm. Under exporting the MNC faces a trade cost, greenfield investment involves a set up cost, and merger involves paying an acquisition price. Let us restrict to the assumption that the integrated firm under M&A has access to the least possible production cost, hence we assume that whenever foreign technology is

transferred to the merged firm, full knowledge is transferred at zero cost.[14] Finally, we define the host country welfare (W) to be the sum of consumers' surplus (CS) and payoffs of the local firms.

Initially, before foreign entry occurs, the host country market structure is an asymmetric duopoly. Then the pre-entry host welfare is:

$$W^0 = (CS)^0 + \pi_1^0 + \pi_2^0 = \frac{(2a - c_1 - c_2)^2}{18} + \frac{(a - 2c_1 + c_2)^2}{9} + \frac{(a - 2c_2 + c_1)^2}{9} \qquad (16)$$

When the MNC enters by setting up a subsidiary, the host country has three firms under Cournot competition. However, the MNC is assumed to repatriate the profit it earns in the host country to its home country. As a result, welfare in the host country will be consisting of consumers' surplus and profits of its two domestic firms,

$$W^S = (CS)^S + \pi_1^S + \pi_2^S = \frac{(3a - 2c_1 - c_2)^2}{32} + \frac{(a - 2c_1 + c_2)^2}{16} + \frac{(a - 3c_2 + 2c_1)^2}{16} \qquad (17)$$

First note that compared to pre-entry situation, the consumer surplus under subsidiary will be higher due to increase in competition with the foreign subsidiary. However, the profits of both domestic firms will fall. Then by simple comparison of the two welfare expressions W^0 and W^S, we find that the host country is worse off with foreign entry under subsidiary operation. This happens mainly because the MNC's profit is a leakage from the host economy.

When the MNC enters by acquiring a local partner by using the threat of a subsidiary operation, it acquires the inefficient firm (firm 2). So there will be two firms in the host country with equal efficiency, and the merged local partner will receive its reservation payoff. Hence, the host country welfare expression will be

$$W^{M2} = (CS)^{M2} + \pi_1^{M2} + \pi_2^S = \frac{2(a - c_1)^2}{9} + \frac{(a - c_1)^2}{9} + \frac{(a - 3c_2 + 2c_1)^2}{16} \qquad (18)$$

Since under this situation both the merged firm and firm 1 are operating with the efficient technology, therefore compared to the initial domestic profits and consumers' surplus (as

[14] If there is a fixed cost of transferring the foreign technology to the merged firm (see section 4.1.1), it is borne by the MNC, hence it will have no effect on the host country welfare.

given in (16)), the profits under merger are lower and consumers' surplus is higher (because of increased competitor). However, the overall comparison yields that the welfare in the host country falls as the MNC enters through merger with the inefficient firm.[15] Hence it is clear that whenever subsidiary is a credible threat, foreign entry either in the form of greenfield investment or by acquiring a local partner will always be welfare reducing.

Now consider the scenario when exporting is a better strategy than subsidiary operation for the MNC. In such a situation exporting will be used as the credible threat, and whenever merger is the equilibrium strategy, merger will occur with the inefficient firm. In this case welfare expression will be similar to the expression given by (18) except that π_2^S will be replaced by the new acquisition price π_2^E ($> \pi_2^S$ for $t > 0$). Since this increase is not large enough, the overall welfare will fall compared to the initial level.

Finally, if the MNC prefers to choose export option as the mode of entry (this can happen if both t and c_2 are small), then the host country will have two domestic firms and export will involve trade costs.[16] Assuming trade cost to be the per unit transport cost of the good and that no tariff is imposed by the domestic country, we can write the welfare expression under exporting as,

$$W^E = (CS)^E + \pi_1^E + \pi_2^E = \frac{(3a - 2c_1 - c_2 - t)^2}{32} + \frac{(a - 2c_1 + c_2 + t)^2}{16} + \frac{(a - 3c_2 + 2c_1 + t)^2}{16} \quad (19)$$

First note that W^E is a positive function of *t*. For t equal to zero the above expression coincides with (17), and we have already seen that welfare is lower in that case. For prohibitive trade cost there would be no export and the host economy would become duopoly with two domestic firms, and in that case the welfare would be given by (16). Since W^E is increasing in *t*, for the permissible range of values of t the welfare in the host country will be strictly lower under exporting strategy compared to initial duopoly. Thus foreign entry is

[15] If for some reasons, merger with the efficient domestic firm occurs, then there will be no efficiency gain. Consumers' surplus and profits of firm 2 will not change if such a merger occurs. On the other hand, the profit of firm 1 will be lower with subsidiary being the credible threat. This means domestic welfare under merger with the efficient firm will be less compared to the initial level.

[16] In our analysis we implicitly assume that in a globalized world the host government does not impose any tariff due to some common understanding between nations. However, in case a tariff is imposed, the welfare result needs to be suitably modified as the total tariff revenue would also appear in the welfare expression of the host country. For an analysis of optimal tariff and domestic welfare in the context of foreign entry see Kabiraj (1993) and Bhattacharjea (2002).

welfare reducing even with exporting option. Hence we can write the final proposition of our paper.

Proposition 4: *In our structure foreign entry either in the form of subsidiary, exporting or merger with a domestic firm is always welfare reducing for the host country.*

This result is interesting as it highlights that, starting with two domestic firms with differing productivity levels, entry of a foreign firm in any form reduces welfare in the host economy when the foreign technology is equally efficient as that of a domestic firm.[17] The possibility of welfare reducing foreign entry is demonstrated in the earlier trade and FDI literature (Dixit (1984), Richardson (1998), Bhattacharjea (2002) etc.)[18]. In particular, Bhattacharjea (2002), allowing for cost asymmetry between domestic and foreign firms with many foreign firms and a fixed number of domestic firms, has shown that with foreign entry domestic welfare may be lower unless the foreign share of the market is large enough. We have similar results with heterogeneous domestic firms and even with an international merger that bridges the technology efficiency gap between domestic and foreign firms.

6. Conclusion

We have studied the question of optimal entry strategy of a foreign multinational which is going to serve a domestic market. The possible entry strategies we have discussed in the paper are greenfield investment, acquisition and direct export. We have first examined the choice between acquisition of a target firm among the multiple heterogeneous targets and greenfield investment. Throughout the paper we have focused our attention on the process of selection of the target firm and provided an analysis based on three different games, viz., sequential offer game, bidding game and repeated offer game. If technology transfer to the merged firm is costless and complete, we find that in case of acquisition the multinational firm always prefers to acquire the inefficient target. But the MNC's target is tilted towards the efficient firm if there is an associated cost of technology transfer or the transfer of technology is incomplete. For large enough technology transfer cost, or when the technology

[17]It would be an interesting exercise to see whether the results derived in this paper would be altered when the foreign firm is more efficient than any of the domestic firms. We keep this for future work along with some other issues in the context of foreign entry.

[18] See Bhattacharjea (2002) for a nice description of an earlier literature in this context.

transfer is far from complete, the MNC prefers to merge with the efficient firm. When the multinational firm chooses to set up a subsidiary, it does so because the reservation payoff of the inefficient firm is not favourable for acquisition as compared to the low level of fixed set up cost. The divergence of technological efficiency plays a crucial role in the choice between greenfield investment and acquisition.

When tariffs or trade costs are low relative to the subsidiary set up cost, export option is likely to dominate subsidiary, that is, export is the credible threat. We have shown that even then merger can be the optimal entry mode of the MNC for a wide parameter range. And whenever merger occurs it occurs with the inefficient firm. When trade costs are very low and technological asymmetry between the local firms is small enough, exporting can be the optimal mode of entry of the MNC.

Finally, we have studied the welfare effect of an entry of a foreign firm in an asymmetric duopoly industry of the host country. Given the optimal entry decision of the foreign multinational, the host country in our framework becomes worse off. The social welfare defined as the sum of consumers' surplus and producers' surplus, unambiguously falls after entry of an MNC compared to the pre-entry situation. Hence the present work to some extent complements the existing literature on foreign entry and welfare..

Appendix

Proof of Lemma 3

In Game 1, the first acquisition offer of the MNC goes to firm 1, which is either accepted (A) or rejected (R). If accepted, acquisition of firm 1 takes place. If rejected, the MNC's second acquisition offer goes to firm 2. If the offer is accepted, acquisition of firm 2 occurs; otherwise, greenfield investment occurs. The game is solved by backward induction. Denote by x_i the acquisition price that the MNC offers to firm i and x_i^* is the optimal offer.

Consider the subgame that starts with the MNC's offer x_2 to firm 2. Since firm 2 will accept any offer $x_2 \geq \pi_2^S$, the optimal offer in this subgame would be $x_2 = \pi_2^S$ provided that

$$\Pi_{2f}^{M2} - \pi_2^S \geq \pi_f^S \quad \Leftrightarrow \Pi_{2f}^{M2} \geq \pi_2^S + \pi_f^S$$

And given (A2), the above condition is reduced to (see (7))

$$\text{(C2)} \qquad \frac{(a-c_1)^2}{16} \geq F \geq R_2(c_2)$$

Therefore, when (C2) holds, the optimal offer in this subgame is $x_2^* = \pi_2^S$, which is accepted by firm 2. In this case, the MNC gets a payoff of $(\Pi_{2f}^{M2} - \pi_2^S)$, firm 1 gets π_1^{M2} and firm 2 gets π_2^S.

If (C2) does not hold, the MNC will give an offer $x_2 < \pi_2^S$, which would be rejected. For convenience we take $x_2^* = -\infty$ in this case.

Now move to the beginning of the game where the MNC makes the offer to firm 1. If (C2) holds, then the optimal offer would be $x_1 = \pi_1^{M2}$ provided

$$\Pi_{1f}^{M1} - \pi_1^{M2} \geq \Pi_{2f}^{M2} - \pi_2^S$$

But this condition never holds (in view of (C3)). Therefore the optimal beginning offer to firm 1 will be the `rejection' offer $x_1^* = -\infty$

Thus in the subgame perfect equilibrium, the MNC first gives a `rejection' offer $x_1^* = -\infty$ to firm 1, and offers $x_2^* = \pi_2^S$ iff (C2) holds; otherwise, `rejection offer' $x_2^* = -\infty$ is optimal, in which case subsidiary is the outcome. This gives the SPNE of the game as stated in Lemma 3.

Proof of Lemma 4

In Game 2, the MNC gives the first acquisition offer to firm 2, and if it is rejected then the MNC's second offer goes to firm 1. In the subgame that starts with the MNC's second offer, the optimal offer would be $x_1 = \pi_1^S$ if and only if

$$\Pi_{1f}^{M1} - \pi_1^S \geq \pi_f^S \quad \Leftrightarrow \Pi_{1f}^{M1} \geq \pi_1^S + \pi_f^S$$

Given (A2), this condition is reduced to (see (4))

$$\text{(C1)} \qquad \frac{(a-c_1)^2}{16} \geq F \geq R_1(c_2)$$

Therefore, if (C1) holds, the optimal offer is $x_1^* = \pi_1^S$ which is accepted. This yields a payoff of $(\Pi_{1f}^{M1} - \pi_1^S)$ to the MNC, π_1^S to firm 1 and π_2^{M1} to firm 2. If (C1) does not hold, the MNC will give a rejection offer, $x_1 < \pi_1^S$, i.e., $x_1^* = -\infty$.

When (C1) holds, in the subgame beginning with the MNC's first offer to firm 2, the optimal offer would be $x_2 = \pi_2^{M1}$ if and only if

$$\text{(C4)} \qquad \Pi_{2f}^{M2} - \pi_2^{M1} \geq \Pi_{1f}^{M1} - \pi_1^S$$

But (C4) holds iff $c_2 \in (\tilde{c},\ \bar{c})$; $c_1 < \tilde{c} < \bar{c}$. Therefore if both (C1) and (C4) hold (i.e., (c_2, F) satisfies (C1) and $c_2 > \tilde{c}$), the optimal offer is $x_2^* = \pi_2^{M1}$, which is accepted. If (C1) holds but (C4) does not, then $x_2^* = -\infty$ and the offer is rejected by firm 2, but the second offer $x_1^* = \pi_1^S$ is accepted by firm 1.

Finally, if (C1) does not hold (this means, $x_1^* = -\infty$, in which case the outcome is subsidiary), then in the beginning the MNC would offer $x_2 = \pi_2^S$ if and only if $\Pi_{2f}^{M2} - \pi_2^S \geq \pi_f^S$. This leads to condition (C2).

Hence if (C1) does not hold but (C2) holds, then the optimal first offer will be $x_2^* = \pi_2^S$ which is accepted by firm 2 and acquisition of firm 2 takes place. But if neither (C1) nor (C2) holds, the MNC's first offer will also be $x_2^* = -\infty$. That is, in this case the MNC gives both rejection offers and the outcome is subsidiary. This leads to the results of Lemma 4.

References

Bhattacharjea, A., 2002, "Foreign Entry and Domestic Welfare: Lessons for Developing Countries" *Journal of International Trade and Economic Development*,11, 143-162.

Bjorvatn, K., 2004, "Economic Integration and the Profitability of Cross-Border Mergers and Acquisitions", *European Economic Review* 48, 1211-1226.

Buckley, P. J. and M. C. Casson, 1998, "Analyzing Foreign Market Entry Strategies: Extending the Internalization Approach", *Journal of International Business Studies*, 29, 539-561.

Calderon, C. and N. Loayza and L. Serven, 2002, "Greenfield FDI vs. Mergers and Acquisitions: Dos the Distinction Matter?", *Working Paper*, Santiago Central Bank of Chile.

Dixit, A. (1984) "Trade Policy for Oligopolistic Industries", *The Economic Journal*, 94, 1–15.

Gorg, H., 2000, "Analysing Foreign Market Entry: The Choice between Greenfield Investment and Acquisitions", *Journal of Economic Studies*, 27, 165-181.

Head, K and J. Ries, 2008, "FDI as an Outcome of the Market for Corporate Control: Theory and Evidence", *Journal of International Economics*, 74, 2-20.

Hennart, J.-F. and Y. R. Park, 1993, "Greenfield vs. Acquisition: The Strategy of Japanese Investors in the United States", *Working Paper*, Tilburg University.

Horstmann, I. J. ans J. R. Markusen, 1987, "Licensing versus Direct Investment: A Model of Internalisation by the Multinational Enterprise", *Canadian Journal of Economics*, 20, 464-481.

Kabiraj, T., 1993, "Tariffs versus Licensing in the Presence of Fixed Costs", *Journal of International Trade and Economic Development*, 2, 27-41.

Kim, Y.-H., 2009, "Cross-border M&A vs. Greenfield FDI: Economic Integration and Its Welfare Impact", *Journal of Policy Modeling*, 31, 87-101.

Mattoo, A., M. Olarreaga and K. Saggi, 2004, "Mode of Foreign Entry, Technology Transfer, and FDI Policy", *Journal of Development Economics*, 75, 95-111.

Müller, T., 2007, "Analyzing Modes of Foreign Entry: Greenfield Investment versus Acquisition", *Review of International Economics*, 15, 93-111.

Nocke, V. and S. Yeaple, 2007, “Cross-border Mergers and Acquistions vs. Greenfield Foreign Direct Investment: The Role of Firm Heterogeneity”, *Journal of International Economics,* 72, 336-365.

Nocke, V. and S. Yeaple, 2008, "An Assignment Theory of Foreign Direct Investment," *Review of Economic Studies,* 75, 529-557.

Raff, H., M. Ryan, and F. Stähler, 2009, “The Choice of Market Entry Mode: Greenfield Investment, M&A and Joint Venture”, *International Review of Economics and Finance,* 18, 3-10.

Raff, H., M. Ryan, and F. Stähler, 2012. "Firm Productivity and the Foreign-Market Entry Decision*," Journal of Economics* & *Management Strategy*, 21, 849-871.

Richardson, M., 1998, “Foreign Entry and Domestic Welfare”, *Weltwirtschaftliches Archiv*, 134, 251-261.

Salant, S.W., S. Switzer, R. J. Reynolds, 1983. “The Losses of Horizontal Merger: The Effects of an Exogenous Change in Industry Structure on Cournot-Nash Equilibrium”. *Quarterly Journal of Economics*, 98,185-199.

Sinha, U. B., 2010, “Strategic Licensing, Exports, FDI and Host Country Welfare”, *Oxford Economic Papers*, 62, 114 – 131.

Stepanok, I., 2012, “Cross-border Mergers and Greenfield Foreign Direct Investment”, *Kiel Working Paper No. 1805*, Kiel Institute for the World Economy, Germany.

UNCTAD., 2000, “Cross-border Mergers and Acquisitions and Development”, *World Investment Report,* New York and Geneva.

Tang, M.-G. and C.-M. J. Yu, 1990, “Foreign Market Entry: Product Related Strategies”, *Management Science*, 36, 476-89.

Zhao, K. (2011), “Entry Mode Choice and Target Firm Selection: Private and Collective Incentive Analysis”, *mimeo.*, GAINS-TEPP, Universit´e du Maine.

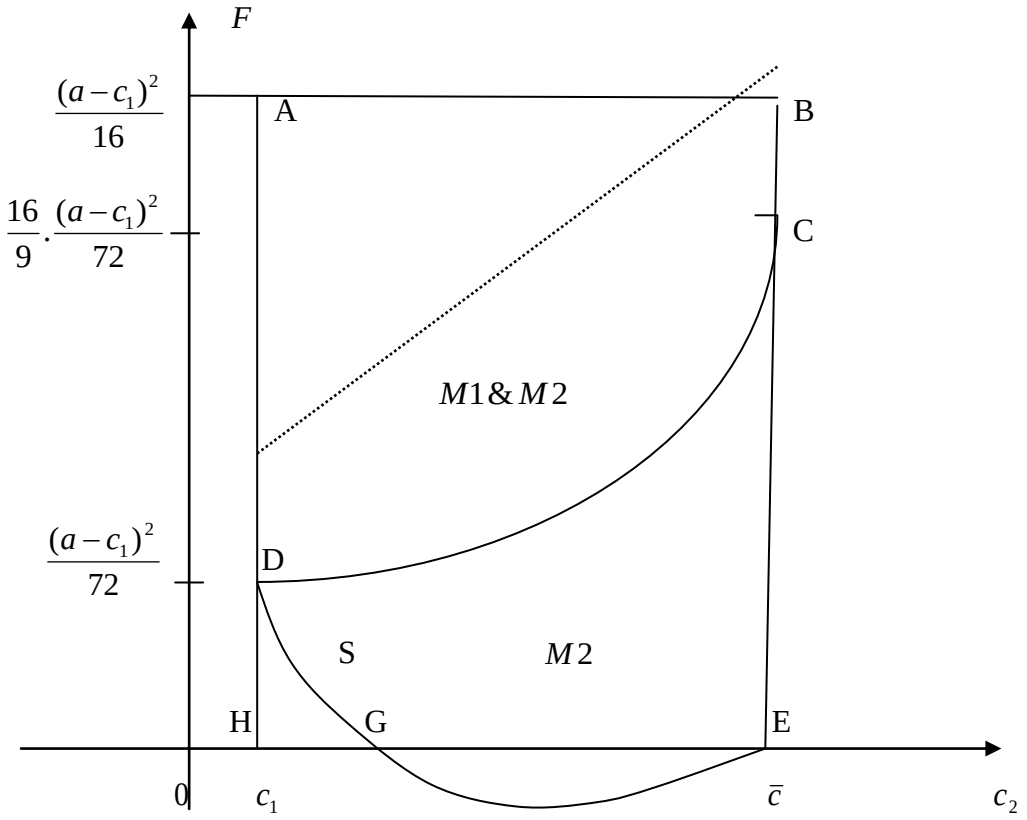

Figure 1: Different regimes of acquisition and subsidiary.

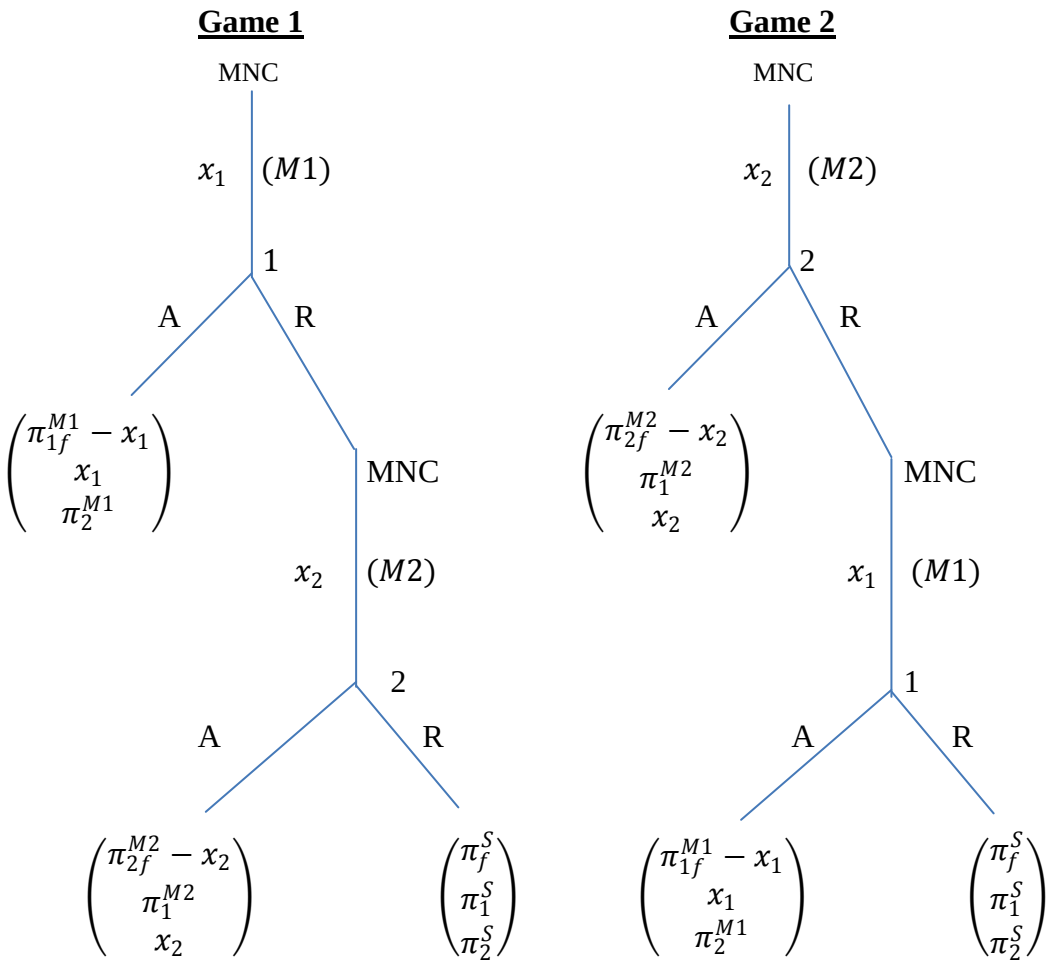

Figure 2: Sequential offer merger game