International Journal of Engineering, Economics and Management
ISSN: 2319-7927, Volume 2, Issue 2

Entry Mode Choice and Target Firm Selection

Kai Zhao
HuaQiao University
668, JIMEI Avenue, Xiamen, China

***Abstract* — The purpose of this paper is to formalize the choices of market entry strategy (Export, Greenfield investment, Cross border M&A) and the target selection (Acquisition of high-productivity firm or low-productivity one) for a foreign firm. It is found that cross border M&A is always the most profitable entry mode under both greenfield investment and export credible threats. If greenfield FDI is viable, entering firm prefers acquiring the low-productivity firm, when the integration ability is strong and the technological gap is sufficiently small; otherwise it prefers high-productivity one.**

***Key Words* — Cross border M&A, Export, Foreign direct investment, Greenfield investment, Technological gap**

I. INTRODUCTION

In an increasingly globalized world, the decision of how best to serve foreign markets is becoming one of the key challenges facing firms. A firm that has decided to sell its product abroad has two distinct options of serving foreign markets: exporting or producing locally by Foreign Direct Investment (FDI). As well as seeing an increase in total FDI, cross border M&As increase [1] in importance relative to Greenfield investment. Consequently, the attention is shifted to the composition of FDI as firms can choose between different types of FDI[2].

Despite this increased importance of cross border M&A, the determinants underlying such activities remain unclear. There have been a fair number of papers written about cross border M&A versus Greenfield investment, and some include a third option for a foreign firm such as exporting[3].

The existing theoretical literature on foreign firm's entry modes is separated into three important areas. One strand explores strategic aspects of the FDI/trade decision, such as tariff jumping FDI (e.g., Horstmann and Markusen, 1992; Motta, 1992; Buckley and Casson, 1998), a second set of models analyzes the choice between FDI greenfield and acquisition (e.g., Hennart and Park, 1993; Mueller, 2001; Görg, 2000; Haller, 2009) in the absence of trade costs, and a third category examines entry mode selection/firm's heterogeneity (e.g., Head and Ries, 2003; Helpman, Melitz and Yeaple, 2004; Nocke and Yeaple, 2007). We combine key aspects of each of the previous approaches to construct one integrated theoretical framework that allows for all three entry modes, namely Export, Greenfield investment and Cross border M&A[4]. This allows us to examine the determinants of foreign firm's entry decisions as a function of trade costs, FDI fixed costs, firm heterogeneity and market characteristics. Apart from discussing three alternative entry modes, we regard the main contribution: while most of the existing models on cross border M&A do not focus on the target firm selection (because they simply assume domestic firms are identical), the current paper considers a target choice process when several domestic firms accept the M&A proposal. This allows us to investigate how the relevant factors (i.e., the technological gap, integration ability, trade cost) affect the acquisition target choice.

Our main purpose is to formalize the choices of market entry strategy and the target selection for a foreign firm. To realize this objective, we suppose that firms with different productivity levels coexist, and the foreign entering firm is assumed to be more efficient than the firms in host country. This assumption is consistent with the common observation[5] in Central and Eastern Europe (CEE). Empirical evidence[6] confirms the potential entrant's superior technology. In addition, Helpman et al. (2004) highlight the important role

[1] Caldéron et al., (2002) report that M&A activity almost doubled as a percentage of GDP (and increased as a share of total investment) in industrialized countries between the late 1980s and the late 1990s. Meanwhile, in developing countries, M&A is more than nine times as high as a share of GDP compared to 1987-1989. The bulk of FDI actually belongs to M&A activity, over eighty percent in 1999 according to UNCTAD (2000), or according to Head and Ries (2008) for the years between 1987 and 2001, two thirds of total FDI.

[2] Although FDI has received an enormous amount of attention in the literature, most of this literature has dealt exclusively with a single mode of FDI, mainly greenfield investment, and to a lesser extent with cross border M&A.

[3] Theoretical work starts to emphasize cross border M&A and greenfield investment as two modes of foreign direct investment and alternatives to exporting as a way to enter foreign markets only recently (Nocke and Yeaple, 2007)

[4] In practice, world M&A have been predominantly driven by acquisitions. Cross border mergers represented only 3% of cross border M&As in 1999 (UNCTAD 2000). This is the reason why we focus upon the acquisition rather than mergers in this framework.

[5] See Müller (2000).

[6] Empirical evidence shows that exporters are more productive than non-exporters (see Bernard and Jensen (1999), Aw, Chung and Roberts (2000) and Clerides, Lach and Tybout (1998)), firms engaging in FDI are more productive (see Helpman (2006)) and within the group of firms choosing FDI as an option for entering the foreign market, the more productive ones are involved in FDI (see Yeaple (2008)).

of within-sector firm productivity differences and demonstrate that only the most productive firm engages in foreign activities. This result reinforces the hypothesis on superior technology for foreign firm from the theoretical viewpoint. The gap of productivity (or technology) is introduced and aims to measure the firm heterogeneity. It could also be used to delineate the heterogeneity of technological know-how in R&D-intensive industries and that of marketing expertise in advertising-intensive industries.

The innovative aspect of this model is how the foreign entering firm's superior technology is transferred. The new plant constructed by foreign firm via greenfield investment can fully use the foreign firm's advanced technology, however, the superior technology will be partially transferred to the local acquired firm. We emphasize the word "partially" because the newly acquired firm's productivity will be inbetween the productivity of the two firms participating in the M&A. For instance, following the M&A deal between Renault and Nissan in 1999, Renault installed one of its top managers, Carlos Ghosn, as Nissan's CEO. He restructured Nissan and brought it back to profitability. It is this transfer of expertise and technology that we model.

Furthermore, the acquisition integration ability is also the relevant factor which affects the productivity of newly merged firm. This integration problem stems from in general the existence of the relative disadvantage of the foreign firm to a local firm in an unfamiliar environment or arises from the different company cultures. According to Hennart (1988), the post-acquisition integration problem can be neglected for the greenfield entry mode, but should be pinpointed for the cross border M&A. Therefore, the impact of integration ability is taken into account in our entry mode analysis, in particular, in the case of cross border M&A[7].

Without loss of generality, export implies additional trade cost, greenfield investment involves a sunk cost for installing a new plant, while cross border M&A incurs the cost for purchasing the asset of the existing firm in the host country. It is worthwhile to note that this acquisition cost depends not only upon foreign firm's target selection (namely, the acquisition of high-productivity firm is more expensive than the purchasing of low-productivity one.), but also on the outside credible alternative, which emphasizes the interdependence of three alternative entry options.

The timing of the game is as follows: the foreign firm submits a take-it-or-leave-it offer to both high-technology firm and low-technology firm simultaneously, and these two local firms can either reject or accept this proposal. If no local firm accepts the offer, the foreign firm decides whether to engage in greenfield investment or to export; if one local firm accepts the proposal, the foreign firm pays the amount of reservation profit of the target firm to enter the market; if both local firms accept, this foreign firm will select the local firm with which it earns more profit. Finally, all independent firms compete in Cournot fashion. Notice that letting foreign firm firstly make a cross border M&A proposal doesn't restrict its ability to choose greenfield investment or export, it can simply propose an unacceptably small payment to target firm if the foreign firm prefers greenfield investment to M&A8[8].

We find that cross border M&A is always the most profitable entry mode under both greenfield investment and export credible threats. If greenfield investment is viable, the foreign firm acquires the low-productivity firm when the integration ability is strong and the technological gap is sufficiently small; by contrast, the foreign firm has interest to acquire the high-productivity firm when the integration ability is sufficiently weak and the gap is comparatively large, and this outcome can be irreversible when either the technological gap or the integration ability satisfies some conditions. If the export entry mode is viable, we shed light on the fact that the variation of trade cost will alter the choice of target firm through the influence of acquisition price. The higher the trade cost is, the foreign firm has more incentive to purchase low-technology firm.

This paper is organized as follows. In the next section, the hypothesis and three alternative entry modes of the game are presented. In Section 3, we analyze the sub-game of the whole game and demonstrate how to deduce the optimal entry mode under greenfield investment and export credible threats respectively. Section 4 concludes this paper.

II. THE MODEL

2.1 Hypothesis

We consider an international oligopoly model where firms with different productivity levels coexist. There are two domestic (or local) firms, H and L. They differ in their level of marginal cost (or productivity), firm L attributed to the

[7] In addition to the effect of the market structure associated with the entry mode, the influence of an exogenous change in the competition intensity on the entry mode preference is analyzed. After the M&A of one local firm, the number of firms competing in the host market is reduced (soften competition) while both export and greenfield investment entry mode lead to a more competitive situation.

[8] See Raff, Ryan and Stähler (2009)

"Low marginal cost (high-productivity) enterprise" is more efficient than firm H: $c_H \geq c_L$. The potential entrant F is assumed to be more efficient than domestic firms, its marginal cost is given by c, where $c \leq c_L \leq c_H$.

To simplify, we suppose that the gap between two closer productivity (or technology) levels is identic and equal to "s". The relationship between single foreign firm and two local firms is established in terms of marginal cost, namely, $c_H - c_L = c_L - c = s$. The parameter s signifies the gap of productivity (or technology) between firms, and it can also measure the firm heterogeneity. The larger the gap s, the more heterogeneous firms.

Firms are producing a homogeneous good. Hence, demand is the same for all firms with the inverse demand function given by $p = a - Q$, where "a" represents the size of market and "Q" denotes the sum over all firms' sales. For firms to produce positive levels of output, we require $a > c_H \geq c_L \geq c > 0$

Firm *F* decides to sell its products abroad and has two distinct options of serving foreign markets: exporting or producing locally as FDI. If the foreign firm serves the market by exports, export implies additional marginal (and unit) trade cost "t". If firm *F* decides to produce locally, it can choose between different types of FDI: greenfield investment or cross border M&A. The former involves a fixed cost[9] (sunk cost) "f" in building new plant, while the latter involves the cost for purchasing the asset of the existing firm (either firm *H* or firm *L*) in the host country at the amount of "μ_i" with $i = \{H, L\}$.

The timing of the game is as follows:

Stage 1: Firm *F* submits a take-it-or-leave-it offer to both local firm *H* and firm *L*, and these two local firms can either reject or accept this proposal.

– If neither firm accepts the offer, the foreign firm decides whether to engage in greenfield investment or to export.
– If one local firm accepts the proposal, firm F pays the acquisition price for the target firm to enter the market.
– If both local firms accept, firm F will select only one of the local firms with which the foreign firm can earn more.

Stage 2: All independent firms compete in Cournot fashion.

Note that letting foreign firm firstly make a cross border M&A proposal doesn't restrict its ability to choose greenfield investment or exporting, it can simply propose an unacceptably small payment to target firm if the foreign firm "dislikes" M&A.

The exogenous parameter $\theta \in [0,1]$ measures the integration ability[10]. After the takeover target is bought, the acquired firm obtains a new productivity level which depends on its productivity before M&A, the technological gap between firms, the integration ability. The marginal cost of new firm *M* arising from acquisition is expressed as:

$$c_M = \theta c + (1-\theta) c_i \quad \text{with} \quad c_i = \{c_L, c_H\}$$

2.2 Different Modes of Entry

We turn to the equilibrium analysis of this model and determine the equilibrium pattern of greenfield investment, export and cross border M&A. To derive the foreign firm's optimal entry mode, we search for sub-game perfect equilibria through backward induction.

Greenfield Investment

Greenfield investment, denoted by the superscript "G", allows the foreign firm to produce locally in the host market. The total cost for the foreign firm is $cq_F + f$, where *f* is the plant specific fixed cost, and the marginal cost of the affiliated plant reflects the cost of foreign firm[11] c, q_F represents the foreign firm's output sold in the host country[12].

The profits of the foreign firm and the domestic firms are

[9] We make the simplifying assumption that the other FDI mode do not involve fixed cost. Hence one can view "*f*" as the differential fixed cost of greenfield investment relative to M&A.

[10] The integration ability can be regarded as cultural and geographical proximity which is studied by Di Giovanni (2005) and Head and Ries (2007) using respectively Tobit and Poisson Maximum Likelihood method.

[11] This assumption is based on the fact that the profit maximization strategy of a multinational firm drives the affiliate firm in the host country to use the same profit maximizing technology as the parent firm.

[12] The fixed cost can be differentiated into plant specific fixed cost and firm specific fixed cost when FDI types are differentiated into vertical FDI and horizontal FDI. Markusen (2002) and Navaretti and Venables (2004) provide classic definition of horizontal FDI and vertical FDI as follows "*Horizontal direct investment refers to the foreign production of products and services roughly similar to those the firm produces for its home markets. Vertical investment refers to those that geographically fragment the production by stages of production. By horizontal FDI, we refer to firms producing roughly the same final products in multiple countries even though foreign plants are supplied with headquarters services. Vertical firms generally produce outputs not produced by the parent-country operation. A parent firm may ship designs and/or intermediate inputs to a foreign assembly plants and export the final output back to the parent country market.*"

then defined as follows

$$\pi_F^G = (p-c)q_F^G - f$$
$$\pi_i^G = (p-c_i)q_i^G \quad \text{with} \quad i = \{L, H\}$$

We henceforth note $A = a - c$ for simplicity. The equilibrium outputs and profits are then shown in Table 1:

Different firms	Equilibrium	
	Output	**Profit**
Firm F	$q_F^G = \frac{A+3s}{4}$	$\pi_F^G = \frac{(A+3s)^2}{16} - f$
Firm L	$q_L^G = \frac{A-s}{4}$	$\pi_L^G = \frac{(A-s)^2}{16}$
Firm H	$q_H^G = \frac{A-5s}{4}$	$\pi_H^G = \frac{(A-5s)^2}{16}$

Table 1: Equilibrium in Greenfield Investment

Note also that the technological gap s ought to be less than $\frac{1}{5}A$ in order to ensure the interior solution ($q_H^G \geq 0$). Then the lower and upper bounds of a subset s are respectively zero and $\bar{s} = \frac{1}{5}A$.

Export

There is an additional trade cost of size t per unit, when the foreign firm chooses export denoted by "E". The equilibrium output and profit of each firm are shown in Table 2.

Different firms	Equilibrium	
	Output	**Profit**
Firm F	$q_F^E = \frac{A+3s-3t}{4}$	$\pi_F^E = \frac{(A+3s-3t)^2}{16}$
Firm L	$q_L^E = \frac{A-s+t}{4}$	$\pi_L^E = \frac{(A-s+t)^2}{16}$
Firm H	$q_H^E = \frac{A-5s+t}{4}$	$\pi_H^E = \frac{(A-5s+t)^2}{16}$

Table 2: Equilibrium in Export

Notice that $0 < t \leq \bar{t}$ with $\bar{t} = \frac{A}{3}$. This assumption guarantees the non negativity of prices and ensures the possibility for all firms to be active.

Cross border M&A

When the foreign firm chooses to enter the host market by cross border M&A, denoted by the superscript "M", the competition in the market is reduced. The cost of M&A for foreign firm is the purchasing price of the target firm i, which should be at least the same or larger than the target firm's reservation profit level. It is equivalent to this firm's profit level under greenfield investment or under export mode. The foreign firm's total cost when it chooses cross border M&A will be

$$c_M q_M + \mu_i = [\theta c + (1-\theta)c_i]q_M + \mu_i$$

with $i = \{L, H\}$, where μ_i is the acquisition price13[13] for the purchase of local firm i.

Since the foreign firm can purchase either local firm L or firm H, there are two possibilities. We begin with the scenario where the firm L is acquired. Consider the newly acquired entity as firm "ML" which signifies the new entity achieved by purchasing firm L, then the model reduces to a duopoly game in which firm ML and firm H compete. The respective profit levels are equal to

$$\pi_{ML}^M = \frac{(A+2\theta s)^2}{9} - \mu_L$$
$$\pi_H^M = \frac{(A-3s-\theta s)^2}{9}$$

When foreign firm F acquires the low productivity firm H, the equilibriums are given by:

$$\pi_{MH}^M = \frac{[A-s(3-4\theta)]^2}{9} - \mu_H$$
$$\pi_L^M = \frac{(A-2\theta s)^2}{9}$$

In the following section, we compare the alternative entry modes and carry out the equilibrium dominance analysis.

III. PROFIT ANALYSIS AND COMPARISON

3.1 Credible threat: Greenfield investment Vs. Export

The incentive for the shift of multinational firm's entry mode from export to greenfield investment is affected by the rise of trade cost. However, when the sunk cost for greenfield investment is relatively high, there is no incentive for the foreign firm to choose greenfield investment entry mode. By comparing foreign firm's profit in greenfield investment (π_F^G) option to that in export option (π_F^E), we can derive the credible threat condition.

Through $\pi_F^G = \pi_F^E$, the expression of f^* is found:

[13] The acquisition price obviously depends on the bargaining power of the entrant and the incumbents. Other bargaining solutions, where the local firm has some bargaining power, would lead to a higher acquisition price and therefore shift preferences of the multinational firm in favor of greenfield investment or export. Assuming full bargaining power of the entrant instead, at least constitutes a lower bound for the acquisition price.

$$f^* = \frac{3t(2A+6s-3t)}{16}$$

Obviously, the foreign firm will prefer greenfield investment to exporting when the sunk cost f is less than f^*. Notice that $f \le f^*$ is also the condition for greenfield investment to be a credible threat if the cross border M&A proposal is rejected. For instance, suppose $f \le f^*$ is fulfilled, when take-it-or-leave-it offer is rejected by local firm, the entrant can credibly commit to greenfield investment entry, then the acquisition price μ_i^G will clearly be equal to local firm i's post-greenfield profit π_i^G, thereby, any cross border M&A proposal larger or equal to $\mu_i^G = \pi_i^G$ (with $i = \{L, H\}$) will be accepted by local firm i. If this condition is not fulfilled ($f > f^*$), cross border M&A will be accepted if and only if the foreign firm can afford to pay the acquisition price (μ_i^E) which is larger or equal to π_i^E. It is noticeable that the acquisition payment under greenfield investment credible threat is lower than that under export credible threat, because of $\pi_i^G < \pi_i^E$.

3.2 Greenfield investment credible threat

Under this credible threat, greenfield investment is more profitable than export, it is clear that the foreign firm prefers greenfield investment to export as the market entry mode. We will firstly investigate whether the foreign firm has interest to enter the host market by M&A. If the answer is 'yes', which one the foreign firm prefers purchasing ?

Since the acquisition price μ_i, in turn, depends upon the credibility of greenfield investment or export, the acquisition price for potential target firm L or H under greenfield investment credible threat will respectively be:

$$\mu_L^G = \pi_L^G = \frac{(A-s)^2}{16}$$

$$\mu_H^G = \pi_H^G = \frac{(A-5s)^2}{16}$$

Clearly, for a cross border M&A to be profitable, the willingness to pay on the part of the acquiring firm should be equal to or exceed the reservation price of the target firm.

Result 1 *The foreign firm has always the incentive to enter the host country by cross border M&A under greenfield investment credible threat.*

Proof: If the foreign firm F decides to purchase the domestic firm L, the profit of the new entity is

$$\pi_{ML}^M = \frac{(A+2\theta s)^2}{9} - \mu_L^G = \frac{(A+2\theta s)^2}{9} - \frac{(A-s)^2}{16} > 0$$

If the firm F chooses the target firm H, the profit is

$$\pi_{MH}^M = \frac{[A-s(3-4\theta)]^2}{9} - \mu_H^G$$

$$= \frac{[A-s(3-4\theta)]^2}{9} - \frac{(A-5s)^2}{16} > 0$$

Since both these acquisition manners are profitable, the foreign firm has to decide which one it prefers. The profit of the new entity achieved by acquiring firm L and that realized by purchasing firm H are compared. Suppose $\Delta^G \pi^M$ the difference[14] between π_{ML}^M and π_{MH}^M.

$$\Delta^G \pi^M = \pi_{ML}^M - \pi_{MH}^M = \frac{s[3-8\theta+3s(3+16\theta-8\theta^2)]}{18}$$

The condition $\Delta^G \pi^M > 0$ implies that the profit of the new entity by purchasing firm L exceeds that by acquiring firm H, in other words, there is an advantage for foreign firm to acquire high-productivity (Low marginal cost) firm L; whereas $\Delta^G \pi^M < 0$ sheds light on the advantage of purchasing low-productivity (High marginal cost) firm H. Evidently, the foreign firm has no target preference while $\Delta^G \pi^M = 0$.

Result 2 *Under greenfield investment credible threat, the foreign firm F will select the low-productivity (High marginal cost) firm H, if the technological gap is sufficiently small and the integration ability is comparatively strong; otherwise, the firm F will choose the high-productivity (Low marginal cost) firm L as target.*

Proof: Firm F selects firm L ($\Delta^G \pi^M > 0$), if

$$0 \le \theta \le \frac{3}{8}$$

$$\frac{3}{8} < \theta \le 1 \text{ and } \frac{3-8\theta}{3(8\theta^2-16\theta-3)} < s < \bar{s}$$

Firm F selects firm H ($\Delta^G \pi^M < 0$), if

[14] Without loss of generality, the assumption $A = 1$ is henceforth taken into account for simplifying the model.

$$\frac{3}{8} < \theta \le 1 \text{ and } 0 < s < \frac{3-8\theta}{3(8\theta^2-16\theta-3)}$$

The intention to acquire the low-productivity firm is explained by the following reasons: 1). The high value of θ allows large technologic transfers by which the marginal cost (or productivity) of newly acquired firm *MH* can be tremendously reduced (or improved); 2). the small gap making firms less heterogeneous, lessens the impact of target firm choice; 3). the payment to acquire firm *H* is less than the price acquisition of firm *L* ($\mu_H^G < \mu_L^G$). Therefore, purchasing low-productivity firm *H* is more profitable in this situation. By contrary, the foreign firm has interest to acquire high-productivity firm when the integration ability is sufficiently weak and the technological gap is comparatively large. Under this circumstance, the gains arising from purchasing firm *L* effortlessly compensate the payout which is much higher than the outlay of purchasing firm *H*. This makes acquisition of firm *L* more beneficial.

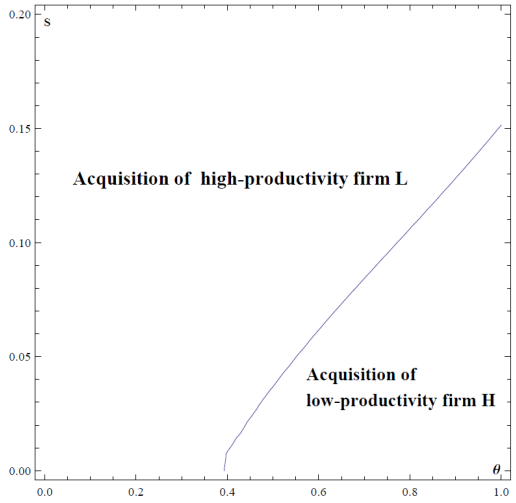

Figure 1: Acquisition target selection under greenfield investment threat

According to Figure 1, it is worth while to note that the foreign firm is willing to acquire firm *L* when the integration ability θ is sufficiently weak ($\theta < \frac{3}{8}$), and this outcome is independent of the technological gap. Moreover, when the technological gap exceeds the threshold $\frac{3-8\theta}{3(8\theta^2-16\theta-3)}$, the foreign firm has incentive to purchase firm *L* regardless of the integration ability.

3.3 Export credible threat

Under export credible threat, the acquisition price for potential target firm *L* or *H* will respectively be

$$\mu_L = \pi_L^E = \frac{(A-s+t)^2}{16}$$

$$\mu_H = \pi_H^E = \frac{(A-5s+t)^2}{16}$$

Result 3 *The foreign firm has always the incentive to enter the host country by cross border M&A under export credible threat.*

Proof: In case of purchasing the target firm *L*, the profit of the new entity is

$$\pi_{ML}^M = \frac{(A+2\theta s)^2}{9} - \mu_L^E = \frac{(A+2\theta s)^2}{9} - \frac{(A-s+t)^2}{16} > 0$$

In case of purchasing the target firm *H*

$$\pi_{MH}^M = \frac{[A-s(3-4\theta)]^2}{9} - \mu_H^E$$

$$= \frac{[A-s(3-4\theta)]^2}{9} - \frac{(A-5s+t)^2}{16} > 0$$

Assume $\Delta^E\pi^M$ the difference between π_{ML}^M and π_{MH}^M under export credible threat.

$$\Delta^E\pi^M = \pi_{ML}^M - \pi_{MH}^M = \frac{s[3-9t-8\theta+3s(3+16\theta-8\theta^2)]}{18}$$

The foreign firm acquires firm *L* when the difference of profit ($\Delta^E\pi^M$) is positive; the firm *H* will be the target while $\Delta^E\pi^M < 0$.

We demonstrate that under export credible threat, the foreign firm *F* will acquire the high-productivity (Low marginal cost) firm *L* ($\Delta^E\pi^M > 0$) if

$$\theta = 0$$

$$0 < \theta < \frac{1}{3} \text{ and } 0 < s \le \frac{1}{6-3\theta} \text{ and } 0 < t < \hat{t}$$

$$0 < \theta < \frac{1}{3} \text{ and } \frac{1}{6-3\theta} < s < \bar{s}$$

$$\frac{1}{3} \le \theta \le \frac{3}{8} \text{ and } 0 < t < \hat{t}$$

$$\frac{3}{8} < \theta \le 1 \text{ and } \frac{3-8\theta}{3(8\theta^2-16\theta-3)} < s < \bar{s}$$

otherwise, the firm F will purchase the low-productivity (High marginal cost) firm H ($\Delta^E \pi^M < 0$). Note that

$$\hat{t} = \frac{3+9s-8\theta+48s\theta-24s\theta^2}{9}$$

In order to show the above-mentioned finding more visually, we illustrate it with Figure 2 assuming the discrete values for trade cost $t = \left\{0, \frac{\bar{t}}{4}, \frac{\bar{t}}{2}, \frac{3\bar{t}}{4}, \bar{t}\right\}$. This assumption allows us to explain how a variation in trade costs can trigger two channels of cross border M&A.

Using the similar *quomodo*, we draw the curve $\Delta^E \pi^M$ with discrete values for integration ability $\theta = \left\{0, \frac{1}{4}, \frac{1}{2}, \frac{3}{4}, 1\right\}$ in the pattern (Figure 3) where the horizontal axis represents the trade cost and the vertical axis delineates the technological gap.

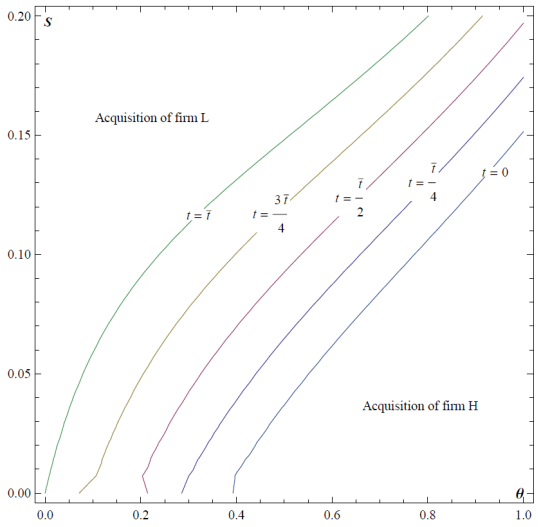

Figure 2: Choice of acquisition target under export threat

According to Figure 2, the higher the trade cost, the larger the surface where foreign firm has incentive to purchase firm *H*. The variation of trade cost alters the choice of target firm through the influence of acquisition price. Although the rise of trade cost increases both the payments of purchasing firm *L* and firm *H*, the sensibility relative to trade cost is given by

$$\frac{\partial \mu_L^E}{\partial t} > \frac{\partial \mu_H^E}{\partial t} > 0$$

Following an increase of *t*, the M&A cost of acquiring firm *L* increases more rapidly than the cost for purchasing firm *H*. This could make the acquisition of firm *L* less beneficial and give rises to the diminution of the area where the purchase of firm *L* prevails over the acquisition of firm *H*.

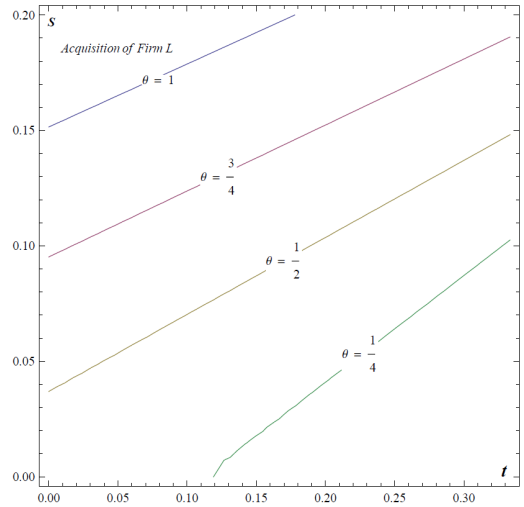

Figure 3: "Acquisition of Firm L" area under export threat

Figure 3 describes the foreign firm's selection propensity with respect to the integration ability. In particular, when $\theta = 0$, the marginal cost of newly acquired firm *M* reflects its own initial productivity level, therefore, the foreign firm looking for a takeover target would want to acquire the more efficient domestic firm (low marginal cost firm *L*). However, following an increase of integration ability, the advantage of taking over the less efficient domestic one emerges, in virtue of large scale of technologic transfer and comparatively lower acquisition price. In the case of max value of θ, there is a very small area left for "Acquisition of Firm L".

To sum up, in the profit analysis, the foreign firm is always willing to enter the host market by cross border M&A under both greenfield investment credible threat and export credible threat. The technological gap and the integration ability evidently affect the selection of target firm. In addition, the trade cost alters this selection decision under export credible threat.

IV. CONCLUDING REMARKS

The choice of foreign entry mode is one of the core topics in international trade research (Werner, 2002), with many studies examining the *ex ante* determinants or the *ex post* performance implications of a firm's choice among certain modes. This paper draws on the traditions of both industrial organization and international trade theories. By developing a simple international oligopoly model, we provide a game-

theoretic approach to explaining FDI and export activities, analyze both the "entry mode choice" and "target firm selection" decisions. Furthermore, the issue of foreign firm's preference and host government's judgment is tracked.

A main result of our analysis is that a foreign firm technologically advantaged has a stronger incentive to choose cross border M&A, rather than greenfield investment or export, moreover, it prefers acquiring the low-productivity firm when the integration ability is strong and the technological gap is sufficiently small; otherwise it prefers high-productivity one, under the precondition that greenfield investment is more profitable than export. If the export entry mode is viable, the variation of trade cost will alter the choice of target firm through the influence of acquisition price. The higher the trade cost is, the more likely foreign firm purchases low-technology firm. This result could help firms choose the expansion mode and may be fruitful to inform government policies toward international trade.

There are certainly a number of interesting issues related to this framework, that are not explored in the present paper. For instance, what will be the optimal entry mode, if firms produce differentiated goods? Whether the main findings hold true in other competition fashions (e.g., Bertrand, Stackelberg)? How the results change if the trade cost here refers to the tariff designed by government? Among three alternative entry options, which one the foreign firm, facing unknown quality of its potential target, will choose? All these research questions will be studied in the future.

ACKNOWLEDGMENT

I am grateful to Nicolas Le Pape for thoughtful comments and suggestions. We also thank Thierry Penard, Said Souam, Bernard Franck, Jean-Pascal Gayant and Philippe Gagnepain. We have received helpful comments on earlier drafts of this article from participants at Association Francaise de Science Economique and seminar participants at GAINS..... Thanks for 华侨大学东方企业管理研究中心 &华商研究院 sponsor and financial support.

REFERENCES

[8] Albornoz, F., Corcos, G., Kendall, T., 2006. Subsidy competition and the Mode of FDI: Acquisition vs Greenfield, Working paper, University of Birmingham.

[9] Aw, B. Y., Chung, S., Roberts, M. J., 1998. Productivity and the decision to export: micro evidence from Taiwan and South Korea, National Bureau of Economic Research Working Paper 6558.

[10] Bernard, A. B., Jensen, J.B., 1999. Exceptional exporter performance: cause, effect, or both?, Journal of International Economics, 47, 1-25.

[11] Bertrand, O., Zitouna, H., Trade liberalization and industrial restructuring: The role of cross-border mergers and acquisitions, mimeo., Universite de Paris I.

[12] Bjorvatn, K., 2004. Economic integration and the profitability of cross-border mergers and acquisitions, European Economic Review, 48, 1211-1226.

[13] Calderon, C., Loayza, N., Serven, L., 2002. Greenfield FDI vs. Mergers and Acquisitions: Does the Distinction Matter?, Working paper, Santiago Central Bank of Chile.

[14] Caves, R.E., 1971. Industrial corporations: the industrial economics of foreign investment, Economica, 38, 1-27.

[15] Di Giovanni, J., 2005. What drives capital flows? The case of cross-border M\&A activity and financial deepening. Journal of International Economics, 65, 127-149.

[16] Eicher and Kang., 2005. Trade, foreign direct investment, Review of International Economics, 5, 770-788.

[17] Gao, T., 2005. Foreign direct investment and growth under economic integration, Journal of International Economics, 67, 157-174.

[18] Görg, H., 2000. Analysing foreign market entry: the choice between greenfield investment and acquisitions, Journal of Economic Studies, 27, 165-181.

[19] Haller, S. A., 2009. The impact of multinational entry on domestic market structure and investment. International Review of Economics & Finance, 18, 52-62.

[20] Head, K., Ries, J., 2008. FDI as an outcome of the market for corporate control: Theory and evidence, Journal of International Economics, 74, 2-20.

[21] Helpman, E., Melitz, M. J., Yeaple, S. R., 2004. Exports versus FDI with heterogeneous firms, American Economic Review, 94, 300-316.

[22] Helpman, E., 2006. Trade, FDI and the organization of firms, Journal of Economic Literature, 44, 589-630.

[23] Hennart, J. F., Park, Y.R., 1993. Greenfield vs. Acquisition: the strategy of Japanes investors in the United states, Working paper, Tilburg University.

[24] Hopenhayn, H., 1992a. Entry, Exit, and Firm Dynamics in Long Run Equilibrium, Econometrica, 60, 1127-1150.

[25] Hopenhayn, H., 1992b. Exit, Selection, and the Values of Firms, Journal of Economic Dynamics and Control, 16, 621-653.

[26] Horn, H., Persson, L., 2001. The equilibrium ownership of an international oligopoly, Journal of International Economics, 53, 307-333.

[27] Horstmann, I. J., Markusen, J.R., 1992. Endogenous market structure in international trade. Journal of International Economics, 32, 109-129.

[28] Kim, Y. H., 2009. Cross-border M\&A vs. greenfield FDI: Economic integration and its welfare impact, Journal of Policy Modeling, 31, 87-101.

[29] Markusen, J. R., 2002. Multinational Firms and the Theory of International Trade, The MIT Press, Cambridge, MA.

[30] Mattoo, A., Olarreaga, M., Saggi, K., 2004. Mode of foreign entry, technology transfer and FDI policy, Journal of Development Economics, 75, 95-111.

[31] Melitz, M.J., 2003. The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity, Econometrica, 71, 1695-1725.

[32] Motta, M., 1992. Multinational firms and the tariff-jumping argument: a game theoretic analysis with some unconventional conclusions. European Economic Review, 36, 1557-1571.

[33] Muller, T., 2001. Analyzing Modes of Foreign Entry: Greenfield Investment versus Acquisition, Working paper, University of Munich.

[34] Navaretti. G. B., Venables, A, J., 2004. Multinational Firms in the World Economy, Princeton University Press.
[35] Neary, J. P., 2007. Cross-Border Mergers as Instruments of Comparative Advantage, Review of Economic Studies, 74, 1229-1257.
[36] Nocke, V., Yeaple, S., 2007. Cross-border mergers and acquisitions vs. greenfield foreign direct investment: The role of firm heterogeneity, Journal of International Economics, 72, 336-365.
[37] Petit, M. L., Sanna-Randaccio, F., 2000. Endogenous R&D and foreign direct investment in international oligopolies, International Journal of Industrial Organization, 18, 339-367.
[38] Raff, H., Ryan, M., Stahler, F., 2009. The choice of market entry mode: Greenfield investment, M&A and joint venture, International Review of Economics and Finance, 18, 3-10.
[39] Slangen, A., Hennart, J.F., 2007. Greenfield or acquisition entry: A review of the empirical foreign establishment mode literature, Journal of International Management, 13, 403-429.
[40] Stepanok, I., 2010. Cross-Border Mergers and Greenfield Foreign Direct Investment, Working paper, Stockholm School of Economics.
[41] Yeaple, S., 2008. Firm Heterogeneity and the Structure of U.S. Multinational Activity: An Empirical Analysis. NBER Working Papers 14072, National Bureau of Economic Research, Inc.
[42] Yu, C. M., Tang, M. J., 1992. International joint ventures: theoretical considerations, Managerial and Decision Economics, 13, 331-342.