ENTRY MODE AND QUALITY INTRODUCTION OF FDI FIRMS

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Abstract - This paper employs a three-stage game to investigate the optimal entry mode and quality incremental introduction of MNEs when it introduces a vertical product. The results show that, with vertical product, a higher number of domestic firms lead to an introduction of higher quality incremental when domestic quality is sufficiently low. On the contrary, for a sufficiently high domestic quality, he foreign quality incremental exhibits a concavely change in the number of domestic firms. It also shows that the foreign firm with direct entry mode introduces lower quality incremental than which with acquisition mode when the domestic quality is sufficiently high. However, the foreign firm always prefers to enter the domestic market with direct entry mode.

Index Terms - Acquisition, entry mode, quality transfer, three stage game

I. INTRODUCTION

Emerging markets collectively accounted for $7 billion in 2000, but $111 billion in 2008, in outward international M&A, which shows about an average annual increase of 200% over the 8-year period.[1] The M&A entry mode in this period accounted for about 65%, 82%, and 27% of FDI (foreign direct investment) flows in the world, the developed economies, and the developing economies, respectively, according to UNCTAD statistics (2010). Due to the enormous growth in FDI has significantly increased the number of multinational enterprises (MNEs), the issue of technology transfer and entry mode of foreign firms has gained increasing attention. In the literature, technology transfer is always proxied by the reduction of marginal production cost. However, it can also exhibit in the introduction of higher level of quality with a higher production cost and/or with extra transfer cost. Usually the MNEs produce product with higher quality than that the domestic firms produce. The MNEs could use quality incremental a strategy in competing for domestic market and in term affects its mode of the entry, which is not yet studied.

Basically, there are two alternative entry modes for the FDI flows: direct entry and acquisition entry (e.g., Elango, 2005; Williams, 2005). Acquisition may be preferred when entry costs are very high (Al-Kaabi et al., 2010; Fatica, 2010) or when enabling market development is desired in less developed markets (Teixeira and Grande, 2012). While, direct entry may be preferred when direct historical and cultural ties exist between home and host countries (Demirbag et al., 2010). On the other hand, Eicher and Kang (2005) found that large countries are more likely to attract acquisitions, the intermediate-sized countries may be served predominantly through trade, and small countries are most likely to experience either or no entry.

Different entry mode may induce different level of technology transfer of the MNE, which makes the technology transfer be an important strategic decision for MNEs (Kasuga, 2003; Eicher and Kang, 2005) and the host regulations. Doubtless, the MNEs seek the optimal entry mode to prevent the dissipation of their technological advantages (e.g., Ethier and Markusen, 1996; Markusen, 2001), while the host government regulates on the MNEs' entry mode for larger social welfare. Mattoo et al (2004) showed that an MNE with acquisition entry puts in more technology transfer when the number of firms in the market is small. However, the knowledge gap, for instance, between the MNEs and the developing countries usually result in larger costs of technology transfer for acquisition, making direct entry more preferable to MNEs (Bjorvatn, 2001).[2] Also, the regulations of host governments affect the MNE's mode of entry.[3] Taiwan bio-tech firms, for example, generally consider acquisition as the first-priority mode for entering mainland China (Lee et al., 2011) due to China's foreign-ownership restrictions, which nonetheless may lower the quality of technology transferred (Lee and Shy, 1992). Besides, Muller (2007) showed that direct entry mode is optimal to an MNE if the cost of technology transfer is sufficiently high and the competition of home market is sufficiently low.

In this paper, we focus on this issue to investigate what the optimal entry mode is for the MNEs when it introduces a higher quality product. To achieve this goal, a three stage game is employed. The owner of the foreign firm chooses mode of entry (acquisition or direct entry), decides the level of quality incremental,

[1] It accounted for about 74%, 21%, and 8% of FDI flows in EU, Asia and China, respectively, and China. Hong Kong and other South-East Asian countries were the main beneficiaries of the heightened FDI flows.

[2] The ability and effectiveness of adopting new technology for the host countries are essential to the decision of an MNE's acquisition-entry.

[3] The host governments generally have incentive to attract FDI for gaining effect of technology transfer as shown in Glass and Saggi (2002).

and finally compete the sale of product with domestic firms in a Cournot fashion.

The results are interesting. We find that, with vertical product, a higher number of domestic firms lead to an introduction of higher quality incremental when domestic quality is sufficiently low. On the contrary, for a sufficiently high domestic quality, he foreign quality incremental exhibits a concavely change in the number of domestic firms. It also shows that the foreign firm with direct entry mode introduces lower quality incremental than which with acquisition mode when the domestic quality is sufficiently high. However, the foreign firm always prefers to enter the domestic market with direct entry mode.

This paper is organized as follows. Section 2 discusses the theoretical setup and describes the two entry modes (acquisition and direct entry) for the foreign firm to enter the host country. Section 3 provides a four-stage game model to analyze the extent of technology transfer and the optimal entry mode when a foreign firm decides to enter the market of the host country. Section 4 focuses on the impact of the foreign firm's entry decision on the host country's welfare. Section 5 offers our conclusions.

II. THE MODEL

There are 2 domestic firms and one foreign firm. The domestic firms have identical marginal production costs and homogeneous products. The foreign firm enters the domestic market via acquisition or direct entry, introduces a differentiated product with higher level of quality.[4] To investigate the relation of product differentiation, technology transfer, and mode of entry, we employ a three-stage game.

In the first stage of the model, the foreign firm has two options for entering the domestic market: acquiring a domestic firm or setting up a wholly owned subsidiary that directly competes with domestic firms.[5] If it chooses to acquire a domestic firm, it makes a take-it-or-leave-it offer (v) to buy out the target firm. If the target firm accepts the offer, they form a new firm owned by the foreign firm. If the target firm refuses the offer, the foreign firm can enter the market by establishing its own subsidiary or by acquiring some other domestic firm.[6] We assume the buy-out fee offer will leave the target firm with a payoff equal to that when some other domestic firm is acquired. Therefore, the structure of the domestic market influences costs of acquisition entry but not those of direct entry.

After selecting the mode of entry, the foreign firm in the second stage chooses the amount of technology transfer (x) to its subsidiary, which gives it an extra level x in quality higher than the domestic products and costs it an extra investment $C(x) = \beta x^2/2$. A higher parameter β implies lower transfer efficiency and higher marginal transfer costs. In the last stage, firms compete in a Cournot-Nash fashion.

If the foreign firm chooses direct entry, the total number of firms in the domestic market is 3; otherwise it is 2. Also note that, hereafter, subscript h, i, and f denote all the domestic firms, the individual domestic firm, and the foreign firm, respectively. Let v represent the quality of domestic product and is fixed due to the constraint of technology.

To explore how the vertical differentiated product affect a foreign firm's strategic behavior, we follow Auriol (2012) and Singh and Vives (1984) to build a quality augmented linear demand. Assume the indirect utility of a representative consumer consuming two goods of quality v_1 and v_2 is represented by:

$$V(w, p_1, p_2) = u(w) + v_1 q_1 + v_2 q_2 - \frac{1}{2}Q^2 \quad (1)$$

Where p_i, q_i and v_i represents price, quantity and quality of good i; $Q = q_1 + q_2$; u(w) is an increasing and concave utility function of the consumer net income, $w = R - p_1q_1 + p_2q_2$. Optimizing V with respect p_1, we have

$$\frac{\partial V}{\partial q_1} = -u'p_1 + v_1 - Q = 0 \text{ and } p_1 = \frac{1}{u'}(v_1 - Q) \quad (2)$$

The u′ is the marginal utility of income for the consumer. We can derive equation (2) to obtain $p_1 - p_2 = (1/u')(v_1 - v_2)$, implying the two goods are not perfect substitution unless they have same quality. To simplify our analysis, we assume u′ = 1 throughout the paper, which results in the quality augmented linear demand as $p_i = v_i - Q$. Therefore, for our paper, the demand of individual domestic firm and the foreign firm will respectively be

$$p_i = v - Q \text{ and } p_f = (v + x) - Q \quad (3)$$

Where $Q = \sum_{i=1}^{n} q_i + q_f$ in which n = 2 and 1for the foreign firm choosing direct and merger entry mode, respectively

III. MODEL ANALYSIS

By backward induction, the analysis starts from the last stage (i.e., the product market), in which the domestic firms and the foreign firm simultaneously choose their output levels. The firms' profit functions are given by:

$$\pi_i = (v - Q)q_i \text{ and } \pi_f = (v + x - Q)q_f \quad (4)$$

By optimization with respect to q_i and q_f, we obtain the equilibrium outputs, prices and profit as the followings:

$$q_i = \frac{v - x}{n + 2} \text{ and } q_f = \frac{v + (n + 1)x}{n + 2} \quad (5)$$

$$p_i = \frac{v - x}{n + 2} \text{ and } p_f = \frac{v + (n + 1)x}{n + 2} \quad (6)$$

$$\pi_i = \left(\frac{v - x}{n + 2}\right)^2 \text{ and } \pi_f = \left(\frac{v + (n + 1)x}{n + 2} - \frac{\tau x^2}{2}\right) \cdot \frac{v + (n + 1)x}{n + 2} \quad (7)$$

[4] Without loss of generality, the assumption that all domestic firms produce homogeneous products can simplify our analysis.

[5] Mattoo et al (2004) shows that, in equilibrium, the foreign firm does not choose partial acquisition. Throughout the paper in order to proceed to a concise mathematical analysis, we consider only the case of full acquisition of the domestic firm.

[6] There is a fixed cost of setting up plant for direct-entry MNEs. We do not contain the fixed cost in our model because it does not affect the decisions of optimal choice.

Thus we here impose a constraint v > x for guaranteeing the existence of the domestic firms. We can see from the above equations, higher quality improvement induced by the foreign firm will decreases the price, quantity, and profit of domestic firms, but increase the price and quantity of the foreign. As for the foreign firm's profit remains indetermined, depending on the cost of the introduction of quality improvement. Also, given that the foreign firm introduces the same level of quality improvement for any entry mode. After the foreign firm enters, the price, quantity, and profit decreases when the competition of domestic market is higher. However, with higher competition of domestic market, the foreign firm's price, quantity, and profit are all increasing. This is in the reverse of the traditional model, in which larger quantity generally leads to lower price. We summarize the findings in Lemma 1.

Lemma 1.

$$(1)\ \frac{\partial q_i}{\partial x}<0,\frac{\partial p_i}{\partial x}<0,\frac{\partial \pi_i}{\partial x}<0;\ \frac{\partial q_f}{\partial x}>0,\frac{\partial p_f}{\partial x}>0.$$

$$(2)\ \frac{\partial q_i}{\partial n}<0,\frac{\partial p_i}{\partial n}<0,\frac{\partial \pi_i}{\partial x}<0;\ \frac{\partial q_f}{\partial n}>0,\frac{\partial p_f}{\partial n}>0,\frac{\partial \pi_f}{\partial n}>0.$$

At the second stage, expecting profit of (7) and taking into account the cost of technology transfer for improving quality, the foreign firm chooses the level of quality improvement (x) to maximize its profit. To assure there is a maximum, the second order condition of (7) need to be satisfied, which give us the constraint that:

$$x > \frac{-B}{2A} \qquad (8)$$

where $A=-3N(N+1)\beta, B=-2(N+1)v\beta+4N^2-2d$, and $d=1,0$.

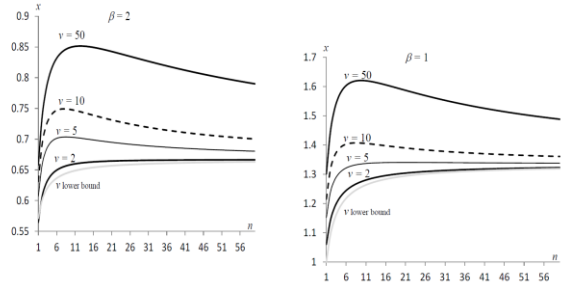
In the merger-entry, N = n and d = 1, while it's N = n+1 and d = 0 for the direct entry case. Defining C = (4N+2d)v and optimizing (7) with respect to x, we obtain the equilibrium level of quality improvement:

$$x^* = \frac{-B-(B^2-4AC)^{)}}{2\,A} \qquad (9)$$

As already known in equation (5), v must be greater than x^*, thus we derive our assumption throughout the paper as the following:

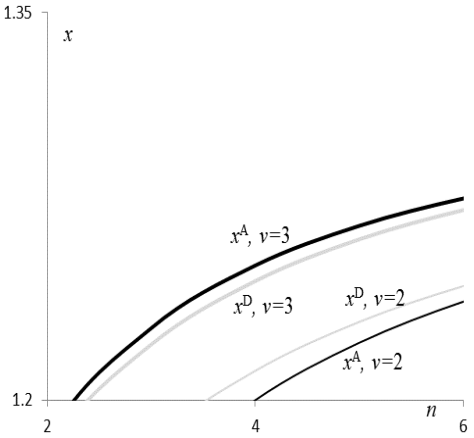
$$Assumption.\ \ v > \frac{4(n+1)}{2+3(n+1)\beta}$$

By simulation as Figure 1, it clearly shows that as in Figure 1.



We see that when domestic quality v is sufficiently small, quality increment induced by foreign firm is increasing in the number of firms. However, when domestic quality is sufficiently high, then the quality increment transferred by the foreign firm will be first increasing and second decreasing in the number of firms. That is:

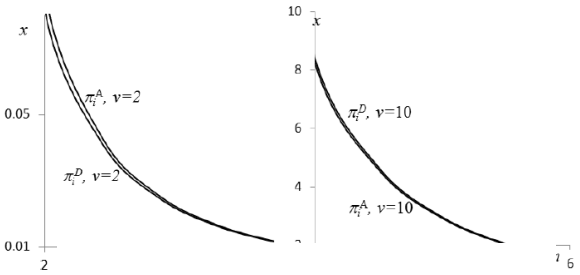
Proposition 1. A sufficiently low quality of home product leads to an increasing quality incremental of a foreign firm for an increasing domestic competition. However, the foreign quality-incremental exhibits a concavely change in domestic competition when domestic quality is sufficiently high.



Lest assume technology transfer parameter β equal 1. By Figure 2 we see that for a small domestic quality level, the foreign firm with direct entry mode will introduce a higher quality incremental than which with acquisition mode. However, it reverses when the domestic quality level is sufficiently high. That is because higher competition when faces higher domestic quality makes less profit for direct entry mode of the foreign firm, which inducing a lower quality incremental.

Proposition 2. With a sufficiently high domestic quality, the foreign firm with direct entry mode introduces lower quality incremental than which with acquisition mode.

As for the profit, we see from simulations that acquisition mode of the foreign firm will benefit the domestic firm more when the domestic product quality is small. On the contrary, when the domestic product quality is sufficiently high, the direct entry mode will benefit the domestic firm more than the acquisition mode.



The optimal choice of entry mode depends on which mode brings more profit to the foreign firm itself. As simulations shown in Figure 4, regardless of the level of domestic product quality, the foreign firm always prefers direct entry mode to acquisition mode.

Proposition 3. With vertical product quality introduction, the foreign firm always prefers to enter the domestic market with direct entry mode.

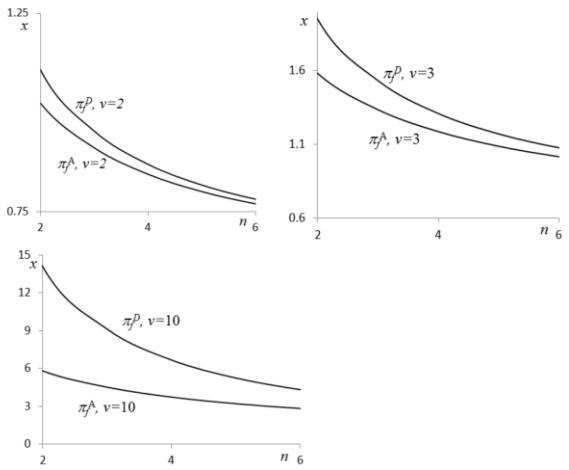


Figure 4 the foreign profit for both modes

According to Proposition 1 and 3, we see that the foreign always chooses direct entry mode, but it introduces higher level of quality incremental only when the domestic quality is sufficiently low.

Proposition 4. The direct entry mode is an optimal choice of the foreign firm, but it induces higher quality incremental than acquisition mode only when the domestic quality is sufficiently low.

CONCLUSIONS

Multinational enterprises and their products have been and will continue to be an important source for improving competitiveness of domestic firms in developing countries. Accordingly, multinationals' entry mode, technology transfer, and product differentiation will have distinct impact on the host countries' welfare. This paper focuses the optimal entry mode of MNEs when it introduces a higher quality product and introduces a three stage game. We then find that, with vertical product, a higher number of domestic firms lead to an introduction of higher quality incremental when domestic quality is sufficiently low. On the contrary, for a sufficiently high domestic quality, he foreign quality incremental exhibits a concavely change in the number of domestic firms. It also shows that the foreign firm with direct entry mode introduces lower quality incremental than which with acquisition mode when the domestic quality is sufficiently high. However, the foreign firm always prefers to enter the domestic market with direct entry mode.

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