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# The Choice of Market Entry Mode: Greenfield Investment, M&A and Joint Venture

by Horst Raff, Michael Ryan and Frank Stähler

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Christian-Albrechts-Universität Kiel

Department of Economics

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# The Choice of Market Entry Mode: Greenfield Investment, M&A and Joint Venture

Horst Raff\*, Michael Ryan<sup>†</sup> and Frank Stähler<sup>‡</sup>

## Abstract

Multinationals may enter a host market by different modes of foreign direct investment (FDI). This paper examines the choice of FDI mode, and shows that the profitability of greenfield investment influences this choice not only directly, but also indirectly since it determines the outside option of potential acquisition targets and joint venture partners. In particular, even if greenfield investment is a viable option, the multinational may prefer a joint venture to M&A, and M&A to greenfield investment, provided that M&A and joint venture both involve sufficiently low fixed costs. The reason is that the profitability of greenfield investment both reduces the acquisition price in the case of M&A, and gives local firms an incentive to agree to a joint venture.

**JEL-Classification:** F12, F23.

**Keywords:** Foreign direct investment, multinational firms, merger and acquisition, joint venture, greenfield investment

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# 1 Introduction

The current paper examines a multinational firm's choice between different modes of foreign direct investment (FDI). In particular, we let the firm choose between the following strategies for selling goods in the host country: (i) greenfield investment, *i.e.*, setting up a plant in the host country to produce goods locally; (ii) acquisition of a local firm and its production capacity (M&A); (iii) cooperation with a local firm by setting up a joint venture; (iv) exporting goods produced in an existing plant in the home country. We show that the profitability of greenfield investment has an important indirect effect on the choice of a joint venture or a merger, since it determines the outside option of the potential acquisition target or joint venture partner. Hence, even if greenfield investment is not observed in equilibrium, it makes target/partner firms agree to deals they would otherwise not have agreed to.

In particular, we find that if greenfield investment is a viable option and the other FDI modes involve sufficiently low fixed costs, a joint venture will be agreed to by the local firm, and the multinational prefers a joint venture to a merger. Furthermore, the multinational prefers a merger to greenfield investment if the fixed cost of greenfield investment is sufficiently large. If greenfield investment is less profitable than exporting, local firms may refuse to participate in a joint venture, leaving the multinational to choose between M&A and exporting.

Foreign direct investment (FDI) has received an enormous amount of attention in the literature.<sup>1</sup> Most of this literature has dealt exclusively with a single mode of FDI, mainly greenfield investment, and to a lesser extent with international mergers and acquisitions (M&As) and joint ventures. This pa-

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<sup>1</sup>See Markusen (2002) for a recent survey. For empirical papers, see Blonigen, Davis and Head (2002), and Carr, Markusen and Maskus (2001).

per, however, is not the first to explore the interdependence between different modes of FDI. It is closest to Bjorvatn (2004) who considers the interaction between M&A, greenfield investment and trade.<sup>2</sup> The novelty of our paper is that we allow for the possibility to form a joint venture, and that we endogenize the synergies that make a merger or a joint venture attractive options for the multinational. In particular, we assume that these synergies are the result of joint investments into cost reduction. The different incentives that M&As and joint ventures create for this investment – in addition to the different strategic effects on host market competition – create trade-offs for the choice between FDI modes. Another difference is that we allow the multinational to serve the foreign market through exports if a merger or joint venture offer has been declined; this, too, has implications for the choice of market-entry mode.<sup>3</sup>

## 2 The Model

In order to keep the model as simple as possible, we assume that there are two local firms in the host country, and a single multinational firm that considers how to enter this country's market. The multinational has the following options: it may acquire a local firm; it may cooperate with a local firm by setting up joint venture; it may choose greenfield investment, *i.e.*, set up a plant in the host country; and it may export goods produced in an existing plant in its home country. If the multinational proposes a merger or a

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<sup>2</sup>See Raff, Ryan and Stähler (2006) for empirical evidence. Horn and Persson (2001), and Nocke and Yeaple (2007) offer other models of the choice between M&A and greenfield investment, as well as further references.

<sup>3</sup>Papers like Head and Ries (2003), Helpman, Melitz and Yeaple (2004), and Nocke and Yeaple (2007) emphasize the importance of firm heterogeneity in marginal costs for the choice between FDI and exporting. To a certain extent, the current paper explains endogenously the heterogeneity of firms in case of a merger or joint venture, because firms undertake cost-reducing investment.

joint venture, it makes a take-it-or-leave-it offer to one of the (identical) local firms. Since the local firms are *ex ante* symmetric, it does not matter which local firm will be the potential target. We will label the multinational firm as firm 1, and the potential target as firm 2, leaving firm 3 as an independent producer in all scenarios. In case of a merger, only firm 1 survives, firm 2 becomes firm 1's division.

Mergers and joint ventures differ from greenfield investment, because they offer the participating firms the possibility to realize synergies. These synergies, however, do not arise exogenously. Rather they require investment by the partners. In case of a merger, firm 1 determines how much each division of the firm is to invest; the merged firm's total output is determined centrally by firm 1. In case of a joint venture, partner firms 1 and 2 individually decide how much to invest; but each firm's investment also benefits the other firm; each firm continues to choose output independently. Note that the proposals of a merger and a joint venture differ in another respect. In case of a merger proposal, firm 1 offers a payment to acquire firm 2 that firm 2 either accepts or rejects. If the proposal is accepted, firm 2 is compensated by this payment for giving up its independent business. A joint venture only serves as a platform for (partial) cooperation between the firms; there hence are no side-payments.<sup>4</sup>

The order of moves in the game is as follows: firm 1 makes local firm 2 either a merger or a joint venture proposal. Firm 2 either rejects or accepts this proposal. If the offer is rejected, the multinational chooses whether to engage in greenfield investment or to export. In case of an accepted merger, the multinational determines cost-reducing investments for both divisions,

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<sup>4</sup>In this sense, joint ventures in our model are similar to R&D cooperation or any other form of semi-collusion. For the pioneering paper in this field, see D'Aspremont and Jacquemin (1988).

and in case of an accepted joint venture, firms 1 and 2 determine simultaneously their individual cost-reducing investments. Finally, all independent firms choose output levels as Cournot competitors. Note that letting firm 1 first make a joint venture or merger proposal does not restrict its ability to choose greenfield investment or exporting. For instance, if it prefers greenfield investment to M&A, it can simply propose an unacceptably small payment to firm 2.

Due to quadratic, quasi-linear preferences in the host country, the inverse demand function is given by  $p = a - bQ$  with  $p$  denoting the equilibrium price for an aggregate supply of  $Q$ . The marginal cost of production without any cost saving by a merger or a joint venture is equal to  $c$  with  $c < a$ . However, if the multinational serves the market by exports, an additional trade cost of size  $t$  per unit of exports arises, where  $t \leq (a - c)/3$ . The latter assumption will guarantee that exporting yields non-negative profits. Furthermore, we assume that greenfield investment requires a fixed cost of size  $F$ . We make the simplifying assumption that the other FDI modes do not involve fixed costs. Hence one can view  $F$  as the differential fixed cost of greenfield investment relative to M&A and joint ventures.<sup>5</sup>

If the multinational exports, profit maximization by all three firms leads to individual production levels of

$$q_1^T = \frac{a - c - 3t}{4b}, q_2^T = \frac{a - c + t}{4b}, q_3^T = \frac{a - c + t}{4b}, \quad (1)$$

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<sup>5</sup>Obviously introducing fixed costs only for greenfield investment restricts the type of FDI mode choices one observes in equilibrium. However, this assumption allows us to highlight the indirect role that greenfield investment plays in determining the choice between M&A and joint venture. This role comes about because the profitability of greenfield investment determines that outside opportunities of firm 2. It is straightforward to check how the introduction of (different) fixed costs for M&A and joint ventures would affect the choice of FDI mode.

and profits of

$$\Pi_1^T = \frac{(a - c - 3t)^2}{16b}, \Pi_2^T = \frac{(a - c + t)^2}{16b}, \Pi_3^T = \frac{(a - c + t)^2}{16b}, \quad (2)$$

respectively, where  $q_i$  and  $\Pi_i$  denote individual production and profits of firm  $i$ . The superscript  $T$  denotes the exporting regime.

### 3 Modes of Foreign Direct Investment

In this section we discuss in more detail the different FDI modes, and provide equilibrium outputs and profits for each FDI mode. These profits will be compared in the next section to determine the equilibrium FDI mode.

#### 3.1 Greenfield Investment

Greenfield investment, denoted by the superscript  $GF$ , allows the multinational to produce with marginal cost  $c$  in the host market. The individual equilibrium production levels of all three firms coincide, *i.e.*,

$$q_1^{GF} = q_2^{GF} = q_3^{GF} = \frac{a - c}{4b}, \quad (3)$$

and the profits of the multinational differ only by the fixed cost  $F$  from the profits of the local firms:

$$\Pi_1^{GF} = \frac{(a - c)^2}{16b} - F, \Pi_2^{GF} = \Pi_3^{GF} = \frac{(a - c)^2}{16b}. \quad (4)$$

Using (2) and (4) it is straightforward to show that the multinational will prefer to make a greenfield investment rather than to serve the foreign market by exports if  $F$  is less than

$$\bar{F} \equiv \frac{3(2(a - c) - 3t)t}{16b}. \quad (5)$$



Note that  $F \leq \bar{F}$  is also the condition for greenfield investment to be a credible threat if the merger or joint venture proposal is turned down by firm 2. If condition (5) is fulfilled, any merger offer larger or equal to  $\Pi_2^{GF}$  will be accepted by firm 2. If condition (5) is not fulfilled, a merger will be accepted only if the acquisition price is larger or equal to  $\Pi_2^T$ . Hence the acquisition payment is lower if greenfield investment is credible. The acceptance of a joint venture by the local firm similarly depends on the credibility of greenfield investment.

### 3.2 Joint Venture

In case of a joint venture, denoted by the superscript  $J$ , the market structure does not change as all firms remain independent. Both the local firm, assuming that it has agreed to a joint venture, and the multinational may reduce marginal costs. However, these cost-reducing investments are not contractible when agreeing on a joint venture. This may be due to imperfect monitoring of investments by the other party or to the impossibility to prove an insufficient investment in the courtroom, so that both investments are voluntary contributions to a joint cost reduction. Furthermore, since the local firm remains independent, it is more productive as it would be as a dependent division of the multinational in case of a merger. Let  $\zeta^J$  denote the marginal cost after investments have been made. Marginal cost  $\zeta^J$  is equal to

$$\zeta^J = c - \gamma(\beta I_1 + I_2), \quad (6)$$

where  $I_1$  ( $I_2$ ) denotes the investment of firm 1 (2). The parameter  $\gamma$  measures the *general* efficiency of investments, whereas  $\beta, 0 < \beta \leq 1$ , expresses the relative disadvantage of the multinational relative to a local firm in carrying out an investment in an unfamiliar environment.

In the product market, both the local joint venture firm and the multinational compete against each other and the independent local firm. The respective output and profit levels (gross of any investment costs) are equal to

$$q_1^J = q_2^J = \frac{a + c - 2\zeta^J}{4b}, \quad q_3^J = \frac{a - 3c + 2\zeta^J}{4b}, \quad (7)$$

$$\Pi_1^J = \Pi_2^J = \frac{(a + c - 2\zeta^J)^2}{16b}, \quad \Pi_3^J = \frac{(a - 3c + 2\zeta^J)^2}{16b}. \quad (8)$$

In case of a joint venture, both firms maximize their profits w.r.t. their investments independently. Investment costs are assumed to be quadratic, so that profits including investment costs are equal to

$$\tilde{\Pi}_1^J = \frac{(a - c + \gamma(\beta I_1 + I_2))^2}{16b} - \frac{\delta I_1^2}{2}, \quad (9)$$

$$\tilde{\Pi}_2^J = \frac{(a - c + \gamma(\beta I_1 + I_2))^2}{16b} - \frac{\delta I_2^2}{2}, \quad (10)$$

respectively. The parameter  $\delta$  measures the marginal cost of investment. The tilde denotes equilibrium profits on the product market after best-response outputs have been determined.

The first-order conditions yield the equilibrium investment levels

$$I_1^* = \frac{(a - c)\beta\gamma}{2(2b\delta - (1 + \beta^2)\gamma^2)}, \quad I_2^* = \frac{(a - c)\gamma}{2(2b\delta - (1 + \beta^2)\gamma^2)}. \quad (11)$$

A necessary condition for an interior solution is

$$\delta > \frac{(a + c)(1 + \beta^2)\gamma^2}{4bc}. \quad (12)$$

Note that (12) and  $a > c$  guarantee that

$$\delta > \frac{(1 + \beta^2)\gamma^2}{2b}. \quad (13)$$

The equilibrium investment levels imply equilibrium profits of

$$\Pi_1^{J*} = \frac{(a - c)^2\delta(2b\delta - \beta^2\gamma^2)}{8(2b\delta - (1 + \beta^2)\gamma^2)}, \Pi_2^{J*} = \frac{(a - c)^2\delta(2b\delta - \gamma^2)}{8(2b\delta - (1 + \beta^2)\gamma^2)}. \quad (14)$$

The asterisk denotes equilibrium profits after optimal cost-reducing investments have been made.

Due to

$$\frac{\partial \Pi_1^{J*}}{\partial \gamma}, \frac{\partial \Pi_1^{J*}}{\partial \beta}, \frac{\partial \Pi_2^{J*}}{\partial \gamma}, \frac{\partial \Pi_2^{J*}}{\partial \beta} > 0, \quad (15)$$

both firms' profits rise with the efficiency parameters. In particular, also the local firm is interested in forming a joint venture with a strong multinational.

### 3.3 Merger and Acquisition

In case of a merger, denoted by the superscript  $M$ , the multinational is able to determine investments for both divisions, 1 and 2. On the product market, firm 1 (*i.e.*, the parent firm) competes only with firm 3. Within this duopoly, the respective output and profit levels (gross of any investment costs) are equal to

$$q_1^M = \frac{a + c - 2\zeta^M}{3b}, q_3^M = \frac{a - 2c + \zeta^M}{3b}, \quad (16)$$

$$\Pi_1^M = \frac{(a + c - 2\zeta^M)^2}{9b}, \Pi_3^M = \frac{(a - 2c + \zeta^M)^2}{9b}, \quad (17)$$

where  $\zeta^M$  is the marginal cost after investments  $I_1$  and  $I_2$  have been made by the respective divisions. The marginal cost  $\zeta^M$  is equal to

$$\zeta^M = c - \gamma\beta(I_1 + I_2). \quad (18)$$

The role of the *general* efficiency parameter  $\gamma$  remains unchanged but  $\beta$ , expressing the relative disadvantage of the multinational in making investments in the host country, applies to both divisions' investments now. The profit of the merged firm is

$$\tilde{\Pi}_1^M = \frac{(a - c + \gamma\beta(I_1 + I_2))^2}{9b} - \frac{\delta I_1^2}{2} - \frac{\delta I_2^2}{2}. \quad (19)$$

An interior solution is guaranteed if

$$\delta > \frac{(a + 3c)\beta^2\gamma^2}{9bc}. \quad (20)$$

Condition (20) is met if condition (12) holds, because the difference between (20) and (12) is positive due to  $a > c$  and  $0 < \beta \leq 1$ :

$$\frac{(a + c)(1 + \beta^2)\gamma^2}{4bc} - \frac{(a + 3c)\beta^2\gamma^2}{9bc} = \frac{\gamma^2}{36bc}((9 + 5\beta^2)a - 3(3 - \beta^2)c) > 0. \quad (21)$$

The optimal investment levels are equal to

$$I_1^* = I_2^* = \frac{2(a - c)\beta\gamma}{9b\delta - 4\beta^2\gamma^2}, \quad (22)$$

which imply equilibrium profits of the merged firm of

$$\Pi_1^{M*} = \frac{(a - c)^2\delta}{9b\delta - 4\beta^2\gamma^2}. \quad (23)$$

Profits increase with the efficiency parameters  $\gamma$  and  $\beta$  and decrease with the cost parameter  $\delta$ . Due to

$$\Pi_1^{M*}(I_1 = I_2 = 0) = \lim_{\delta \rightarrow \infty} \Pi_1^{M*} = \frac{(a - c)^2}{9b}, \quad (24)$$

there is a positive lower bound for the profit of the merged firm. Note also that this profit is *gross* profit, not taking into account the acquisition price of the target firm. The acquisition price, in turn, depends on the credibility of greenfield investment or exporting, respectively.

## 4 Equilibrium FDI Mode

In case of a credible greenfield investment threat, the acquisition price for the target firm in case of a merger is equal to  $(a - c)^2/16b$ , *i.e.*, equal to the profit the target would realize if it faced competition from the multinational's local subsidiary (and the other local firm). Furthermore, this is also the minimum profit a local firm can guarantee itself when being invited to form a joint venture. The local firm is therefore better off with a joint venture if its profit  $\Pi_2^{J*}$  is larger than its profit when rejecting the offer and facing competition by a multinational firm, *i.e.*, a profit of size  $(a - c)^2/16b$ . Hence, the local firm will accept the joint venture if

$$\begin{aligned} \frac{(a - c)^2}{16} \left( \frac{2\delta(2b\delta - \gamma^2)}{(2b\delta - (1 + \beta^2)\gamma^2)^2} - \frac{1}{b} \right) &> 0 & (25) \\ \Rightarrow 2b\delta(1 + 2\beta^2)\delta - (1 + \beta^2)\gamma^2 &> 0 \end{aligned}$$

which is always true according to (13). Expression (25) proves Lemma 1:

**Lemma 1** *The local firm agrees to a joint venture if greenfield investment is a credible threat.*

Since the multinational can be sure that its potential target will accept a joint venture, it has the choice among all possible types of FDI modes. Lemma 2 has the result.

**Lemma 2** *The multinational prefers a joint venture to a merger if greenfield investment is a credible threat. It prefers a merger to a greenfield investment if the fixed cost of greenfield investment is sufficiently big.*

Proof: Due to (24), the merger profit  $\Pi_1^{M*}$  minus the acquisition price will never be less than  $7(a-c)^2/144b$ , which is larger than the greenfield profit  $\Pi_1^G$  if  $F \geq (a-c)^2/72b$ . Hence, the merger dominates greenfield investment if the fixed cost is sufficiently large.

A joint venture dominates a merger if  $\Pi_1^{J*}$  exceeds  $\Pi_1^{M*}$  minus the acquisition price:

$$\frac{(a-c)^2}{16} \left( \frac{2\delta(2b\delta - \beta^2\gamma^2)}{(2b\delta - (1 + \beta^2)\gamma^2)^2} + \frac{1}{b} - \frac{16\delta}{9b\delta - 4\beta^2\gamma^2} \right) > 0 \quad (26)$$

Condition (26) can be written as

$$\begin{aligned} f(\delta) := & (2b\delta(2b\delta - \beta^2\gamma^2))(9b\delta - 4\beta^2\gamma^2) - 16b\delta(2b\delta - (1 + \beta^2)\gamma^2)^2 \\ & + (2b\delta - (1 + \beta^2)\gamma^2)^2(9b\delta - 4\beta^2\gamma^2) \end{aligned} \quad (27)$$

which is positive in the relevant range.<sup>6</sup>  $\square$

Note that it could well be the case that a merger dominates greenfield investment irrespective of the size of  $F$ , as long as  $F$  still supports the credibility of greenfield investment. Expression (24) gives the gross merger profit without any cost saving and is thus a lower bound for the after merger profit.

Lemma 1 and Lemma 2 prove Proposition 1:

**Proposition 1** *If greenfield investment is a credible threat and greenfield investment involves a sufficiently large fixed cost, both the multinational and a local firm agree upon a joint venture.*

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<sup>6</sup>  $f(\delta)$  is positive because  $f(\delta = (1 + \beta^2)\gamma^2/2b) = (9 + 10\beta^2 + \beta^4)\gamma^6/2$ , and  $df/d\delta = b(4b(14 - 11\beta^2)\delta\gamma^2 + 24b^2\delta^2 + (2\beta^2 + 17\beta^4 - 7)\gamma^4) > 0$  because  $(2\beta^2 + 17\beta^4 - 7)\gamma^4 > -7\gamma^4$ ,  $4b(14 - 11\beta^2)\delta\gamma^2 > 12b\delta\gamma^2 > 6(1 + \beta^2)\gamma^2 > 6\gamma^2$  and  $24b^2\delta^2 > 6(1 + \beta^2)\gamma^2 > 6\gamma^2$  due to  $\beta \leq 1$ .

The outside option for both the potential target of a merger and a local firm invited to form a joint venture improves if greenfield investment is not a credible threat. In this case, the local firm can guarantee itself a profit  $\Pi_2^T$ , which is larger than  $\Pi_2^{GF}$  and increasing in  $t$ . It is no longer clear then whether the local firm will accept a joint venture proposal as Lemma 3 shows:

**Lemma 3** *The local firm rejects a joint venture offer if exporting is a credible threat, and  $\delta$  and/or  $t$  are sufficiently large.*

Proof: The local firm is better off under trade if  $\Pi_2^T$  is larger than  $\Pi_2^{J*}$  which requires

$$\frac{(a - c - t)^2}{b} \geq \frac{2\delta(a - c)^2(2b\delta - \gamma^2)}{(2b\delta - (a + \beta^2)\gamma^2)}. \quad (28)$$

This comparison depends on the size of trade cost  $t$ . Obviously, condition (28) cannot hold for  $t = 0$  as the outside options for trade and greenfield investment coincide for zero trade costs. For the upper bound  $t = (a - c)/3$ , condition (28) reads

$$\frac{(a - c)^2}{72} \left( \frac{8}{b} - \frac{9\delta(2b\delta - \gamma^2)}{(2b\delta - (1 + \beta^2)\gamma^2)62} \right) \geq 0. \quad (29)$$

Expression (29) increases with  $\delta$  and approaches  $7(a - c)^2/144b$  as  $\delta \rightarrow \infty$ . Hence, the local firm rejects a joint venture proposal for sufficiently large  $\delta$  and  $t$ .  $\square$

While it not clear whether a joint venture will be preferred by both parties, the preference of the multinational is obvious. The joint venture profit  $\Pi_1^{J*}$  does not depend on the credibility of greenfield investment, but the acquisition price in case of a merger is larger with exporting than with a credible greenfield investment threat. Hence, the net profit of a merger will be less under the threat of exporting than with a credible greenfield investment

threat, and according to Lemma 2, the multinational prefers a joint venture to a merger already with a credible greenfield investment threat. Therefore, it will also do so if the merger profit is even smaller, which proves Lemma 4.

**Lemma 4** *The multinational prefers a joint venture to a merger if exporting is a credible threat.*

However, if the local firm does not accept the joint venture proposal, the multinational has to decide whether it would like to merge with the local firm or serve the foreign market by exports. Since  $\Pi_2^T$  is the acquisition price, this decision depends on a comparison between  $\Pi_1^{M*}$  and the aggregate profits of both firms under exporting:

$$\Pi_1^T + \Pi_2^T = \frac{(a-c)^2 + 5t^2 - 2t(a-c)}{8b}. \quad (30)$$

If (30) is larger than  $\Pi_1^{M*}$  the multinational prefers exporting. Due to (24), a necessary condition for this preference is

$$\frac{(a-c)^2 + 5t^2 - 2t(a-c)}{8b} \geq \frac{(a-c)^2}{9b} \Rightarrow t \leq \frac{a-c}{15}. \quad (31)$$

According to (31), exporting is preferred to a merger for sufficiently *low* levels of trade cost  $t$ .<sup>7</sup> Note that  $t \leq (a-c)/15$  does not necessarily violate the assumption that the local firm rejects any joint venture proposal. For  $t = (a-c)/15$ , condition (28) reads

$$\frac{(a-c)^2}{1900} \left( \frac{128}{b} - \frac{225\delta(2b\delta - \gamma^2)}{(2b\delta - (1 + \beta^2)\gamma^2)62} \right) \geq 0. \quad (32)$$

Expression (29) increases with  $\delta$  and approaches  $31(a-c)^2/3600b$  as  $\delta \rightarrow \infty$ .

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<sup>7</sup>Condition (31) is also fulfilled for  $t \geq (a-c)/3$  which is excluded as the foreign firm cannot profitably export to the local market if  $t \geq (a-c)/3$ .



Hence, if the local firm rejects any proposal to form a joint venture, the multinational's choice between exporting and M&A depends on the level of  $t$ . The implications of this and of Lemmas 3 and 4 are summarized in Proposition 2:

**Proposition 2** *Suppose that exporting is a credible threat. If  $\delta$  and/or  $t$  are sufficiently small, the multinational proposes a joint venture and the local firm accepts. If  $\delta$  and/or  $t$  are so large that the local firm does not agree to a joint venture, there exists a  $\bar{t}$  with  $0 \leq \bar{t} < (a - c)/15$  such that the multinational prefers M&A (exporting) to exporting (M&A) if  $t \geq \bar{t}$  ( $t < \bar{t}$ ).*

As the outside option for the local firm for zero trade costs is the same with trade and with greenfield investment, Remark 1 is obvious.

**Remark 1** *If trade costs are zero, the multinational and the local firm agree on a joint venture.*

So far, we have assumed that both merger and joint ventures do not require any fixed costs. Including (different) fixed costs across the board may change the equilibrium FDI mode. Although no general preference order can be derived, we are able to explore the *relative* advantage of a joint venture to a merger depending on the efficiency parameters  $\beta$  and  $\gamma$ . We find that joint ventures (mergers) are relatively more attractive for the multinational, the more (less) efficient cost-reducing investments are. For a low productivity of the multinational, merger profits are relatively larger (smaller) for low (high) levels of general efficiency.

## 5 Concluding Remarks

This paper examined the determinants of a multinational firm's choice between greenfield investment, acquisition of a local firm, cooperation with

a local firm through a joint venture, and exporting. We assumed that for M&A and a joint venture to yield synergies the participating firms had to make additional investments. We found that there exist a strong interdependence between the different modes of FDI. In particular, we showed that the profitability of greenfield investment relative to exporting determines the outside options of local firms and hence their decision of whether to accept a merger or joint venture offer. If greenfield investment is more profitable than exporting, this reduces the price the multinational has to offer to acquire a local firm with the consequence that the multinational may prefer M&A to greenfield investment. We also derived conditions under which a credible threat of greenfield investment is likely to support a joint venture agreement. If the multinational prefers exporting to greenfield investment, a local firm may not accept a joint venture, and the multinational will choose M&A if the trade cost is sufficiently large.

## References

- [1] BJORVATN, K. (2004). Economic integration and the profitability of cross-border mergers and acquisitions, *European Economic Review*, 48, 1211-26.
- [2] BLONIGEN, B.A., DAVIS R.B., & HEAD, K. (2003). Estimating the knowledge-capital model of the multinational enterprise: Comment. *American Economic Review*, 93, 980-994.
- [3] CARR, D.L., MARKUSEN, J.R., & K.E. MASKUS (2001). Estimating the knowledge capital model of the multinational enterprise, *American Economic Review*, 91, 693-708.

- [4] D'Aspremont, C.D., & Jacquemin, A. (1988), Cooperative and noncooperative R&D in duopoly with spillovers, *American Economic Review*, 78, 1133-1137.
- [5] Head, K., & Ries, J. (2003). Heterogeneity and the FDI versus export decision of Japanese manufacturers, *Journal of the Japanese and International Economies*, 17, 448-467.
- [6] Helpman, E., Melitz, M.J., & Yeaple, S.R. (2004). Export versus FDI with heterogeneous firms, *American Economic Review*, 94, 300–316.
- [7] Horn, H., & Persson, L. (2001). The equilibrium ownership of an international oligopoly, *Journal of International Economics*, 53, 307-333.
- [8] Markusen, J.R. (2002). *Multinational firms and the theory of international trade*. Cambridge, MA: MIT Press.
- [9] 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.
- [10] Raff, H., Ryan, M., & Stähler, F. (2006). Asset ownership and foreign market entry. CESifo Working Paper 1676.