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## Competition for FDI in the Presence of a Public Firm and the Effects of Privatization

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# Competition for FDI in the Presence of a Public Firm and the Effects of Privatization\*

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## Abstract

In this paper we investigate tax/subsidy competition for FDI between countries of different size when a welfare-maximizing and relatively inefficient public firm is the incumbent in the largest market. First, we analyze how the presence of a public firm affects the investment decision of a multinational operating in the same sector as the former and willing to serve both markets. When the public firm stops exporting to the small country due to the investment of the multinational in the region (or does not export altogether), policy competition between the two countries is irrelevant to the foreign firm's choice. But if the country receiving FDI has to pay a subsidy, only the multinational will be better off provided that it would have invested there anyway absent policy competition. By contrast, when the public firm exports to the small country, policy competition increases the attractiveness of the big country. Second, we show that privatizing the public firm makes the big country a relatively more attractive location for the investment. However, when the privatized firm stays in the market, welfare always decreases. After privatization, policy competition decreases the attractiveness of the big country, which may be willing to tax the multinational in order to discourage FDI from taking place there, and gives the small country the opportunity of benefiting from the investment.

*Keywords:* Foreign direct investment; Tax competition; Public welfare-maximizing firm; Privatization

*JEL Classification:* F12; F23; H25; H73; L13; L33

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# 1 Introduction

One of the most well documented trends in the world economy over the last two decades has been the rise in foreign direct investments (FDI) by multinational enterprises (MNEs). At an aggregate level, the empirical evidence indicates that, due to the existence of trade costs, FDI grew rapidly in the last 15 years of the 20th century, far outpacing the growth of international trade among industrialized countries.<sup>1</sup> Moreover, because of the widely held advantages of receiving FDI (e.g., cheaper or higher-quality goods for domestic consumers, technological spillovers to domestic producers, job creation, etc.), an increasing number of national governments offer MNEs countervailing incentives to attract their investments and competition mostly takes place at an intra-regional level, i.e., between countries belonging to the same economic area (e.g., Latin America, South-East Asia, Eastern Europe, and so on).<sup>2</sup> In spite of that, FDI by foreign MNEs can be an issue to the extent that foreign firms investing in a country often operate in the same sector as some incumbent local firm, which is, in some cases, a public enterprise.<sup>3</sup> In recent years, however, parallel to the massive increase in FDI, privatizations have become an important tool of industrial restructuring in all parts of the world. As the following quotation suggests, *“Since 1990, European governments have sold more than \$450 billion worth of state assets in many different sectors, including the banking, insurance, telecommunication and automobile industries. Many countries are also announcing substantial forthcoming privatizations.”* (Norbäck and Persson, 2005, p. 635). And privatization waves are not confined to the European Union.<sup>4</sup>

Therefore, when we think about the relationship between FDI, public firms and privatization, a lot of questions arise: how does the presence of a public firm affect the investment decision of a MNE operating in the same sector as the former? How does it affect policy competition for FDI between two countries of different size? Does privatization allows a country to attract FDI? Does it improve welfare in the country receiving the investment? In this paper, we try to provide an answer to some of the previous questions. In particular, we study how the presence of a welfare-maximizing public firm affects the investment decision of a foreign MNE and the intensity of policy competition between countries, i.e., between potential alternative locations for the investment. In addition, we discuss the impact of privatization not only on the FDI decision of the MNE but also on attractiveness and welfare of the country hosting the formerly-public firm. By “privatization”, we mean a transfer in ownership rights from the government to domestic private investors, which simply translates into a change in the firm’s objective function.

From a theoretical viewpoint, the literature on mixed oligopoly has generally focused on the optimal behavior of the public firm, the characterization of market equilibria and

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<sup>1</sup>See, e.g., Markusen (1995), Markusen and Venables (1998), and Barba Navaretti et al. (2004).

<sup>2</sup>For an overview of this issue, see Oman (2001).

<sup>3</sup>For instance, in the Norwegian oil industry, the state-owned Statoil competes with two MNEs, Esso Norge and Norske Shell.

<sup>4</sup>In the 1990s, for example, Russia privatized its aircraft industry, Colombia its state-owned automobile maker Colombia Automotriz, and Argentina pursued a policy of selective privatization.

the effects of privatization by adapting the standard models of oligopolistic competition to the welfare-maximizing behavior of public firms.<sup>5</sup> More recently, closer attention has been paid to international mixed oligopoly given that the public firm's behavior is sensitive to the nationality of its private competitor (Fjell and Pal, 1996; Fjell and Heywood, 2002). In particular, some work has been devoted to the analysis of instruments, such as production subsidies, that are alternative to direct public provision (Pal and White, 1998; Sepahvand, 2004); to the study of partial privatization and optimum tariffs (Chao and Yu, 2006); or to make the timing of competition endogenous (Cornes and Sepahvand, 2003; Matsumura, 2003). Other contributions (Norbäck and Persson, 2004; 2005) have studied competition between foreign and domestic private firms as potential buyers of state-owned assets which are sold at an auction during the privatization process.

In the present paper, we apply the analysis of international mixed oligopoly to a context where two active governments seek to attract FDI by a foreign firm from a third country. Our theoretical framework builds on the literature about policy competition for FDI. Namely, on those contributions considering imperfect market competition, country-size asymmetries, and intra-regional trade costs.<sup>6</sup> This strand of the literature grows out of the paper by Haufler and Wooton (1999)(henceforth H&W), which analyzes tax competition between two countries of unequal size trying to attract a foreign-owned monopolist.<sup>7</sup> Even if both countries are willing to offer a subsidy to the firm, in equilibrium the large country “wins” the competition for FDI since the firm prefers locating in the big market in order to save on trade costs; moreover, if the country-size difference is great enough, the large country may be able to levy a positive lump-sum tax on the foreign firm's profit. Ferrett and Wooton (2005) extend H&W's model to study policy competition for FDI by two firms from the same industry producing homogeneous goods in either of the two countries. When country-size asymmetry is “small”, one firm locates in each country and all of the firms' profits are taxed away by host countries; on the contrary, when country-size asymmetry is “large”, the big country is able to attract both firms by taxing them due to its “market access” advantage. Hence, since firms are taxed in both equilibria, a general conclusion stemming from this paper is that tax competition under duopoly does not create a “race to the bottom” in corporate tax rates. Bjorvatn and Eckel (2006) modify

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<sup>5</sup>See Rees (1984), Bös (1986), de Fraja and Delbono (1989), and Beato and Mas-Colell (1984).

<sup>6</sup>The traditional public finance approach to tax competition between countries of different size seems to be more appropriate when dealing with competition for portfolio investments rather than for FDI since trade costs are typically not accounted for and factor and product markets are assumed to be perfectly competitive. Bucovetsky (1991), Wilson (1991) and Kanbur and Keen (1993) represent the cornerstones of this line of research.

<sup>7</sup>A different set of papers looks at two-country policy competition by incorporating positive (or negative) spillovers from FDI. The presence of potential benefits from the investment – due to the existence of, e.g., regional unemployment, vertical industry linkages with domestic producers and agglomeration effects, technological spillovers, etc. – induces countries to a subsidy competition to attract the foreign MNE. See, for instance, Black and Hoyt (1989), Haaparanta (1996), Haaland and Wooton (1999), Barros and Cabral (2000), and Fumagalli (2003). By contrast, when the location of a foreign firm causes negative externalities for the host country (e.g. by polluting its environment), policy competition may result in excessively high tax rates. See Markusen, Morey and Olewiler (1995).

H&W's set-up by introducing a private firm – in the big country – which competes with the foreign investor on the regional market. In the absence of policy competition, the FDI decision is driven by a trade-off between the advantage of locating in the big market (“market size” effect) and the benefit of being a monopolist in the small market (“competition” effect). When countries offer relatively similar location advantages, policy competition is fierce and leads both countries to offer an investment subsidy; this, in turn, may decrease regional (i.e., the sum of the two countries’) welfare. Otherwise, policy competition is less intense and the resulting equilibrium policy is an investment tax which still attracts the foreign investor. An interesting result is that aggregate welfare (the sum of regional welfare and the investor’s profits) rises whenever the introduction of policy competition changes the investor’s location decision. Finally, Haufler and Wooton (2006) develop a three-country model of competition for FDI between a union of two countries and a third potential-host country. As trade costs are assumed to be lower on trade within the union than between the union and the outside country, if the firm settles in one of the union countries, it enjoys a location rent whose size depends on the relative costs for trade within and outside the union and on the relative size of the three different markets. Two types of gains for the union emerge when regional tax/subsidy policies are coordinated and the union as a whole still competes with the third country: first, for investments that would have taken place in the union in the absence of coordination, coordination allows an increase in equilibrium taxes (or a decrease in equilibrium subsidies) which transfers location rents from the firm to the union countries; second, by internalizing the benefits to all union members from the location of a foreign production plant, the union as a whole may be able to attract the firm by means of a lower tax (or a higher subsidy) whereas non-cooperative policies of its members would have led the firm to settle outside the region.

In our paper, we modify H&W’s model by assuming that the incumbent in the big country is a welfare-maximizing and relatively inefficient public firm which competes with a foreign firm on the regional market. First, we show that both countries enjoy higher welfare by receiving FDI, hence are willing to offer a positive subsidy to attract the foreign firm. However, if the public firm does not export to the small country (either *a priori* or due to entry of the MNE on the regional market), policy competition turns out to be irrelevant to the FDI decision; this, in turn, implies that the investment decision of the MNE absent policy competition maximizes aggregate welfare. By contrast, if the public firm exports to the small country, there is an extra-benefit for the big country from receiving FDI, and policy competition increases the attractiveness of the latter. As a second step, we find that privatization of the formerly-public firm may entail a trade-off between attractiveness and welfare from the big country’s perspective. We further show that after privatization, tax/subsidy competition increases the attractiveness of the small country as the big one is willing to tax the MNE in order to protect the domestic industry from a more efficient foreign competitor. But policy competition can also decrease the negative impact of privatization on welfare since the big country may be able to tax away part of the profit gain for the MNE from investing there.

The rest of the paper is organized as follows. In Section 2, we illustrate our basic theoretical framework where the incumbent in the big country is a welfare-maximizing public firm; then,

we analyze the investment decision of a foreign MNE absent policy competition; and, lastly, we study whether and how this decision changes when the two countries compete in lump-sum profit taxes/subsidies in order to attract FDI. In Section 3, we evaluate the effects of privatization of the public firm both on the investment decision of the MNE and on welfare of the big country and investigate the role of tax/subsidy competition in such a modified set-up. Finally, in Section 4, we summarize the main conclusions emerging from our work.

## 2 FDI decision in the presence of a public firm

In this Section, we present the basic model we use to analyze the investment decision of a multinational firm when the incumbent in the big market is a public welfare-maximizing and relatively inefficient firm. We derive the profit-maximizing investment choice in the absence and in the presence of policy competition between two countries which can potentially host the foreign firm. Finally, we compare the results we obtain in these two situations and show that tax/subsidy competition is irrelevant to the FDI decision of the MNE when the public firm does not export to the small country whereas it works in favor of the big country when the public firm serves both markets.

### 2.1 The basic set-up

We develop a model in which a firm from a third-country (we will refer to it as firm 1, the MNE or the foreign firm) has to decide in which of two countries to invest in order to provide some final good to the consumers of the whole region.<sup>8</sup>

The markets of the two countries are of unequal size. Namely, in line with Haufler and Wooton (1999), we assume that there is a single consumer in country  $A$  and  $n \geq 1$  identical consumers in country  $B$ . Hence, when  $n > 1$ , country  $B$  represents the “big” market for the final good. While no production takes place in the small country, the big country already hosts a welfare-maximizing public enterprise (firm 0).<sup>9</sup> The public firm sells the same good as the MNE and serves the small market through exports. However, it is less efficient than the MNE, i.e., it produces the final good at a higher marginal cost,  $c_0 > c_1 \geq 0$ , with  $c_i$  denoting the constant marginal production cost of firm  $i = 0, 1$ . As for the MNE, providing the good to consumers of both countries requires an investment since trade costs associated with exporting from the residence country to the region are assumed to be prohibitively high. Hence, the MNE has to incur a fixed cost  $F > 0$  to establish a production plant in either

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<sup>8</sup>As an example, we can think of a German multinational which has to pick one location between Argentina and Chile where to build a production plant with the purpose of servicing the consumers of this South American region.

<sup>9</sup>We do not exclude from the outset the symmetric-country case, which simply requires  $n = 1$ . However, we do not consider the case where the public firm operates in the small country, which is equivalent to  $n < 1$ . As it will become evident below, this leads to the trivial conclusion that the MNE always prefers to invest in the biggest country with no local competitor.

country and some per unit trade costs  $\tau > 0$  to serve the other market.<sup>10</sup>

If we denote by  $q_{ij}$  the quantity of the final good sold by firm  $i$  on country  $j$ 's market ( $j = A, B$ ), we can write the total cost function of firms 0 and 1 as follows:

$$C_0(q_{0A}, q_{0B}) = c_0(q_{0A} + q_{0B}) + \tau q_{0A} \quad (1)$$

$$C_1(q_{1A}, q_{1B}) = F + c_1(q_{1A} + q_{1B}) + \tau(I_A q_{1A} + I_B q_{1B}) \quad (2)$$

where  $I_j = 0$  if FDI goes to  $j$  and  $I_j = 1$  otherwise.

The two firms face linear demands given by

$$Q_A(p_A) = \alpha - p_A \quad \text{and} \quad Q_B(p_B) = n(\alpha - p_B) \quad (3)$$

where  $Q_j = q_{0j} + q_{1j}$  and  $p_j$  are the total quantity and the price to consumers on country  $j$ 's market, respectively. Production and trade costs are assumed not to exceed the consumers' maximal willingness to pay, i.e.,  $c_0, c_1, \tau \leq \alpha$ . To keep our analysis as simple as possible, we normalize firm 1's marginal production cost to 0 (i.e.,  $c_1 = 0$ ) and set  $\alpha = 1$ , so that  $c_0, \tau \in [0, 1]$ .

The objective of the public firm is to maximize welfare in country  $B$ , which corresponds to the sum of consumer surplus and firm 0's profits:

$$W_B(q_{0A}, q_{0B}, q_{1A}, q_{1B}) = CS_B(Q_B) + \Pi_0(q_{0A}, q_{0B}, q_{1A}, q_{1B}) \quad (4)$$

The MNE is instead interested in maximizing profits whose amount depends on where it locates its production plant:<sup>11</sup>

$$\Pi_1^j(q_{0A}, q_{0B}, q_{1A}, q_{1B}) = p_A(Q_A)q_{1A} + p_B(Q_B)q_{1B} - C_1(q_{1A}, q_{1B}), \quad j = A, B \quad (5)$$

Once the MNE has decided in which country to locate production, firms compete *à la* Cournot on the two markets.<sup>12</sup> The linearity of costs allows firms to choose the quantity produced for, say, country  $A$ 's market independently of that produced for country  $B$ 's market. Then, the public firm's reaction functions are given by:

$$q_{0A} = \max \left\{ \frac{1 - c_0 - \tau}{2} - \frac{q_{1A}}{2}, 0 \right\} \quad \text{and} \quad q_{0B} = \max \{n(1 - c_0), 0\}$$

First of all, we must stress that the public firm's output choice for its domestic market is independent of the MNE's behavior due to the linearity assumptions. Notice also that firm 0 acts as a profit-maximizer in country  $A$ . By contrast, it always realizes negative profits

<sup>10</sup>In what follows, we assume that the fixed cost  $F$  is symmetric across countries and so high that it will never be profitable for the MNE to pay it twice but not so high to make FDI in the favorite country unprofitable.

<sup>11</sup>Throughout the paper, the superscript indicates the country where the MNE invests. In what follows, we will drop the subscript 1 from the expression denoting the MNE's profits in order to ease the notation.

<sup>12</sup>We get qualitatively similar results by allowing for endogenous timing in the order of moves by firms. Relying on Cournot competition to illustrate our conclusions is a way to facilitate the exposition.

on its domestic market.<sup>13</sup> In fact, if the MNE were owned by domestic residents, the public firm would maximize welfare by applying the usual marginal-cost pricing rule which leads to zero profits. However, as the MNE is owned by residents of a third country, the public firm does not take into account the negative effect of its quantity decision on the rival's profits. Hence, it produces a larger quantity which lowers consumer price to a level below its marginal production cost.

The discussion above implies that the public firm may earn negative overall profits. Indeed, while profits from exports to the small country will always be nonnegative – provided that exporting is a viable option – the public firm always runs losses on its domestic market. In this case, we postulate that lump-sum transfers from country  $B$ 's residents occur in order to balance the firm's deficit.

The reaction functions of the foreign firm can be written as:

$$q_{1A} = \max \left\{ \frac{1 - I_A \tau}{2} - \frac{q_{0A}}{2}, 0 \right\} \quad \text{and} \quad q_{1B} = \max \left\{ n \frac{1 - I_B \tau}{2} - \frac{q_{0B}}{2}, 0 \right\} \quad (6)$$

Straightforward computations yield equilibrium quantities for the two firms. On the one hand, if the MNE invests in the big country and exports to the small one, we get:

$$q_{0A}^B = \frac{1}{3} (1 - 2c_0 - \tau) \geq 0 \iff c_0 \leq \frac{1 - \tau}{2}, \quad q_{1A}^B = \frac{1}{3} (1 + c_0 - \tau) \geq 0$$

and

$$q_{0B}^B = n(1 - c_0) \geq 0, \quad q_{1B}^B = \frac{nc_0}{2} \geq 0$$

for country  $A$ 's and  $B$ 's market, respectively. As the MNE is more efficient than the public firm, its entry on the regional market makes exporting to the small country less profitable. At some point, when  $c_0$  is too high, the public firm is better off by not serving country  $A$  anymore. In such a situation, the MNE will behave as a monopolist on the small country market by setting  $q_{1A}^B = \frac{1 - \tau}{2}$ .

On the other hand, if the MNE locates production in the small country and exports to the big one, we have:

$$q_{0A}^A = \frac{1}{3} (1 - 2c_0 - 2\tau) \geq 0 \iff c_0 \leq \frac{1 - 2\tau}{2}, \quad q_{1A}^A = \frac{1}{3} (1 + c_0 + \tau) \geq 0$$

and

$$q_{0B}^A = q_{0B}^B = n(1 - c_0) \geq 0, \quad q_{1B}^A = \frac{n(c_0 - \tau)}{2} \geq 0 \iff c_0 \geq \tau$$

for country  $A$ 's and  $B$ 's market, respectively. As the MNE produces *in loco*, exporting to the small country becomes even less profitable for the public firm. In particular, when the latter stops exporting, the MNE's monopoly output is given by  $q_{1A}^A = \frac{1}{2}$ . However, by locating in  $A$ , the MNE has to incur trade costs to service country  $B$ 's consumers. Hence, exporting is going to be a viable option to the MNE as long as the cost of supplying the final good to the big country's market does not exceed the production cost of the local public firm.

<sup>13</sup>The public firm realizes zero profits on country  $B$ 's market when the MNE invests in  $A$  and trade costs exceed firm 0's marginal production cost. In this situation, the consumers residing in the big country are served by a public monopoly.



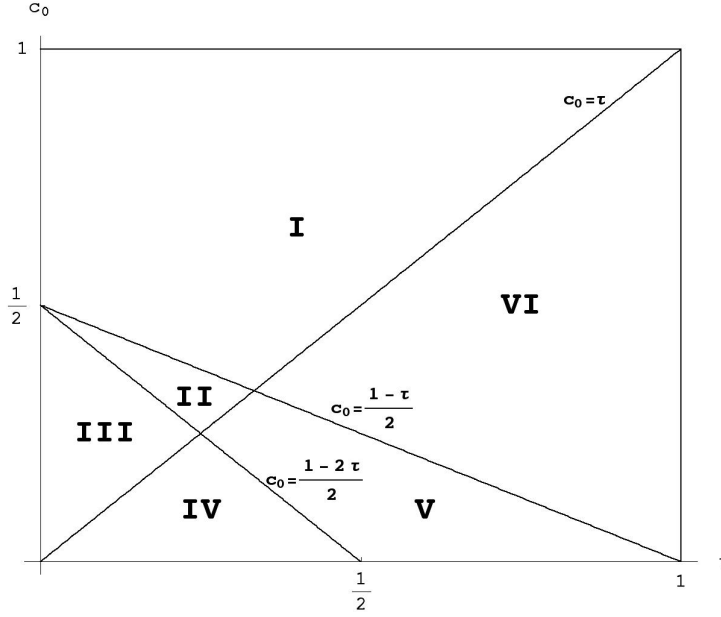


Figure 1: Relevant areas in the space  $(\tau, c_0)$  with a public firm in  $B$

It is evident that, depending on the values of  $c_0$  and  $\tau$  and on whether FDI by the foreign firm goes to country  $A$  or to country  $B$ , we have different market configurations to consider. In Figure 1 and Table 1, we identify and characterize the relevant areas in the parameter space  $(\tau, c_0)$ . For instance, when  $c_0 > \tau$  and  $c_0 < \frac{1-2\tau}{2}$  simultaneously hold (area **III** in Figure 1), both firms sell positive quantities in both markets independently of where the investment takes place. But for  $c_0 > \tau$  and  $c_0 > \frac{1-\tau}{2}$  (area **I**), FDI by the foreign firm in the region will always drive the public firm out of the small country's market.

Area	FDI in $A$		FDI in $B$	
	Country $A$	Country $B$	Country $A$	Country $B$
I	MNE monopoly	Cournot	MNE monopoly	Cournot
II	MNE monopoly	Cournot	Cournot	Cournot
III	Cournot	Cournot	Cournot	Cournot
IV	Cournot	Public Monopoly	Cournot	Cournot
V	MNE monopoly	Public Monopoly	Cournot	Cournot
VI	MNE monopoly	Public Monopoly	MNE monopoly	Cournot

Table 1: Possible market configurations with a public firm in  $B$

## 2.2 Investment decision of the MNE

In this Section, we analyze the MNE investment choice when a public firm is the incumbent in country  $B$ 's market. The two countries' governments can compete to attract FDI by the foreign firm in their own country. In particular, they can either tax or subsidize both local

consumers and the MNE in a lump-sum fashion. The results we present here are derived in the absence of tax competition between the two countries or, similarly, for a situation where the two countries use identical tax/subsidy policies to attract FDI.<sup>14</sup>

In order to pick the best location for the investment, the MNE compares its operating profits from doing FDI in country  $A$  or in country  $B$ . Namely, it invests in, say,  $A$  as long as

$$\Pi^A > \Pi^B \quad (7)$$

When the last condition holds with equality, the MNE is indifferent between investing in  $A$  or in  $B$ , and the gain in profits on  $A$ 's market of locating in  $A$  over  $B$  exactly compensates the gain in profits on  $B$ 's market of locating in  $B$  over  $A$ . Indeed:

$$\Pi^A = \Pi^B \iff \pi_A^A + \pi_B^A = \pi_A^B + \pi_B^B \iff \pi_A^A - \pi_A^B = \pi_B^B - \pi_B^A \quad (8)$$

where  $\pi_j^k$  stands for the MNE's profits on  $j$ 's market when FDI goes to country  $k$  ( $j, k = A, B$ ).

When the two countries have the same market size ( $n = 1$ ), the presence of a public firm – although less efficient than the MNE – is a strong disincentive to invest in  $B$ . Intuitively, as there exist positive trade costs separating the two markets, the MNE prefers to locate as distant as possible from its competitor. Hence, it will always invest in  $A$ .

In general, however, the investment decision of the MNE is driven by a “market size”, a “cost”, and a “competition” effect. The “market size” effect is such that, as we let  $n$  increase, the relative profitability of investing in the big country increases and investment is more likely to take place there. The “cost” effect reflects the efficiency of the incumbent firm in country  $B$ : intuition suggests that the higher  $c_0$ , the higher the attractiveness of country  $B$  since the MNE faces a weaker competitor on the big market. But the opposite may be true when the MNE's decision of investing in  $A$  prevents it from exporting to  $B$  as the public firm is very efficient. In such a case, an increase in  $c_0$  may raise the relative profitability of investing in  $A$ . Finally, the “competition” effect is captured by  $\tau$ . Bjorvatn and Eckel (2006, p. 1896) claim that *“the higher are the trade costs, the more protected are the national markets from international competition, and the more important is the competition argument in favor of location in [the small country]”*. But this is not always true in our model. Higher trade costs, indeed, can increase the relative profitability of investing in the big country if the public firm is inefficient enough and/or country  $B$ 's market is relatively large; in such a situation, the MNE may prefer to locate as close as possible to consumers in  $B$  when the profit loss in  $B$  from investing in  $A$  exceeds that in  $A$  from investing in  $B$ . Therefore, the effect of  $\tau$  on the FDI decision is ambiguous and depends on the values of  $c_0$  and  $n$  and on the market configuration prevailing in the two countries.

Figure 2 illustrates the MNE's decision for different values of the size-asymmetry parameter  $n$  (i.e.,  $n = 1, 2, 3$ ). Intuitively, for a given value of  $n$ , higher trade costs make the MNE prefer investing in country  $A$  in order to be as far as possible from the public firm; however, the more inefficient the public firm is compared to the MNE, i.e., the higher  $c_0$ , the more likely

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<sup>14</sup>We refer the reader to the Appendix for all the computations.



Figure 2: FDI decision with a public firm in  $B$  for  $n = 1, 2, 3$

FDI will go to country  $B$  since the MNE faces a weaker competitor on the big market. This implies that, as  $\tau$  increases, the  $c_0$  that induces the MNE to invest in country  $B$  increases as well, thereby explaining the positive slope of the indifference condition on the  $(\tau, c_0)$ -space. Whenever the indifference condition has a negative slope, the “cost” and the “competition” effects work in the same direction: hence, as  $\tau$  increases, lower values of  $c_0$  are needed to keep the MNE indifferent between  $A$  and  $B$ .

### 2.3 Tax/subsidy competition

In this Section, we investigate how the introduction of tax/subsidy competition between the two countries can affect the investment decision of the MNE. We assume that the country receiving FDI can levy a lump-sum tax on the foreign firm’s profits or has to offer a lump-sum subsidy in order to induce the foreign firm to establish a production plant within its frontiers. We denote country  $j$ ’s tax/subsidy by  $S_j$ ,  $j = A, B$ . The equilibrium policy will be a lump-sum tax when the host country already represents the favorite location for the MNE in the absence of policy competition; otherwise, it will be a lump-sum subsidy which makes the MNE prefer a country to the other.

In the first instance, we need to identify the maximum subsidy each country is willing to offer to the MNE in order to attract FDI. We define such a subsidy as the country’s welfare gain of receiving the investment, i.e.,  $S_j^{max} \equiv W_j^j - W_j^k$ , for  $j, k = A, B$ ,  $j \neq k$ , with  $W_j^k$  denoting country  $j$ ’s welfare when FDI goes to country  $k$  ( $j, k = A, B$ ). While welfare in country  $B$  consists of consumer surplus and public firm’s profits and is given by (4), welfare in country  $A$  simply coincides with consumer surplus as no local firm operates there prior to the MNE’s entry on the regional market. Evidently, country  $A$  always benefits from FDI as consumer surplus is higher by having the final good produced and sold locally instead of being served through exports. As for country  $B$ , we easily show that the same is true, that is welfare is always higher when the MNE invests there than otherwise. This allows us to state

**Proposition 1** *In the presence of a welfare-maximizing public firm, the big country always benefits from the investment of the multinational.*

**Proof.** If the MNE invests in country  $B$ , its production for that market is larger than in case

of FDI in  $A$ . Since the public firm's output for country  $B$ 's market is fixed, the MNE's larger quantity fully translates into an increase in total output which lowers price, and country  $B$ 's welfare is larger because:

- (i) consumers benefit from the lower price on the total quantity that is produced if the MNE invests in  $A$ ; hence, given that the loss in public firm's profits simply represents a neutral transfer to consumers, there is a net gain in welfare due to the lower price for the MNE's quantity;
- (ii) consumers also benefit from the larger quantity produced by the MNE;
- (iii) if the public firm exports to country  $A$ , it enjoys larger profits there since, by investing in  $B$ , the MNE becomes a weaker competitor on that market.

■

Our result contrasts with the one by Bjorvatn and Eckel (2006) according to which the big country *“benefits [from FDI] if trade costs and the size of its market are not too large”* (Lemma 2, p. 1897). Their theoretical framework differs from ours in that the big country hosts a *private* firm which is *as efficient as* the MNE. When trade costs are sufficiently high, the local private firm prefers keeping the MNE as far as possible and the big country benefits from not receiving FDI as the gain in consumer surplus would not compensate for the loss in the local firm's profits.<sup>15</sup> The intuition for our result goes the other way round: when the MNE invests in the big country, consumer surplus of domestic residents always increases by more than the decrease in profits (e.g., the increase in losses) of the public firm on the domestic market.

As each country is better off by receiving FDI, both of them are willing to offer a positive subsidy to the MNE, which will invest in country  $j$  if and only if

$$\Pi^j + S_j^{max} > \Pi^k + S_k^{max}, \text{ for } j, k = A, B, j \neq k \quad (9)$$

i.e., when profits from locating in  $j$  – inclusive of the lump-sum subsidy country  $j$  offers – exceed those – subsidy inclusive – from investing in  $k$ .

Because of different market size, cost-asymmetry, and the presence of positive costs for intra-regional trade, it may be possible that the MNE invests in a country where part of its profits are taxed away in spite of the fact that the other country offers a subsidy. In particular, provided that country  $k$  sets its maximum subsidy, country  $j$  receives FDI by setting a positive lump-sum tax on the MNE's profits if and only if the following condition holds:

$$\Pi^j > \Pi^k + S_k^{max}, \text{ for } j, k = A, B, j \neq k \quad (10)$$

If this were the case, the subsidy country  $k$  is able to offer to the MNE cannot offset its disadvantage relative to country  $j$ . For instance, country  $B$  attracts the MNE by taxing its profits when its market is large enough compared to country  $A$ 's and the public firm is very

<sup>15</sup>A similar reasoning applies when the big country's market is larger enough compared to the small one's.

inefficient. By contrast, when the public firm represents a fierce competitor for the big market, country  $A$  receives FDI even if it taxes away part of the MNE's profits.

The equilibrium policy (subsidy or tax) is the result of an auction where the country making the most attractive offer receives the investment by the MNE.<sup>16</sup> When both countries offer the maximum subsidy to attract FDI, country  $j$  wins the auction if condition (9) holds; however, country  $j$  need not actually pay the maximum subsidy it is willing to offer but just the one which is necessary to out-bid the rival country, which is given by:

$$S_j^* \equiv \Pi^k + S_k^{max} - \Pi^j > 0, \quad \text{for } j, k = A, B, j \neq k \quad (11)$$

By contrast, when country  $j$  represents the most attractive location for FDI without offering any subsidy and despite the fact that country  $k$  offers its maximum affordable subsidy, condition (10) holds. In this case, country  $j$  wins the auction by taxing away part of the MNE's profits and the equilibrium lump-sum tax is given by:

$$T_j^* \equiv \Pi^j - (\Pi^k + S_k^{max}) > 0, \quad \text{for } j, k = A, B, j \neq k \quad (12)$$

Figure 3 depicts the MNE's investment decision for different values of  $n$  (i.e.,  $n = 1, 2, 3$ ) when the two countries compete in lump-sum profit taxes/subsidies to attract FDI. Gray areas represent the parameter combinations  $(\tau, c_0)$  where one of the two countries receives FDI by taxing the MNE. When countries are symmetric ( $n = 1$ ), policy competition does not modify the FDI decision of the MNE, which always invests in country  $A$  where it does not face any local competitor. Notice that if governments' are endowed with such a tax policy instrument, the country hosting the MNE can be better off as it can extract part of its profits. By contrast, if a country has to pay a subsidy to attract the MNE, which would have invested there anyway absent tax competition, the MNE enjoys higher profits. In general, although one country's welfare is higher when the MNE locates within its borders, tax/subsidy competition turns out to be a pure waste of resources for the two countries to the extent that it does not change the investment decision of the foreign firm and the hosting country has to subsidize it.

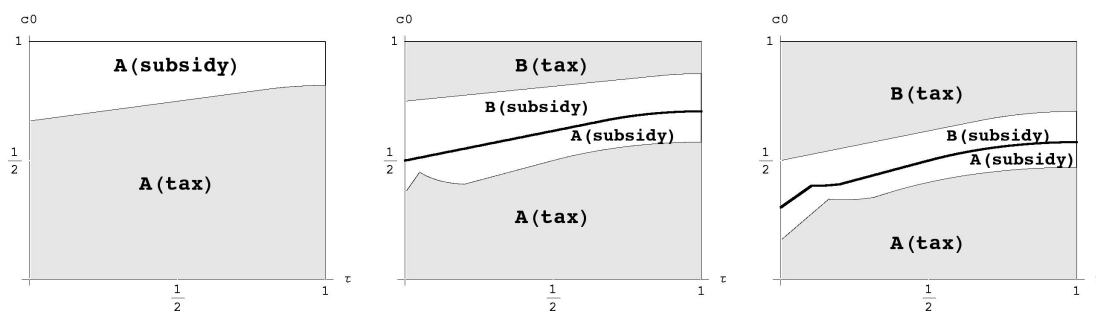


Figure 3: FDI decision with tax/subsidy competition for  $n = 1, 2, 3$

As a next step, we evaluate whether and how tax/subsidy competition affects the MNE's investment decision. As we claim above, if countries are symmetric, the MNE always invests in

<sup>16</sup>The same equilibrium outcome arises if we assume Bertrand price competition between countries for FDI.

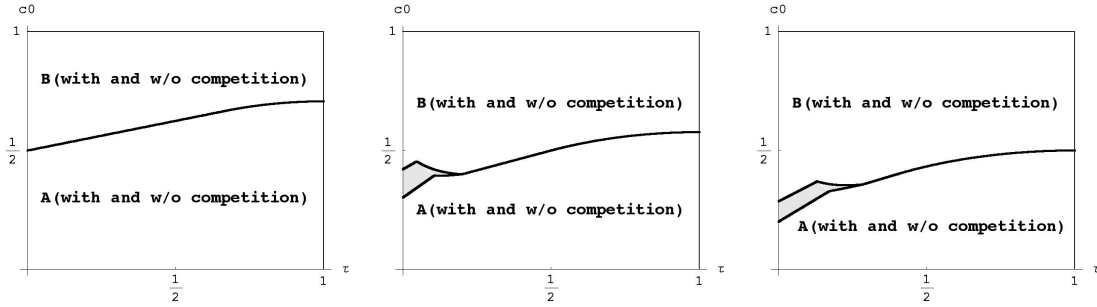


Figure 4: Impact of tax/subsidy competition on the FDI decision for  $n = 2, 3, 4$

the country where it does not face a local competitor. Therefore, it is instructive to see what happens when the size of the two markets is different. Figure 4 illustrates the comparison for  $n = 2, 3, 4$  and gray areas denote the parameter space where policy competition changes the investment decision of the MNE by making it switch from  $A$  to  $B$ . Notice that the MNE's indifference condition may not be affected by the lump-sum subsidies offered by the two competing governments. Namely, this turns out to be the case when the public firm serves just its domestic market. We summarize this result in the following Proposition:

**Proposition 2** *In the presence of a public welfare-maximizing firm which does not export to the small country, tax/subsidy competition is irrelevant to the investment decision of the multinational.*

**Proof.** To show this result we rely on the properties of a monopoly with linear cost and demand. In fact, when the public firm does not export to country  $A$ , there is no strategic interaction between firms since the MNE enjoys monopoly power on the small market and serves as a monopolist the constant residual demand on the big market. The residual demand in  $B$  is given by:

$$Q_{ResB} = n(1 - p_B) - n(1 - c_0) = n(c_0 - p_B) \implies p_B = c_0 - \frac{Q_{ResB}}{n}$$

Absent tax/subsidy competition, we know from (8) that if the MNE is indifferent between  $A$  and  $B$ , the gain in local profits from FDI to  $A$  is equal to the gain in local profits from investing in  $B$ . In the presence of tax/subsidy competition, instead, the indifference condition is given by (9) holding with equality.

Since the public firm always produces the same quantity in  $B$ , any change in its own profits is a neutral transfer to consumers. Then, any change in welfare due to the investment decision of the MNE is entirely measured by the change in the consumer surplus on the residual demand, i.e.,

$$S_B^{max} \equiv W_B^B - W_B^A = CS_{ResB}^B - CS_{ResB}^A$$

where  $CS_{ResB}^j$  stands for the consumer surplus on the residual demand in country  $B$ 's market when the MNE invests in country  $j = A, B$ . So, from (9), the indifference condition with

tax/subsidy competition can be rewritten as follows:

$$\pi_A^A - \pi_A^B + CS_A^A - CS_A^B = \pi_B^B - \pi_B^A + CS_{ResB}^B - CS_{ResB}^A \quad (13)$$

and we can easily show that when (8) holds with equality, then (13) holds true because

$$CS_j^j - CS_j^k = \frac{1}{2} (\pi_j^j - \pi_j^k), \quad \forall j, k = \{A, ResB\}, \quad j \neq k$$

Consider now a monopoly market with linear (inverse) demand,  $p = a - bq$  and cost,  $C(q) = cq$ , so that the equilibrium quantity and price are  $q^* = \frac{a-c}{2b}$  and  $p^* = \frac{a+c}{2}$ . We analyze the change in consumer surplus and profits due to a change in  $c$  by assuming that marginal costs fall to zero. The new equilibrium quantity and price are  $q^{**} = \frac{a}{2b}$  and  $p^{**} = \frac{a}{2}$ , respectively.

The change in consumer surplus has two components:

(i) the effect of the reduction in price on the initial quantity

$$\Delta_1 CS = (p^* - p^{**}) q^* = \frac{c(a-c)}{4b}$$

(ii) the effect of the increase in quantity

$$\Delta_2 CS = \frac{1}{2} (p^* - p^{**}) (q^{**} - q^*) = \frac{1}{2} \frac{c^2}{4b}$$

Similarly, we can define two components of the change in profits:

(i) the increase in profits on the initial quantity

$$\Delta_1 \pi = cq^* - (p^* - p^{**}) q^* = \frac{c}{2} q^* = \frac{c(a-c)}{4b}$$

(ii) the profits on the quantity increase

$$\Delta_2 \pi = (q^* - q^{**}) p^{**} = \frac{ca}{4b}$$

and it is immediate to check that the following relations hold:

$$\Delta_2 \pi = \Delta_1 CS + 2\Delta_2 CS \quad \text{and} \quad \Delta_1 \pi = \Delta_1 CS \implies \Delta CS = \frac{1}{2} \Delta \pi$$

In order to apply this result to our framework, let  $c = \tau$ ,  $a = 1$  and  $b = 1$  for country  $A$ 's market, and  $a = c_0$  and  $b = \frac{1}{n}$  for country  $B$ 's market residual demand. ■

Proposition 2 is valid both in the case where the public firm does not export to the small country *a priori* and when it stops exporting because of the investment of the MNE in the region. Such an *irrelevance* result rests on the absence of strategic interaction on both markets which is essentially due to the fact that the incumbent is a public firm. The MNE, indeed, enjoys monopoly power on the small market, whereas the public firm always produces

the same quantity for the big market, where the MNE serves as a monopolist the constant residual demand. When the MNE is indifferent between investing in  $A$  or in  $B$ , the gain in local profits on  $A$ 's market of locating in  $A$  over  $B$  exactly compensates the gain in local profits on  $B$ 's market of locating in  $B$  over  $A$ . In addition, each country's welfare gain of receiving the investment is a fixed proportion of the local profit gain for the MNE. Therefore, when local profit gains are equal, the same holds for welfare gains, and since welfare gains represent the maximum subsidy each country is willing to offer to attract FDI, we can argue that tax/subsidy competition does not modify the MNE's investment decision.

From Proposition 2, it immediately follows

**Corollary 1** *In the presence of a public welfare-maximizing firm which does not export to the small country, when the country receiving FDI has to pay a subsidy, only the multinational will be better off. In this case, tax/subsidy competition is just a waste of resources for the region as a whole.*

The discussion above also allows us to state

**Corollary 2** *In the presence of a public welfare-maximizing firm which does not export to the small country, the investment decision of the MNE absent tax/subsidy competition maximizes aggregate welfare.*

**Proof.** When the MNE maximizes its overall profits by investing in, say, country  $A$ , we have that  $\Pi^A > \Pi^B$ . This, together with our previous discussion, implies that

$$W_A^A + W_B^A > W_A^B + W_B^B$$

Therefore, if we follow Bjorvatn and Eckel (2006) and define aggregate welfare as the sum of the two countries' welfare and the MNE's profits, it is straightforward to obtain

$$W_A^A + W_B^A + \Pi^A > W_A^B + W_B^B + \Pi^B$$

which completes the proof. ■

Figure 4 further suggests that tax/subsidy competition can affect the MNE's indifference condition when the public firm sells the final good in both markets and country  $B$ 's market is relatively big enough. We can thus state

**Proposition 3** *In the presence of a public welfare-maximizing firm which does export to the small country, tax/subsidy competition increases the attractiveness of the big country.*

**Proof.** When the MNE invests in country  $B$  rather than in country  $A$ , it becomes a weaker competitor on the small market and the public firm always enjoys larger profits there. Thus, country  $B$  can offer a subsidy which enhances its attractiveness relative to  $A$ . In fact, the new indifference condition for the MNE becomes:

$$\pi_A^A - \pi_A^B + CS_A^A - CS_A^B = \pi_B^B - \pi_B^A + CS_{ResB}^B - CS_{ResB}^A + \pi_{0A}^B - \pi_{0A}^A \quad (14)$$



where the RHS of (14) is larger than in (13) and bigger than its LHS when condition (8) holds.

■

Differently from the case where the public firm does not export, country  $B$ 's welfare gain of receiving FDI now exceeds country  $A$ 's one when the MNE is indifferent absent policy competition. This implies that the big country can offer the MNE a higher subsidy than the small country.

Proposition 3 sharply contrasts with the finding by Bjorvatn and Eckel (2006) according to which policy competition increases the attractiveness of the small country. The intuition for our result is straightforward if we refer to Proposition 2. The only difference here is that there is an extra-benefit for the big country from hosting the MNE. When FDI goes to  $B$ , indeed, the MNE becomes a weaker competitor on the small market, and since the public firm now earns positive profits from exporting to  $A$ , its profits (hence, country  $B$ 's welfare) will be higher.

### 3 The effects of privatization

In this Section, we modify our basic theoretical framework to account for the effects of privatization on the investment decision of the MNE. By “privatization”, we mean that the incumbent firm in country  $B$  is no longer owned by the domestic government so that its objective is to maximize profits instead of welfare. In addition, we assume that the privatized firm fully remains in the hands of residents of the big country, i.e., no shares in the firm are sold to foreigners.<sup>17</sup>

Once again, we determine the profit-maximizing investment choice of the MNE in the absence and in the presence of policy competition between the two countries. We show that privatization of the formerly-public firm increases the attractiveness of country  $B$  as the location of FDI (even when countries are symmetric); however, welfare decreases when the MNE invests in  $B$  if the privatized firm stays in the market. Finally, we analyze the interaction between privatization and policy competition and discuss whether and how tax/subsidy competition affects the FDI decision of the MNE in this modified set-up.

#### 3.1 The modified set-up

We consider a situation where the government of country  $B$  privatizes the public firm by selling all of the shares in this firm to domestic residents. The privatized firm wants to maximize its profits – instead of country  $B$ 's welfare. As privatization *per se* does not imply a decrease in production costs, the only difference with respect to our basic set-up is the nature of the incumbent firm in  $B$ , i.e., the privatized firm's objective, which is now given by  $\Pi_0(q_{0A}, q_{0B}, q_{1A}, q_{1B})$ . Total cost and profit functions of the MNE are unchanged.

<sup>17</sup>Similarly, we can think that country  $B$ 's government has full bargaining power when it sells the firm to foreign investors and can correctly anticipate the expected profits of the formerly-public firm after privatization. If this were the case, the government could ask foreign investors a price for the firm which coincides with the resulting producer surplus.

After the MNE's FDI decision has been made, Cournot competition takes place between the two firms on the two markets. The privatized firm's reaction functions are given by:

$$q_{0A} = \max \left\{ \frac{1 - c_0 - \tau}{2} - \frac{q_{1A}}{2}, 0 \right\} \quad \text{and} \quad q_{0B} = \max \left\{ \frac{n(1 - c_0)}{2} - \frac{q_{1B}}{2}, 0 \right\}$$

While the public firm acts as a profit-maximizer just in country  $A$ , the privatized firm maximizes its profits in both markets, so that its output choice for the domestic market is no longer independent of the MNE's behavior. Namely, quantities of the two firms are strategic substitutes in the two markets. Moreover, the privatized firm always earns nonnegative profits in each country – otherwise, it does not produce for that market. As for the MNE, its reaction functions are the same as in (6) with  $q_{0B}$  denoting here the quantity produced by the privatized firm for country  $B$ 's market.

Since the privatized firm behaves in the same way as the public firm on country  $A$ 's market, privatization does not affect the corresponding equilibrium quantities. By contrast, privatization does change equilibrium quantities on country  $B$ 's market. On the one hand, if the MNE invests in the big country, we get:

$$q_{0B}^B = \frac{n(1 - 2c_0)}{3} \geq 0 \iff c_0 \leq \frac{1}{2} \quad \text{and} \quad q_{1B}^B = \frac{n(1 + c_0)}{3} \geq 0$$

Entry of the relatively more efficient MNE in the region makes domestic production less profitable for the privatized firm. Due to the presence of positive trade costs, such an argument is even stronger for exports. Hence, if the privatized firm is not efficient enough, it will be forced not to produce in order to avoid losses, and the MNE will behave as a monopolist on both markets by setting  $q_{1B}^B = \frac{n}{2}$  and  $q_{1A}^B = \frac{1-\tau}{2}$ , respectively.

On the other hand, if the MNE invests in the small country, we have:

$$q_{0B}^A = \frac{n(1 - 2c_0 + \tau)}{3} \geq 0 \iff c_0 \leq \frac{1 + \tau}{2} \quad \text{and} \quad q_{1B}^A = \frac{n(1 + c_0 - 2\tau)}{3} \geq 0 \iff c_0 \geq 2\tau - 1$$

Although the MNE exports the final good from the small country, if the privatized firm is not efficient enough, it will not be able to compete with the MNE on the big country's market. In this case, the MNE will be a monopolist both in  $B$  and in  $A$ , where it will sell  $q_{1B}^B = \frac{n(1-\tau)}{2}$  and  $q_{1A}^B = \frac{1}{2}$ , respectively. However, if trade costs are sufficiently high relative to  $c_0$ , investing in  $A$  may prevent the MNE from serving country  $B$  and leave monopoly power on that market to the privatized firm, which will set  $q_{0B}^A = \frac{n(1-c_0)}{2}$ .

As in our basic set-up, depending on the values of  $c_0$  and  $\tau$  and on whether FDI goes to  $A$  or to  $B$ , we have different market configurations to analyze. Clearly, privatization increases the number of cases to study since FDI may now drive the incumbent firm out of the big country's market. For instance, when  $c_0 > \frac{1+\tau}{2}$ , FDI in the region ensures the foreign firm monopoly power in both markets, independently of where it locates production. By contrast, when  $c_0 < 2\tau - 1$ , investing in  $A$  makes exporting unprofitable for the privatized firm but leaves it monopoly on the big country's market. In Figure 5 and Table 2, we identify and characterize all the relevant areas (i.e., market outcomes) in the parameter space  $(\tau, c_0)$ .

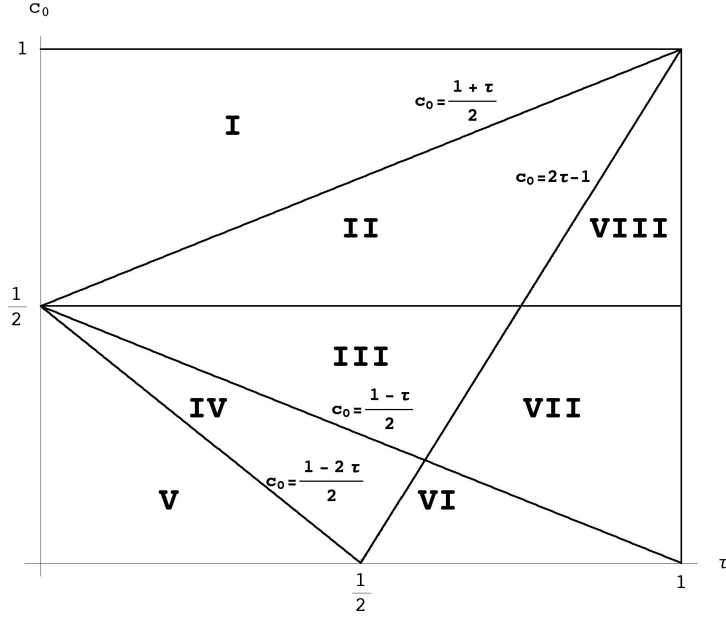


Figure 5: Relevant areas in the space  $(\tau, c_0)$  with a privatized firm in  $B$

Area	FDI in $A$		FDI in $B$	
	Country $A$	Country $B$	Country $A$	Country $B$
I	MNE monopoly	MNE monopoly	MNE monopoly	MNE monopoly
II	MNE monopoly	Cournot	MNE monopoly	MNE monopoly
III	MNE monopoly	Cournot	MNE monopoly	Cournot
IV	MNE monopoly	Cournot	Cournot	Cournot
V	Cournot	Cournot	Cournot	Cournot
VI	MNE monopoly	Privatized Monopoly	Cournot	Cournot
VII	MNE monopoly	Privatized Monopoly	MNE monopoly	Cournot
VIII	MNE monopoly	Privatized Monopoly	MNE monopoly	MNE monopoly

Table 2: Possible market configurations with a privatized firm in  $B$

### 3.2 Investment decision of the MNE

We now analyze whether and how privatization of the public firm affects the MNE investment choice. In this Section, we look at a situation where no policy competition between the two countries takes place or, similarly, where the two countries use identical tax/subsidy policies to attract FDI. As before, the foreign firm chooses its favorite location for the investment by comparing operating profits from doing FDI in country  $A$  or in country  $B$ .<sup>18</sup>

In general, privatization decreases the importance of the “cost” effect relative to the “market size” effect in driving the investment decision of the MNE. On the big market, the privatized firm produces as long as its profits are nonnegative and it clearly represents a much weaker competitor for the MNE than the public firm, which either runs losses or realizes zero profits from sales. In the small country, instead, privatization does not affect the intensity of market competition. Therefore, the “cost” effect is less likely to discourage the MNE from investing in the big country than before privatization, and higher values of  $n$  dramatically increase the attractiveness of country  $B$  because of the “market size” effect. In particular, if the privatized firm is not efficient enough (i.e.,  $c_0 > \frac{1}{2}$ ), the MNE always invests in the big country as this allows it to be a monopolist on both markets and to serve the relatively large market without incurring any trade costs.

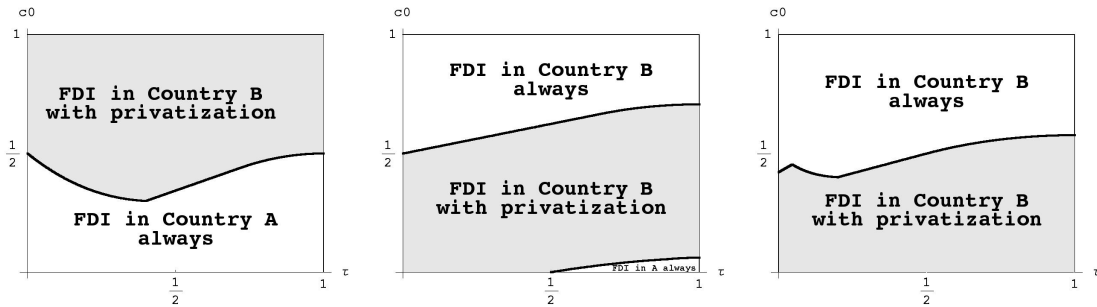


Figure 6: Impact of privatization on the FDI decision for  $n = 1, 2, 3$

Figure 6 illustrates the FDI choice of the MNE before and after privatization of the incumbent firm on country  $B$ 's market. Gray areas represent the parameter space  $(\tau, c_0)$  where privatization changes the investment decision of the MNE and induces it to locate in country  $B$ . The impact of privatization on the attractiveness of the big country is evident from this Figure and consistent with our discussion above, so that we can state

**Proposition 4** *Privatization always increases the attractiveness of the big country.*

**Proof.** This result follows from an intuitive and straightforward argument. First of all, notice that public and privatized firm behave identically on country  $A$ 's market. On the domestic market, however, the privatized firm is a less aggressive competitor than the public firm, so that the MNE faces a larger residual demand. Hence, independently of where FDI goes to,

<sup>18</sup>All the computations can be found in the Appendix.

local profits in  $B$  are higher when the incumbent is the privatized firm. This, in turn, implies that the gain in profits from investing in  $B$  over  $A$  is always bigger than in the presence of the public firm. ■

Privatization of the formerly-public firm makes it more likely that the foreign firm invests in country  $B$  rather than  $A$ . In particular, when the incumbent in  $B$  is inefficient enough (i.e.,  $c_0 > \frac{1}{2}$ ), the MNE always invests there and this, in turn, makes the privatized firm shut down and leaves monopoly power to the MNE. By contrast, when the incumbent is not too inefficient (i.e.,  $c_0 < \frac{1}{2}$ ), the privatized firm continues to produce – at least for the big country’s market – in spite of the fact that it may have to face a more efficient competitor producing locally.

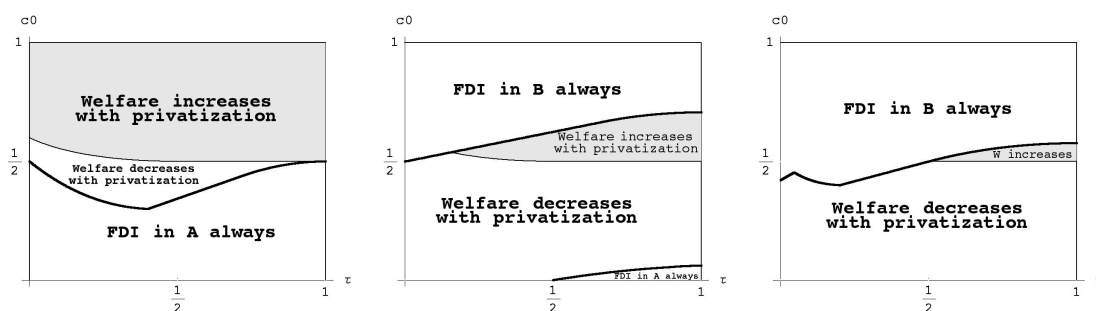


Figure 7: Impact of privatization on country  $B$ 's welfare for  $n = 1, 2, 3$

However, an FDI-attracting privatization does not necessarily make the big country better off. This is clearly shown by Figure 7, which allows us to state

**Proposition 5** *Privatization always decreases welfare in the big country when it induces the MNE to invest there if the privatized firm stays in the market.*

**Proof.** To understand and prove such a sufficient condition, we can compare the worst situation - in terms of country  $B$ 's welfare - before privatization with the best one after. Before privatization, when FDI goes to  $A$ , the worst it can happen is to have a public monopoly serving the domestic market. After privatization, the best situation is to have Cournot duopoly on both countries' markets.<sup>19</sup>

We divide our proof in two steps: first, we isolate the “pure privatization” effect on country  $B$ 's welfare; then, we consider the “FDI-switch” effect on the privatized firm's profits resulting from privatization.

- (i) When the incumbent firm is efficient enough (namely,  $c_0 < \frac{1}{2}$ ), the total quantity produced for the big country's market by a public monopoly,  $Q_B^{OM} = n(1 - c_0)$ , is greater

<sup>19</sup>Before privatization, as the public firm always produces the same quantity in  $B$ , every market configuration in which the MNE produces a positive quantity for that market increases welfare since the gain in consumer surplus always exceeds the loss in public firm's profits. For the same reason, after privatization, two firms competing on the domestic market yield higher welfare than a monopoly; moreover, the privatized firm can never be a monopolist on the foreign market.

than that supplied by a private duopoly,  $Q_B^{PD} = \frac{n}{3}(2 - c_0)$ . Then, the sum of consumer surplus and incumbent firm's profits on the domestic market is always smaller after privatization. Therefore, the "pure privatization" effect is negative for any market configuration when  $c_0 < \frac{1}{2}$ .

- (ii) The FDI switch from  $A$  to  $B$  following privatization leads to a profit loss on the domestic market and a profit gain on the foreign market for the privatized firm. The overall effect turns out to be negative because of the "cost" and of the "market size" effects. To see this, suppose that countries are symmetric so that the "market size" effect disappears. If the MNE invests in  $B$  rather than  $A$ , privatized firm's profits are lower because the gain on the foreign market does not compensate for the loss on the domestic market. Introducing market-size asymmetry makes such an argument even stronger since the loss occurs in the bigger market.

To sum up, both the "pure privatization" and the "FDI-switch" effects have a negative impact on country  $B$ 's welfare, and the condition  $c_0 < \frac{1}{2}$  ensures that the privatized firm stays in the market if the MNE invests in  $B$ . This completes the proof. ■

The intuition behind Proposition 5 is that when privatization induces the MNE to invest in the big country, the increase in profits for the incumbent firm can never compensate for the loss in consumer surplus of domestic residents. Hence, welfare in the big country decreases. It is thus evident that the decision of privatizing the public firm entails a trade-off for country  $B$  between attractiveness and welfare.

We also want to stress that the big country's welfare can decrease with FDI following privatization despite the fact that the privatized firm remains entirely in the hands of domestic residents. Indeed, if we allow for the possibility of foreign investors acquiring shares in the formerly-public firm, the welfare-reducing impact of an FDI-attracting privatization would be even stronger unless country  $B$ 's government is able to sell the firm at a value which fully reflects its future profit earnings.

### 3.3 Tax/subsidy competition

We finally investigate how tax/subsidy competition between the two countries can affect the investment decision of the MNE after privatization. The analysis in the present Section parallels that in Section 2.3 where the incumbent in  $B$  is a public firm. As before, each country sets a lump-sum tax/subsidy on the MNE's profits and the equilibrium policy results from an auction where the country making the most attractive offer receives the investment.

Figure 8 - which is drawn for the case  $n = 2$  - is useful to illustrate the impact of tax/subsidy competition both on the investment decision of the MNE and on welfare of the big country.

First, we clearly see that tax/subsidy competition enlarges the parameter space  $(\tau, c_0)$  where the MNE chooses to invest in the small country. This is due to the fact that the big country is less willing to subsidize the foreign firm than before privatization. This allows us to claim

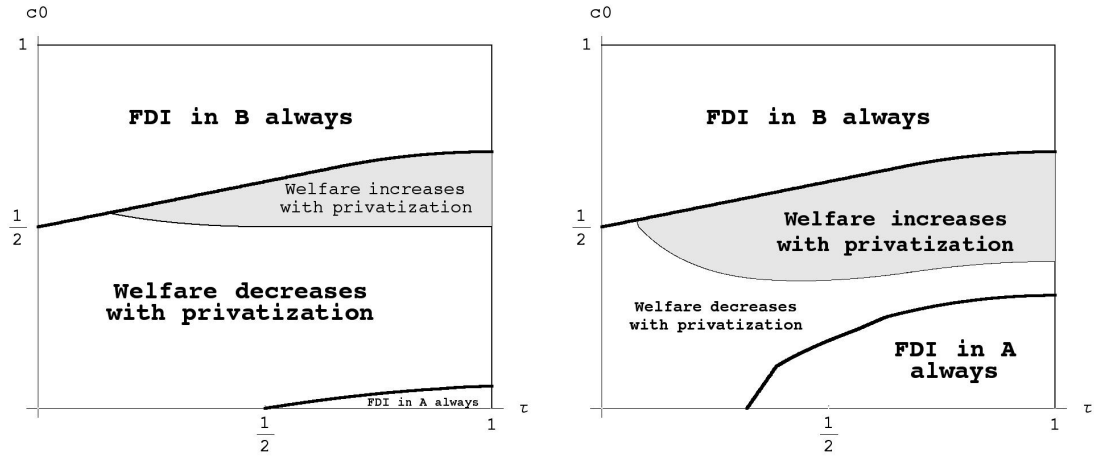


Figure 8: Impact of tax/subsidy competition after privatization for  $n = 2$

**Proposition 6** *Following privatization, tax/subsidy competition increases the attractiveness of the small country.*

**Proof.** Suppose that the privatized firm produces the same quantity in  $B$  irrespective of where the investment takes place. Then, the indifference condition for the MNE would correspond to (14). However, the privatized firm's reaction function is downward sloping. Hence, any increase in the MNE's output in  $B$  reduces the privatized firm's quantity with a negative effect both on its profits and on country  $B$ 's consumer surplus. From the "FDI-switch" effect (Proof of Proposition 5), we know that if the MNE invests in  $B$  rather than  $A$ , the gain in privatized firm's profits on the foreign market does not compensate for the loss on the domestic market. This is enough to conclude that  $\Pi^A + S_A^{max} > \Pi^B + S_B^{max}$  when  $\Pi^A = \Pi^B$ . ■

After privatization of the public firm, the big country is less eager to attract FDI than before. Hence, the small country will represent a more attractive location for the investment and can even succeed in hosting the MNE by taxing away part of its profit gain from investing there. Intuitively, the net effect on country  $B$ 's welfare of receiving FDI can now be negative since the gain in consumer surplus could not be sufficient to counteract the loss in domestic firm profits. This implies that the big country may be willing to tax the MNE in order to discourage it from investing there and to protect the domestic industry from more efficient foreign competitors. Such a result puts forward an argument for the "protectionist" role of tax/subsidy competition for FDI. Moreover, it is consistent with the finding by Bjorvatn and Eckel (2006) according to which the big country may gain from not receiving FDI when its market size is relatively large. However, our conclusions are more general than theirs in that the privatized firm in the big country can be either as efficient as or less efficient than the foreign MNE.

Secondly, Figure 8 suggests that tax/subsidy competition allows the big country to reduce the negative impact on welfare of an FDI-attracting privatization. We summarize this result in

**Proposition 7** *Tax/subsidy competition decreases the negative impact of privatization on welfare since the big country can tax away part of the MNE's gain in profits from investing there.*

Intuitively, privatization dramatically increases the attractiveness of the big country, so that it is extremely beneficial for the MNE to invest there instead of investing in the small country. This, in turn, implies that country  $B$  can tax away part of the profit gain from investing there (without changing the FDI decision of the foreign firm), thereby increasing welfare above the no policy competition level.<sup>20</sup>

## 4 Conclusions

In this paper we have analyzed how the FDI decision of a foreign MNE and tax/subsidy competition for FDI between countries of different market size are affected by the presence in the big market of a welfare-maximizing and relatively inefficient public firm operating in the same sector as the foreign investor. In addition, we have studied the effects of privatization on attractiveness and welfare of the big country but also on the outcome of the policy competition game between the two countries.

In the first instance, we have shown that when the incumbent in the big market is a public rather than a private firm, both countries always benefit from receiving the investment of the MNE. In particular, differently from Bjorvatn and Eckel (2006), when the MNE locates in the big country, the gain in consumer surplus of domestic residents is always greater than the loss in profits for the domestic firm. Hence, both governments are always ready to offer a subsidy to attract FDI. However, when the public firm does not export to the small country (either *a priori* or due to entry of the MNE on the regional market), tax/subsidy competition turns out to be irrelevant to the investment decision of the foreign firm. This implies that if the country receiving the investment has to pay a subsidy, only the MNE will gain from policy competition provided that it would have invested there anyway. This also means that the FDI decision of the MNE absent policy competition maximizes aggregate welfare (i.e., the sum of the two countries' welfare and the foreign firm's profits). By contrast, when the public firm exports to the small country (even after entry of the foreign MNE in the region), policy competition increases the attractiveness of the big country. In this case, indeed, there is an extra-benefit from receiving FDI for the big country because the public firm will have to face a weaker competitor on the small market. As a result, the maximum subsidy the big country is willing to offer now exceeds the small country's one when the MNE is indifferent in the absence of policy competition.

As a second step, we have found that privatization of the public firm may entail a trade-off between attractiveness and welfare from the big country's perspective. On the one hand,

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<sup>20</sup>We must stress that policy competition does not prevent country  $B$ 's welfare to decrease as a result of an FDI-attracting privatization when countries are symmetric ( $n = 1$ ). In such a situation, indeed, country  $B$  is always willing to offer a subsidy (in equilibrium) which lowers its net-of-subsidy welfare below the corresponding level in the absence of policy competition.



privatization makes the big country a relatively more attractive location for the foreign MNE since the privatized firm is a much less aggressive competitor than the public firm on its domestic market. On the other hand, when the privatized firm stays in the market after investment of the MNE in the big country, welfare always decreases relative to the before-privatization scenario. This is due to the fact that the increase in profits for the local firm can never compensate for the decrease in consumer surplus of domestic residents. In our model, privatization does not entail any efficiency gain.<sup>21</sup> However, the fundamental trade-off between attractiveness and welfare is robust to the assumption that privatization allows the domestic firm to produce at the same cost level as the MNE. In fact, it is possible to show that for high values of  $c_0$  and  $\tau$ , privatization with full efficiency gains increases welfare but induces the MNE to invest in the other country, while the opposite occurs for low values of the two parameters. Attractiveness and welfare simultaneously increase only for intermediate values.

We have also discussed the interaction between privatization and tax/subsidy competition and put forward the role policy competition may play in protecting one country's domestic industry from efficient foreign competitors. As (after privatization) the net effect on welfare of receiving the investment can be negative, the big country can be willing to tax the MNE in order to discourage FDI from taking place there. This, in turn, increases the attractiveness of the small country. Such a result generalizes the finding by Bjorvatn and Eckel (2006) to a set-up where the incumbent private firm can be less efficient than the foreign MNE. Finally, we have pointed out that tax/subsidy competition can attenuate the negative impact of privatization on welfare since the big country may be able to tax away part of the profit gain for the MNE from investing there.

To sum up, the presence of a public firm (although relatively inefficient) is a strong disincentive to invest in a country even if the latter represents a large market. In this case, policy competition is not useful to attract FDI if the public firm just serves its domestic market. Moreover, privatization *per se* is not necessarily "good news" from the big country's perspective as it might attract FDI while decreasing welfare. However, allowing for tax/subsidy competition after privatization seems to be an improvement to the extent that it endows the big country with an instrument which it can use either to protect its local producers from tough foreign competitors or to extract part of the rents the foreign firm earns by locating there.

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<sup>21</sup>Indeed, the empirical evidence in this respect is mixed and the variance of the results is substantial (Cuervo and Villalonga, 2000). By contrast, there is general agreement on the fact that liberalization processes and increased competition enhance efficiency. See, for example, the meta-reviews of Villalonga (2000), Megginson and Netter (2001), and Willner (2001), that report the results of hundreds of empirical papers on privatization.

## Appendix

### Investment decision with a public firm in $B$

When FDI goes to  $A$ , the MNE will behave as a monopolist on that market if the public firm does not export to the small country or as a duopolist if it does. Hence, the price to consumers in country  $A$  is given by either  $p_A = \frac{1}{2}$  or  $p_A = \frac{1+c_0+\tau}{3}$ , respectively. In country  $B$ , the public firm will behave as a monopolist if the MNE does not export to the big country or as a duopolist if it does, implying  $p_B = c_0$  or  $p_B = \frac{c_0+\tau}{2}$ , respectively. When FDI goes to  $B$ , instead, the MNE will always behave as a duopolist on that market where it has to compete with the incumbent public firm. Hence, the price to consumers in country  $B$  is always given by  $p_B = \frac{c_0}{2}$ . In country  $A$ , the MNE will behave as a monopolist if the public firm does not export to that country or as a duopolist if it does, implying  $p_A = \frac{1+\tau}{2}$  or  $p_A = \frac{1+c_0+2\tau}{3}$ , respectively. Straightforward computations allow us to derive profits of the MNE from investing in country  $A$  or in country  $B$  and the corresponding welfare in the two countries, which we summarize in the Table below.

FDI in $A$			
Market in $A, B$	$\Pi^A + F$	$W_A^A$	$W_B^A$
Mon, CN	$\frac{1}{4} + \frac{n(c_0-\tau)^2}{4}$	$\frac{1}{8}$	$\frac{n(2-c_0-\tau)^2}{8} - \frac{n(1-c_0)(c_0-\tau)}{2}$
CN, CN	$\frac{(1+c_0+\tau)^2}{9} + \frac{n(c_0-\tau)^2}{4}$	$\frac{(2-c_0-\tau)^2}{18}$	$\frac{n(2-c_0-\tau)^2}{8} + \frac{(1-2c_0-2\tau)^2}{9} - \frac{n(1-c_0)(c_0-\tau)}{2}$
CN, Pub Mon	$\frac{(1+c_0+\tau)^2}{9}$	$\frac{(2-c_0-\tau)^2}{18}$	$\frac{n(1-c_0)^2}{2} + \frac{(1-2c_0-2\tau)^2}{9}$
Mon, Pub Mon	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{n(1-c_0)^2}{2}$
FDI in $B$			
Market in $A, B$	$\Pi^B + F$	$W_A^B$	$W_B^B$
Mon, CN	$\frac{(1-\tau)^2}{4} + \frac{nc_0^2}{4}$	$\frac{(1-\tau)^2}{8}$	$\frac{n(2-c_0)^2}{8} - \frac{n(1-c_0)c_0}{2}$
CN, CN	$\frac{(1+c_0-\tau)^2}{9} + \frac{nc_0^2}{4}$	$\frac{(2-c_0-2\tau)^2}{18}$	$\frac{n(2-c_0)^2}{8} + \frac{(1-2c_0-\tau)^2}{9} - \frac{n(1-c_0)c_0}{2}$

Table 3: Profits and welfare from FDI in  $A$  or in  $B$  with a public firm in  $B$

We define the difference in operating profits of the MNE between investing in  $B$  and in  $A$  as  $\Delta\Pi \equiv \Pi^B - \Pi^A$  and country  $j$ 's welfare gain of receiving FDI as  $\Delta W_j \equiv W_j^j - W_j^k$ , for  $j, k = A, B, j \neq k$ . It is then easy to determine the value of these variables in the relevant areas of the parameter space  $(\tau, c_0)$  by using Table 3.

### Investment decision with a privatized firm in $B$

After privatization, the MNE's behavior on the small market is the same as in the presence of a public firm. However, the way firms compete in the big country changes. When FDI goes to  $A$ , the privatized firm will behave as a monopolist if the MNE does not export to the big country or as a duopolist if it does, implying  $p_B = \frac{1+c_0}{2}$  or  $p_B = \frac{1+c_0+\tau}{3}$ , respectively. In addition, the MNE can enjoy monopoly power in  $B$  (even by investing in  $A$ ) since the privatized firm does not want to run losses; in this case,  $p_B = \frac{1+\tau}{2}$ . When FDI goes to  $B$ , instead, the MNE will always behave either as a duopolist or as a monopolist on that market

FDI in A			
Market in A, B	$\Pi^A + F$	$W_A^A$	$W_B^A$
Mon, CN	$\frac{1}{4} + \frac{n(1+c_0-2\tau)^2}{9}$	$\frac{1}{8}$	$\frac{n(2-c_0-\tau)^2}{18} + \frac{n(1-2c_0+\tau)^2}{9}$
CN, CN	$\frac{(1+c_0+\tau)^2}{9} + \frac{n(1+c_0-2\tau)^2}{9}$	$\frac{(2-c_0-\tau)^2}{18}$	$\frac{n(2-c_0-\tau)^2}{18} + \frac{n(1-2c_0+\tau)^2}{9} + \frac{(1-2c_0-2\tau)^2}{9}$
Mon, Mon	$\frac{1}{4} + \frac{n(1-\tau)^2}{4}$	$\frac{1}{8}$	$\frac{n(1-\tau)^2}{8}$
Mon, Priv Mon	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{n(1-\tau)^2}{8} + \frac{n(1-c_0)^2}{4}$
FDI in B			
Market in A, B	$\Pi^B + F$	$W_A^B$	$W_B^B$
Mon, Mon	$\frac{(1-\tau)^2}{4} + \frac{n}{4}$	$\frac{(1-\tau)^2}{8}$	$\frac{n}{8}$
Mon, CN	$\frac{(1-\tau)^2}{4} + \frac{n(1+c_0)^2}{9}$	$\frac{(1-\tau)^2}{8}$	$\frac{n(2-c_0)^2}{18} + \frac{n(1-2c_0)^2}{9}$
CN, CN	$\frac{(1+c_0-\tau)^2}{9} + \frac{n(1+c_0)^2}{9}$	$\frac{(2-c_0-2\tau)^2}{18}$	$\frac{n(2-c_0)^2}{18} + \frac{(1-2c_0-\tau)^2}{9} + \frac{n(1-2c_0)^2}{9}$

Table 4: Profits and welfare from FDI in A or in B with a privatized firm in B

where the incumbent privatized firm produces as long as it earns nonnegative profits. Hence, the price to consumers in country B is given by either  $p_B = \frac{1+c_0}{3}$  or  $p_B = \frac{1}{2}$ . Straightforward computations allow us to derive profits of the MNE from investing in country A or in country B and the corresponding welfare in the two countries. Finally, we determine profit and welfare differentials in the relevant areas by using Table 4, which summarizes all the possible values of the variables we are interested in.

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