

Market Size, Local Sourcing and Policy Competition for Foreign Direct Investment¹

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Abstract

This paper analyzes policy competition for a foreign-owned monopolist firm between two asymmetric countries. In particular, one country has a larger economy than the other country does. At the same time, the small country produces an intermediate good for the final good production, while the large country does not. We show that whether a country will win FDI competition is determined by the interaction between relative transport costs of intermediate and final goods and the market size of the large country relative to that of the small country; and policy competition for FDI may Pareto improve the welfare of the competing countries.

Key Words: Foreign direct investment; Policy competition; Market size; Local sourcing; Welfare

JEL Classification: F12; F23; H25; H73; L12

1 Introduction

Policy competition for attracting foreign direct investment (hereafter FDI) has become commonplace in the past twenty years.¹ For instance, in 2007, Texas Instruments Inc. announced its intention of establishing an assembly plant with an investment of \$1 billion in Asia. Competition for this investment was fierce among Thailand, Vietnam, China and the Philippines. China and the Philippines comprised the final shortlist, and the Philippines beat out China for the site of the plant. Though it is not clear what tax breaks or other incentives the Philippine government may have offered Texas Instruments, the new facility is located in a special economic zone, which typically does provide considerable investment incentives.² In March 2007, Intel Corp. announced in Beijing that it would build a \$2.5 billion chip-fabrication plant in Dalian, China. CEO Paul Otellini said Intel's choice of China for the plant reflects in part the advantages of building such facilities in places that offer better financial incentives than the U.S. does. Mr. Otellini cited testimony that he gave before a U.S. government panel in 2005 estimating that, because the U.S. offers less-favorable tax breaks and incentives, it costs \$1 billion more to build a fab in the U.S. than elsewhere.³

Although the competing countries differ in certain important respects, such as market size (for example, China versus the Philippines), and level of development (for example, China versus the U.S.), and so forth, they have an economic incentive to attract foreign investors since possible benefits of FDI include job creation, technological spillover and import substitution effects. In addition, when a country succeeds in attracting FDI in one sector, it can help encourage other manufacturing industries to follow and unleash a flow of new investments to that country. Thus,

¹For an overview of policy competition for foreign direct investment, see UNCTAD (1996), Oman (2000), Charlton (2003) and Barba Navaretti and Venables *et al.* (2004).

²*Wall Street Journal Asia*, May 4-6, 2007.

³*Wall Street Journal Asia*, March 27, 2007.

the beneficial effects of FDI will be reinforced. At the same time, there are also a number of reasons why multinational firms wish to launch new overseas plants. The investments may be driven by the market seeking motive. The access to cheap inputs and resources, such as labor, both unskilled and skilled, land, raw materials and parts and components for assembling into final goods is also relevant. When evaluating possible investment locations, multinational firms may also have a logistical concern.⁴ The outcome of FDI competition is determined by the interaction between these factors.

In this paper, we analyze policy competition for a foreign-owned monopolist firm between two asymmetric countries. In particular, one country has a larger economy than the other country does. At the same time, the small country produces an intermediate good for the final good production, while the large country does not. We ask the following questions. On the positive side, (i) under what condition will a country win the multinational firm? (ii) how is the equilibrium subsidy for attracting FDI determined? On the normative side, (i) is allocative efficiency achieved? (ii) what is the distribution effect of competition for FDI? (iii) compared to the case when countries do not provide any financial incentive to attract FDI, does FDI competition Pareto improve the welfare of the competing countries?

We show that whether a country will win FDI competition is determined by the interaction between relative transport costs of intermediate and final goods and the market size of the large country relative to that of the small country. We also characterize the condition under which the winning country will subsidize/tax the multinational firm. On the welfare effects of FDI competition, we first show that allocative efficiency is always achieved when countries engage in competition to attract the multinational firm. After analyzing its distribution effect, we show that policy competition for FDI may Pareto improve the welfare of the competing countries.

⁴For example, see the case of Intel's investment in China, *Wall Street Journal Asia*, March 23-25, 2007.

Our analysis has important implications for international investment policy. There is a policy debate about the possible effects of “bidding war for firms” on the competing countries. The advocates of FDI competition argue that tax competition is better than tax harmonization since the latter is a governmental tax and spending cartel, which is as objectionable as a private cartel. While the opponents argue that competition for FDI results in a pure waste of resources of the competing countries. In addition, it may weaken public finances and distort the location of investment. Our analysis suggests that FDI competition will Pareto improve the welfare of the competing countries when the differences among them are not only in the same directions, but also sufficiently great, that is, the degree of FDI competition is low. If this is the case, there is no need for calling for tax harmonization. While competition for FDI will do harm to the competing countries when the differences among them are not in the same directions and countries’ edges in FDI competition offset one another, that is, the degree of competition for FDI is high. As a result, multinational firms will receive a transfer from host countries. This calls for international cooperation to contain excesses of policy competition for FDI.

Related Literature

There have been interesting contributions which consider two asymmetric countries competing for a profit-maximizing multinational firm from the rest of the world, and have trade costs and imperfect competition as the basic building blocks for the analysis. Haufler and Wooton (1999) study competition for a foreign-owned monopolist firm between two countries of different size. Since trade between countries incurs transport costs, the large country is the attractive location for FDI since the multinational firm will save on transports costs if it chooses to locate in the large country. Call this the market size effect. At the same time, both countries have an economic incentive to attract FDI due to strictly positive import substitution effects. In equilibrium, the large country wins FDI competition and may even be able to charge a tax on

the multinational firm, if the difference between the market size of the large country and that of the small country is sufficiently great.

Barros and Cabral (2000) also analyze the case where two countries compete for a foreign-owned monopolist firm. They differ in country size; and the small country suffers from problems of unemployment, while the large country does not. The large country is more attractive for FDI than the small country is because trade between two countries incurs transport costs and the nominal wage is equal in both countries. In the meantime, the large country's valuation of FDI is strictly positive due to import substitution effects; while the small country has an economic incentive to attract the multinational firm since it benefits from FDI in two respects: import substitution and employment expansion. The winner of FDI competition results from the interaction of two factors, relative country size and employment gains from FDI. When market size effects dominate employment gains, the large country wins the foreign firm, and *vice versa*. In any case, FDI competition increases the attractiveness of the small country as location for the foreign firm since it would choose to locate in the large country when countries do not engage in competition for FDI. They also consider welfare implications of competition for FDI. In particular, they show that the small country's welfare is greater when countries engage in FDI competition than in the situation when countries do not engage in competition for FDI. Conversely, the large country welfare is lower under FDI competition than in the case where countries do not engage in FDI competition.⁵

Bjorvatn and Eckel (2006) consider the situation where two countries try to attract a foreign-owned firm to locate in their own territory. They differ in country size; and there is a domestic

⁵When doing welfare analysis, they also consider the first-best solution as the counterfactual with respect to the subsidy game, where subsidies are minimized while efficient location decisions are induced. They show that absent side payments, one of the countries prefers the equilibrium with subsidies to the first-best solution.

firm located in the large country, which produces the same good as the foreign firm does, while this is not the case in the small country. The attractive location for FDI is determined by the interaction between two opposite forces: market size effects favor the large country, while competition effects favor the small country since the multinational firm locating there will soften competition between itself and the local firm. The small country's willingness to pay to attract FDI is strictly positive due to import substitution effects. Things are a bit more complicated for the large country. The impact of FDI on consumer surplus is positive, while its effect on the local firm's profits is negative. As a result, both countries have a chance to win the multinational firm; and policy competition for FDI increases the attractiveness of the small country as location for the multinational firm. They also discuss welfare implications of FDI competition. In particular, they show that when countries engage in competition for FDI, allocative efficiency is achieved. In addition, FDI competition may Pareto improve the welfare of the competing countries.

Fumagalli (2003) examines the case where two countries of different levels of technology compete for the location of a foreign-owned firm.⁶ In each country there exists a local firm that produces the same good as the foreign firm does, however, the multinational firm uses the most efficient technology. When the multinational firm invests in a country, FDI determines a positive externality in the form of a technological spillover. It is assumed that the spillover has only a local effect and it generates a larger efficiency gain the larger the technological gap between the domestic and the foreign firm. The attractive location for FDI is the technologically advanced country. But the advanced country's willingness to pay to attract the multinational firm is smaller than that of the less advanced country. As a result, both countries have a chance to win FDI; and policy competition for the multinational firm increases the attractiveness of the

⁶She assumes that the market size is equal in both countries, and hence does not consider the market size effect in the paper.

less advanced country as location for the multinational firm. She shows that competition for FDI may increase the aggregate welfare of the competing countries, though it is not a Pareto improvement.⁷

Our paper differs from Haufler and Wooton (1999), Barros and Cabral (2000), Bjorvatn and Eckel (2006) and Fumagalli (2003) mainly in that we incorporate a new asymmetry, that is, multinational firms from the rest of the world can source inputs locally in one of the competing countries rather than the other, into the analysis of competition for FDI; and study its impacts on the FDI location choice, the equilibrium subsidy policy and welfare. As we noted earlier, the access to cheap inputs and resources is one of the most important concerns for multinational firms to establish new plants overseas. This in turn may affect policy choice. In fact, our analysis shows that incorporating the new asymmetry into the analysis affects the FDI location choice, investment subsidy and welfare in interesting ways. We compare the results derived in our paper with those obtained in their papers after completing equilibrium and welfare analysis of our model.⁸

Raff (2004) extends the above two-country framework to consider how free-trade agreements and customs unions affect the location of FDI and social welfare, taking into account that governments may adjust taxes and external tariffs to compete for FDI. He considers three countries – two of them representing potential members of a free-trade agreement or customs

⁷She also considers the case where multinational firms can use both FDI and exports to service a foreign market.

⁸Haaparanta (1996) uses a common agency approach to studying competition for FDI between two countries with unequal wage rate. Both countries face problems of unemployment and will gain from FDI from increased employment (reduced unemployment). He treats FDI as being perfectly divisible and consider the impact of policy competition on how the foreign firm allocates its capital between the competing countries. This differentiate his paper from our paper and other previous contributions cited.

unions, the other representing the rest of the world – and a foreign investor with monopoly power who has a choice of locating a plant in one or more of the potential member countries or serving them via exports from an existing plant in the rest of the world. Haufler and Wooton (2006) also extend the two-country framework to analyze the effects of a regionally coordinated profit tax or location subsidy in a model with three active countries, one of which is not part of the union, and a globally mobile firm.

This paper is also related to the literature of tax competition for mobile capital in traditional public finance, such as Bucovetsky (1991), Wilson (1991), Kanbur and Keen (1993), and Trandel (1994).⁹ In a perfectly competitive environment, it introduces asymmetries between countries and studies the interaction of different tax instruments. However, since profit-maximizing firm is different from mobile capital, thus, as Fumagalli (2003) notes, this approach is more appropriate when dealing with competition for portfolio investments rather than for FDI.

The remainder of the paper proceeds as follows. Section 2 sets out the model. Follows equilibrium and welfare analysis. Next, we compare our results with those established in previous contributions on policy competition for FDI. The final section concludes and discusses policy implications of our analysis.

2 Model

There are two countries indexed by i , $i \in \{A, B\}$, in a region. Direct demand in country A is given by

$$x_A = 1 - p_A;$$

⁹See Wilson (1999) and Wilson and Wildasin (2004) for surveys of tax competition literature.

while country B 's economy is larger than country A 's, and its direct demand is given by

$$x_B = n(1 - p_B), \quad n > 1,$$

where p_i is the market price in country i , x_i is the quantity demanded in country i , and n measures the market size of country B relative to that of country A .

A firm from the rest of the world, the multinational firm, intends to establish a production plant in one of the two countries in order to serve the regional market. It produces good x using an intermediate good y . In the region, the intermediate good is competitively supplied in country A at price c . Other costs of producing x are normalized to zero, and producing one unit of good x requires one unit of intermediate good y . Transaction costs associated with exporting good x and intermediate good y to the region are assumed to be prohibitively high, so that in order to supply the regional market the multinational firm needs to make an investment and to source inputs locally.¹⁰ The investment cost is assumed to be the same in both countries and it is denoted as F .¹¹ Exports of good x between countries incur a transport cost of t_x per unit, while exports of intermediate good y between countries incur a transport cost of t_y per unit.¹²

¹⁰The reasons for making this assumption are as follows. The trade versus FDI choice is well understood from the literature on trade costs and foreign direct investment. See Neary (2009) for a most recent survey. It is not the focus of our paper.

In addition, FDI obviously involves the make-or-buy decision. See Helpman (2006) for an excellent survey for this topic. See Leahy and Montagna (2009) for a study of the decision between outsourcing and FDI in the context of oligopoly. In our paper, the make-or-buy decision is abstracted and our approach can be taken to represent a case where outsourcing inputs is always cheaper than producing them in-house. In reality, inputs or resources seeking is one of the most important motives for firms to launch new plants overseas.

¹¹We make this assumption in line with previous contributions. Allowing for differences in fixed investment costs would have obvious effects on the FDI location choice. All else being equal, the low cost country becomes a relatively more attractive location.

¹²Note that the multinational firm's effective unit production cost is $c + t_y$ when it locating in country B , while

Note that there are two asymmetries in the model. Countries differ in market size; and the multinational firm can source inputs locally in one of the competing countries rather than the other.¹³

Two countries and the multinational firm play a two-stage game of complete information. In the first stage, two countries simultaneously announce a lump-sum subsidy b^i to the multinational firm (conditional on it locating in its territory).¹⁴ In the second stage, after observing two countries' subsidies offered, the multinational firm makes its location choice, then services the regional demand. Before analyzing the game, we make the following assumptions.

Assumption 1 $1 - c - t_x - t_y > 0$.

Assumption 1 is standard and it guarantees that the multinational firm is able to service both countries' demands.

Assumption 2 $\frac{t_y}{t_x} < 1$.

Assumption 2 says that the unit trade cost of the intermediate good is strictly smaller than that of the final good. As we will see, it ensures that country B 's net benefit under FDI is strictly positive so that it has an economic incentive to compete for FDI.¹⁵

it is c when it investing in country A .

¹³This is a way to model the asymmetry in the foreign firm's local sourcing behavior. Here is a story for backing up this assumption. Suppose that the large country supplies the input competitively at a price that is higher than $c + t_y$ in autarky. When opening up for trade, those producers are driven out of the market by their efficient foreign competitors.

¹⁴It is a lump-sum tax if b^i is strictly negative.

¹⁵As we will see, relaxing this assumption will not change our results qualitatively.

3 Analysis

3.1 No policy competition for FDI

We first consider the benchmark case where countries do not engage in FDI competition, that is, $b^A = b^B = 0$, in this subsection. We simply need to examine what the multinational firm's profit-maximizing location is. If the multinational firm establishes a production plant in country A , it would receive:

$$\pi^A = (1 - x_{AA} - c) x_{AA} + \left(1 - \frac{1}{n} x_{AB} - c - t_x\right) x_{AB} - F,$$

where x_{AA} denotes its sales in country A , while x_{AB} denotes its sales in country B in the case.

The equilibrium outputs would be:

$$x_{AA}^* = \frac{1 - c}{2}, \quad x_{AB}^* = \frac{n(1 - c - t_x)}{2}. \quad (1)$$

The equilibrium profits would be:

$$\pi^{A*} = \frac{(1 - c)^2}{4} + \frac{n(1 - c - t_x)^2}{4} - F. \quad (2)$$

If the multinational firm invests in country B , it would receive:

$$\pi^B = (1 - x_A - c - t_x - t_y) x_A + \left(1 - \frac{1}{n} x_B - c - t_y\right) x_B - F,$$

where x_{BA} denotes its sales in country A , while x_{BB} denotes its sales in country B in the case.

The equilibrium outputs would be:

$$x_{BA}^* = \frac{1 - c - t_x - t_y}{2}, \quad x_{BB}^* = \frac{n(1 - c - t_y)}{2}. \quad (3)$$

The equilibrium profits would be:

$$\pi^{B*} = \frac{(1 - c - t_x - t_y)^2}{4} + \frac{n(1 - c - t_y)^2}{4} - F. \quad (4)$$

Hence, the multinational firm will invest in country A if and only if its investment premium in country A is strictly positive:

$$\pi^{A*} - \pi^{B*} > 0. \quad (5)$$

When the unit transport cost of the intermediate good becomes higher, the multinational firm's investment premium in country A becomes greater. When country B 's economy becomes larger; or the unit transport cost of the final good becomes higher, the multinational firm's investment premium in country A becomes smaller. Obviously, the multinational firm will choose to locate in country B if and only if its investment premium in country B is strictly positive.¹⁶

Proposition 1 *Let*

$$(t_y/t_x)^* \equiv \frac{n-1}{n+1}. \quad (6)$$

When countries do not engage in competition for FDI, the multinational firm will establish a production plant in country A if and only if $(t_y/t_x) > (t_y/t_x)^$; otherwise it will invest in country B .*

Proof. Condition (5) implies the Proposition immediately. ■

When making its FDI location decision, the multinational firm faces a trade-off between the savings in transport costs of the final good and those of the intermediate good. If the multinational firm chooses to invest in country A , it does not need to pay transport costs of the intermediate good at all; however, exporting final goods to country B , a larger economy, means that it incurs higher transport costs of the final good. If it establishes a production plant in country B , it saves on transport costs of the final good since country A is a smaller economy; but it needs to ship the intermediate good from country A to country B in the first place incurring transport costs of the intermediate good. The savings in transport costs of the intermediate

¹⁶We henceforth omit the knife-edge cases.

good and those of the final good balance when $(t_y/t_x) = (t_y/t_x)^*$. When $(t_y/t_x) > (t_y/t_x)^*$, the former dominates the latter, and *vice versa*. In addition, it is easy to see that other things being equal, an increase in the market size of country B relative to country A , or an increase in the unit transport cost of the final good makes the multinational firm more likely locate in country B ; while an increase in the unit transport cost of the intermediate good makes the multinational firm more likely invest in country A .¹⁷

Next we turn to discuss the welfare implications of the multinational firm's location decision and want to know (i) whether allocative efficiency is achieved; (ii) the distribution effect of FDI. Allocative efficiency requires that the multinational firm locates in a country so that the country's net gains under FDI and the multinational firm's profits received when it locating in the country are jointly maximized. When the multinational firm establishes a production plant in country A , country A 's national welfare is:

$$W_{AA} = \frac{1}{2}x_{AA}^{*2}. \quad (7)$$

When the multinational firm invests in country B , its national welfare is:

$$W_{AB} = \frac{1}{2}x_{BA}^{*2}. \quad (8)$$

Hence, country A 's net benefit under FDI, v^A , is given by:

$$v^A \equiv W_{AA} - W_{AB} = \frac{1}{8} \left[(1-c)^2 - (1-c-t_x-t_y)^2 \right] > 0. \quad (9)$$

It is easy to see that country A 's net benefits under FDI become larger when either the unit transport cost of the final good; or that of the intermediate good; or both become higher. When the multinational firm locates in country A , country B 's national welfare is:

$$W_{BA} = \frac{1}{2n}x_{AB}^{*2}. \quad (10)$$

¹⁷It is easy to see that relaxing Assumption 2 will not change the FDI location choice. Moreover, our results derived in the following analysis will not be changed qualitatively by relaxing this assumption as well.

When the multinational firm invests in country B , its national welfare is:

$$W_{BB} = \frac{1}{2n} x_{BB}^{*2}. \quad (11)$$

Hence, country B 's net benefit under FDI, v^B , is given by:

$$v^B \equiv W_{BB} - W_{BA} = \frac{n}{8} \left[(1 - c - t_y)^2 - (1 - c - t_x)^2 \right] > 0. \quad (12)$$

The last inequality in expression (12) is due to Assumption 2. Obviously, all else being equal, country B 's net benefits under FDI become larger when its economy becomes larger; or the unit transport cost of the final good becomes higher; or the unit transport cost of the intermediate good becomes lower. We are ready to establish the following result.

Proposition 2 *Consider the case when countries do not engage in FDI competition. (i) allocative efficiency is achieved. (ii) The distribution effects of FDI are that the host country of FDI wins, while the other country loses.*

Proof. (i) The sum of country A 's net benefits under FDI, and the multinational firm's profits when it locating in country A is $v^A + \pi^{A*}$, while the sum of country B 's net benefits under FDI, and the multinational firm's profits when it locating in country B is $v^B + \pi^{B*}$. When $(t_y/t_x) > (t_y/t_x)^*$, the multinational firm invests in country A , and it is easy to show $v^A + \pi^{A*} > v^B + \pi^{B*}$; and *vice versa*. (ii) Note that both countries' net gains under FDI are strictly positive. (See expression (9) and (12).) Hence, when the multinational firm invests in a country, its net benefits under FDI are achieved; while those of the other country are not achieved. ■

Let us briefly summarize the discussion on the case when countries do not engage in FDI competition. See Figure 1. The horizontal axis measures the relative market size; while the vertical axis measures the relative transport costs of intermediate and final goods. The upward sloping curve represents the case where $(t_y/t_x)^* \equiv \frac{n-1}{n+1}$ (expression (6)) and it divides the

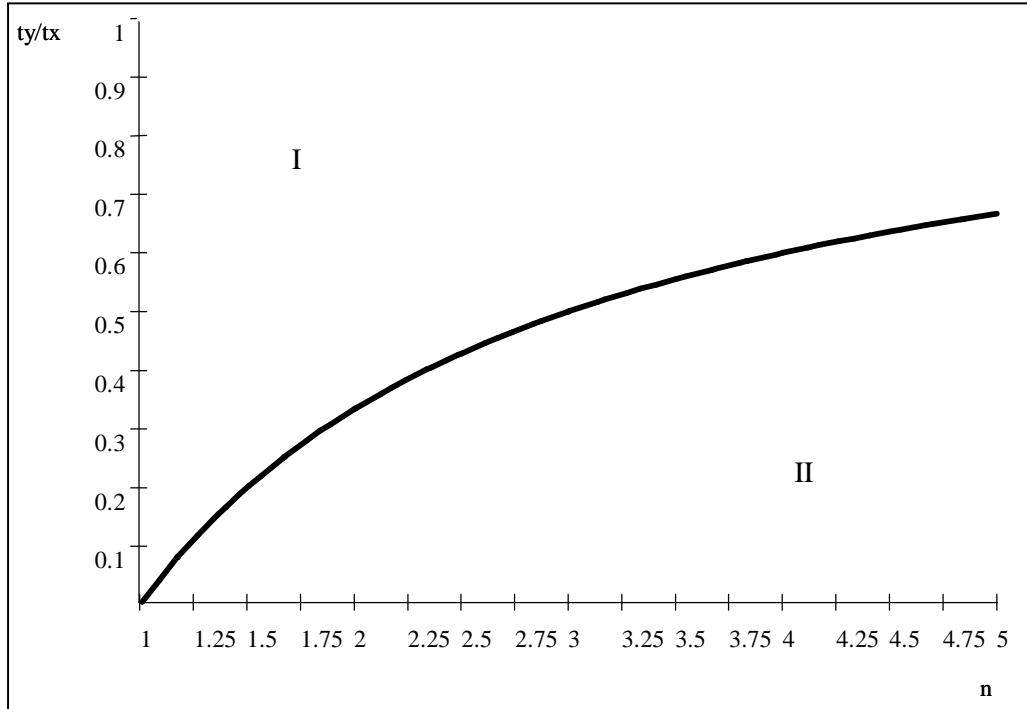


Figure 1: No policy competition for FDI

quadrant into two regions. When parameter configurations fall into region I, the multinational firm chooses to establish a production plant in country A ; country A wins, while country B loses from the multinational firm's location choice. When parameter configurations fall into region II, the multinational firm chooses to locate in country B ; country A loses, while country B wins from the multinational firm's location choice. In any case, allocative efficiency is achieved.

3.2 Policy competition for FDI

Let us turn to the case where countries engage in FDI competition. In the last stage of the game, after observing two countries' lump-sum subsidies b^A , and b^B , the multinational firm chooses a location to maximize its profits, π^{i*} plus b^i , $i \in \{A, B\}$. Therefore, it will establish a production

plant in country A if and only if

$$\pi^{A*} + b^A > \pi^{B*} + b^B. \quad (13)$$

Otherwise, it will choose to invest in country B . Clearly, besides the trade-off between the savings in transport costs of the final good and those of the intermediate good, the multinational firm's location choice is affected by countries' subsidy policies.

The first stage Nash subsidy game is a slight variant of a first-price sealed-bid auction of complete information, in which the player with the highest valuation of the object wins the object and pays a price that is equal to the second highest valuation of the object. Note that a country's net benefit under FDI is simply its valuation of FDI. However, things are a bit more complicated here. A country with a higher valuation of FDI might not win the multinational firm if the multinational firm's investment premium in the rival country is strictly positive, and it plus the rival country's willingness to pay to attract FDI dominates this country's valuation of FDI. Taking this into account, we are ready to characterize the equilibrium of the first stage game. Country A will win FDI competition if and only if

$$v^A > v^B + (\pi^{B*} - \pi^{A*}); \quad (14)$$

and it will pay the amount,

$$b^{A*} = v^B + (\pi^{B*} - \pi^{A*}), \quad (15)$$

to the multinational firm. Otherwise, country B will attract the multinational firm and pay it,

$$b^{B*} = v^A + (\pi^{A*} - \pi^{B*}). \quad (16)$$

Proposition 3 *When countries engage in FDI competition, the multinational firm will establish a production plant in country A if and only if $(t_y/t_x) > (t_y/t_x)^*$; otherwise the multinational firm will invest in country B .*

Proof. Condition (14) immediately implies the Proposition. ■

It is easy to see that other things being equal, an increase in the market size of country B relative to that of country A , or an increase in the unit transport cost of the final good makes country B more likely win FDI competition; while an increase in the unit transport cost of the intermediate good makes country A more likely attract the multinational firm.¹⁸

When *country A* wins the multinational firm in an equilibrium outcome, its subsidy paid to the multinational firm is given by expression (15). When country B 's economy becomes larger; or the unit transport cost of the final good becomes higher, both country B 's valuation of FDI and the multinational firm's investment premium in country B become larger, hence, country A will pay the multinational firm a higher subsidy. When the unit transport cost of the intermediate good becomes higher, both country B 's willingness to pay to attract the multinational firm and the multinational firm's investment premium in country B become smaller, hence, country A will pay the multinational firm a lower subsidy. When *country B* wins FDI competition in an equilibrium outcome, its subsidy paid to the multinational firm is given by expression (16). When country B 's economy becomes larger, the multinational firm's investment premium in country A becomes smaller, therefore, country B will pay the multinational firm a lower subsidy. When the unit transport cost of the intermediate good becomes higher, both country A 's valuation of FDI and the multinational firm's investment premium in country A become greater, hence, country B will pay a higher subsidy to the multinational firm. When the unit transport cost of the final

¹⁸The parameter configurations for which condition (14) holds happen to be the same as those for which condition (5) holds. This is because we consider a monopoly model with linear demand functions and the monopolist firm's unit production cost is a constant, so that the monopolist firm's profits received in one country and the country's consumer surplus are proportionate. Considering other forms of demand may make us have more cases to analyze, but the basic trade-off that we address is still there and our results cannot be changed qualitatively.

good becomes higher, country A 's valuation of FDI becomes higher, while the multinational firm's investment premium in country A becomes smaller. As a result, the effect of the unit transport cost of the final good on country B 's subsidy payment is ambiguous. Next, we want to know whether a winning country's subsidy payment is strictly positive or strictly negative, that is, whether it subsidizes or taxes the multinational firm in an equilibrium outcome.

Proposition 4 *Let*

$$(t_y/t_x)^{**} \equiv \frac{3n-2}{3n+2}. \quad (17)$$

*When country A attracts the multinational firm, it subsidizes the multinational firm if and only if $(t_y/t_x) < (t_y/t_x)^{**}$; otherwise it taxes the multinational firm.*

Proof. Note $(t_y/t_x)^{**} > (t_y/t_x)^*$. According to expression (15),

$$b^{A*} = \frac{1}{4}(2 - 2c - t_x - t_y) \left[\frac{3}{2}n(t_x - t_y) - (t_x + t_y) \right]. \quad (18)$$

According to Assumption (1), $2 - 2c - t_x - t_y > 0$. Hence, the sign of b^{A*} is determined by the sign of $\left[\frac{3}{2}n(t_x - t_y) - (t_x + t_y) \right]$. $\frac{3}{2}n(t_x - t_y) - (t_x + t_y) > 0$ if and only if $(t_y/t_x) < (t_y/t_x)^{**}$.

■

Note that country B 's valuation of FDI is strictly positive due to Assumption 2; while the multinational firm's investment premium in country B is strictly negative. When condition (17) holds, these two opposite effects on country A 's payment to the multinational firm balance. When $(t_y/t_x) < (t_y/t_x)^{**}$, the former dominates the latter so that country A pays the multinational firm a subsidy, and *vice versa*. In addition, it is easy to show that other things being equal, an increase in the market size of country B relative to that of country A , or an increase in the unit transport cost of the final good makes country A more likely subsidize the multinational firm; while an increase in the unit transport cost of the intermediate good makes country A more likely charge a tax on the multinational firm.

Proposition 5 *Let*

$$(t_y/t_x)^{***} \equiv \max \left[0, \frac{2n-3}{2n+3} \right]. \quad (19)$$

When country B attracts the multinational firm, it subsidizes the multinational firm if and only if $(t_y/t_x) > (t_y/t_x)^{***}$; otherwise it taxes the multinational firm.

Proof. Note $(t_y/t_x)^* > (t_y/t_x)^{***}$. According to expression (16),

$$b^{B*} = \frac{1}{4} (2 - 2c - t_x - t_y) \left[\frac{3}{2} (t_x + t_y) - n (t_x - t_y) \right]. \quad (20)$$

According to Assumption (1), $2 - 2c - t_x - t_y > 0$. Hence, the sign of b^{B*} is determined by the sign of $\left[\frac{3}{2} (t_x + t_y) - n (t_x - t_y) \right]$. It is easy to see that when $n < \frac{3}{2}$, $b^{B*} > 0$, irrespective of the values of t_y/t_x . When $n > \frac{3}{2}$, $\frac{3}{2} (t_x + t_y) - n (t_x - t_y) > 0$ if and only if $(t_y/t_x) > \frac{2n-3}{2n+3} > 0$. ■

Note that country A 's willingness to pay to attract FDI is strictly positive; while the multinational firm's investment premium in country A is strictly negative. When condition (19) holds as $(t_y/t_x)^{***} = \frac{2n-3}{2n+3}$, these two opposite effects on country B 's payment to the multinational firm balance. When $(t_y/t_x) > (t_y/t_x)^{***}$, the former dominates the latter so that country B subsidizes the multinational firm, and *vice versa*. Note that when country B 's market size is not sufficiently larger than country A 's in the sense $n < \frac{3}{2}$, country B will always pay the multinational firm a subsidy. In addition, it is easy to see that all else being equal, an increase in the market size of country B relative to that of country A , or an increase in the unit transport cost of the final good makes country B more likely tax the multinational firm; while an increase in the unit transport cost of the intermediate good makes country B more likely subsidize FDI.

3.3 Welfare effects

In this subsection, we derive the welfare implications of competition for FDI. We want to know:

(i) whether allocative efficiency is achieved; (ii) the distribution effect of competition for FDI;

(iii) whether competition for FDI Pareto improves the welfare of the competing countries.

Proposition 6 *When countries engage in competition for FDI, allocative efficiency is achieved irrespective of the location of FDI.*

Proof. When country A wins FDI competition in an equilibrium outcome, condition (14) must hold. This implies that allocative efficiency is achieved in this case. Similarly, when country B wins FDI competition in an equilibrium outcome, condition (14) must hold strictly in the reverse direction. This implies that allocative efficiency is achieved in that case. ■

Proposition 1 and Proposition 6 together imply the following result immediately.

Corollary 1 *Allocative efficiency is achieved irrespective of whether countries engage in FDI competition or not.*

Next, we turn to discuss the welfare of the competing countries. Our benchmark is the case where two countries do not provide any financial incentive to attract FDI.

Proposition 7 (i) *When $0 \leq (t_y/t_x) < (t_y/t_x)^{***}$, country A 's national welfare is the same as that in the benchmark case, while country B 's national welfare is strictly higher than that in the benchmark case. This implies that competition for FDI Pareto improves the welfare of the competing countries. (ii) When $(t_y/t_x)^{***} < (t_y/t_x) < (t_y/t_x)^*$, country A 's national welfare is the same as that in the benchmark case, while country B 's national welfare is strictly lower than that in the benchmark case. This implies that the region as a whole loses from FDI competition. (iii) When $(t_y/t_x)^* < (t_y/t_x) < (t_y/t_x)^{**}$, country A 's national welfare is strictly lower than that in the benchmark case, while country B 's national welfare is the same as that in the benchmark case. This implies that the region as a whole loses from FDI competition. (iv) When $(t_y/t_x) < (t_y/t_x)^{**} < 1$, country A 's national welfare is strictly higher than that in the*

benchmark case, while country B's national welfare is the same as that in the benchmark case. This implies that competition for FDI Pareto improves the welfare of the competing countries.

Proof. Consider part (i). Here, country B wins FDI competition. It is easy to see that country A 's national welfare is equal to its national welfare in the benchmark case (expression (8)). Since in this case, country B collects a lump-sum tax from the multinational firm, its national welfare is strictly higher than that in the benchmark case (expression (11)). These imply that FDI competition Pareto enhances the welfare of the competing countries. It is straightforward to establish other results stated in the Proposition. ■

As we noted in the previous analysis, other things being equal, larger market size of country B relative to that of country A , and higher unit transport cost of the final good give an edge to country B in FDI competition; while higher unit transport cost of the intermediate good makes country A be in an advantageous position in the bidding war for the foreign firm. Though having attracted the multinational firm, when the winning country's edge over the rival country's is not sufficiently large, it needs to subsidize the multinational firm. However, if the winning country's advantage relative to the rival country's is high enough, it is able to tax the multinational firm.

We briefly summarize the discussion on policy competition for FDI with the help of Figure 2. The horizontal axis measures the relative market size; while the vertical axis measures the relative transport costs of intermediate and final goods. Curve F1 represents the case where $(t_y/t_x)^* \equiv \frac{n-1}{n+1}$ (expression (6)). When parameter configurations are on the left side of curve F1, country A wins the multinational firm. Curve F2 represents the case where $(t_y/t_x)^{**} \equiv \frac{3n-2}{3n+2}$ (expression (17)). When parameter configurations fall into region I.1, country A taxes the multinational firm, and competition for FDI Pareto improves the welfare of the competing countries. When parameter configurations fall into region I.2, country A subsidizes FDI, and FDI competition incurs a pure welfare loss for the region as a whole. Curve F3 represents

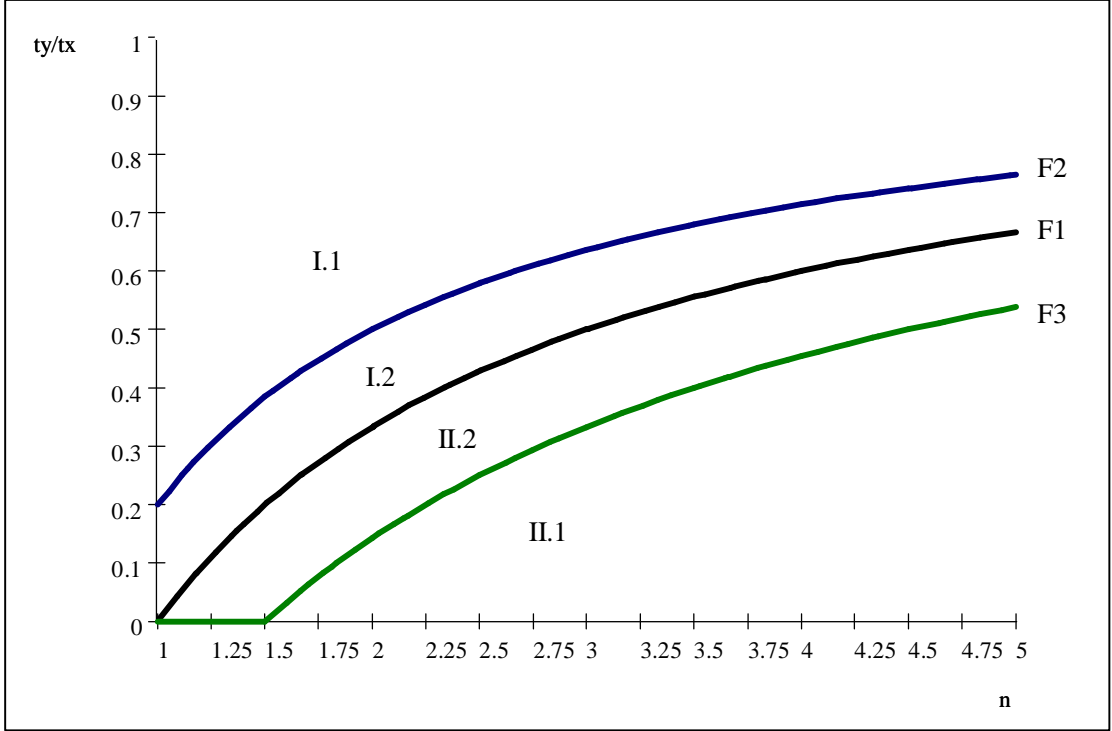


Figure 2: Policy competition for FDI

the case where $(t_y/t_x)^{***} \equiv \max \left[0, \frac{2n-3}{2n+3} \right]$ (expression (19)). When parameter configurations fall into region II.1, country B taxes the multinational firm, and competition for FDI Pareto enhances the welfare of the competing countries. When parameter configurations fall into region II.2, country B subsidizes the multinational firm, and FDI competition incurs a pure welfare loss for the region as a whole. In any case, allocative efficiency is achieved.

4 Discussion of Results

As we have seen in the previous analysis, incorporating the asymmetry in the multinational firm's local sourcing behavior besides difference in market size into the analysis of FDI competition affects the FDI location choice, investment policy and welfare in interesting ways. Our paper

both contributes and complements the literature of policy competition for FDI in a number of respects.

When countries do not provide any financial incentive to attract FDI, which country is the attractive location for FDI? Our paper shows that when making its FDI location decision, the multinational firm faces a trade-off between the savings in transport costs of the final good and those of the intermediate good. If the former concern dominates the latter one, the multinational firm chooses to invest in the relatively large country, and *vice versa*. In Bjorvatn and Eckel (2006), the attractive location for FDI is determined by the interaction between the market size effect and the competition effect. When the former dominates the latter, the foreign firm will invest in the large country, and *vice versa*. While absent policy competition for FDI, both Haufler and Wooton (1999) and Barros and Cabral (2000) show that the foreign firm will establish a plant in the large country due to market size effect. In Fumagalli (2003), the foreign firm will definitely invest in the technically advanced country.

In case when countries engage in FDI competition, we show that both countries have a chance to win the foreign firm. Barros and Cabral (2000), Bjorvatn and Eckel (2006) and Fumagalli (2003) obtain a similar result. While in Haufler and Wooton (1999), the small country will never win FDI competition since the two competing countries only differ in market size. In addition, some papers show that policy competition increases the attractiveness of the small country (Barros and Cabral (2000) and Bjorvatn and Eckel (2006)), or the less technologically advanced country (Fumagalli (2003)) as location for the investment since its valuation of FDI is higher than that of the other country. While such a result is not derived in Haufler and Wooton (1999) and our paper.¹⁹

¹⁹Not that policy competition may change the FDI location choice in Barros and Cabral (2000), Fumagalli (2003) and Bjorvatn and Eckel (2006), while this is not the case in Haufler and Wooton (1999) and our paper.

Let us turn to discuss welfare issues. We show that allocative efficiency is achieved when countries compete for FDI, that is, from an aggregate perspective, policy competition leads to an efficient outcome. This point has been made also by Barros and Cabral (2000), Fumagalli (2003) and Bjorvatn and Eckel (2006). Though Haufler and Wooton (1999) do not explore the welfare implications of FDI competition, their analysis imply this result as well. The explanation of this result is that the model of policy competition for FDI in nature is a slight variant of first-price sealed-bid auction of complete information, in which economic efficiency is always achieved.

Another interesting result that we obtain is that policy competition for FDI may Pareto improve the welfare of the competing countries. This happens when the winning country's advantage in competition relative to the rival country's is so high that it is able to tax the multinational firm. Bjorvatn and Eckel (2006) obtain a similar result. That happens in the case where one of the competing countries does not benefit from the entry of the multinational firm, hence, its valuation of FDI is strictly negative. This increases the bargaining power of the other country and may lead to taxation of FDI rather than subsidies. While we derive the result in the situation where both countries have an economic incentive to attract FDI.²⁰ Barros and Cabral (2000) and Fumagalli (2003) do not derive this result.²¹

²⁰Though Haufler and Wooton (1999) do not consider welfare implications of FDI competition, their analysis implies a similar result.

²¹Finally, note that Haufler and Wooton (1999) analyze the case of integrated markets, implying equal prices (adjusted for trade costs) across countries. While our analysis is based on the assumption that markets are segmented. However, our results cannot be changed qualitatively when considering the case of an integrated market since the basic trade-off between market size and local sourcing is not sensitive to the question whether markets are integrated or segmented.

5 Concluding Remarks

We have studied policy competition for a foreign-owned monopolist firm between two countries, which differ in market size; and the relatively small country produces an intermediate good for the final good production, while the relatively large country does not. We show that whether a country will win FDI competition is determined by the interaction between relative transport costs of intermediate and final goods and the relative market size of the two countries; and policy competition for FDI may Pareto improve the welfare of the competing countries.

Our model naturally has some limitations. We capture the idea that countries benefit from FDI due to import substitution effects. In addition, the situation that we focus on is relevant for both market seeking and inputs or resources seeking FDI. However, we do not consider other possible beneficial effects, such as job creation and technological spillovers.²² It is also well known that when multinational firms make the FDI location choice, logistics may become one of the most important concerns. We plan to incorporate the above considerations into the analysis of policy competition for FDI in our future researches.

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