# Crowding Out and Distributional Effects of FDI Policies

**Amy Jocelyn Glass***
**Department of Economics**
**Ohio State University**

**Kamal Saggi**
**Department of Economics**
**Southern Methodist University**

To examine the effects of international investment agreements, suppose that firms from two source countries invest in a host country. An increase in the tax faced by firms from one source decreases foreign direct investment (FDI) from that source and increases FDI from the other. When free to discriminate, the host country imposes a larger tax on multinationals that benefit most from FDI. The source country whose multinationals pay the larger tax would gain from a most-favored-nation standard requiring nondiscrimination relative to other foreign firms, and would gain further from a national treatment standard requiring nondiscrimination relative to domestic firms.

# 1    Introduction

Foreign direct investment (FDI) occurs in an environment in which countries are relatively free to pursue investment policies of their own choosing. While trade policies of member countries of the World Trade Organization (WTO) are subject to a multitude of disciplines, investment policies presently are not.[1] Whether the member countries of the WTO should negotiate a multilateral investment agreement is an unresolved policy issue – see Hoekman and Saggi (2000) for an overview.

In the absence of a multilateral agreement on investment, bilateral investment treaties have proliferated. Two common standards of treatment used in these treaties are most-favored-nation (MFN) and national treatment. MFN requires nondiscrimination relative to other foreign firms, while national treatment requires nondiscrimination relative to domestic firms. The MFN standard is far closer to being generally accepted than the national treatment standard (UNCTAD 1999a). Most host countries still adopt policies that favor domestic firms.

Despite the practical importance of the issue, the literature largely ignores how FDI policies alter production location decisions and impact firms and workers in a multi-country setting.[2] When the literature does move beyond a two-country setting, it focuses on multiple host countries competing for FDI from a source country.

To emphasize the third country repercussions of FDI policies, we develop a model where a host country sets its policy toward FDI from multiple source countries. A model with one host and two source countries is the simplest scenario for considering issues related to third country repercussions and nondiscrimination requirements. We model FDI as occurring in oligopolistic markets, consistent with the observations made by Brainard (1997) and Markusen (1995).

---

[1]The Uruguay round did lead to the agreement on Trade Related Investment Measures (TRIMS) that came into effect in 1995. However, this agreement deals only with those investment policies that are deemed to be *trade-related*, such as domestic content requirements and licensing requirements. Investment policies face no direct disciplines. Furthermore, even some key TRIMS such as export performance requirements are not covered by this agreement.

[2]See Horstmann and Markusen (1989, 1992), Janeba (1996, 1998), Markusen and Venables (1998, 1999), Motta (1982), and Raff and Srinivisan (1996).

By shifting labor demand, FDI transmits resource conditions across countries and affects wages and profits. Consequently, the host country's FDI policy toward one country has repercussions not only for the extent of FDI from the alternative source country but also for wages and profits in all countries. In particular, we show that FDI policies alter the:

- composition of FDI across source countries (*crowding out effect*),

- distribution of rents between firms (*strategic effect*),

- distribution of income between workers and firms (*distributional effect*).

We characterize the optimal FDI policy profile offered by the host government: the tax or subsidy on multinationals from each source country. Inward FDI raises wages thereby benefitting workers and hurting host firms. This tension between the interests of the two groups determines optimal host policy. We find that the host government levies a higher tax on multinationals from the source country with the smaller labor supply per firm and thus the stronger natural tendency to conduct FDI.

What are the consequences of requiring the host country to abide by the MFN principle – that the host country must tax or subsidize all multinational production to the same degree? Clearly, the host country is harmed by any restriction on its freedom to set policies differentially. But the disfavored source country benefits from equal treatment through a reduction in the tax imposed on its multinationals and thus has an incentive to push for MFN treatment. Likewise, the disfavored source country also would benefit from requiring national treatment – that the host country must tax or subsidize production by multinationals no differently than production by host firms.

After establishing the basic setup of the model, we examine the properties of the no intervention equilibrium. Then we consider FDI policies adopted by the host country and the effects of imposing nondiscrimination constraints on these policies. We also comment on the case where firms from different countries have different technologies of production, thereby generating another basis for policy discrimination.

## 2   Model

The world consists of three countries indexed by $i$: a host country receiving FDI from two source countries $i = 1, 2$.[3] Each country $i$ has $n$ symmetric oligopolistic industries comprised of $m_i$ number of firms. There is one factor of production, skilled labor; any reference to labor should be understood to mean skilled labor. Producing one unit of output of any good requires one unit of skilled labor in any country.

Source firms decide whether to produce each unit of output at home or abroad. Let $\alpha_i$ denote the share of skilled labor demanded in the host country by a firm from source country $i$, which provides a measure of the extent of FDI in the host country from source country $i$. Figure 1 illustrates the FDI flows considered in our model.

Host country policy alters the incentives for FDI. Suppose that a firm from country $i$ faces an output tax of $\tau_i$ for each unit of output produced in the host country.[4] From the perspective of a firm from a source country, the tax increases the marginal cost of producing in the host country. If source firms split production across countries, $0 < \alpha_i < 1$, the marginal cost of production (including any tax or subsidy) must be equalized across countries

$$z_i = z_0 + \tau_i, \ \forall i = 1, 2, \tag{1}$$

where $z_i$ denotes the wage in source country $i$ and $z_0$ denotes the wage in the host country. Each firm views the wage in each country as given as there are many firms hiring skilled labor in each country.

Firms behave as Cournot oligopolists. The demand function facing the world industry is given by $P = p(Q)$ where $p'(Q) < 0$ and $p''(Q) \leq 0$. Let $y_i$ denote the output of a firm from country $i$. Total world output equals $Q \equiv \sum_{i=0}^{2} m_i y_i$. Profit of a firm in country $i$ is $\pi_i = (p - c_i) y_i$, where $c_i = \alpha_i (z_0 + \tau_i) + (1 - \alpha_i) z_i$ for source firms $i = 1, 2$ and $c_0 = z_0$ for host firms. Profit maximization requires the first order conditions

$$p - y_i \psi = c_i, \ \forall i = 0, 1, 2, \tag{2}$$

[3]Some fixed cost of FDI has already been paid by each source firm to fix the pattern of FDI.

[4]Since taxes are not restricted to be positive, we allow subsidies. Other policy instruments, such as profit taxes and local content requirements, are common, especially for restricting FDI – see Lahiri and Ono (1998). Profit and output taxes impact production location decisions and wages in a similar fashion.

where $p \equiv p(Q^*) > 0$ is the price and $\psi \equiv -p'(Q^*) > 0$ is the negative of the slope of the demand function at the equilibrium industry output. Applying the FDI equilibrium conditions to simplify the first order conditions yields $p - y_i\psi = z_i$ as $c_i = z_i$ for any $\alpha_i > 0$.

We examine an environment where output in each country is constrained by the supply of a scarce factor, such as skilled labor. Denote the skilled labor supply per industry in country $i$ by $k_i$ (with $K \equiv \sum_{i=0}^{2} k_i$ as the total labor supply per industry).[5] Since only a fixed supply of workers are available in each country $i$, wages adjust to clear labor markets. The labor market equilibrium condition for the host country is

$$m_0 y_0 + \sum_{i=1}^{2} \alpha_i m_i y_i = k_0, \tag{3}$$

where labor demand in the host country equals host firm production plus multinational production from both source countries.[6] Similarly, the labor market equilibrium conditions for the two source countries are

$$(1 - \alpha_i)m_i y_i = k_i, \ \forall i = 1, 2, \tag{4}$$

where labor demand in each source country is the share of multinational production kept in the source country. Adding together the labor constraints (3) and (4) yields that total output is constrained by the total availability of labor $Q^* = K$ and is hence unresponsive to changes in FDI policies.

Define welfare in the host country as the sum of profit and labor earnings plus any tax revenues (or minus any subsidy payments)

$$W_0 = Bm_0\pi_0 + z_0 k_0 + T, \tag{5}$$

where $0 \leq B \leq 1$ denotes host country ownership share of host firms and total tax revenues are

$$T = \tau_1\alpha_1 m_1 y_1 + \tau_2\alpha_2 m_2 y_2. \tag{6}$$

Define welfare in each source country as the sum of profit and labor earnings.

$$W_i = \beta m_0\pi_0 + m_i\pi_i + z_i k_i, \ \forall i = 1, 2 \tag{7}$$

[5]We maintain the notation of Dixit and Grossman (1986) and Glass and Saggi (1999), who refer to skilled labor as $k$.

[6]Brander and Spencer (1987), Bughin and Vannini (1995), and Das (1981) consider models with unemployment in the host country.

where $0 \leq \beta \leq 1$ denotes source country ownership share of host firms and $B \equiv 1 - 2\beta$ generates full ownership of host firms within these three countries.[7]

Define world welfare as the sum of host and source countries welfare $W \equiv W_0 + W_1 + W_2$. We measure welfare net of consumer surplus since consumer surplus does not respond to policy changes due to total output being fixed.[8] In our model, policy intervention cannot improve aggregate welfare of the world economy but only alter the distribution of welfare across countries. This feature is useful in highlighting strategic and distributional effects of FDI policies, the focus of this paper.

## 3   No Intervention and National Treatment

An no-intervention equilibrium (allowing FDI) specifies the output of firms $\{y_0, y_1, y_2\}$, the wage in each country $\{z_0, z_1, z_2\}$, and the extent of FDI from each source country $\{\alpha_1, \alpha_2\}$. Let $\{y_i^n, z_i^n, \alpha_i^n\}$ denote the optimal solution to the three first order conditions (2), the three labor constraints (3, 4) and the two FDI equilibrium conditions (1) when $\tau_1 = \tau_2 = 0$.

In the absence of government intervention, the equilibrium extent of FDI from source country $i$ into the host country is

$$\alpha_i^n = 1 - \frac{M}{m_i} \frac{k_i}{K}, \ \forall i = 1, 2, \tag{8}$$

where $M \equiv \sum_{i=0}^{2} m_i$ the total number of firms in the world. Label the source countries so that the first potential source country has a larger labor supply per firm than the second potential source country.

$$\frac{k_0}{m_0} > \frac{k_1}{m_1} \geq \frac{k_2}{m_2} \tag{9}$$

[7]We assume source firms are fully owned within the source country (and the source counties own the same share of host firms) for simplicity. Allowing the source countries to own different shares of host firms would not affect the policies chosen by the host country.

[8]An absence (or lack of importance) of consumer surplus effects may also occur for export-oriented FDI, where sell (primarily) to an external market. Such a situation is particularly relevant when FDI occurs to lower production costs (as is the case in our model).

To ensure that FDI does indeed occur from the first potential source country $\alpha_1^n > 0$, we additionally assume that the first source country has fewer resources per firm than the world average.

$$\frac{k_1}{m_1} < \frac{K}{M} \tag{10}$$

This assumption for the first source country is stronger than the ordering due to the labeling of countries (9).

In our model, FDI arises due to labor scarcity in the source country relative to the host country (or world). The equilibrium extent of FDI from a source country is smaller the larger the labor supply in the source country relative to the world. The intuition is that a larger labor supply implies a smaller incentive for FDI. Similarly, the equilibrium extent of FDI from a source country is larger the larger the number of firms in the source country relative to the world. Proofs appear in the Appendix.

**Proposition 1** *An increase in the labor supply of a source country relative to the world decreases the extent of FDI from that source country. An increase in the number of firms in a source country relative to the world increases the extent of FDI from that source country.*

Define $\delta_i \equiv k_i/k_0$ as the labor supply of source country $i$ relative to the host country. Figure 2 illustrates the FDI patterns in $(\delta_1, \delta_2)$ space. From (8), the line **D1** depicts the boundary for FDI to occur from the first source country,

$$\delta_2 > -1 + \left(\frac{M}{m_1} - 1\right)\delta_1 \iff \alpha_1^n > 0 \tag{11}$$

and the line **D2** depicts the boundary for FDI to occur from the second source country

$$\delta_2 < \frac{1}{\frac{M}{m_2} - 1}(1 + \delta_1) \iff \alpha_2^n > 0. \tag{12}$$

The area where firms from both source countries invest in the host country ($\alpha_1^n > 0$ and $\alpha_2^n > 0$) lies between the two lines (below **D2** and above **D1**). In this region, the labor supply in each source country is small relative to the host country.

In the absence of government intervention, FDI equalizes wages across countries.[9]

$$z_i^n = z^n = p - \frac{\psi K}{M}, \ \forall i = 0, 1, 2 \tag{13}$$

In equilibrium, the wage in any country decreases with an increase in labor in any country and increases with an increase in the number of firms in any country. A greater number of firms generates greater labor demand, which elevates the wage; a greater labor supply depresses the wage.

The output of each firm reflects the average labor supply per firm in the world.

$$y_i^n = y^n = \frac{K}{M}, \ \forall i = 0, 1, 2 \tag{14}$$

The output of a firm from any country clearly increases with an increase in the labor supply in any country, and decreases with an increase in the number of firms in any country (as the constant total output must be split across a larger number of firms).

The driving force behind these results is that any change (a decrease in the labor supply or an increase in the number of firms relative to the world) that increases the wage in a source country relative to the host country encourages more FDI in order to restore the equality of wages across countries. When the labor supply in the first source country increases relative to the world, its firms shift less production abroad.

The structure of our model makes only the tax difference relative to host firms matter for the location of production and a country's welfare. We set the tax on host firms to zero. Due to the fixed labor supply, any common tax on production by all firms manifests itself only in the host wage falling by the amount of the tax so that the unit production cost inclusive of the tax is unchanged – see Dixit and Grossman (1986) for a similar feature. Output, FDI, and welfare levels are unaffected. Hence we can view our nonintervention equilibrium as representing national treatment, where multinationals are taxed to the same degree as are local firms. The tax on multinational production in what follows should therefore be viewed as the tax on multinationals in excess of the tax on local firms (and wages as gross of the tax on local firms).

[9]Wages are measured in efficiency units of labor, so observed wages may still differ across countries.

## 4    Discriminatory Treatment

Consider the scenario where the host government can set FDI policies that differ across firms from different countries (that is, the host country does not abide by national treatment and also violates the MFN principle). We describe equilibrium under such discriminatory policy intervention and then investigate optimal policies.

### 4.1    Equilibrium

Let $\{y_i^*, z_i^*, \alpha_i^*\}$ denote the optimal solution to the three first order conditions (2), the three labor constraints (3, 4) and the two FDI equilibrium conditions (1). The equilibrium extent of FDI from each source country is

$$\alpha_i^* = \frac{m_j \tau_j + \psi \left[K - \frac{M}{m_i} k_i\right] - \tau_i \left(M - m_i\right)}{m_j \tau_j + \psi K - \tau_i \left(M - m_i\right)}, \ \forall i, j = 1, 2; i \neq j. \tag{15}$$

The extent of FDI from the first source country decreases with its own FDI tax and increases with its rival's FDI tax; the extent of FDI from the second source country has identical properties.

Equilibrium wages in the host country equal

$$z_0^* = p - \frac{\psi K + m_1 \tau_1 + m_2 \tau_2}{M} \tag{16}$$

and equilibrium wages in each source country equal

$$z_i^* = p - \frac{\psi K - \left(M - m_i\right) \tau_i + m_j \tau_j}{M}, \ \forall i, j = 1, 2; i \neq j. \tag{17}$$

Wages decrease in each country with an increase in the world labor supply. The host country wage decreases with either FDI tax; the wage in each source country rises with its own FDI tax and falls with its rival's FDI tax. This latter effect is interesting as it indicates that a tax on FDI from source country $i$ impacts wages in rival source country $j$.

Lastly, equilibrium output of a local firm in the host country is

$$y_0^* = \frac{K}{M} + \frac{m_1 \tau_1 + m_2 \tau_2}{M \psi} \tag{18}$$

while equilibrium output of a multinational firm from each source country is

$$y_i^* = \frac{K}{M} + \frac{m_j \tau_j - \tau_i (M - m_i)}{M \psi}, \; \forall i, j = 1, 2; i \neq j. \tag{19}$$

Equilibrium output of a multinational firm falls with its own FDI tax and rises with its rival's FDI tax. Equilibrium host firm output increases with the tax on FDI from either source country. In our next proposition, we consider the effects of raising the tax on FDI from one of the source countries; a full analysis of the policy equilibrium follows in the next subsection.

**Proposition 2** *A tax on multinational production by firms from one source country discourages FDI from the source country whose firms are subject to the tax while encouraging FDI from the other source country, increases wages in the disfavored source country while decreasing wages both in the other source country and in the host country, and expands output (and profits) for firms from the favored source country and host firms, while contracting output (and profits) for firms from the other source country.*

The above proposition demonstrates the third country effects of FDI policies. Since national labor markets are linked by FDI in our model, the host country's FDI policy has repercussions not only for the FDI flows from the alternative source country but also for the wages (and therefore the output levels and profits of firms) in both countries.

## 4.2  Policy

We calculate welfare in each country by substituting the equilibrium values of the endogenous variables from the previous subsection. An increase in the FDI tax on the output of firms from the first source country affects the host country's welfare according to $dW_0/d\tau_i$. Setting $dW_0/d\tau_1 = 0$ and likewise $dW_0/d\tau_2 = 0$ determines the optimal FDI policy schedule.

$$\tau_i = \frac{\psi}{2} \left[ \frac{K + k_0}{\frac{M}{B} - m_i - m_j} - \frac{k_i}{m_i} \right], \; \forall i, j = 1, 2; i \neq j \tag{20}$$

Firms from both source countries are subject to FDI taxes ($\tau_1^* > 0$ and $\tau_2^* > 0$) provided world labor supply (host labor supply) and host country

ownership of host firms are not too small.[10]

Figure 3 illustrates the range of relative labor supplies $\delta_i \equiv k_i/k_0$, $i = 1, 2$ where firms from both source countries suffer FDI taxes from the host government. For each source country, its relative labor supply must be sufficiently small to suffer a tax. The boundary lines are the line **D3** for firms from the first host country to suffer a tax on their FDI

$$\delta_2 > -2 + \left( \frac{2m_1 + m_2 - \frac{M}{B}}{m_1} \right) \delta_1 \iff \tau_1^* > 0, \tag{21}$$

and the line **D4** for firms from the second host country to suffer a tax on their FDI.

$$\delta_2 < \left( \frac{m_2}{\frac{M}{B} - (m_1 + 2m_2)} \right) (2 + \delta_1) \iff \tau_2^* > 0 \tag{22}$$

Thus, firms from both countries suffer taxes ($\tau_1^* > 0$ and $\tau_2^* > 0$) when the relative labor supplies of both countries are sufficiently small. There also exist ranges where FDI from only one of the source countries is taxed (while FDI from the other is subsidized) and where FDI from both source countries is subsidized.

Comparing the taxes on firms from the two countries, the optimal tax schedule implies the difference

$$\triangle\tau = \tau_1^* - \tau_2^* = \frac{\psi}{2} \left[ \frac{k_2}{m_2} - \frac{k_1}{m_1} \right] \tag{23}$$

The optimal tax is lower for the first source country than the second $\tau_1^* < \tau_2^*$ because the first source country has a larger labor supply per firm than the second (9), making the firms from the first country more sensitive to taxes on FDI.

**Proposition 3** *Firms from the source country with the larger labor supply per firm and hence the smaller natural tendency to conduct FDI face a smaller tax on multinational production.*

---

[10]If the host country government cares strongly about local wages ($B$ is small), it may subsidize inward FDI. This result suggests that the use of incentives to attract FDI may stem from the desire to improve the welfare of workers in host countries.

## 4.3    Discriminatory versus National Treatment

Let $\triangle W_i^{*n} \equiv W_i^* - W_i^n$ be the extent that welfare in country $i$ is higher under discriminatory FDI policies than national treatment. For the same number of firms $m_i = m$, the first source country gains more from discriminatory FDI policies relative to national treatment than the second source country due to its larger labor supply.

$$\triangle W_{12}^{*n} \equiv \triangle W_1^{*n} - \triangle W_2^{*n} = \frac{\psi K}{4M} \left(k_1 - k_2\right) \left(1 + 3\frac{k_0}{K}\right) > 0 \qquad (24)$$

The host country must gain: it can always set the FDI taxes to zero so it can do no worse being able to set its FDI policy. World welfare is fixed, so one source country must lose. We find that the second source country necessarily loses from discriminatory (relative to national) treatment while the first source country might gain or lose. Hence, the second source country, the one that suffers the larger tax, would have an incentive to push for national treatment. This result also holds true if multinational production is subsidized: the second source country gets the smaller subsidy and prefers that all subsidies be eliminated. Next, we check whether the second source country benefits from MFN treatment, and whether it still benefits from national treatment if it already enjoys MFN treatment.

## 5    Most-Favored-Nation Treatment

Now we consider host country intervention, but where the tax on FDI is constrained to be the same across firms from different source countries $\tau_1 = \tau_2 = \tau$. This scenario represents most-favored-nation (MFN) treatment, where a foreign firm cannot be treated worse that the best that any other foreign firm is treated.

## 5.1    Equilibrium

Let $\{y_i^s, z_i^s, \alpha_i^s\}$ denote the optimal solution to the three first order conditions (2), the three labor constraints (3, 4) and the two FDI equilibrium conditions (1) when $\tau_1 = \tau_2 = \tau$. Equilibrium expressions for the endogenous variables appear in the Appendix.

**Proposition 4** *A symmetric tax on multinational production decreases FDI as well as the output (and profits) of firms from both source countries, increases profit and output of host firms, and raises wages in both source countries while lowering wages in the host country.*

The above proposition highlights the strategic as well as distributional consequences of FDI policies. A tax on FDI reduces the wage in the host country and thus decreases the marginal cost of host firms thereby increasing their profits at the expense of source firms.

## 5.2   Policy

We calculate welfare in each country by substituting the equilibrium values of the endogenous variables. An increase in the symmetric FDI tax affects the host country's welfare according to $dW_0/d\tau$. Setting $dW_0/d\tau = 0$ determines the optimal FDI tax under the MFN principle.

$$\tau^s = \frac{\psi}{2} \left[ \frac{K + k_0}{\frac{M}{B} - (M - m_0)} - \frac{K - k_0}{M - m_0} \right] \tag{25}$$

Increases in the labor supply (or decreases in the number of firms) in either source country lower the tax level. The FDI tax is positive provided the world labor supply (implicitly the host labor supply) and weight on host firm profits are not too small.

$$\frac{dW_0}{d\tau} > 0 \Leftrightarrow \frac{k_1 + k_2}{m_1 + m_2} < 2B\frac{K}{M} \tag{26}$$

This expression is the counterpart to **D3** and **D4** but for symmetric FDI policy.

## 5.3   Discriminatory versus MFN Treatment

A comparison of the MFN tax with the discriminatory taxes indicates how the policies adjust under mandated symmetric treatment.

**Proposition 5** *If forced to treat firms from the two source countries symmetrically, the host country increases the FDI tax on firms from the larger country and decreases the FDI tax on firms from the smaller country: $\tau_1^* < \tau^s < \tau_2^*$.*

The consequences of this policy change are clear: FDI from the favored source country is squeezed out if discriminatory treatment is replaced by MFN treatment. Such a policy change also has distributional consequences because firms from the first country obviously lose (and its workers gain) when their tax increases whereas firms from the second country gain (and its workers lose). Thus firms from the source country with the lower tax would object to any move toward equal treatment of multinationals.

Let $\triangle W_i^{s*} \equiv W_i^s - W_i^*$ be the extent that welfare in country $i$ is higher under MFN relative to discriminatory treatment. For the same number of firms $m_i = m$, the first source country gains less from MFN relative to discriminatory treatment than the second source country due to its larger labor supply.

$$\triangle W_{12}^{s*} \equiv \triangle W_1^{s*} - \triangle W_2^{s*} = -\frac{\psi}{4M}(k_1 - k_2)\left(K + 3k_0 - 4\frac{\tau m}{\psi}\right) < 0 \quad (27)$$

The host country suffers when it loses its freedom to set FDI policy differentially. Since world welfare if fixed, the second source country gains from imposing MFN treatment whereas the first source country may gain or lose.

## 5.4   MFN versus National Treatment

Removing a symmetric tax decreases the profits of host firms and increases the profits of source firms. Labor earnings decrease in both source countries and increase in the host country. Thus, each country has a conflict between labor earnings and profits in overall welfare.

Let $\triangle W_i^{ns} \equiv W_i^n - W_i^s$ be the extent that welfare in country $i$ is higher under national relative to MFN treatment. For the same number of firms $m_i = m$, the first source country gains less from national relative to MFN treatment than the second source country due to its larger labor supply.[11]

$$\triangle W_{12}^{ns} \equiv \triangle W_1^{ns} - \triangle W_2^{ns} = -\frac{\tau m}{M}(k_1 - k_2) < 0 \quad (28)$$

The host country suffers when it loses its freedom to discriminate against foreign relative to domestic firms. The second source country gains from a

[11]When the symmetric policy is a subsidy, this expression holds for "same as" national treatment; "no less favorable" national treatment would permit discrimination against local investors and thus would be equivalent to MFN treatment – UNCTAD (1999b).

move from MFN to national treatment, whereas the first source country may gain or lose.

**Proposition 6** *The smaller source country, which has the larger natural incentive to conduct FDI, benefits from an investment agreement adopting MFN treatment standards. The host country necessarily loses, and the other source country may benefit or lose. These same effects hold for adopting national treatment, whether start from discriminatory or MFN treatment.*

## 6    Another Basis for Discrimination

Our model points out that the optimal host policy differs across the two source countries due to differences in labor supplies in the two source countries that generate different incentives for FDI on the part of firms. An alternative rationale for such discrimination might stem from firms from one country having a more efficient technology of production. How do our results change under this scenario?

To highlight the role of technology, assume that labor supplies and number of firms are symmetric across countries $k_i = k$ and $m_i = m$. Furthermore, let firms in one of the source countries (say the second country) have a less efficient technology of production: they require $\theta \geq 1$ units of labor to produce one unit of output.

Equilibrium under autarky can be derived as before. Nothing changes for the host and the first source country. However, the first order condition of firms from the second source country is given by

$$p - y_2\psi = \theta z_2. \tag{29}$$

Furthermore, the labor market constraint for the second source country also needs to be rewritten as

$$\theta m y_2 = k. \tag{30}$$

When FDI is allowed, the equilibrium can also be derived as before, except that the labor constraint in the host country must be rewritten as

$$m y_0 + \alpha_1 m y_1 + \theta \alpha_2 m y_2 = k, \tag{31}$$

and the labor constraint in the second source country must be rewritten as

$$\theta(1 - \alpha_2)my_2 = k. \tag{32}$$

We can derive results similar to those derived under the basic model. The main motivation for introducing technology differences is to examine the rationale for discrimination. Similar results can be derived in this alternative model: firms from the country with the smaller desire to engage in FDI face a smaller tax and the symmetric tax is bound by the two asymmetric taxes. Not only do the various effects discussed in this paper continue to exist, but the consequences of nondiscrimination are analogous.

## 7    Conclusion

This paper examines the cross-country repercussions of FDI policies. A tax reduction on FDI from one country promotes FDI from the favored source country while discouraging FDI from the other source country (crowding out effect), lowers wages in the favored source country while raising wages in the other source country and in the host country (distributional effect), and expands output for multinationals from the favored source country while contracting output for multinationals from the other source country and local firms in the host country (strategic effect). Distributional consequences arise, both within as well as across countries.

Our results help evaluate some of the potential distributional consequences of adopting MFN or national treatment standards. Nondiscriminatory treatment of multinationals forces the host country to increase the tax on firms from the source country with the smaller desire to engage in FDI and lower the tax on firms from the other source country. These findings help portray the positions different interest groups (as well as different countries) can be expected to take on the issues of MFN and national treatment.

The principles of MFN and national treatment appear in existing investment agreements and can be expected to figure prominently during negotiations for a potential multilateral investment agreement. Our paper takes a useful step forward by exploring the consequences of adopting these principles in international investment policies. Our work focuses on distributional effects: we do not address issues of efficiency since total output is fixed in our model by design. Future research should, no doubt, analyze efficiency.

# A    Appendix

Define $k_i \equiv \kappa_i K$ so that an increase in $\kappa_i$ increases labor in source country $i$ relative to the world. Define $m_i \equiv \mu_i M$ and interpret $\mu$ similarly but for the number of firms.

## A.1    Proof of Proposition 1

Increasing labor in a source country relative to the world reduces the extent of FDI into that source country.

$$\frac{\partial \alpha_i^n}{\partial \kappa_i} = -\frac{1}{\mu} < 0$$

Increasing the number of firms in a source country relative to the world raises the extent of FDI into that source country.

$$\frac{\partial \alpha_1^n}{\partial \mu} = \frac{\eta \kappa}{\nu \mu^2} > 0$$

## A.2    Proof of Proposition 2

The extent of FDI from the first source country decreases with its own tax

$$\frac{\partial \alpha_1^*}{\partial \tau_1} = \frac{-\left(\frac{M}{m_1} - 1\right) M \psi k_1}{\left[(M - m_1)\sigma_1 - m_2 \sigma_2 + \psi K\right]^2} < 0$$

and increases with its rival's tax

$$\frac{\partial \alpha_1^*}{\partial \tau_2} = \frac{m_2 \frac{M}{m_1} \psi k_1}{\left[(M - m_1)\sigma_1 - m_2 \sigma_2 + \psi K\right]^2} > 0.$$

The wage in the host country decreases with either tax

$$\frac{\partial z_0^*}{\partial \tau_1} = -\frac{m_1}{M} < 0$$

The wage in the first source country increases with its own tax

$$\frac{\partial z_1^*}{\partial \tau_1} = \left(1 - \frac{m_1}{M}\right) > 0$$

and decreases with its rival's tax

$$\frac{\partial z_1^*}{\partial \tau_2} = -\frac{m_2}{M} < 0.$$

Output by a firm from the host country increases with either tax

$$\frac{\partial y_0^*}{\partial \tau_1} = \frac{1}{\psi}\frac{m_1}{M} > 0$$

Output by a firm from the first source country decreases with its own tax

$$\frac{\partial y_1^*}{\partial \tau_1} = -\frac{1}{\psi}\left(1 - \frac{m_1}{M}\right) < 0$$

and decreases with its rival's FDI tax

$$\frac{\partial y_1^*}{\partial \tau_2} = \frac{1}{\psi}\frac{m_2}{M} > 0.$$

## A.3   Proof of Proposition 3

Obvious from the expression for the difference in taxes (23).

## A.4   Proof of Proposition 4

The extent of FDI from source country $i$ is

$$\alpha_i^s = \frac{\psi\left[K - \frac{M}{m_i}k_i\right] - m_0\tau}{\psi K - m_0\tau}, \ \forall i = 1, 2$$

and similarly for the second source country. Equilibrium wages in the host country equal

$$z_0^s = p - \frac{\psi K + \tau(m_1 + m_2)}{M}$$

and equilibrium wages in each source country equal

$$z_i^s = z^s = p - \frac{\psi K - \tau m_0}{M}, \ \forall i = 1, 2$$

Lastly, equilibrium output of a local firm in the host country is

$$y_0^s = \frac{K}{M} + \frac{\tau(m_1 + m_2)}{M\psi}$$

while equilibrium output of a multinational firm from source country $i$ is

$$y_i^s = y^s = \frac{K}{M} - \frac{\tau m_0}{M\psi}, \ \forall i = 1, 2$$

The extent of FDI from either source country decreases with the tax

$$\frac{\partial \alpha_1^s}{\partial \tau} = -\frac{\frac{m_0}{m_1} M\psi k_1}{[m_0 \sigma + \psi K]^2} < 0$$

The wage in the host country decreases with the tax

$$\frac{\partial z_0^s}{\partial \tau} = -\frac{m_1 + m_2}{M} < 0$$

The wage in either source country increases with the tax

$$\frac{\partial z_1^s}{\partial \tau} = \frac{m_0}{M} > 0$$

Output by a firm from the host country increases with the tax

$$\frac{\partial y_0^s}{\partial \tau} = \frac{m_1 + m_2}{\psi M} > 0$$

Output by a firm from either source country decreases with the tax

$$\frac{\partial y_1^s}{\partial \tau} = -\frac{m_0}{\psi M} < 0$$

WELFARE: Comparing symmetric FDI policy to nonintervention, the profits of host firms fall due to higher costs and lower output

$$\Pi_0^s - \Pi_0^n = -\tau m_0 \left(1 - \frac{m_0}{M}\right)\left[2\frac{K}{M} + \frac{\tau}{\psi}\left(1 - \frac{m_0}{M}\right)\right] < 0$$

Meanwhile, the profits of source firms fall

$$\Pi_i^s - \Pi_i^n = -\frac{\tau m_0 m_i}{M^2}\left(2K - \frac{\tau m_0}{\psi}\right) < 0, \ \forall i = 1, 2$$

Also, labor earnings increase in both source countries

$$(z_i^s - z_i^n) k_i = \frac{\tau m_0 k_i}{M} > 0, \forall i = 1, 2$$

and fall in the host country.

$$(z_0^s - z_0^n) k_0 = -\tau \left(1 - \frac{m_0}{M}\right) k_0 < 0$$

## A.5    Proof of Proposition 5

Recall that the symmetric tax is

$$\tau^s = \frac{\psi}{2} \left[ \frac{K + k_0}{\frac{M}{B} - (M - m_0)} - \frac{K - k_0}{M - m_0} \right]$$

whereas the asymmetric FDI taxes are

$$\tau_i = \frac{\psi}{2} \left[ \frac{K + k_0}{\frac{M}{B} - m_i - m_j} - \frac{k_i}{m_i} \right], \forall i = 1, 2$$

Subtracting $\tau^s$ from $\tau_i$ and using the property that

$$\frac{k_0}{m_0} > \frac{K}{M} > \frac{k_1}{m_1} > \frac{k_2}{m_2}$$

delivers the result.

## A.6    Proof of Proposition 6

Obvious from the expressions for the differences in welfare (24), (27) and (28).

## References

BRAINARD, S.L. (1997). An empirical assessment of the proximity-concentration trade-off between multinational sales and trade. *American Economic Review*, 87, 520-44.

BRANDER, J.A. and SPENCER, B.J. (1987). Foreign direct investment with unemployment and endogenous taxes and tariffs. *Journal of International Economics*, 22, 257-79.

BUGHIN, J, and VANNINI, S. (1995). Strategic direct investment under unionized oligopoly. *International Journal of Industrial Organization*, 13, 127-45.

DAS, S.P. (1981). Effects of foreign direct investment in the presence of unemployment. *Journal of International Economics*, 11, 249-57.

DIXIT, A.K. and GROSSMAN, G.M. (1986). Targeted export promotion with several oligopolistic industries. *Journal of International Economics*, 21, 233-49.

GLASS, A.J. and SAGGI, K. (1999). FDI policies under shared factor markets. *Journal of International Economics*, 49, 309-32.

HAUFLER, A. and WOOTON, I. (1999). Country size and tax competition for foreign direct investment. *Journal of Public Economics*, 71, 121-39.

HOEKMAN, B. and SAGGI, K. (2000). Multilateral disciplines for investment-related policies? In P. Guerrieri and H.-E. Scharrer (eds.), *Global Governance, Regionalism, and the International Economy.* Baden-Baden: Nomos-Verlagsgesellschaft.

HORSTMANN, I.J. and MARKUSEN, J.R. (1992). Endogenous market structures in international trade (natura facit saltum). *Journal of International Economics*, 32, 109-29.

—— (1989). Firm-specific assets and the gains from direct foreign investment. *Economica*, 56, 41-8.

JANEBA, E. (1998). Tax competition in imperfectly competitive markets. *Journal of International Economics*, 44, 135-53.

—— (1996). Foreign direct investment under oligopoly: profit shifting or profit capturing? *Journal of Public Economics*, 60, 423-45.

LAHIRI, S. and ONO, Y. (1998). Foreign direct investment, local content requirement, and profit taxation. *Economic Journal*, 108, 444-57.

MARKUSEN, J.R. (1995). The boundaries of multinational enterprise and the theory of international trade. *Journal of Economic Perspectives*, 9, 169-89.

MARKUSEN, J.R. and VENABLES, A.J. (1999). Foreign direct investment as a catalyst for industrial development. *European Economic Review*, 43, 335-56.

—— (1998). Multinational firms and the new trade theory. *Journal of International Economics*, 46, 183-203.

MOTTA, M. (1992). Multinational firms and the tariff-jumping argument: a game theoretic analysis with some unconventional conclusions. *European Economic Review*, 36, 1557-71.

MOTTA, M. and NORMAN, G. (1996). Does economic integration cause foreign direct investment? *International Economic Review*, 37, 757-83.

RAFF, H. and SRINIVASAN, K. (1998). Tax incentives for import-substituting foreign investment: does signaling play a role? *Journal of Public Economics*, 67, 167-93.

ROWTHORN, R.E. (1992). Intra-industry trade and investment under oligopoly: the role of market size. *Economic Journal*, 102, 402-14.

UNCTAD (1999a). *Trends in International Investment Agreements: An Overview*. Geneva: United Nations Publications.

UNCTAD (1999b). *National Treatment*. Geneva: United Nations Publications.

UNCTAD (1999c). *Most-Favoured-Nations Treatment*. Geneva: United Nations Publications.

Figure 1: FDI Pattern
with Two Source Countries

Source

Country 1

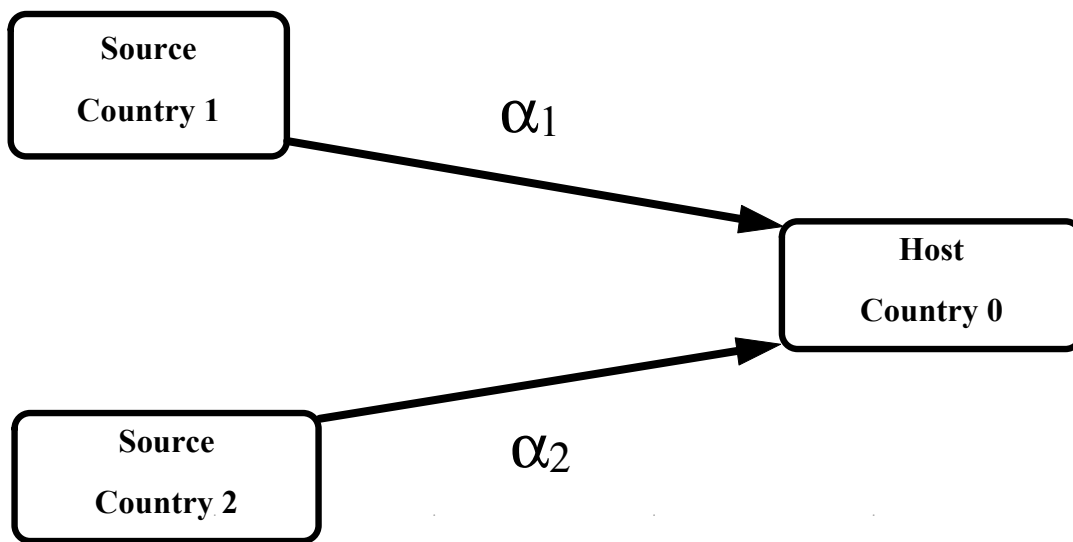$\alpha_1$

Host

Country 0

Source

Country 2
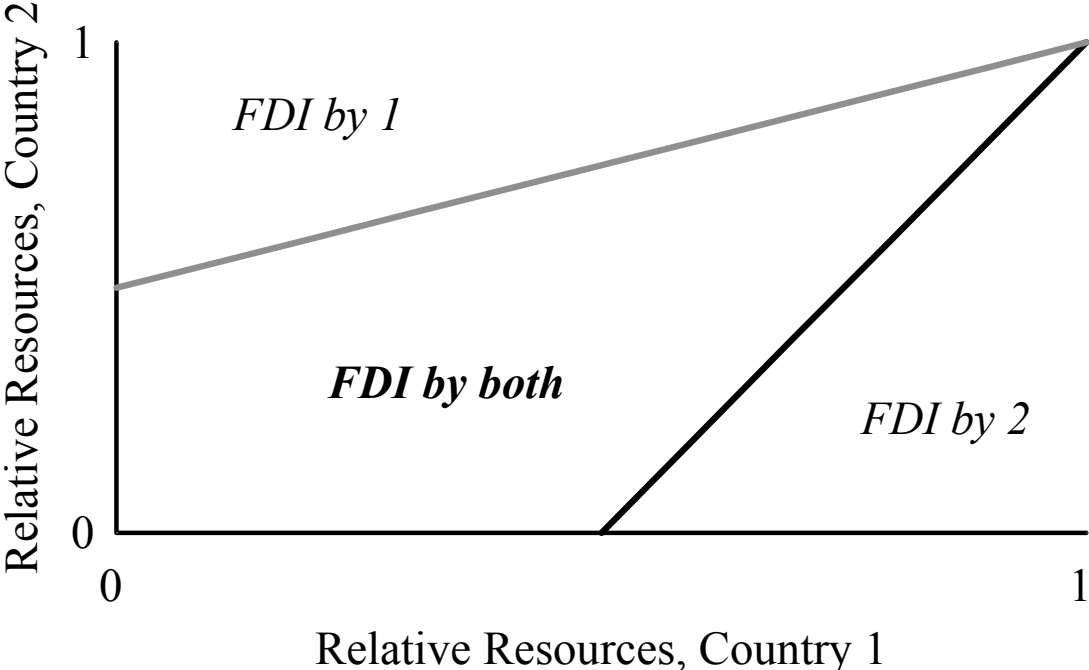
$\alpha_2$

Figure 2: Equilibrium FDI Patterns
with Two Source Countries

Figure 3: Equilibrium FDI Policies with Two Source Countries