Incentives to Tax Foreign Investors

Rishi R. Sharma*

April 29, 2016

Abstract

This paper shows that a small country can have incentives to tax inbound FDI even in a setting with perfect competition and free entry. While investors make no aggregate profits worldwide due to free entry, they make taxable profits in foreign production locations because their costs are partly incurred in their home country. These profits are not perfectly mobile because firm productivity varies across locations. Consequently, the host country does not bear the entire burden of a tax on foreign investors and this gives rise to an incentive to impose taxes. The standard zero optimal tax result can be recovered in this model under a cost-apportionment system that ensures zero economic profits in each location.

JEL Classification: H87; H25; F23

Keywords: international taxation; foreign direct investment; tax competition; firm heterogeneity

*Department of Economics, University of Michigan, 611 Tappan St., Ann Arbor, MI 48104 (email: rishirs@umich.edu). I am very grateful to Alan Deardorff, Jim Hines, Joel Slemrod and Kyle Handley for their guidance throughout this project. I thank Dominick Bartelme, Javier Cravino, Sebastian Sotelo, Ugo Troiano, seminar participants at the University of Michigan, and especially Andrei Levchenko for useful comments and discussion. This work was supported by the Rackham One-Term Dissertation Fellowship and the William Haber Graduate Fellowship.

1 Introduction

A central result in the theory of international taxation suggests that small countries should not impose taxes on inbound FDI (Gordon, 1986).[1] This is because a small country faces a perfectly elastic supply of capital and so the burden of any tax on foreign investors falls entirely on domestic immobile factors. It would therefore be preferable tob tax the immobile factors directly instead of unnecessarily reducing inbound investment. The existing literature has interpreted this result to be an implication of the Diamond-Mirlees (1971) framework, where firms are competitive and households receive no profits. The literature suggests that incentives to tax foreign investors arise only in settings that depart from the Diamond-Mirlees framework, which entails introducing market imperfections, entry restrictions or policy instrument limitations.

The current paper explains why it can be optimal for small countries to tax foreign investors even in a perfectly competitive setting with free entry. Free entry into production implies that investors from each country make no aggregate profits worldwide and so there are no economic profits that accrue to households.[2] Nevertheless, investors can make positive taxable profits in foreign production locations because the initial investment costs that enable production globally are incured in the investor's home country. These profits are not perfectly mobile because owing to productivity differences arising from uncertainty associated with entry, some investors find it more profitable to produce in a particular country than they would elsewhere in the world. When a host country taxes foreign investors, it taxes away a portion of the profits of these inframarginal investors. While this will affect business creation incentives in the rest of the world, a small country does not internalize

[1] See also Dixit (1985), Razin and Sadka (1991), and Gordon and Hines (2002) for alternative forms of this argument.

[2] This is as in Hopenhayn (1992) and Melitz (2003). The production structure is especially similar to Dharmapala et al. (2011).

this effect. As a result of this externality, domestic agents do not bear the entire burden of the tax and the host country therefore has an incentive to tax foreign investors.

The benchmark zero tax result can be recovered in this model under a specific system of cost apportionment. If the initial investment costs were apportioned to each country proportionately to the profits made in the location, investors would earn no aggregate economic profits location by location, just as in Gordon (1986). With such an apportionment system, the host country would no longer have an incentive to tax foreign investors. It is natural, therefore, to interpret the optimal zero tax results as implicitly assuming an apportionment regime that guarantees zero profits in each location. Note, however, that while such a regime would be efficient from a global standpoint, it would not be incentive-compatible: the host country has a unilateral incentive to not allow the apportioned investment costs to be deductible.[3]

In addition to the benchmark zero tax result, this paper is connected to a literature that studies business taxation in the presence of location rents.[4] This literature shows that countries can have incentives to impose taxes on foreign investors if a portion of the profits earned by foreign firms in a location could not be earned elsewhere in the world. The key contribution of the current paper is to explain how location rents from the standpoint of the host country can exist even in a setting where free entry guarantees that there are no true rents that accrue to any households. This distinction is substantively important because it illustrates how a rent-like motive for taxing foreign investors can exist in an open economy setting even when firms are fully subjected to competitive pressures.

This paper also makes a contribution to a growing literature on inter-

[3]See Huizinga (1992) for a related point in the context of the R&D expenditures of multinational enterprises.

[4]See for example, Mintz and Tulkens (1996), Huizinga and Nielsen (1997) and Devereux and Hubbard (2003).

jurisdictional taxation with heterogeneous firms. Burbidge et al. (2006) and Davies and Eckel (2010) study settings where firm heterogeneity gives rise to location rents. These models depart from the Diamond-Mirlees framework by allowing for positive aggregate profits and/or imperfect competition. Since these features are themselves capable of breaking the zero optimal tax result in settings without firm heterogeneity, the role of firm heterogeneity per se becomes more difficult to interpret. The current paper introduces producer heterogeneity without introducing other factors that could independently break the zero tax result and highlights the key role of the implicit apportionment system in generating location rents from the standpoint of the host country.

The rest of the paper is structured as follows. Section 2 presents the model. Section 3 studies optimal taxation. Section 4 discusses some additional implications of the model. Section 5 concludes.

2 Model

2.1 Households

I study a setting with two countries: a small country and the rest of the world. The representative household in each country consumes a single final good that will be the numeraire, and is endowed with labor and capital. Labor is internationally immobile with the wage in country i given by w_i, and capital is mobile with rental rate r. Given that there is a single final good and this good is the numeraire, welfare in country i is given by the income of the representative households:

$$V_i = w_i L_i + rK_i + T_i,$$

where L_i and K_i are the inelastic supplies of labor and capital, respectively; and T_i is government revenue rebated lump sum to the household. Note that there are no profits that enter into the household's budget because free entry will guarantee zero aggregate profits in equilibrium.

There are two points to note here in connection with Diamond and Mirlees (1971). First, the presence of a lump sum transfer indicates that I am studying a first-best setting instead of a second-best one unlike in much of the public finance literature. This is not an important difference in the context of the current paper because my main result is that the optimal tax rate on inbound FDI income is positive. If such a tax is optimal even in a first-best setting, it will be optimal a fortiori in a second-best context. Second, the Diamond-Mirlees framework requires that households receive no pure profits, either because there are no pure profits or because pure profits can taxed away at 100%. In this paper, the requirement that households receive no pure profits will be satisfied directly without a 100% tax on profits. This means that there are no pure profits in this model in the sense relevant for the production efficiency theorem, even though individual firms produce under decreasing returns to scale and do make variable profits. Put differently, as Dharmapala et al. (2011) point out, this type of setup essentially features constant returns to scale at the industry level.

2.2 Overview of Production

Figure 2.1: Timing of Events

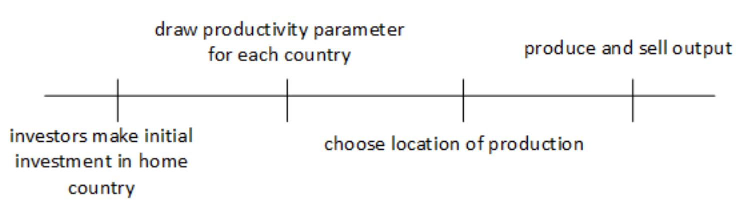

Figure 2.1 shows the logical timing of the events in the model. Ex-ante identical and risk-neutral investors in each country may pay fixed costs in their home country in order to engage in production. By doing so, they draw a productivity parameter for each country from a bivariate distribution. The investors then choose where to produce on the basis of their productivity draws. Finally, they will engage in production and sell their output at the world market price.

A free entry condition guarantees that the investors make no profits in expectation net of the initial fixed costs they incur. Since there are a continuum of firms, zero expected profits will imply that there are no aggregate profits. This in turn means that the representative household in each country receives no pure profits from the activities of the firms that it owns. An individual firm, however, can make positive or negative ex-post profits. The entry process here is very similar to Melitz (2003) but with perfect competition instead of monopolistic competition as in Dharmapala et al. (2011).

Firms with different levels of productivity can co-exist in equilibrium despite perfect competition because each firm has a decreasing returns to scale production function. The decreasing returns to scale can be interpreted as reflecting the presence of an implicit firm-specific factor. The initial investment that enables production is the process by which this firm-specific factor is brought into existence. Given that the implicit firm-specific factor essentially determines each firm's productivity across the world, we could also interpret this initial entry process as an R&D investment with an uncertain return.

An alternative to the current setup would be a model with monopolistically competitive firms, such as Helpman et al. (2004). While assuming a decreasing returns to scale production function at the firm level is similar in many respects to a framework with firm-level product differentiation, there are a few important differences for the purposes of the current paper. First, imperfect competition generally introduces a pre-existing distortion that complicates the interpretation of an optimal tax problem. Second, in a monopolistically competitive setting, goods are differentiated at the firm level and so even small countries have terms-of-trade effects.[5] Finally, a perfectly competitive ensures that the current analysis remains within the Diamond-Mirlees framework.

2.3 Firm Problem

With this basic setup in mind, we can solve the model starting with the firm's problem. A firm will be indexed by a vector of productivity parameters $(\tilde{z}_1, \tilde{z}_2)$, where $\tilde{z}_i$ is the productivity parameter in country i. A firm with productivity parameter $\tilde{z}_i$ that has chosen to produce in country i whose home country is j solves the following problem:

$$\max_{l,k} \quad (1-\tau_{ij})\left[\tilde{z}_i F_{ij}\left(l,k\right) - w_i l - rk\right], \tag{2.1}$$

where the choice variables l and k are the quantities of labor and capital, respectively, used by the firm; τ_{ij} is the tax rate faced by an investor in country i that is from country j. I will assume that $\tau_{ij} = \tau_i$ for $i \neq j$ and $\tau_{ii} = 0$: all foreign investors face the same tax rate while domestic investors are untaxed.[6]

$F(.)$ exhibits decreasing returns to scale and is assumed to be homogeneous of degree $\lambda < 1$. Under this homogeneity assumption, the pre-tax variable profit function $\pi_{ij}(w_i, r, \tilde{z}_i)$ can be written as $\tilde{z}_i^{1/(1-\lambda)}\pi_{ij}\left(w, r\right)$ (see Appendix A1 for the proof). For notational simplicity, I will define $z_i \equiv \tilde{z}_i^{1/(1-\lambda)}$ and work with z_i instead of $\tilde{z}_i$ henceforth. The pre-tax variable profit function is then $z_i\pi_{ij}\left(w_i, r\right)$. We can also define the supply and factor demand

[5]See Helpman and Krugman (1989) for more discussion of the complications that can arise when interpreting optimal trade policy questions in imperfectly competitive models.

[6]Domestic firms being untaxed is not essential to the central point of this paper. This assumption allows us to clearly see that the incentives to tax foreign investors do not arise from the presence of fiscal externalities of any kind.

functions that arise from the firm's problem: $x_{ij}(w_i, r, z_i)$, $l_{ij}(w_i, r, z_i)$ and $k_{ij}(w_i, r, z_i)$.

The tax system here allows for the deduction of all variable capital expenses and so is essentially a cash-flow tax. Such a tax does not distort the firm's intensive margin decision regarding how much labor and capital to use in production. However, the tax will still be distortionary because it will affect a firm's extensive margin decision concerning which country to produce in. Due to this extensive margin distortion, this assumption does not qualitatively alter the main argument made in this paper. Even if the tax base included the regular return to capital, part of the tax burden would still fall upon foreigners. A consideration that I have ignored here is that of potential royalty payments from the foreign affiliate to its parent for the use of the parent's technology. This is an important question that I postpone to subsection 4.1.

An investor chooses which country to produce in by comparing the profits it would make in each. It will locate in country i if it makes more profits by producing in i than in it would in the alternative country[7]:

$$(1-\tau_{ij})\, z_i \pi_{ij}(w_i, r) \geq (1-\tau_{-ij})\, z_{-i} \pi_{-ij}(w_{-i}, r),$$

where the notation $-i$ refers to the country that is not i. We can define the set of firms from j that locate in i as follows:

$$\Theta_{ij} = \{z : (1-\tau_{ij})\, z_i \pi_{ij}(w_i, r) \geq (1-\tau_{-ij})\, z_{-i} \pi_{-ij}(w_{-i}, r)\} \tag{2.2}$$

Further, I define the boundary set of Θ_{ij} – where the condition defining the set holds with equality – as $\partial\Theta_{ij}$.

[7]For clarity of exposition, this setup assumes that the firm knows with certainty its productivity in each country before making its location choice. The main result will hold as long as the firm has a signal of its productivity in each location.

2.4 Free Entry and Market Clearing

So far, I have discussed the problem solved by investors that have already drawn their productivities. I now turn to the entry process. An investor can choose to pay a fixed cost and thereby draw a productivity vector z from a joint distribution $G(z)$ with joint density $g(z)$. Across investors, the draws are independently and identically distributed. I assume that the components of z are not perfectly correlated and that z is bounded below at zero and has a finite upper-bound. These assumptions guarantee an interior solution where both potential production locations are always chosen by some investors from each country.

In equilibrium, a potential entrant makes zero expected profits net of the initial fixed costs. The required fixed costs in terms of labor and capital and will be denoted f_i and ϕ_i, respectively. The free entry condition in country j is then:

$$\sum_i \int_{\Theta_{ij}} (1 - \tau_{ij})\, z_i \pi_{ij} (w_i, r)\, g(z) dz \leq f_j w_j + \phi_j r \tag{2.3}$$

The left-hand side of (2.3) gives us the expected profits of a potential entrant. We need to sum over i because a firm could choose either country as the location of production. The term dz is a two-dimensional volume differential. If there is entry in equilibrium, the free entry condition will hold with equality. Note that this setup assumes investors are risk-neutral. Since there are a continuum of firms, the free entry condition implies that aggregate profits net of the fixed costs are equal to zero. This ensures that the fundamentals of the current model are consistent with Diamond and Mirlees (1971) since households will receive no pure profits. The presence of a continuum of firms also implies that there is no aggregate uncertainty in this model.

The model is closed by market clearing conditions for the final good and for the factors of production. For the final good, the condition is:

$$\sum_i (w_i L_i + rK_i + T_i) = \sum_i \sum_j m_j \int_{\Theta_{ij}} x_{ij}(w_i, r, z_i)\, g(z) dz, \tag{2.4}$$

where m_j is the measure of entrants from country j. Note that since there is a single final good and this good is the numeraire, the demand for the good – the left-hand side – is equal to world income. The term on the right hand side of (2.4) is the world supply of the good. We sum over j to take into account the production of firms from each country and sum over i to aggregate across both locations of production. The market clearing conditions for labor and capital are:

$$L_i = \sum_j m_j \int_{\Theta_{ij}} l_{ij}(w_i, r, z_i)\, g(z) dz + m_i f_i \tag{2.5}$$

$$\sum_i K_i = \sum_i \sum_j m_j \int_{\Theta_{ij}} k_{ij}(w_i, r, z_i)\, g(z) dz + \sum_i m_i \phi_i \tag{2.6}$$

The two terms on the right-hand side of the factor market clearing conditions capture the fact that each factor is used to pay the fixed costs as well as being a direct input into production. Note that we sum over i for capital but not labor because capital is internationally mobile and so this market clears worldwide rather than country-by-country.

3 Optimal Taxation

3.1 Preliminaries

This section will study the optimal taxation of foreign firms from the standpoint of a small host country that will be denoted as country 1. The small country takes r and w_2 as given. Since it has a negligible effect on the aggregate profits of foreign firms, it also takes the mass of entrants in the rest of the world as given.[8] The variables that are endogenous from the point of view of the small country are its domestic wage, the set of firms that choose to site in the country and the mass of domestic firms. These variables are determined by country 1's labor market clearing condition, the location choice problem of firms, and by country 1's free entry condition.

Before turning to the government's problem, it will be useful to define several terms. The total after-tax profits made by foreign firms in country 1 is given by:

$$(1-\tau_1)\,\Pi_{12} = m_2 \int\limits_{\Theta_{12}} (1-\tau_1)\, z_1 \pi_{12}\left(w_1, r\right) g(z) dz$$

Next, we can define the inframarginal profits earned by foreign firms in country 1 as:

$$R_{12} = m_2 \int\limits_{\Theta_{12}} \left[(1-\tau_1)\, z_1 \pi_{12}\left(w_1, r\right) - z_2 \pi_{22}\left(w_2, r\right)\right] g(z) dz$$

These inframarginal profits are defined as the difference between the after-tax profits made by foreign affiliates in country 1 and the counterfactual profits they would make in country 2. This expression captures the profits made by foreign affiliates in excess of what they would require in order to site in the host country. These inframarginal profits are location rents from the standpoint of the host country. They are not true rents in a global sense, however, because these profits enter into the foreign free-entry condition rather than accruing to foreign households. In Appendix A.2, I derive the derivatives of $(1-\tau_1)\,\Pi_{12}$ and R_{12} for later use.

[8] See Flam and Helpman (1987), Demidova and Rodriguez-Clare (2009) and Bauer et al. (2014) for similar small country assumptions in monopolistically competitive settings.

3.2 Taxes, Welfare and the Optimal Tax Rate

We can now study the welfare effects of host-country taxation. I will focus on an equilibrium where there are no domestically owned firms and leave the simpler case with domestic firms to Appendix A.3. Given that there is a single final good and this good is the numeraire, welfare is simply given by the representative household's income:

$$V_1 = w_1 L_1 + r K_1 + \tau_1 \Pi_{12}$$

The effect of the tax on welfare is:

$$\frac{dV_1}{d\tau_1} = \frac{dw_1}{d\tau_1} L_1 + \Pi_{12} + \tau_1 \frac{d\Pi_{12}}{d\tau}$$

Noting that we are considering the case without domestic firms (i.e. $L_1 = L_{12}$) and evaluating this expression at $\tau_1 = 0$, we obtain:

$$\begin{aligned} \left.\frac{dV_1}{d\tau_1}\right|_{\tau_1=0} &= \frac{dw_1}{d\tau_1} L_{12} + \Pi_{12} \\ &= -\left.\frac{dR_{12}}{d\tau_1}\right|_{\tau=0}, \end{aligned}$$

where the second equality follows from an expression derived in Appendix A.2. To interpret the above result, note that $dR_{12}/d\tau_1$ is the effect of taxes on the inframarginal profits of foreign affiliates. This term captures the portion of the tax incidence that is not borne by domestic agents, since a reduction in the inframarginal profits of foreign affiliates does not affect incentives to invest in country 1. Unsurprisingly, host country taxation will reduce these inframarginal profits (see Appendix A.3 for the formal proof) and so the small country will necessarily benefit from a sufficiently small tax:

$$\left.\frac{dV_1}{d\tau_1}\right|_{\tau_1=0} = -\left.\tfrac{dR_{12}}{d\tau_1}\right|_{\tau=0} > 0$$

In addition to showing that a small tax will improve welfare, we can also derive a formula for the optimal tax rate (see Appendix A.4. for the derivation):

$$\tau_1 * = \frac{dR_{12}/d\tau_1}{\frac{d}{d\tau_i}(1-\tau_1)\Pi_{12}} \tag{3.1}$$

This formula shows that the optimal tax rate depends on two key expressions. The numerator, as discussed earlier, captures the effect of the tax that is not borne by domestic agents. To the extent the tax is borne by foreigners, the optimal tax rate will be larger. The denominator captures the overall responsiveness of after-tax profits to host-country taxation. If profits are very responsive to taxes, we expect a greater behavioral distortion, and so the optimal tax rate will be smaller.

An important point to note throughout this analysis is that all of the derivations here would be the same whether the total mass of entrants in the rest of the world is determined by free entry or just fixed at some exogenous value. This is because either way, it is fixed from the standpoint of the small country which has a negligible effect on the aggregate worldwide profits of foreign firms. As a result, even though there are no rents that accrue to foreign households, from the standpoint of the small country, the situation is no different from one where the foreign households did receive rents from the activities of its firms.

4 Additional Discussion

4.1 Cost Apportionment and Zero Tax Result

This subsection will discuss the relationship between my results and the standard optimal zero tax results in the literature (e.g. Gordon, 1986). In my model, foreign affiliates make taxable profits in a host country despite the fact that there are no aggregate profits. We can obtain zero profits location by location in the current model – as in a setting that directly assumes constant returns to scale production functions – if we assume the presence of a specific type of cost apportionment system. Specifically, we require that initial investment costs are apportioned to each country proportionately to the profits made in that country. Multiplying the free entry condition (2.3) that holds with equality by the mass of firms that enter in country j, we obtain:

$$\sum_i \int_{\Theta_{ij}} (1-\tau_{ij})\, m_j z_i \pi_{ij}(w_i, r)\, g(z) dz = m_j f_j w_j + m_j \phi_j r$$

This condition simply states that the total profits of investors from country j excluding fixed costs are equal to the total fixed costs incurred in entry. If a share s_{ij} of the profits of firms from j were earned from production undertaken in i, the proposed apportionment system would imply that fixed costs equal to $s_{ij}(m_j f_j w_j + m_j \phi_j r)$ would be apportioned to country i. Consequently, the total profits apportioned to country i net of the fixed costs would be equal to zero:

$$s_{ij} \sum_i \int_{\Omega_{ij}^n} (1-\tau_{ij})\, m_{ij} z_i \pi_{ij}(w_i, r)\, g(z) dz - s_{ij}(m_j f_j w_j + m_j \phi_j r) = 0$$

Thus, with such an apportionment system, there would be no economic profits earned in the host country, and so the basis for the positive optimal tax on foreign investors would no longer be present. A cash flow tax – which is the type of tax considered in the previous sections – would simply generate no revenue. If marginal capital expenses were not fully deductible, then the benchmark optimal zero tax result would hold directly. We can thus interpret the benchmark as implicitly assuming that there is a system which apportions costs so that profits are equal to zero location by location.

A natural example of such an apportionment system would be a specific type of royalty system. If the affiliate is making use of firm-specific assets that are owned by the parent, it should make royalty payments to the parent. It is natural to think of a royalty payment that is based on an arms-length valuation of the implicit firm-specific asset used by the foreign affiliate. If unrelated foreign affiliates could pay for this implicit asset, the equilibrium payment would be equal to the profits that can be made through its use. This is because any payment in excess would cause a loss to the buyer of the asset, while any payment less than profits will give rise to an infinite demand for the asset. If we employ this type of pricing for the asset, the affiliate would pay $(1-\tau_i)\, z_i \pi_{ij}\,(w_i, r)$ as royalties, and as a result, make no taxable profits.

Note that this type of cost apportionment would not be incentive-compatible. The host country would have an incentive to either tax the royalty payments or limit their deductibility. The royalty payments in this case would in fact be identical to what I have been calling profits so far, and the entire analysis as applied to profits would then apply to royalty payments instead. The model thus also suggests that countries have incentives to tax royalty payments from foreign affiliates to their parents for the same reason they have incentives to tax profits. This is consistent with the fact that most countries impose taxes on cross-border royalty payments.

A further point to note here is that the royalty system in place in the world does not conform to this theoretically ideal system even aside from taxes and deduction limitations for at least two important reasons. First, only certain specific aspects of a parent's overall contribution to an affiliate's productivity will trigger royalty payments in reality. For example, if an affiliate is productive because of the parent firm's business culture or the quality of its general administration, this may not give rise to corresponding royalty payments. Second, this ideal system would be implausible from an informational standpoint. Standard transfer pricing methods would be unlikely to capture the profitability of an individual technology given that all firms have made the same initial investment.

4.2 Global Distortions

The previous section showed that a small host country that maximizes domestic welfare has an incentive to impose taxes on foreign investors. While optimal from the standpoint of a country that is acting unilaterally, these taxes are distortionary from the point of view of the world as a whole for two reasons. First, the taxes will affect location choice, as is evident from (2.2). This is because while all explicit costs are deductible, the opportunity costs – the profits that could be earned elsewhere in the world – are not. As a result, taxes will affect the location of production as is standard in models of international taxation.

This first distortion would be absent if the opportunity costs were hypothetically deductible so that the tax would apply only to the inframarginal profits. There is a second distortion that would exist even if opportunity costs were deductible. This second distortion arises because taxes affect the expected profit of an entrant (see (2.3)). We can imagine an alternative model to the current one where we drop the free entry conditions (2.3), and the mass of entrants are treated as exogenous. In this alternative model, a hypothetical tax on inframarginal profits would merely be a lump sum transfer from one country to another that has no behavioral effects. Thus, the endogeneity of firm creation – which is governed by the free entry condition

– causes an additional global distortion.[9]

Because countries have unilateral incentives to tax foreign investors even when this tax is globally distortionary, the model suggests potential incentives for countries to coordinate to mutually reduce the taxes imposed on foreign investors. This is consistent with the fact that bilateral tax treaties entail reductions in dividend withholding tax rates. The discussion concerning royalties in 4.1 suggests that countries have incentives to tax royalties that are similar to the incentives to tax profits. This model thus also provides a possible explanation for why countries use royalty withholding taxes and why these taxes are reduced by bilateral tax treaties.

4.3 Implications for Tax Competition

In this model, there are location rents from the small country's standpoint because of which it will have unilateral incentives to tax foreign investors. These are incentives that would counteract a race to the bottom in an open economy. The incentives to tax foreign investors arise from an externality that the host country imposes on the rest of the world and therefore can only exist in open economies.[10] The model thus identifies a mechanism because of which increased globalization need not be a downward pressure on tax rates.[11]

Given the forces that drive the incentives to tax foreigners, the model suggests two factors that could potentially mitigate the effects of tax competition in reality. First, greater globalization increases the likelihood that

[9]Note also that this distortion is distinct from a potential distortion to world savings that would arise if capital supply were not perfectly inelastic.

[10]In a closed economy, a cash-flow tax would either raise no revenues (if the fixed costs are deductible) or would be sub-optimal because it causes production inefficiency (if the fixed costs are not deductible).

[11]It should be noted that the incentives discussed here apply to taxes on the taxable economic profits of foreign investors. To the extent that variable capital expenses are not deductible, the standard forces leading to downward pressures on tax rates would still be present.

investments undertaken in one country contribute to profitability elsewhere in the world. As a result, countries are likely to host firms whose profitability may be connected with investments that were not specifically made with the host country in mind. To the extent that this is the case, host countries would have increased incentives to tax foreign investors.

The second reason is one that has been discussed in the literature before but is present in the current model in a particularly sharp manner. The increasing share of foreign ownership of firms should imply a greater incentive to impose taxes on business income in general (Huizinga and Nielsen, 1997).[12] The existing literature makes this claim in a context where there are rents which give rise to conceptually similar incentives to tax domestic and foreign firms. In the current paper, host-country incentives arise from an externality imposed on the rest of the world and thus these incentives are more directly connected to taxing foreign investors specifically.

[12] See also Huizinga and Nicodeme (2006), who provide empirical evidence that higher foreign ownership is associated with higher corporate tax rates.

5 Conclusion

This paper shows that small host countries can have incentives to tax inbound FDI even in a competitive setting with free entry. While investors make no aggregate profits worldwide, they make taxable profits in foreign production locations because part of their investment costs are incurred in their home country. Due to firm productivity differences, some firms will be inframarginal in a foreign location. By taxing foreign investors, host countries can partially tax these inframarginal profits. While such taxes discourage investment in the rest of the world, a small country does not internalize this effect and thus has an incentive to tax foreign investors.

A literature based on Diamond and Mirlees (1971) has served as the basis for much of the policy advice in the area of international taxation. The current paper shows that one important piece of advice that is usually taken to be an implication of this framework – that small countries should not impose source-base investment taxes – need not hold even within the framework itself. The reason for this is that location rents that justify taxes on inbound FDI can exist from the standpoint of a host country even in a setting where expected profits are competed away by entry. This analysis thus identifies incentives to tax inbound FDI that are likely to be relevant across a wide range of countries and industries.

A Proofs

A.1 Profit Function Property

In this appendix, I show that we can write the variable pre-tax profits in the following separable form: $\pi_{ij}(w_i, r, \tilde{z}_i) = \tilde{z}_i^{1/(1-\lambda)}\pi_{ij}(w_i, r)$. First, note that from the homogeneity of the production function, we can use Euler's rule to obtain:

$$(F_l(.)l + F_k(.)k) = \lambda F(.),$$

where$\lambda < 1$ is the returns to scale parameter. The first-order conditions are: $\tilde{z}_i F_l(.) = w_i$ and $\tilde{z}_i F_k(.) = r$. Using the first-order condition, the firm's variable profits before taxes are:

$$\begin{aligned}
\pi_{ij}(w_i, r, \tilde{z}_i) &= \tilde{z}_i F(.) - \tilde{z}_i F_l(.)l - \tilde{z}_i F_k(.)k \\
&= \tilde{z}_i F(.) - \lambda \tilde{z}_i F(.) \\
&= (1-\lambda)\,\tilde{z}_i F(.)
\end{aligned}$$

Thus, the firm's variable profits are proportional to firm sales.

Next, we can differentiate maximized profits, $\tilde{z}_i F(.) - wl - rk$, with respect to $\tilde{z}_i$ using the envelope theorem to get:

$$\begin{aligned}
\frac{d\pi_{ij}(.)}{d\tilde{z}_i}\frac{\tilde{z}_i}{\pi_{ij}(.)} &= F(.)\,\frac{\tilde{z}_i}{\pi_{ij}(.)} \\
\frac{d\pi_{ij}(.)}{d\tilde{z}_i}\frac{\tilde{z}_i}{\pi_{ij}(.)} &= F(.)\,\frac{\tilde{z}_i}{(1-\lambda)\,\tilde{z}_i F(.)} \\
\frac{d\pi_{ij}(.)}{d\tilde{z}_i}\frac{\tilde{z}_i}{\pi_{ij}(.)} &= \frac{1}{1-\lambda}
\end{aligned}$$

The above expression is a separable first-order differential equation and can be solved as follows:

$$\begin{aligned}
\frac{1}{\pi_{ij}(.)}d\pi_{ij}(.) &= \frac{1}{1-\lambda}\frac{1}{\tilde{z}_i}d\tilde{z}_i \\
\int \frac{1}{\pi_{ij}(.)}d\pi_{ij}(.) &= \frac{1}{1-\lambda}\int \frac{1}{\tilde{z}_i}d\tilde{z}_i + c \\
\log \pi_{ij}(.) &= \frac{1}{1-\lambda}\log \tilde{z}_i + c \\
\log \pi_{ij}(.) &= \log \tilde{z}_i^{1/(1-\lambda)} e^c \\
\pi_{ij}(w_i, r, \tilde{z}_i) &= \tilde{z}_i^{1/(1-\lambda)} e^c
\end{aligned}$$

In order to solve for the constant of integration e^c, we can set $\tilde{z}_i$ to some arbitrary value - say one - to obtain:

$$\pi_{ij}(w_i, r, 1) = e^c$$

If we define $\pi_{ij}(w_i, r) \equiv \pi_{ij}(w_i, r, 1)$, then the profits of an individual firm can be expressed as being proportional to a general term that is common to all firms: $\pi_{ij}(w_i, r, \tilde{z}_i) = \tilde{z}_i^{1/(1-\lambda)} \pi_{ij}(w_i, r)$.

A.2 Expressions for $d\Pi_{12}/d\tau_1$ and $dR_{12}/d\tau_1$

This Appendix derives expressions for $d\Pi_{12}/d\tau_1$ and $dR_{12}/d\tau_1$.

$$\begin{aligned}
\frac{d\Pi_{12}}{d\tau_1} &= -m_2 \int\limits_{\Theta_{12}} z_1 l(.) \frac{dw_1}{d\tau_1} g(z)dz \\
&+ m_2 \int\limits_{\partial\Theta_{12}} (v \cdot u)\, z_1 \pi_{12}(.)\, g(z)dz \\
&= -L_{12}\frac{dw_i}{d\tau_i} + m_2 \int\limits_{\partial\Theta_{12}} (v \cdot u)\, z_1 \pi_{12}(.)\, g(z)ds, \qquad \text{(A.1)}
\end{aligned}$$

where L_{12} is the total labor used by foreign firms in country i. In taking the derivative (first equality above), I use a generalization of Leibniz's rule for differentiating an integral. The first term captures the change in profits that arises from changes in the profits of inframarginal firms, using Hotelling's Lemma to differentiate the profit function. The second term captures the change in profits due to a change in the set of firms that locate in the country. The term v is a two-dimensional vector that captures how the boundary set changes with the tax rate (i.e. the "velocity" of the boundary set), u is the unit normal vector and ds is the surface differential.

The derivative of R_{12} can be derived in a similar manner:

$$\begin{aligned} \frac{dR_{12}}{d\tau_1} &= -\Pi_{12} - m_2 \int_{\Theta_{12}} (1-\tau_1)\, z_1 l(.) \frac{dw_1}{d\tau_1} g(z) dz \\ &+ m_2 \int_{\partial\Theta_{12}} (v \cdot u) \left[(1-\tau_1)\, z_1 \pi_{12}(.) - z_2 \pi_{22}(w_2, r) \right] ds \\ &= -\Pi_{12} + -m_2 \int_{\Theta_{12}} (1-\tau_1)\, z_1 l(.) \frac{dw_1}{d\tau_1} g(z) dz \\ &= -\Pi_{12} + -(1-\tau_1)\, L_{12} \frac{dw_1}{d\tau_1} \end{aligned} \tag{A.2}$$

The third after the first equality captures the change in the set of firms locating in the country as a result of the tax rate change. It is equal to zero because firms on the boundary set $\partial\Theta_{12}$ make no inframarginal profits by definition.

A.3 Positive Optimal Tax Rate

This appendix proves that the optimal tax rate is positive. I first deal with the case without domestic firms, which is also the case discussed in the main text. The main text shows that the optimal tax rate will be positive if

$dR_{12}/d\tau_1 < 0$.

$$R_{12} = m_2 \int_{\Theta_{12}} \left[\left(1-\tau_1\right) z_1 \pi_{12}\left(w_1, r\right) - z_2 \pi_{22}\left(w_2, r\right) \right] g(z) dz$$

$$\frac{dR_{12}}{d\tau_1} = m_2 \int_{\Theta_{12}} \left\{ z_1 \frac{\left[d\left(1-\tau_1\right) \pi_{12}\left(w_1, r\right) \right]}{d\tau_1} \right\} g(z) dz$$

Note now that a firm that is on the boundary set, i.e. $z \in \partial\Theta_{12}$, will be indifferent between locating in country 1 and country 2:

$$\begin{aligned} \left(1-\tau_1\right) z_1 \pi_{12}\left(w_1, r\right) &= z_2 \pi_{22}\left(w_2, r\right) \\ \left(1-\tau_1\right) \pi_{12}\left(w_1, r\right) &= a_{12} \pi_{22}\left(w_2, r\right), \end{aligned} \tag{A.3}$$

where a_{12} is the cutoff value of z_2/z_1 that defines the indifferent firm. For later use, note that (A.3) implies a function $a_{12} = \gamma(w_1, \tau_1)$, with $\partial\gamma/\partial w_1 < 0$ and $\partial\gamma/\partial\tau_1 < 0$.

Differentiating (A.3), we obtain:

$$\frac{d}{d\tau_1} \left[\left(1-\tau_1\right) \pi_{12}\left(w_1, r\right) \right] = \frac{da_{12}}{d\tau_1} \pi_{22}\left(w_2, r\right)$$

Thus:

$$\begin{aligned} \frac{dR_{12}}{d\tau_1} &= m_2 \int_{\Theta_{12}} \left[z_1 \frac{da_{12}}{d\tau_1} \pi_{22}\left(w_2, r\right) \right] g(z) dz \\ &= \frac{da_{12}}{d\tau_1} \times m_2 \int_{\Theta_{12}} \left[z_1 \pi_{22}\left(w_2, r\right) \right] g(z) dz \end{aligned}$$

Thus, the sign of $dR_{12}/d\tau_1$ will be the same as the sign of $da_{12}/d\tau_1$. Since higher taxes will cause firms to leave country 1, it follows that the new marginal firm will be one that is relatively more productive in country 1, i.e. $da_{12}/d\tau_1 < 0$. To show this formally, we need to use the labor market clearing condition.

With no domestic firms, the labor market clearing condition is:

$$\begin{aligned} L_1 &= m_2 \int\limits_{\Theta_{12}} l_{ij}\left(w_1, r, z_1\right) g(z) dz \\ &= m_2 \int\limits_0^{z_1^{max}} \int\limits_0^{a_{12} z_1} l_{12}\left(w_1, r, z_1\right) g(z) dz, \end{aligned}$$

where z_1^{max} is the upper-bound on productivity for z_1. The right-hand side above is decreasing in w_1 and increasing in a_{12}. Thus, this expression defines a positive relationship between w_1 and a_{12}. This is intuitive: at a fixed wage, more firms would mean that labor supply exceeds labor demand, necessitating an increase in the wage to restore equilibrium. We can express this relationship as a function: $a_{12} = \delta(w_1)$ with $\partial\delta/\partial w_1 > 0$. This function, together with $\gamma(w_1, \tau_1)$ defined earlier implies that an increase in τ_1 will shift down $\gamma(.)$ and cause a movement along $\delta(.)$ corresponding to a lower wage. Consequently, $dw_1/d\tau_1 < 0$ and $da_{12}/d\tau_1 < 0$. This should be unsurprising: higher taxes on FDI reduce the number of firms that site in the host country and reduce domestic wages.

The case with domestic firms operating in equilibrium is simpler from the point of view of optimal taxation. In this case, the domestic free-entry condition holds with equality:

$$\int\limits_{\Theta_{11}} z_1 \pi_{11}\left(w_1, r\right) g(z) dz + \int\limits_{\Theta_{21}} \left(1 - \tau_2\right) z_2 \pi_{21}\left(w_2, r\right) g(z) dz = f_1 w_1 + \phi_1 r$$

Differentiating this expression, we obtain:

$$-\frac{dw_1}{d\tau_1}\int\limits_{\Theta_{11}} l_{11}\left(w_1,r,z_1\right)g(z)dz+\int\limits_{\partial\Theta_{11}}\left(v\cdot u\right)z_1\pi_{11}\left(w_1,r\right)g(z)ds$$

$$+\int\limits_{\partial\Theta_{21}}\left(v\cdot u\right)\left(1-\tau_2\right)z_1\pi_{21}\left(w_2,r\right)g(z)ds \quad = \quad f_1\frac{dw_1}{d\tau_1}$$

Note that: $\int_{\partial\Theta_{11}}\left(v\cdot u\right)z_1\pi_{11}\left(w_1,r\right)g(z)ds=\int_{\partial\Theta_{21}}\left(v\cdot u\right)\left(1-\tau_2\right)z_1\pi_{21}\left(w_2,r\right)g(z)ds$ because a marginal firm by definition would make the same profit if it located in the foreign country. Thus, the total profit loss for a marginal firm as a result of higher host-country taxation is equal to zero. Consequently:

$$-\frac{dw_1}{d\tau_1}\left(\int\limits_{\Theta_{11}} l_{11}\left(w_1,r,z_1\right)g(z)dz+f_1\right)=0$$

$$\frac{dw_1}{d\tau_1}=0$$

Since $dw_1/d\tau_1=0$, it follows immediately that the optimal tax rate will be positive in this case.

A.4 Optimal Tax Formula

This appendix will derive a formula for the optimal tax rate. As shown in the main text, the first-order condition for the optimal tax formula is:

$$L_{12}\frac{dw_1}{d\tau_1}+\Pi_{12}+\tau_1\frac{d\Pi_{12}}{d\tau_1}=0$$

Using (A.1) and (A.2), we can obtain the following:

$$
\begin{aligned}
& -(1-\tau_1)\left(-\frac{dw_1}{d\tau_1}L_{12}\right)+\Pi_{12} \\
& +\tau\left[m_2\int\limits_{\partial\Theta_{12}}(v\cdot u)\,z_1\pi_{12}\,(.)\,g(z)ds\right] \quad = \quad 0 \\
-\frac{dR_{12}}{d\tau_1}+\frac{\tau_1}{1-\tau_1}\left[-\frac{dR_{12}}{d\tau_1}+\frac{d}{d\tau_1}(1-\tau_1)\Pi_{12}\right] \quad &= \quad 0
\end{aligned}
$$

Thus, the optimal tax rate is:

$$
\tau_1* \quad = \quad \frac{dR_{12}/d\tau_1}{\frac{d}{d\tau_1}(1-\tau_1)\Pi_{12}}
$$