Economic Integration and Tax Policy with Endogenous Foreign Firm Ownership[†]

by

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Abstract

This paper analyzes the impact of economic integration on tax policy in a model where corporate taxation is motivated by the desire to tax profits accruing to foreigners and the number of foreign owned firms is endogenous. Increasing economic integration is modeled as a decline in trade costs or tariffs. It turns out that declining trade costs lead to increasing profit taxes if the government may use import tariffs. If tariffs are not available, declining trade costs induce profit taxes to decline as well. A mandatory reduction in tariffs also triggers profit tax reductions. We conclude that the existence of foreign firm ownership may fail to prevent profit taxes from declining as economic integration proceeds.

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1 Introduction

In the debate on the impact of globalization on national tax policies, a key issue is whether taxes on internationally mobile firms will survive. While most contributions to this debate emphasize the downward pressures on taxes implied by tax competition, some factors have been identified which may act as a break on tax reductions. One of those factors is foreign firm ownership. If firms are owned by foreigners, governments have incentives to tax these firms because the tax burden is at least partly borne by the residents of other jurisdictions, i.e. part of the tax burden is "exported" (Richter and Wellisch (1996), Huizinga and Nielsen (1997), (2002)).

While the idea that tax exportation may be a reason to levy corporate taxes in open economies is certainly plausible, a limitation of the literature in this field is that the existence of foreign firm ownership is taken as given. This neglects that the very decision of investors to set up firms in foreign countries is influenced by the process of economic integration. Moreover, the magnitude of foreign firm ownership is likely to depend on the tax burden on foreign owned firms. This paper develops a model where the number of foreign owned firms is endogenous and reacts to increasing economic integration as well as taxation. We consider a model of an open economy, where firms and goods are internationally mobile and households are immobile. Imperfect competition in goods markets gives rise to profits and intra industrial trade. Firms from the rest of the world may serve the domestic market either via exports or by setting up a production facility in the country. Exports face a transport cost and setting up an additional production facility gives rise to a fixed cost which differs across industries. The government may levy profit taxes and tariffs. Our model thus combines elements of new economic geography models, in particular the trade-off between

transport costs and fixed costs of production (see e.g. Krugman (1991)), with elements of tax competition models and the concept of tariff-jumping foreign direct investment.[1]

In this setup, we ask how increasing economic integration affects profit taxes and foreign direct investment. We interpret increasing economic integration as i) a decline in transport cost or ii) a decline in tariffs which is imposed exogenously (for instance, as a result of free trade agreements). The analysis leads to the following results. In the absence of tariffs, a reduction in transport costs leads to a decline in corporate taxes. Investment by foreign firms is hump shaped in transport costs. In contrast, if the government of the host country may levy import tariffs, a decline in transport costs leads to higher corporate taxes and foreign investment unambiguously declines. Finally, a mandatory reduction in tariffs leads to a reduction in corporate taxes and an increase in foreign investment. These results suggest that foreign firm ownership may not prevent profit taxes from declining as economic integration proceeds. A decline in profit taxes is even compatible with increasing foreign firm ownership. Moreover, our results imply that the reduction of tariffs through international free trade agreements may give rise to more aggressive corporate tax competition. Of course, these findings are derived in a model based on a set of common but nevertheless restrictive assumptions like, for instance, linear cost and demand functions. The paper includes a section which explores the relevance of these assumptions for the results.

In the literature, the contributions which are most closely related to this paper are Richter and Wellisch (1996), Huizinga and Nielsen (1997, 2002), Wildasin and Wilson (1998) and Kind et al. (2003). Richter and Wellisch (1996) analyse a model with household and

[1] For recent surveys on tax competition see Haufler (2001) or Fuest et al. (2003). On tariff jumping foreign investment see e.g. Bhagwati and Srinivasan (1983).

firm mobility and show, among other things, that foreign ownership of land gives rise to an underprovision of productive local public goods and inefficiently high taxes on firms and mobile households. Huizinga and Nielsen (1997) show that small open economies will levy source based capital income taxes if pure profits which accrue to foreigners cannot be taxed at confiscatory rates. Huizinga and Nielsen (2002) analyse the implications of foreign firm ownership for tax coordination. They show that capital may be overtaxed in the presence of foreign firm ownership. In all three papers, foreign firm ownership is taken as given and the optimal tax policy is derived for a given degree of economic integration. Wildasin and Wilson (1998) consider a model where households hold foreign assets in order to diversify risks. They show that the confiscatory taxation of foreign owned fixed factors prevents risk diversification. In their model, foreign ownership is endogenous because it is a result of risk diversification but the analysis does not ask how increasing economic integration affects foreign ownership. In a recent paper, Kind et al. (2003) ask how increasing economic integration caused by a decline in transport costs affects the taxation of foreign firms. They find that increasing economic integration increases profit taxes if trade costs are low. But in their analysis, the foreign ownership share is also exogenous.

The rest of the paper is set up as follows. The next section describes the model we use. In section 3, we derive the equilibrium in our model. Section 4 analyses the impact of increasing economic integration on profit taxes and foreign direct investment. In section 5, we discuss the empirical implications of our results and we relax some assumptions made in the earlier sections. Section 6 concludes.

2 The model

The world consist of two countries, a capital importing country labelled country A and the rest of the world which we call country B. Firms and goods are internationally mobile whereas private households are immobile.

2.1 Households

For notational convenience, the number of households in A is normalized to unity. The household consumes a numeraire good denoted by Y and a continuum of other differentiated goods X(s), where s is an index of differentiation which is distributed between 0 and 1, with density $\sigma(s)$ and a distribution function $\Gamma(s)$. The overall number of differentiated goods is $\Gamma(1) = m$. The preferences of the representative household are given by

$$U_A = Y + \int_0^1 [aX(s) - \frac{1}{2}bX(s)^2]\sigma(s)ds \tag{1}$$

The numeraire good Y is produced by perfectly competitive firms and the goods $X(s)$ are produced under conditions of imperfect competition and increasing returns to scale.[2] The household owns a set of domestic firms which will be specified further below. We denote the household ´s profit income by Π. Next to profit income, the household receives a lump sum transfer from the government if taxes collected by the government exceed expenditures. Accordingly, if expenditures exceed tax revenue from other sources, the deficit is covered by lump sum taxes on households. The transfer the household receives from the government

[2]The preference structure in (1) is used frequently in models with increasing returns and discrete choice problems (see e.g. Horstmann and Markusen (1992) or Markusen et al (1995)). It facilitates the analysis because it implies zero income effects and linear demand curves for $X(s)$. In section 5, we will discuss the implications of relaxing the assumption of linear demand curves.

is denoted by T. The household´s budget constraint is thus

$$\Pi + T = Y + \int_0^1 p(s)X(s)\sigma(s)ds \tag{2}$$

where $p(s)$ is the price of good $X(s)$. Maximizing (1) subject to (2) yields the inverse demand curves

$$p(s) = a - bX(s) \tag{3}$$

2.2 Firms

Each good $X(s)$, is produced by two firms and each firm is active in one sector s only. One of the two firms in each sector is located in country A and owned by the household residing in A. The other firm is initially located in country B and owned by residents of B. We assume that both firms only serve the market in A, i.e. we neglect that there will also be demand for consumption goods in B.[3] There are two possibilities for a country B firm to enter the market of country A. Firstly, a firm may simply serve the market via exports. In this case, the firm faces a transport cost and, possibly, import tariffs. We assume that the goods $X(s)$ can be traded internationally only at a per unit trade cost θ. Secondly, B-firms may set up a production facility in country A. We assume that doing so gives rise to a fixed cost $k(s)$ which differs across sectors. For all sectors, $k(s)$ is distributed over the interval $[\underline{k}, \overline{k}]$, with density $\phi(k)$ and a distribution function $\Phi(k)$. Without loss of generality, we assume that the marginal cost of producing $X(s)$ is equal to zero for all firms.

[3] An earlier version of this model assumed that A and B are symmetric. This adds notation but does not change any of the results we derive for country A.

2.3 The Government

The following analysis assumes that the tax policy of country B is given and focuses on country A.[4] The government of country A may use three tax instruments. Firstly, there is the lump sum tax or transfer to the household introduced above. Secondly, the government may tax or subsidize firms operating in A. As in the case of taxes or transfers to households, we assume that the government only uses lump sum taxes or subsidies for firms. Thirdly, the government may levy import tariffs. Allowing for tariffs as a policy instrument may be problematic because the use of tariffs is restricted under WTO rules and many countries are members of regional free trade agreements. In fact, increasing economic integration is not only due to falling transport costs but also to political agreements on tariff reductions. Therefore, the following analysis will also consider the case where countries cannot use tariffs. Moreover, we will consider the impact of an increase in economic integration due to coordinated tariff reductions.

2.4 Timing

Since firms and governments have to make various strategic decisions in this model, assumptions on timing are important for the analysis. We assume that decisions are taken in the following sequence of stages:

Stage 1: The government of country A sets profit taxes.

Stage 2: Firms from B decide whether or not to set up a production facility in A.

Stage 3: The government of A sets tariffs.

Stage 4: Firms set their quantities.

[4]The implications of endogenizing the tax policy of country B are discussed in section 5.

The assumption that location decisions are made before quantities are chosen is standard (see e.g. Norman and Motta (1996)) and needs no further discussion. The timing of decisions on profit taxes and tariffs is more problematic. The assumption that the government sets its profit tax at stage 1, before firms have made their location decision, implies that our analysis abstracts from commitment problems in profit taxes on direct investment. These problems have been studied extensively in the literature (see e.g. Konrad and Lommerud (2001)) and the present paper does not intend to contribute to this particular debate. In contrast to profit taxes, tariffs are assumed to be set after location decisions have been made. This sequence follows Haufler and Wooton (1999) who provide the following justification. Since firms are aware that governments may increase profit taxes after a firm has located in a country, they will only invest if the government may commit to an announced level of profit taxes. Indirect taxes or tariffs, in contrast, are not firm specific. Moreover, governments may have to adjust indirect taxes in response to unexpected changes in revenue needs. Therefore, commitment with respect to these instruments may be impossible.

3 Equilibrium

As usual, we derive the equilibrium in this model by backward induction. Since the analysis focuses on country A, we drop the country index in order to reduce notation unless misunderstandings may arise. At stage 4, firms have made their location choice and engage in Cournot competition. Each sector for the production of $X(s)$ is characterized by one of the following two regimes: In the first regime, which we label the *foreign investment regime*, the firm from country B has set up a production plant in country A. In the second regime, the firm from country B serves the market in country A via exports. We call this the *trade*

regime. Consider first the foreign investment regime. At stage 4, the fixed investment cost is sunk and both firms face the same marginal production cost. Therefore, the foreign investment regime is characterized by a symmetric duopoly. Denote the quantity supplied by the domestic firm by $x(s)^{AF}$ and that of the foreign firm by $x(s)^{BF}$. The superscript F refers to the foreign investment regime and the index A (B) refers to the ownership of the firm. The price of good $X(s)$ under the foreign investment regime is given by

$$p(s)^F = a - b(x(s)^{AF} + x(s)^{BF}) \tag{4}$$

Firms take the quantity supplied by the other firm as given and maximize the profit functions

$$\pi^{jF} = p(s)^F x(s)^{jF} - \tau^A \tag{5}$$

$j = A, B$, where τ^A is the profit tax in country A. The equilibrium quantities are

$$x(s)^{AF} = x(s)^{BF} = \frac{a}{3b} \tag{6}$$

and the equilibrium price is

$$p(s)^F = \frac{a}{3} \tag{7}$$

Profits net of (sunk) fixed costs are

$$\pi(s)^{jF} = \frac{a^2}{9b} - \tau^A, \tag{8}$$

$j = A, B$. Consider next the trade regime, where the firm from country B exports to country A. This regime is characterized by an asymmetric duopoly. The firm from country B faces a marginal cost which is equal to the trade cost plus the tariff $\theta + t^A$ whereas the

firm residing in country A has zero marginal costs. The profit of the country B firm from exporting to country A is given by[5]

$$\pi^{BT} = p(s)^T x(s)^{BT} - (\theta + t^A) x(s)^{BT} \tag{9}$$

The equilibrium quantities are now given by

$$x(s)^{AT} = \frac{a + \theta + t^A}{3b} \tag{10}$$

and

$$x(s)^{BT} = \frac{a - 2(\theta + t^A)}{3b} \tag{11}$$

The equilibrium price is

$$p(s)^T = \frac{a + \theta + t^A}{3} \tag{12}$$

Finally, equilibrium profits are

$$\pi(s)^{AT} = \frac{(a + \theta + t^A)^2}{9b} - \tau^A \tag{13}$$

and

$$\pi(s)^{BT} = \frac{(a - 2(\theta + t^A))^2}{9b} \tag{14}$$

Equations (10) and (11) show that, under the trade regime, the foreign firm has a smaller market share than the domestic firm. Not surprisingly, the profit of the domestic firm is increasing in trade costs and tariffs. Note that quantities, prices and profits are identical

[5] The following formula abstracts from profit taxes the firm may have to pay in country B. As we point out in section 5, endogenizing the tax policy of B would lead to the result that profit taxes in B are zero. Including profit taxes in B would only add notation.

in all sectors under the foreign investment regime. The same holds for the trade regime. For notational simplicity, the following analysis therefore drops the sector index s and only distinguishes between sectors under the foreign investment regime and sectors under the trade regime.

At stage 3, firm location is given and country A sets import tariffs. In principle, these tariffs could be sector specific. But since quantities, prices and profits are the same in all sectors under the trade regime, the optimal tariff will also be the same. Denote the number of sectors under the trade regime by m^T. Overall profits of firms owned by residents of country A are given by

$$\Pi = (m - m^T)\pi^{AF} + m^T\pi^{AT} \tag{15}$$

The government budget constraint is

$$T = (2m - m^T)\tau^A + t^A m^T x^{BT} \tag{16}$$

Using (2), (15), (16), and the results derived in the analysis of stage 4 in (1), we can write the utility of the representative household in country A as

$$\begin{aligned} U_A \;=\; & m^T[a - \frac{1}{2}b(x^{AT} + x^{BT}) - p^T](x^{AT} + x^{BT}) \\ & +(m - m^T)[a - \frac{1}{2}b(x^{AF} + x^{BF}) - p^F](x^{AF} + x^{BF}) \\ & +m^T t^A x^{BT} + (2m - m^T)\tau^A + (m - m^T)\pi^{AF} + m^T\pi^{AT} \end{aligned} \tag{17}$$

The first two terms on the right hand side of (17) include the consumer surplus from the sectors under the trade regime and the foreign investment regime, the third term represents tariff revenue, the fourth term is profit tax revenue and the last two terms stand for profits of domestically owned firms. Using the results derived in equations (6)-(8) and (10)-(14),

this can be reduced to

$$U_A = m^T[\frac{2a^2 + (\theta + t^A)^2}{6b} + t^A\frac{(a - 2(\theta + t^A))}{3b}] + (m - m^T)[\frac{a^2}{3b} + \tau^A] \tag{18}$$

Maximizing (18) over t^A yields

$$t^A = \frac{a - \theta}{3} \tag{19}$$

It turns out that the optimal tariff is increasing in the taste parameter a and decreasing in trade costs. Country A levies a tariff for two reasons. Firstly, the tariff increases the profits of the domestic firms at the expense of the foreign firms. Secondly, part of the burden of the tariff is borne by foreign firms, not by domestic consumers, because these firms have market power. The optimal tariff trades off these advantages against the loss in consumer surplus caused by the price increase triggered by higher tariffs.[6]

Consider next stage 2, where firms from country B decide whether or not to set up a production plant in country A. They will invest in country A if the profit (π^{BF}) minus

[6]The tariff given by (19) is optimal, given that $x_i^{BT} > 0$. An option not considered so far is the possibility for country A of setting a prohibitive tariff, which would give rise to a monopoly to the domestic firm in the domestic market. It is easy to show, though, that country A´s surplus in this case is always lower than the surplus generated under a duopoly market, so that we can neglect the option of setting a prohibitive tariff. Intuitively, the tariff can always be set so that the quantity supplied and, hence, the profit of the foreign duopolist is negligible. In this case, the quantity supplied by the domestic firm will be higher than the quantity supplied if the firm is a monopolist. Therefore, the surplus for country A generated by a sector with a domestic monopolist is always lower than the surplus generated in the presence of a foreign competitor. This implies that country A cannot gain from setting a prohibitive tariff.

the fixed investment cost k_i is higher than the profit under the trade regime (π^{BT}). As a result, all firms below a critical fixed cost level which we denote by k^* will choose to invest whereas all firms with higher fixed costs will prefer to serve the market of country A via exports. The critical fixed cost level is given by the equation $\pi^{BF} - k^* = \pi^{BT}$, which, using equations (8)-(14), can be written as

$$k^* = \frac{a^2}{9b} - \tau^A - \frac{(a - 2(\theta + t^A))^2}{9b} \tag{20}$$

For later use, note that (20) implies $k^* = k^*(\tau^A, \theta, t^A)$, with $\frac{\partial k^*}{\partial \tau^A} = -1 < 0$, $\frac{\partial k^*}{\partial \theta} = \frac{\partial k^*}{\partial t^A} = \frac{2(a-2(\theta+t^A))}{9b} > 0$. Not surprisingly, an increase in profit taxes in country A reduces foreign direct investment in A whereas an increase in trade costs or tariffs c.p. increases foreign direct investment. Consider finally the choice of the profit tax rate at stage 1. At this stage, the government takes into account that a change in its tax policy will also change the number of firms operating in the country. The government objective function can now be written as

$$U_A = \Phi[k^*(\tau^A, \theta, t^A)] \left(\frac{a^2}{3b} + \tau^A \right) + (1 - \Phi[k^*(\tau^A, \theta, t^A)]) \left(\frac{2a^2 + (\theta + t^A)^2}{6b} + t^A \frac{(a - 2(\theta + t^A))}{3b} \right) \tag{21}$$

The first term on the right hand side of (21) represents country A ´s consumer surplus plus profit taxes plus domestic profits generated by sectors under the foreign investment regime. The second term includes consumer surplus, tariff revenue and profits from the trade regime. Maximizing (21) over τ^A and using $\frac{\partial k^*}{\partial \tau^A} = -1$ yields the first order condition

$$\Phi[k^*(\tau^A, \theta, t^A)] - \phi(k^*) \left[\frac{a^2}{3b} + \tau^A - \frac{2a^2 + (\theta + t^A)^2}{6b} - t^A \frac{(a - 2(\theta + t^A))}{3b} \right] = 0 \tag{22}$$

This first-order condition has the following interpretation. In the absence of profit taxes ($\tau^A = 0$), and if $0 \leq t^A \leq \frac{a-\theta}{3}$, the term in brackets on the left hand side of (22) is negative.

This implies that, with $\tau^A = 0$, the country benefits more from sectors under the trade regime than sectors under the foreign investment regime. Under the trade regime, consumer surplus is lower than under the foreign investment regime but this is overcompensated by tariff revenue and higher profits of domestic firms. An inflow of foreign direct investment is only attractive if this investment can be taxed.[7] This explains why the optimal profit tax is positive. The optimal level of τ^A is determined by the following considerations. Firstly, a higher profit tax increases revenue from the existing firms. This effect is captured by the first term on the left hand side of (22). Secondly, a higher tax induces some firms to serve the domestic markets via exports, rather than producing within the country. This effect is represented by the second term on the left hand side of (22)

4 How does increasing economic integration affect profit taxes and foreign direct investment?

In this section, we ask how increasing economic integration caused by declining transport costs or a mandatory tariff reduction affects profit taxation and investment by foreign owned firms. We consider three experiments. We start with the simplest one, which is a reduction in trade cost, assuming that tariffs are not available as a policy instrument. The second experiment is a reduction in trade cost, assuming that country A may use tariffs as described in the preceding sections. Finally, the third experiment takes trade costs as

[7] Most of the literature on tariff jumping foreign investment argues that countries will be harmed by foreign direct investment (Brecher and Diaz-Alejandro (1978)). Our analysis shows that this view is not appropriate if foreign investment can be taxed. In a different theoretical framework, this point was first made by Dehejia and Weichenrieder (2001).

given and asks how a mandatory reduction in tariffs below the level preferred by country A will affect profit taxes and investment. In all cases, we focus on interior solutions, i.e. we assume that i) quantities supplied by firms from country B are positive under the trade regime and ii) some sectors operate under the trade regime and some sectors operate under the foreign investment regime ($\underline{k} < k^* < \overline{k}$). It follows from equation (20) that the first assumption requires $\theta < \frac{1}{2}$ for the case where tariffs are ruled out and $\theta < \frac{1}{4}$ in the presence of tariffs. The second asumption is satisfied if $\underline{k}$ is small enough and $\overline{k}$ is sufficiently large. In the following paragraphs, we focus on providing intuitive explanations for our results. The formal proofs are given in the appendix. Consider first the case where tariffs are ruled out ($t^A = 0$). Here, we may state:

Proposition 1 *In the absence of tariffs, a marginal reduction in transport costs leads to a decline in profit taxes. Foreign direct investment increases if* $\frac{4}{11}a < \theta < \frac{1}{2}a$ *and declines if* $\frac{4}{11}a > \theta$.

Proof: See the appendix.

The result in proposition 1 may be explained as follows. As pointed out in the preceding section, country A´s incentives to set profit taxes are determined by two factors. Firstly, increasing profit taxes is more attractive, the larger the number of foreign owned firms operating in the country. If trade costs decline, the number of foreign firms investing in A will also decline. This effect reduces profit taxes. Secondly, by increasing the profit tax, country A may increase the number of sectors operating under the trade regime. How does the decline in trade costs affects country A´s surplus from a sector under the trade regime, compared to the surplus under the foreign investment regime? A decline in transport costs c.p. makes the trade regime less attractive for country A. This is because a decline

in transport costs reduces the market share and, hence, the profits of the domestic firm. The decline in trade costs also increases consumer surplus, but this effect is insufficient to compensate for the business stealing effect. Since the trade regime becomes less attractive, relative to the foreign investment regime, country A reduces profit taxes. Of course, this result has been derived in a model which makes several restrictive assumptions, including linear demand and cost functions, the absence of domestic ownership of foreign firms or the assumption that the goods market is characterized by Cournot competition. The role of these assumptions for the finding in proposition 1 will be discussed further in section 5.

Interestingly, given the assumptions made, the reduction in profit taxes does not necessarily imply that foreign investment increases. Foreign direct investment is hump shaped in transport costs, i.e. it increases at high levels of transport costs but declines if transport costs are already low. Why is this the case? Foreign direct investment is affected by two forces. While, the decline in transport costs makes foreign investment less attractive, the decline in profit taxes makes it more attractive. At high levels of transport costs, the profit tax effect dominates, i.e. foreign investment increases. As trade costs decline further, the trade cost effect becomes stronger because the benefit from a decline in transport costs is proportional to the quantity of goods exported from B to A, x^{BT}. At high values of transport costs, x^{BT} is small, so that the benefit from the reduction in transport costs is small, compared to a given reduction in profit taxes. If transport costs decline further, x^{BT} increases, so that the benefit from declining transport cost increases. If transport costs fall below $\theta = \frac{4a}{11}$[8], the effect of the decline in transport costs dominates and foreign direct investment declines. Does a decline in transport costs have different effects if countries are

[8]Remember that the quantity imported to country B is positive as long as $\theta < a/2$.

allowed to levy tariffs? The answer is yes:

Proposition 2 *If country A may use tariffs as a policy instrument, a decline in transport costs leads to higher profit taxes. Foreign investment declines.*

Proof: See the appendix.

Proposition 2 shows that the question of whether or not country A may use tariffs is very important for the impact of a decline in trade costs. The change in profit taxes is now diametrically opposed to the case without tariffs. Why does this happen? The result is best understood by asking how the change in trade costs affects country A´s surplus from the trade regime. As in the case without tariffs, declining transport costs give rise to the business stealing effect explained above, which makes the trade regime less attractive. But the tariff now works against this effect. Country A reacts to a decline in transport costs by increasing the tariff by $dt^A = -\frac{1}{3}d\theta$ (see equation (19)). This increases the marginal costs of the foreign competitor and raises profits of domestic firms. At the same time, the higher tariff yields a revenue increase. Given this, the decline in transport costs makes the trade regime more attractive compared to the foreign investment regime. Therefore, country A increases profit taxes. The availability of the tariff thus explains the difference to the results in proposition 1. Given that profit taxes increase, it is not surprising that foreign investment declines.

Consider finally the effect of a reduction in tariffs which is imposed on country A. It is clear that, in order to be binding, the mandatory tariff reduction has to depart from a level $t^A \leq \frac{a-\theta}{3}$. Here, we may state

Proposition 3 *If a mandatory tariff reduction is imposed on country A, profit taxes decline.*

Foreign investment is constant if the reform departs from $t^A = \frac{a-\theta}{3}$ *and increases if the reform departs from* $t^A < \frac{a-\theta}{3}$.

Proof: See the appendix.

The effects of a mandatory tariff reduction are similar but not identical to those of a decline in trade costs. The difference is that foreign investment unambiguously increases whereas, in the case of a reduction in trade costs without tariffs, investment first increases and then starts to decline at lower levels of trade costs. This difference can be explained as follows. Note first that the reduction in tariffs makes the trade regime less attractive, relative to the foreign investment regime. The reduction in country A´s surplus from sectors under the trade regime is now even stronger because, next to the increase of the market share of foreign firms which reduces the profits of domestic firms, the tariff reduction has the additional effect of reducing tariff revenue accruing to country A. Therefore, country A reduces profit taxes.

But the interesting result is that foreign investment increases, even if the tariff reduction starts from low tariff levels. This result is diametrically opposed to the idea that tariff jumping investment should decrease if tariffs decline. So why does foreign investment increase in response to declining tariffs? The reason is that the reduction in profit taxes always overcompensates the tariff reduction. In the case of declining transport costs without tariffs, the profit reduction was insufficient to overcompensate the trade cost reduction at low trade costs and high quantities. This does not happen here because the higher quantities traded at lower tariffs also imply that the loss in public sector revenue caused by a given tariff reduction grows, so that the incentive to cut profit taxes also increases. Thus, as tariffs decline and quantities supplied by foreign firms under the trade regime increase,

the increment in profits under the trade regime grows, but the reduction of the profit tax also becomes larger. On balance, the profit tax reduction always dominates and foreign investment increases.

5 Discussion of the results and extensions

The most important result derived in this paper is the finding that profit taxes which are motivated by the existence of foreign firm ownership decrease as trade costs decline or if countries are subject to mandatory tariff reductions. The only scenario where we find increasing profit taxes assumes that countries may use tariffs without restrictions. In this case, our analysis predicts that tariffs will increase as nontariff trade costs decline. But this seems to be at odds with the empirical observation that tariffs have been reduced over the last decades. In most cases, the decline in tariffs is due to international trade agreements. For the case where tariff reductions are imposed on countries, our analysis implies that profit taxes decline. This result is interesting because it implies that international agreements on tariff reductions will intensify corporate tax competition.

What do these results add to the existing literature? The existing literature points out that, at a given degree of economic integration, the presence of foreign firm ownership implies that corporate taxes are higher than they would be in the absence of foreign firms. This result is not questioned by our model. It was deliberately constructed so that foreign firm ownership is the main reason to levy profit taxes. But the fact that foreign firm ownership is a reason to levy taxes does not imply that foreign firm ownership will prevent the erosion of corporate taxes as economic integration proceeds. Our analysis shows that increasing foreign firm ownership and declining profit taxes may occur simultaneously as a

result of increasing economic integration. This is consistent with the empirical observation that foreign direct investment has increased dramatically in the last two decades while effective average tax rates have declined.[9]

Of course, it has to be taken into account that these results have been derived in a model which makes several restrictive assumptions. In the following, we discuss the consequences of relaxing some of these assumptions and ask how our main result - corporate taxes decline if trade costs decline (proposition 1) - is affected. Firstly, we have assumed that both firms move simultaneously. Of course, other forms of strategic interaction are possible. In particular, one may ask what happens if one of the two firms acts as a Stackelberg leader. Assume that this is the firm from country A. In this case, it is straightforward to show that equilibrium quantities, prices and profits will change in both sectors. But the profits of country A firms in the trade sector still decline if trade costs decline, and consumer surplus increases, as in the base case. It turns out that declining trade costs again reduce the corporate tax. If the firm from country B acts as a Stackelberg leader, the sign of the effect is the same.[10]

Another important assumption is that firms setting up foreign subsidiaries do not sell equity to local owners. In the literature, several authors have pointed out that multinational firms may benefit from selling at least part of the equity of foreign subsidiaries to local residents (Olsen and Osmundsen (2001), Konrad and Lommerud (2001)) because this

[9] For a set of 16 OECD countries, Devereux et al. (2002, p. 465) report a decline in the weighted mean effective average tax rate from around 42% in 1982 to around 33% in 2001.

[10] The analysis runs along the same lines as in the base case, the only difference being that country A firms take into account the reaction function of country B firms (or vice versa). The derivation of the results reported here is available from the author on request.

reduces incentives for local governments to tax the profits generated by these firms. Of course, there must be a reason not to sell the firm ´s entire equity to local shareholders. If this is possible, the problem of foreign firm ownership disappears. Below, we will therefore briefly consider the case where residents of country A own a share $s^A < 1$ of country B firms. There are two other restrictive assumptions which we may relax jointly with the ownership issue: demand functions are linear and marginal costs are constant and equal to zero. What happens if we relax these assumptions? Assume that the utility function of the representative country A resident takes the form

$$U_A = Y + \int_0^1 u[X(s)]\sigma(s)ds$$

where $u[X(s)]$ is a standard, concave subutility function. This utility function implies that the inverse demand function for good $X(s)$ takes the general form $p(s) = u'[X(s)]$, with $p' = u''[X(s)] < 0$. Assume further that the variable production cost of firm j is given by the convex function $c^j(x^j)$, $j = A, B$. Profits of a country A firm under the trade regime are now given by $\pi^{AT} = p^T x^{AT} - c^A(x^{AT}) - \tau^A$. For country B firms, we have $\pi^{BT} = p^T x^{BT} - c^B(x^{BT}) - \theta x^{BT}$. The equilibrium in all markets under the trade regime is characterized by the optimality conditions $\pi^{jT}_{x^{jT}}(x^{AT}, x^{BT}) = 0$, $j = A, B$. Accordingly, the foreign investment regime satisfies $\pi^{jF}_{x^{jF}}(x^{AF}, x^{BF}) = 0$, $j = A, B$. The location decision of country B firms is again given by the condition $\pi^{BF} - k^* = \pi^{BT}$. Consider finally the optimal tax policy, which is set at stage 1. Given that residents of country 1 own a share s^A of foreign firms[11], welfare of country A residents is

[11] If domestic ownership of foreign firms is to influence tax policy, the ownership decision obviously has to be taken before the government sets tax policy. It is straightforward to show in our model that an increase in s^A reduces the corporate tax. Firms will therefore always choose the maximum

$$U_A = \int_{\underline{k}}^{k^*(\tau^A,\theta)} [u[X^F] - p^F X^F + \pi^{AF} + s^A(\pi^{BF} - k) + 2\tau^A]\phi(k)dk \qquad (23)$$
$$+ \int_{k^*(\tau^A,\theta)}^{\overline{k}} [u[X^T] - p^T X^T + \pi^{AT} + \tau^A + s^A\pi^{BT}]\phi(k)dk$$

The first order condition for the optimal corporate tax rate can be expressed as

$$\Phi[k^*(\tau^A,\theta)](1-s^A) - \phi(k^*)\left[u[X^F] - p^F X^F + \pi^{AF} + \tau^A - [u[X^T] - p^T X^T + \pi^{AT}]\right] = 0 \qquad (24)$$

where we have used $\pi^{BF} - k^* = \pi^{BT}$. Does a decline in trade costs still lead to a reduction of the profit tax? Differentiating (24) yields, after some rearrangements:

$$\frac{d\tau^A}{d\theta} = \frac{1}{(2-s^A)}\left((1-s^A) + \frac{p'}{\Delta}[(x^{AT} - sx^{BT})(p' + p''x^{AT}) + p''x^{AT}x^{BT} + x^{BT}c^{A\prime\prime}(x^{AT})]\right) \qquad (25)$$

where $\Delta = \pi^{AT}_{x^{AT}x^{AT}}\pi^{BT}_{x^{BT}x^{BT}} - \pi^{AT}_{x^{AT}x^{BT}}\pi^{BT}_{x^{BT}x^{AT}}$. In general, the right hand side of (25) may be positive or negative, which implies that the result in proposition 1, according to which τ^A is reduced if θ declines, does not necessarily hold in a more general framework. But there are some interesting special cases which confirm our earlier findings. Firstly, assume as in the preceding sections that cost and demand functions are linear, but let s^A be positive. In this case, it is easy to check that the right hand side of (25)) is strictly positive, i.e. declining trade costs also reduce corporate taxes if foreign firms are partly owned by domestic citizens. Secondly, assume that the cost function of country B firms is extremely convex, so that $c^{B\prime\prime}(x^{BT})$ is very large. In this case, Δ approaches infinity and

possible ownership share of domestic residents.

we again find that $\frac{d\tau^A}{d\theta} > 0$. This is a case where the effect of declining trade costs on x^{BT} is so small so that the business stealing effect and the change in consumer surplus are negligible. The decline in profit taxes occurs because the decline in trade costs reduces the number of country B firms which invest in country A, so that the benefit from a marginal tax increase becomes smaller.[12]

Apart from the assumptions on ownership and cost and demand functions, there are several other limitations of the analysis which should briefly be discussed. Firstly, we have assumed that the tax policy of country B is given. It is straightforward to extend the model by allowing country B to influence the location decision of firms from country B. For instance, country B could tax or subsidize firms if they locate in B. In this case, it would be natural to assume that countries A and B simultaneously decide on profit taxes or subsidies at stage 1. It is easy to show, however, that country B would not distort the location decisions of domestic firms, so that the results derived above would not change. The reason is that, given the level of profit taxes in country A, the decision of domestic firms whether or not to invest in A is efficient from the perspective of country B.

Secondly, profit taxes have simply been modeled as lump sum taxes. Of course, real world corporate tax systems are much more complex. But our rather simple approach does capture the idea that foreign direct investment will decline if the "effective average tax rate" on profits in country A changes. A possible extension of our analysis would include

[12]It is also possible to construct examples where profit taxes increase if trade costs decline. It is easy to check that this happens, for instance, if s^A is close to unity and the cost function of country A firms is very convex. In this case, the increase in consumer surplus dominates the business stealing effect and determines the overall change in τ^A.

tax rates and tax bases as separate instruments. This would allow country A, for instance, to manipulate quantities supplied by domestic and foreign firms in the trade sector. The impact of declining trade costs on the overall level of corporate taxes may then be different.[13]

Finally, our analysis assumes away the impact of foreign direct investment on local factor markets, in particular labour markets. There is no doubt that the creation of employment opportunities is an important reason for countries to compete for foreign direct investment. But exploring this issue is beyond the scope of this paper.

6 Conclusions

This paper asks how increasing economic integration will affect profit taxes in a model where profit taxation is motivated by foreign firm ownership and the number of foreign owned firms is endogenous. It turns out that economic integration driven by declining transport costs or mandatory tariff reductions may lead to an erosion of profit taxes, even if foreign firm ownership increases. Therefore, the plausible idea that foreign firm ownership may be a reason to levy corporate taxes in an open economy does not necessarily imply that corporate taxes will rise as economic integration proceeds. One case where we find increasing profit taxes is a scenario where transport costs decline and countries may use import tariffs without restrictions. Since the use of tariffs is increasingly restricted by international and supranational free trade agreements, this scenario is unlikely to be empirically relevant.

[13] In our model, it can be shown that, if country A may subsidize output of domestic firms in the trade sector, the subsidy will be set so that the price is reduced to marginal costs and exports from country B disappear. In this case, trade costs do not affect corporate taxes. The analysis of this case is available from the author on request.

The result on the role of tariffs does show, however, that agreements on the reduction of tariffs may also lead to more agressive competition in corporate taxation. These results have been derived in a model which makes some restrictive assumptions on the shape of cost and demand functions, the corporate tax system, ownership structures and the form of strategic interaction between firms. We have investigated the relevance of some of these assumptions. But there are several issues which should be addressed in greater detail in future research. In particular, it would be interesting to extend the framework used here by considering a more sophisticated model of the corporate tax system. Such a model would include tax rates and tax bases as separate instruments, and it would take into account double taxation agreements and other institutional aspects of real world tax systems.

Appendix

In this appendix, we give the proofs of propositions 1-3.

Proof of Proposition 1:

Proposition 1 is based on the assumption $t^A = 0$. Given this, the first-order condition for the optimal profit tax in equation (22) becomes

$$\int_{\underline{k}}^{k^*(\tau^A,\theta)} \phi(k)dk - \phi(k^*)\left[\frac{a^2}{3b} + \tau^A - \frac{2a^2+\theta^2}{6b}\right] = 0 \tag{26}$$

where

$$k^*(\tau^A,\theta) = \frac{a^2}{9b} - \tau^A - \frac{(a-2\theta)^2}{9b} \tag{27}$$

(27) determines τ^A as a function of θ. Totally differentiating (27) yields

$$\frac{d\tau^A}{d\theta} = \frac{4a-5\theta}{18b} \tag{28}$$

The right hand side of (28) is positive if $\theta < \frac{4}{5}a$. But it has been assumed that the quantity supplied by the foreign firms under the trade regime is positive ($x^{BT} > 0$) , which requires $\theta < \frac{1}{2}a$. It follows that $\frac{d\tau^A}{d\theta} > 0$. The effect on the critical fixed cost level is given by

$$\frac{dk^*}{d\theta} = \frac{\partial k^*}{\partial \theta} + \frac{\partial k^*}{\partial \tau^A}\frac{d\tau^A}{d\theta} = \frac{4a - 11\theta}{18b} \tag{29}$$

We thus have an increase of foreign direct investment in response to declining trade costs ($\frac{dk^*}{d\theta} < 0$) if $\frac{4}{11}a < \theta < \frac{1}{2}a$ and a decline in investment ($\frac{dk^*}{d\theta} > 0$) if $\theta < \frac{4}{11}a$. Q.E.D.

Proof of proposition 2:

Given that $t^A = \frac{a-\theta}{3}$, the first-order condition for the optimal profit tax in equation (22) is

$$\int_{\underline{k}}^{k^*(\tau^A,\theta)} \phi(k)dk - \phi(k^*)\left[\tau^A - \frac{(a+2\theta)^2 + 2(a-\theta)(a-4\theta)}{54b}\right] = 0 \tag{30}$$

where

$$k^*(\tau^A, \theta) = \frac{a^2 - (a-4\theta)^2}{81b} - \tau^A \tag{31}$$

Totally differentiating (31) yields

$$\frac{d\tau^A}{d\theta} = -\frac{(a-4\theta)}{162b} \tag{32}$$

Given that $t^A = \frac{a-\theta}{3}$ a positive quantity supplied by the foreign firms under the trade regime ($x^{BT} > 0$) requires $\theta < \frac{1}{a}a$. It follows that $\frac{d\tau^A}{d\theta} < 0$. The effect on the critical fixed cost level is given by

$$\frac{dk^*}{d\theta} = \frac{\partial k^*}{\partial \theta} + \frac{\partial k^*}{\partial \tau^A}\frac{d\tau^A}{d\theta} = \frac{17(a-4\theta)}{162b} > 0, \tag{33}$$

which implies that foreign investment declines if θ declines. Q.E.D.

Proof of proposition 3:

The first order condition for the optimal profit tax is

$$\int_{\underline{k}}^{k^*(\tau^A,\theta,t^A)} \phi(k)dk - \phi(k^*)\left[\frac{a^2}{3b} + \tau^A - \frac{2a^2+(\theta+t^A)^2}{6b} - t^A\frac{(a-2(\theta+t^A))}{3b}\right] = 0 \quad (34)$$

where t^A is now an exogenous parameter and

$$k^*(\tau^A,\theta,t^A) = \frac{a^2}{9b} - \tau^A - \frac{(a-2(\theta+t^A))^2}{9b} \quad (35)$$

Totally differentiating (35), holding constant the transport cost ($d\theta = 0$) yields

$$\frac{d\tau^A}{dt^A} = \frac{7a-11\theta-17t^A}{18b} \quad (36)$$

At $t^A = \frac{a-\theta}{3}$, (36) becomes $\frac{d\tau^A}{dt^A} = \frac{4(a-4\theta)}{54b} > 0$. Since proposition 3 is based on the assumption $t^A \leq \frac{a-\theta}{3}$, and given that the right hand side of (36) is decreasing in t^A, it follows that $\frac{d\tau^A}{dt^A} > 0$. The effect on k^* is given by

$$\frac{dk^*}{dt^A} = \frac{\partial k^*}{\partial t^A} + \frac{\partial k^*}{\partial \tau^A}\frac{d\tau^A}{dt^A} = \frac{t^A - \frac{1}{3}(a-\theta)}{162b} \leq 0. \quad (37)$$

Q.E.D.

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