

Why Corporate Taxes May Rise: The Case of Economic Integration^α

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Abstract

Almost all the literature on tax competition in the presence of multinationals (MNCs) ignores the combined effect of profit shifting and economic integration (i.e., a reduction in trade costs) on equilibrium capital taxes. In this paper we set up a two-country model with trade costs to analyze the relationship between economic integration and equilibrium taxes. We find that economic integration leads to higher equilibrium tax rates for sufficiently low levels of trade costs if multinationals are owned by home country residents.

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1 Introduction

A prominent feature of what is often referred to as internationalization is the strong growth of foreign direct investment (FDI) throughout the world with surges in annual growth rates of 25 and 32 percent in the late 80s and 90s. This trend has been accompanied by a rise in trade between affiliates of multinationals located in different countries to the extent that about 33 percent of world trade was intra-firm trade in 1993 (Markusen (2002, ch1)).

The rising importance of multinationals and intra-firm trade in the world economy has at least three implications for the corporate tax base: (1) profits incurred in a given country may not be received by domestic residents; (2) a larger share of corporate income in any given country will stem from activities by affiliates of foreign multinationals; (3) the corporate tax base becomes more sensitive to international differences in tax rates. The first point indicates that internationalization entails more international ownership of firms. The second and third points, contrary to popular belief, do not necessarily pertain to the choices made by multinationals as to where they undertake FDI, but to the fact that the sheer volume of intra-firm trade allows multinationals to shift profits to low tax countries by under- or over-invoicing intra-firm transactions. Empirical evidence on the importance of income shifting and transfer pricing is well documented (see e.g. Weichenrieder (1996), Hines (1999), and Gresik (2001)). The problem posed by profit shifting for the fiscal autonomy of countries seemingly depends on the volume of trade and thus trade costs, since a substantial part of intra-firm trade is in goods where arm's length prices are not easily established (see Markusen (2002, ch1.)).

The literature on tax competition in the presence of multinationals that is of relevance to this paper can be divided into two. The first set of papers studies how transfer pricing affects tax policy. Mansori and Weichenrieder (2001) and Raimondos-Møller and Scharf (2002) model transfer pricing regulations by two governments and investigate how transfer pricing affects equilibrium tax rates. Elitzur

and Mintz (1996) discuss corporate tax competition under alternative transfer pricing rules when transfer pricing affects managerial incentives as well as the overall tax payment. Haufer and Schjelderup (2000) investigate the optimal taxation of corporate profits when governments can choose both the tax rate and the base of the corporate tax, and multinationals shift profits by transfer pricing. Finally, Smart and Mintz (2001) study corporate income taxation when firms operating in multiple jurisdictions can shift income by using financial planning strategies. Most of these papers embed trade explicitly, but none of them incorporates the effect of economic integration, in terms of reduced trade costs, on the outcome of their analysis. The second set of papers ignores transfer pricing, but examines how the structure of ownership affects tax policy in the presence of multinationals. A benchmark result is that increased foreign ownership leads to higher equilibrium taxes. As shown by Huizinga and Nielsen (1997) and more recently by Olsen and Osmundsen (2001) in a setting of asymmetric information, the rise in taxes can be explained by the incentive to shift part of the tax burden on to foreigners.

The purpose of this paper is to bridge the gap between the two strands of literature by developing a model of tax competition in the presence of multinationals and profit shifting, where the corporate tax base is partly foreign owned and the tax base endogenously determined by the tax rates set by each government. Moreover, we aim at answering one major question that so far has been left unresolved: How does economic integration, here taken to imply a reduction in trade barriers, affect equilibrium taxes? To answer this question we use a two-country model with trade costs, and assume for simplicity that each country is host to a multinational firm (henceforth MNC) producing a single consumer good. The two MNCs serve their home markets, but also export goods to their foreign sales offices unless trade costs are too high. Each government sets taxes so as to maximize national welfare, taking into consideration the strategic choices of the multinationals and their ability to shift profits. We demonstrate that a reduction in trade barriers between countries reduces taxes in the tax competition equilibrium if MNCs are owned by residents of

a foreign country, while it increases equilibrium taxes if MNCs are owned by home country residents.¹

The paper is organized as follows. Section 2 presents the modelling framework, while section 3 explores the impact of economic integration on equilibrium tax rates. Section 4 addresses the issue of international cross ownership and the interaction between cross ownership structures, economic integration and tax rates. Finally, section 5 offers some concluding remarks.

2 The modelling framework

The purpose of this paper is to analyze the relationship between economic integration, corporate taxation, and transfer pricing of multinational corporations (MNCs). We therefore abstract from MNCs' localization decisions, i.e. the decision of whether or not to set up an affiliate abroad, and employ a model that has two identical countries, A and B, and two identical multinational companies.² Multinational company MNC_i has headquarters with production facilities in country i and a sales office in country j ($i \in j$). Part of the production in country i is sold in country i and the rest is exported to the sales office in country j : Domestic and foreign profits before tax for MNC_i are equal to π_{ii} and π_{ij} , respectively, where the first subscript indicates where the headquarters are located and the second where profits are derived. Aggregate profit before tax for MNC_i is $\pi_i = \pi_{ii} + \pi_{ij}$ ($i, j = A, B; i \in j$).

The MNCs produce homogenous goods, and face the inverse demand curve

$$p_i = 1 - \alpha_i (x_{ii} + x_{ji}); \quad (1)$$

¹Home country refers to the country where the MNC's parent company is located.

²In some industries the long-run localization pattern of multinational companies may partly be determined by tax incentives (e.g. for export-oriented MNCs) and partly by access to specific factors of production. Our focus, however, is on MNCs where the foreign subsidiaries are primarily set up to serve local markets, and we therefore treat the number of MNCs and affiliates in each country as exogenous.

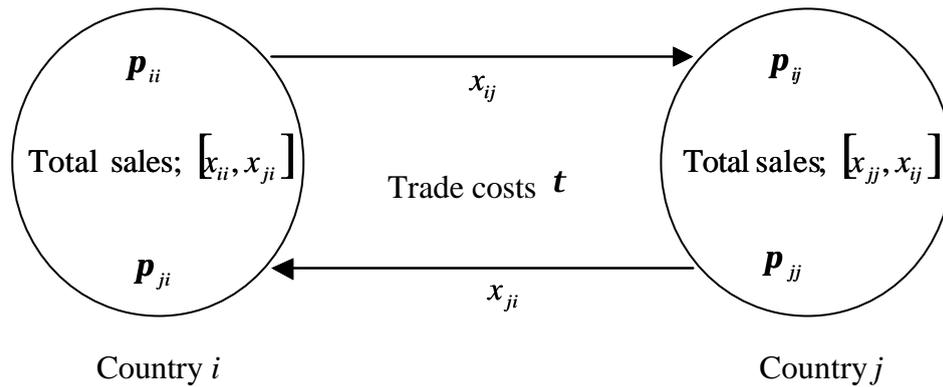


Figure 1: Figure 1: The model

where p_i is the price in country *i*; and x_{ii} and x_{ji} denote quantities supplied by the domestic and foreign MNC, respectively. Without any effect on the main conclusions of this analysis we assume for simplicity that marginal costs of production are equal to zero.

The foreign sales office of each MNC is charged g_i for each unit that it buys from its parent. Since marginal costs are zero, it follows that the transfer price is higher (lower) than true production costs if $g_i > 0$ ($g_i < 0$): In addition to the transfer price, the foreign affiliate must also pay a trade cost $t > 0$ for each unit it receives from its headquarters. We emphasize that trade costs in our setting should be interpreted as a synthetic measure of a wide range of barriers to trade including transport costs, costs of frontier formalities, and differing product standards. We do not consider income generating tariffs, as these are typically of limited importance in the trade between industrialized countries. The model is illustrated in Figure 1.

The transfer price is potentially an instrument that the MNCs can use to shift profit from one country to the other in order to save taxes. It is assumed that the good is specialized, so that the true cost of exporting cannot be directly observed by tax authorities. But, in line with most of the literature on transfer pricing we make the realistic assumption that it is costly to conceal deviations in the transfer price from the true cost of production. More specifically, we assume that the concealment

cost function is strictly convex, and equal to $C_i = \pm g_i^2 x_{ij}$ so it is equally expensive to manipulate the transfer price upwards as downwards: This assumption can be interpreted either as an increased probability of detection by the tax authorities (see, e.g. Kant, 1988) or as costs that need to be incurred in order to conceal the true price of the product for example by hiring of lawyers or accountants (see, e.g., Haußer and Schjelderup, 2000).³

We can now express profit before taxes as

$$\pi_{ii} = p_i x_{ii} + g_i x_{ij} \pm g_i^2 x_{ij}; \quad (2)$$

while the profit level of the foreign plant equals

$$\pi_{ij} = (p_j - \tau_j - g_j) x_{ij}; \quad (3)$$

Total profits for MNC_i before taxes are thus

$$\pi_i = \pi_{ii} + \pi_{ij} = p_i x_{ii} \pm g_i^2 x_{ij} + (p_j - \tau_j) x_{ij}; \quad (4)$$

and this equation shows that manipulation of the transfer price is intrinsically wasteful.

We assume that the countries use separate accounting as foundation for their corporate tax system, i.e. each country imposes a tax on the profits generated within its borders. The aim of this tax code is to identify the precise receipts and expenditures attributable to the corporation's activities in each jurisdiction. Although repatriated profits in principle are taxed in the country of residence, there is general agreement that due to deferral possibilities and limited tax credit rules, the source principle of taxation is effectively in operation in most OECD countries (Keen, 1993, and Tanzi and Bovenberg, 1990). Taking this into account, global after tax profits of a multinational firm with headquarters in country *i* are

$$\pi_i = (1 - \tau_i) \pi_{ii} + (1 - \tau_j) \pi_{ij}; \quad (5)$$

³The latter interpretation implies that tax authorities may not even know that these costs are related to transfer pricing decisions by the multinational.

We consider a game with two stages. In the first stage the two countries simultaneously set their tax rates, t_A and t_B : In the second stage the headquarters set the transfer prices to their foreign affiliates, and compete à-la Cournot in the two segmented end-user markets.

Stage 2: In the second stage, the multinational firm with its parent company in country i maximizes (5) with respect to x_{ii} , x_{ij} and g_i ; taking the quantities supplied by the other multinational firm (i.e., MNC_j) and the tax rates as given. Using equations (1), (2) and (3) we find that differentiating (5) with respect to g_i gives

$$\frac{\partial \pi_i}{\partial g_i} = 0 \Rightarrow g_i = \frac{t_j - t_i}{2 \pm (1 - t_i - t_j)}; \quad (6)$$

which shows that MNC_i wants to underinvoice its exports ($g_i < 0$) and shift profits to country j if $t_i > t_j$. Similarly, an incentive for overinvoicing arises when $t_i < t_j$: We further see that the firm will shift all profits to the low-tax country if it is costless to manipulate the transfer price ($\pm = 0$), whilst it will set the transfer price equal to marginal cost if it is prohibitively costly to manipulate the transfer price ($\pm = 1$); or if $t_i = t_j$ (in which case no profit shifting motive exists). Note that the transfer price is independent of trade cost, ζ :

Differentiating (5) with respect to x_{ii} and x_{ij} we obtain the first order conditions for x_{ii} and x_{ij} . Solving this simultaneously for the two MNCs and using (6), allow us to derive the following expressions for home sales and exports:

$$\frac{\partial \pi_i}{\partial x_{ii}} = 0 \Rightarrow x_{ii} = \frac{1 + \zeta}{3} + \frac{1}{12 \pm (1 - t_i - t_j)} \frac{(t_i - t_j)^2}{(1 - t_i - t_j)}, \quad (7)$$

$$\frac{\partial \pi_i}{\partial x_{ij}} = 0 \Rightarrow x_{ij} = \frac{1 - 2\zeta}{3} + \frac{1}{6 \pm (1 - t_i - t_j)} \frac{(t_i - t_j)^2}{(1 - t_i - t_j)}; \quad (8)$$

Since the firm can always choose to set $g_i = 0$; the marginal profit of exports for firm i is higher when it can manipulate the transfer price ($\pm < 1$) as opposed to when it is unable to do so (i.e., when $\pm = 1$). Thus, we may state:

Lemma 1: When $\alpha \in [0; 1)$ and $t_i \leq t_j$; ...rm i sets $g_i \leq 0$ and exports more than if it were prohibitively costly to engage in transfer pricing (i.e., $\alpha = 1$; $g_i = 0$).

Proof: See the Appendix.

Equations (7) and (8) show that a decrease in trade costs (α) increases exports and thus import competition, and as a result, domestic sales fall. If it is prohibitively expensive to manipulate the transfer prices ($\alpha = 1$) or if the countries levy the same taxes ($t_i = t_j$) we have that⁴

$$x_{ii}^* = \frac{1 + \alpha}{3}; \quad \text{and} \quad x_{ij}^* = \frac{1 - \alpha - 2\alpha}{3}; \quad (9)$$

which means that equilibrium quantities (denoted by an asterisk) are independent of tax rates. This result is a variation of the well-known result in public finance stating that if true profits equal taxable profits, the distortionary effect of the tax vanishes. The usefulness of this property in the symmetric equilibrium will become clear later.

Stage 1: At the first stage each government sets its tax rate in order to maximize national welfare, taking the taxes of the other country as given. In order to see how the tax equilibrium is affected by various ownership constellations we define $\theta \in [0; 1]$ as the share of each multinational that is owned by domestic residents. The residual $(1 - \theta)$ is owned by residents of a third country. Welfare in country i is given by

$$W_i = T_i + \theta \pi_i + CS_i;$$

where CS_i is consumer surplus in country i . We note that tax income equals $T_i = t_i(\frac{1}{2}x_{ii} + \frac{1}{2}x_{ji})$ and that $\pi_i = (1 - t_i)\frac{1}{2}x_{ii} + (1 - t_j)\frac{1}{2}x_{ij}$; which allows us to rewrite the expression for welfare as

$$W_i = \underbrace{\theta \left(\frac{1}{2}x_{ii} + \frac{1}{2}x_{ij} \right)}_{(I)} + \underbrace{\theta t_i \frac{1}{2}x_{ii}}_{(II)} + \underbrace{t_i \frac{1}{2}x_{ji} + (1 - \theta) t_i \frac{1}{2}x_{ij}}_{(III)} + CS_i; \quad (10)$$

⁴Notice that there will be no trade if $\alpha = 1$:

The first term in equation (10) is the profit ownership effect (I), which shows that welfare in country i depends positively on the pre-tax rent that the domestic residents receive from MNC_i . The next two terms depend directly on the tax rates that the countries impose, and following the literature in public economics we label these terms the foreign tax exporting externality effect (II) and the home tax exporting externality effect (III).⁵ In general, tax-exporting externalities may occur in tax competition games where residents of one country earn some rents in another country. Each country will then have incentives to use the tax policy to capture some of these rents at the expense of other countries. In equation (10) two tax exporting externalities arise. The foreign tax exporting externality effect (II) arises because country j has an incentive to tax the profit that MNC_j makes in country i : This effect has a negative impact on welfare in country i : The home tax exporting externality (III) arises because country i can use taxes to shift some of the rents derived by foreign residents to the treasury of country i : Specifically, country i can tax foreigners through two channels; either by taxing the foreign affiliate located in country i (i.e., τ_{ji}); or by taxing the foreign share of the profits of MNC_i (that is, $(1 - \theta) \tau_{ii}$):

From equations (7) and (8) we find that $\frac{\partial x_{ii}^a}{\partial \tau_{ji}} = \frac{\partial x_{ji}^a}{\partial \tau_{ii}} = 0$ in the symmetric equilibrium. Thus, a small increase in the tax rates from a symmetric equilibrium will not have any effect on supplied quantities, and thereby no effect on consumer surplus. Hence, taxation only affects welfare through (I)-(III): From (10) it is apparent that the relative magnitudes of the three terms depend on the ownership structure (θ). If MNC_i is entirely owned by domestic residents ($\theta = 1$); then national welfare depends on MNC_i 's profits, the foreign tax exporting effect, and the taxing of the foreign affiliate of MNC_j . In contrast, if MNC_i is entirely owned by third country residents ($\theta = 0$); terms (I) and (II) vanish, and the effect of tax policy on welfare is entirely determined by the degree to which the government

⁵The labelling is a slight abuse of language, since the externalities turn up in the first-order conditions and not in the welfare expression as such.

can tax the foreign affiliate of MNC_j and third country shareholders of MNC_i (i.e., effect (III)):

The government in country *i* maximizes (10) with respect to t_i , taking t_j as given. In the appendix we show that in the symmetric equilibrium $\tau_{ij}^* = t_i = t_j$. This result implies that the impact of taxes on term (I) is zero. Invoking symmetry conditions on the first order conditions and defining $t^* = t_A^* = t_B^*$ in the symmetric equilibrium; the solution to the government's maximization problem gives equilibrium tax rate

$$t^* = \frac{(2\tau_i - 2\tau_j + 5\tau_j^2)\tau_i^{\otimes}(1 + \tau_j)^2}{(2\tau_i - 2\tau_j + 5\tau_j^2)\tau_i^{\otimes} + 3\tau_j - 6\tau_j\tau_i^{\otimes}(1 + \tau_j)^2} \quad (11)$$

From equation (11) it is straightforward to show that an increase in the foreign ownership of firms ($d\tau^{\otimes} < 0$), other things being equal, affects the equilibrium tax rate as follows

$$\frac{dt^*}{d\tau^{\otimes}} = \tau_i \frac{3\tau_j(1 - 2\tau_j)(1 + \tau_j)^2}{(2\tau_i - 2\tau_j + 5\tau_j^2)\tau_i^{\otimes} + 3\tau_j - 6\tau_j\tau_i^{\otimes}(1 + \tau_j)^2} > 0 \quad (12)$$

Equation (12) replicates the benchmark result in the literature (e.g., Huizinga and Nielsen (1997)) that the equilibrium tax rate increases when the foreign ownership share rises. The interpretation of this result is that the larger the share of the corporate tax base owned by residents of a third country, the greater is the share of the tax burden that can be shifted onto foreigners. Put differently, the more important the home tax exporting effect (III); the stronger is the incentive to raise the tax rate.

We now turn to examine how economic integration, taken to imply a reduction in trade barriers, affects the equilibrium tax rate - a question that, to our knowledge, has never before been examined in the tax competition literature.

3 Economic integration and equilibrium taxes

In order to investigate how the equilibrium tax rate is affected by economic integration it is convenient first to consider two special cases; one where MNC_i is fully

owned by residents of country i and one where both multinationals are owned by residents of a third country.

Domestic ownership ($\theta = 1$) We start by analyzing the case where MNC_i is fully owned by residents of country i ; in which case welfare can be written as

$$W_i = \underbrace{\left(\frac{1}{4}_{ii} + \frac{1}{4}_{ij} \right)}_{(I)} i + \underbrace{t_j \frac{1}{4}_{ij}}_{(II)} + \underbrace{t_i \frac{1}{4}_{ji}}_{(III)} + CS_i \quad (13)$$

Recall that in the symmetric equilibrium CS_i^s is independent of taxes, and the net impact of taxes on the term (I) is zero. Differentiating equation (13) with respect to t_i yields

$$\frac{\partial W_i^s}{\partial t_i} = \underbrace{t^s X_{ij}^s \frac{\partial g_i^s}{\partial t_i}}_{\partial(II)=\partial t_i} i + \underbrace{t^s X_{ji}^s \frac{\partial g_j^s}{\partial t_i}}_{\partial(III)=\partial t_i} i - \frac{1}{4}_{ji}^s = 0: \quad (14)$$

Before we discuss (14), it is useful to keep in mind that an increase in t_i induces MNC_i and MNC_j to shift profits to country j by under and overinvoicing exports, respectively. The first term in (14) shows that a higher t_i induces MNC_i to reduce its transfer price by $\partial g_i^s = \partial t_i$ per unit that it exports to its affiliate in country j : The effect is to increase $\frac{1}{4}_{ij}^s$, thus allowing the foreign country to export more of its taxes to residents of country i . The last term in (14) is the change in country i 's ability to shift tax burdens onto foreigners and consists of two effects: (a) The rise in t_i induces the foreign MNC_j to increase its transfer price by $\partial g_j^s = \partial t_i > 0$ per unit on the goods it exports to its affiliate in country i : This lowers $\frac{1}{4}_{ji}^s$ and reduces the scope for taxing foreigners. (b) A higher tax rate in country i - for constant transfer price - allows country i to tax profits derived by foreigners harder, thus increasing welfare. To sum up, the profit shifting effect following an increase in t_i has a detrimental impact on welfare in country i , while the direct effect on tax revenue has a positive welfare effect. By substituting the equilibrium values of $\partial g_i^s = \partial t_i^s$ and $\partial g_j^s = \partial t_i^s$ and using symmetry ($t_i^s = t^s$) in (14) we can express the welfare effects more explicitly

as

$$\frac{\partial W_i^a}{\partial t_i} = \underbrace{\frac{\mu_{1i} - 2\zeta}{3} \frac{\mu_{1i} - 1}{\{z \pm (1 - t^a)\}}}_{\text{profit shifting}} + \underbrace{\frac{\mu_{1i} - 2\zeta}{3} \frac{\mu_{1i} - 2}{\{z\}}}_{\text{direct revenue effect}} = 0: \quad (15)$$

In equation (15) we have grouped the detrimental effects of profit shifting on welfare in the first term, and the direct effects on tax revenue from levying a higher tax on foreigners in the second term. From the first term of (15) we see that a reduction in trade costs increases the amount of profits shifted away from country i : This reduces the scope for home tax exporting, and increases tax exporting by the foreign country. The second term reflects the fact that economic integration increases the foreign affiliate's market share and thus its profits in country i ; thereby allowing country i to export more of its tax burden to the foreign firm. Intuitively, since the profit shifting implies a loss of tax base it suggests that t^a is decreasing when trade costs (ζ) fall, while the direct revenue effect points to a benefit of raising t^a when trade costs are reduced. From (15) we derive explicit expressions for the equilibrium tax rate and the impact of economic integration:

$$t^{j@=1} = \pm \frac{1 - 2\zeta}{3 + \pm(1 - 2\zeta)}; \quad \text{and} \quad \frac{d t^{j@=1}}{d \zeta} = \pm \frac{6}{[3 + \pm(1 - 2\zeta)]^2} < 0 \quad (16)$$

which allows us to state:

Proposition 1: Economic integration increases the equilibrium corporate tax rate (t^a) if MNC_A and MNC_B are fully owned by residents of country A and B; respectively.

The reason for the rise in equilibrium tax rates is that the direct revenue effect dominates the profit shifting effect. From (16) it can further be seen that as trade costs (ζ) go to zero and the maximum tax level is reached, the equilibrium tax rate is a function of the mobility of the tax base (\pm) only, that is, $t^a = \pm/(3 + \pm)$: Hence, the more mobile the tax base (i.e., the lower is \pm) the lower is the equilibrium tax rate.

Foreign ownership ($\theta = 0$) When the multinationals are owned by residents of a third country, welfare in country i is given by

$$W_i = CS_i + \underbrace{t_i \frac{1}{3} \mu_{ji} + t_i \frac{1}{3} \mu_{ij}}_{(11)} \quad (17)$$

It is useful to note that in this case corporate income is fully received by foreigners so only the home tax exporting effect remains. This effect is now made up by profits of the foreign affiliate of MNC_j located in country i ; and the parent company of MNC_i : Since all corporate income derived in country i is earned by foreigners, the tax exporting incentive suggests that a tax rate of 100 percent should be applied. However, such a rate would trigger transfer pricing and thus a reduction in μ_{ji}^* and μ_{ij}^* : Country i must therefore balance the incentive to shift taxes onto foreigners against a potential loss of tax revenue from profit shifting. Differentiating equation (17) gives

$$\frac{\partial W_i^*}{\partial t_i} = \underbrace{t_i^* X_{ji}^* \frac{\partial g_{ji}^*}{\partial t_i} + t_i^* X_{ij}^* \frac{\partial g_{ij}^*}{\partial t_i} + \frac{1}{3} \mu_{ji}^* + \frac{1}{3} \mu_{ij}^*}_{\partial(11)=\partial t_i} = 0 \quad (18)$$

There are four terms in (18). The two last terms reflect the direct tax revenue effect of raising the tax rate, while the two first terms are the change in taxable profits due to profit shifting. In order to see how these effects depend on trade costs we substitute and obtain,

$$\frac{\partial W_i^*}{\partial t_i} = \underbrace{t_i \frac{\mu_{1-i} \mu_{2-i}}{3} \frac{1}{\{z \pm (1-i)t^*\}}}_{\text{profit shifting}} + \underbrace{\frac{\mu_{1-i} \mu_{2-i}}{3} + \frac{\mu_{1+i}}{3}}_{\text{direct revenue effect}} = 0 \quad (19)$$

The first term is the effect of profit shifting on tax revenue. As before, it is negative, indicating that as trade costs fall, more profits will be shifted following a tax increase. The direct revenue effect is in turn made up of two terms, which reflects that trade cost reduction increases the market share of the foreign affiliate (μ_{ji}^*) and reduces the market share of the domestically based MNC_i (μ_{ij}^*). The total effect on tax revenue is negative, since allowing trade implies that the monopoly

profits of MNC_i are replaced by duopoly profits. Taken together, both effects – the profits and the direct revenue effect – therefore suggest that tax rates should fall in equilibrium if trade costs fall. This is confirmed by solving (19) with respect to the equilibrium tax rate,

$$t^{j_{\text{®}=0}} = \pm \frac{2 \tau_i \tau_j (2 \tau_i + 5 \tau_j)}{(2 \tau_i + 2 \tau_j + 5 \tau_i^2) \pm + 3 \tau_i + 6 \tau_j};$$

and

$$\frac{d t^{j_{\text{®}=0}}}{d \tau_j} = 6 \pm \frac{1 + 5 \tau_j (1 + \tau_j)}{[(2 \tau_i + 2 \tau_j + 5 \tau_i^2) \pm + 3 \tau_i + 6 \tau_j]^2} > 0: \quad (20)$$

We have:

Proposition 2: Economic integration reduces the equilibrium corporate tax rate (t^*) if MNC_A and MNC_B are fully owned by residents of a third country.

It is useful to note that the result obtained in Proposition 2 is the opposite of that in Proposition 1. Figure 2 provides a numerical example (with $\tau = 10$) to illustrate these results. The curve labelled $\text{®} = 0$ shows how the tax rate declines as trade costs fall when both multinationals are owned by residents of a third country (cf. Proposition 2). It conveys that economic integration reduces the tax base due to import competition and transfer pricing. The curve labelled $\text{®} = 1$ illustrates Proposition 1. The slope reflects the fact that when MNC_i is fully owned by domestic residents, economic integration increases the equilibrium tax rate, since it enhances the profits earned by the foreign MNC_j in country i ; and thus the tax base of country i . Finally, we see that taxes are higher when multinationals are owned by residents of a third country ($\text{®} = 0$) than by domestic residents ($\text{®} = 1$), c.f. also equation (12). Note, however, that the difference in equilibrium tax rates due to differences in ownership structure ($\text{®} = 0$ and $\text{®} = 1$) diminishes as trade barriers fall.

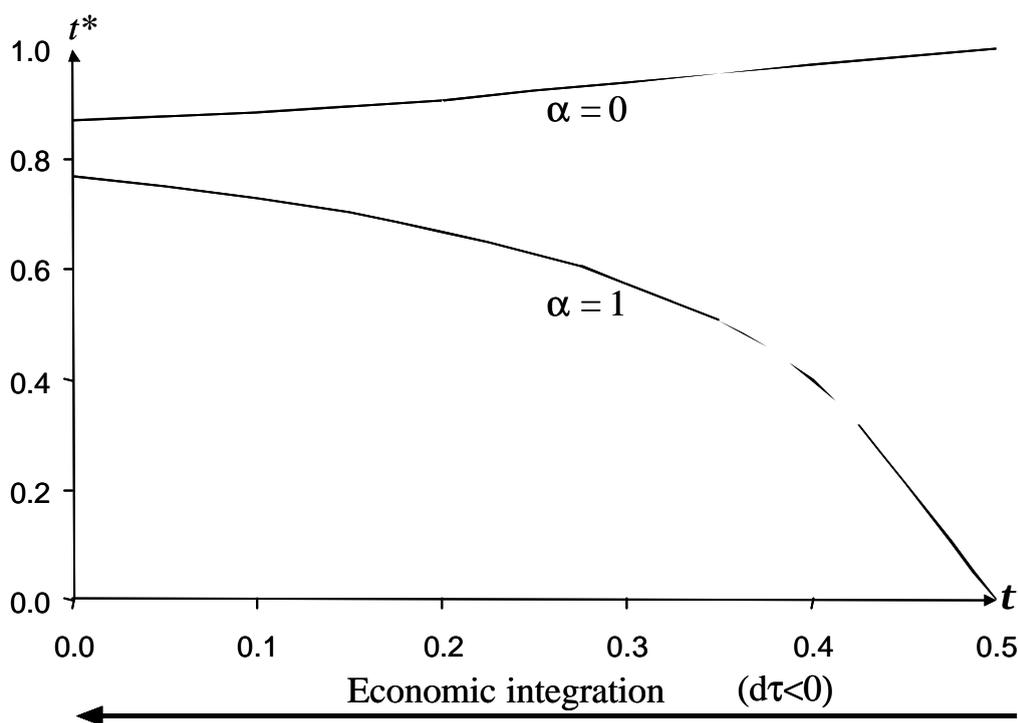


Figure 2: Economic integration and its effect on the equilibrium corporate tax t^*

Figure 2 does not tell us anything about the relationship between economic integration and equilibrium taxes for $\alpha \in (0; 1)$, since economic integration leads to a higher tax rate if $\alpha = 1$ and a lower tax rate if $\alpha = 0$: To examine the relationship between τ and t^* for $\alpha \in (0; 1)$; consider first the case where trade costs are prohibitively high ($\tau \rightarrow 1=2$). From equation (16) we then know that the equilibrium tax rate is equal to zero ($t^* = 0$) if $\alpha = 1$: However, this is a knife-edge result. To see this, suppose that at least a tiny part of the multinationals are owned by residents of a third country ($\alpha < 1$). Any positive tax rate is then a pure tax on foreigners, making it optimal to set $t^* = 1$: The reason for this is that the multinationals cannot use the transfer price to shift profits between the countries when trade is prohibitively expensive. Moreover, it must be optimal to set the tax rate close to unity also if trade costs are somewhat lower than $1=2$: Nonetheless, economic integration means that the tax bases become more sensitive to tax changes as the scope for profit shifting through transfer pricing increases. A reduction of τ

therefore reduces the equilibrium tax rate in the neighborhood of $\lambda = 1/2$ for all $\theta \in [0, 1)$: This is shown for $\theta = 0.1$ and $\theta = 0.9$ in Figure 3.

Though economic integration unambiguously reduces equilibrium taxes for high levels of trade costs, Figure 3 illustrates that the same is not true for low levels of trade costs. In particular, we see that the curve labelled $\theta = 0.9$ is U-shaped. The intuition for this result is that it is particularly important to tax the export product of the foreign multinational if θ is high and λ is low - the latter follows from the fact that export products are larger the lower the level of trade costs. With initially low trade costs we thus find that further economic integration increases the equilibrium tax rate. This is consistent with Proposition 1. If θ is small, on the other hand, we have a result which is consistent with Proposition 2; economic integration leads to lower equilibrium tax rates for all levels of trade costs. More precisely, we have the following result:

Proposition 3: Economic integration increases the equilibrium tax rate for sufficiently low levels of trade costs if $\theta > 1/2$; otherwise economic integration reduces the tax rate.

Proof: See the Appendix.

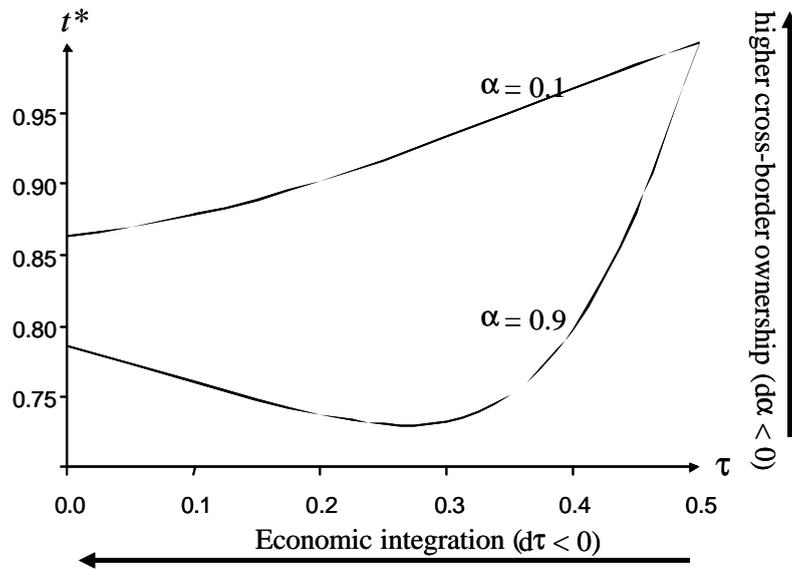


Figure 3: Consequences of economic integration for different values of α :

4 International cross-ownership

The discussion above suggests that economic integration may lead to higher or lower tax rates in the tax equilibrium depending on who owns the corporate tax base. To explore the impact of different ownership structures further, and test the robustness of our results, we consider a different ownership structure which allows cross-ownership in the sense that consumers in country i own a share α of MNC_i and a share $(1 - \alpha)$ of MNC_j ; Likewise, consumers in country j own a share α of MNC_j and a share $(1 - \alpha)$ of MNC_i : The welfare function of country i can be expressed by

$$W_i = CS_i + (\alpha_{ii} + \alpha_{ij}) \alpha^{-1} t_j \alpha_{ij} + (1 - \alpha^{-1}) t_i \alpha_{ii} + (1 - \alpha^{-1}) t_j \alpha_{jj} + \alpha^{-1} t_i \alpha_{ji} \quad (21)$$

As before, the welfare function contains a tax base term and home and foreign tax exporting terms. It is straightforward to derive the equilibrium tax rate as

$$t^* = \pm \frac{(1 + \alpha)^2 \alpha (6 - 3\alpha) \alpha^{-1}}{(1 + \alpha)^2 \pm 3 \alpha (6 - 3\alpha) \alpha \pm \alpha} \quad (22)$$

Again we can illustrate how the equilibrium tax rate is affected by changes in ownership structure and trade costs. This is done in Figure 4. It shows that increased international cross-ownership, implying that residents of country i increase their share in MNC_j while residents in country j increase their share in MNC_i , portrays the same relationship between taxes and trade costs as increased foreign ownership by third country residents in the previous section. However, there is one notable exception: with free trade ($\tau = 0$) the degree of foreign ownership, which was decisive for the equilibrium tax rate in the previous section, does not matter any more: the equilibrium tax rate is $t^* = \frac{1}{3} = 0.333$ and thus identical to the equilibrium tax rate when $\beta = 1$: Free trade means that each multinational's foreign affiliate contributes just as much to tax revenue as the parent firm of the local MNC. Free trade moreover implies that whether residents of a country own 50 percent of each MNC, or 100 percent of one and zero of the other, is irrelevant for their income.

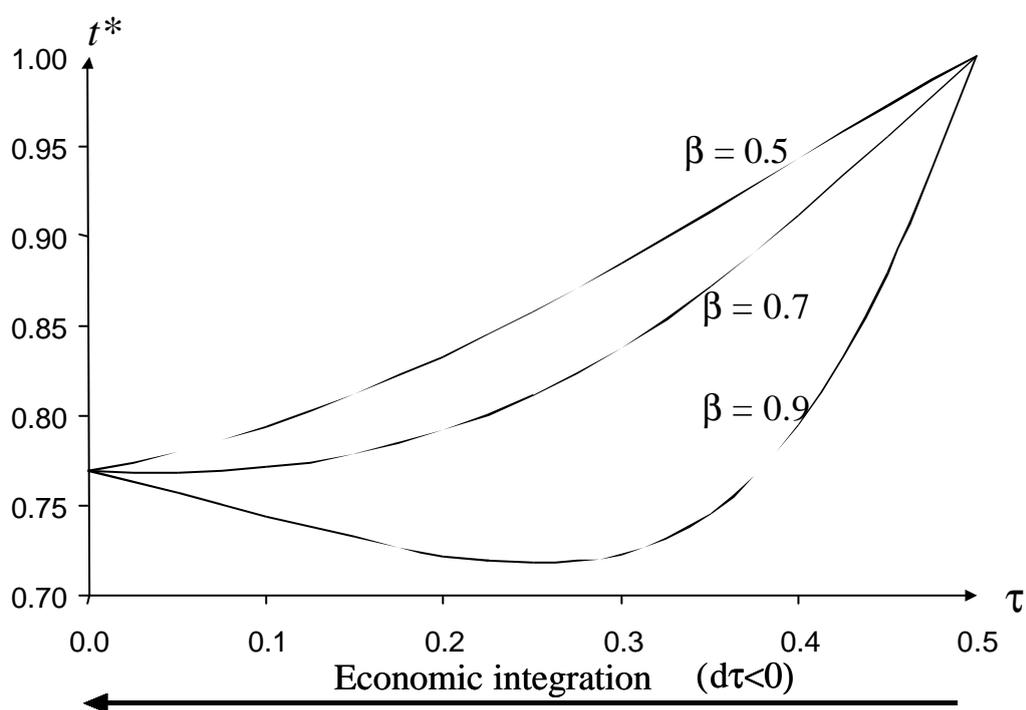


Figure 4: International cross ownership.

5 Concluding remarks

In this paper we have analyzed the outcome of corporate tax competition when governments set taxes to maximize national welfare, taking into consideration the strategic choices of the multinational firms. The aim has been to investigate how economic integration, taken to imply a reduction of trade barriers between countries, affects equilibrium tax rates. The major result that emerges is that economic integration may lead to an increase in the equilibrium tax rate for sufficiently low levels of trade costs if the multinationals are partly owned by domestic residents and partly by foreigners. Moreover the equilibrium tax rate is increasing in the share of foreign ownership of the multinationals for all levels of trade costs, .

Our results have a profound implication for one's view on the outcome of competition over corporate income. In the tax competition literature the main message is that tax competition will lead to a downward pressure on capital tax rates (see Wilson (1999) for a survey). Our analysis predicts that the rising importance of multinationals combined with increased foreign ownership of firms, may dampen and even give rise to higher tax rates as economic integration proceeds. If anything, empirical results give some support to this conclusion in the sense that corporate tax revenues have not fallen over the years either as a share of GDP or as a share of total tax revenue (see Chennels and Griffith (1997) and Bond and Chennels (2000)).

One feature that our model does not encompass is the competition among countries to attract FDI. Intuitively, this effect should be qualitatively similar to the profit shifting effect. Whether the inclusion of this effect within a similar model framework would change our results, is a task for future research.

6 Appendix

Proof of Lemma 1

The first order conditions for MNC_i are

$$\frac{\partial \pi_i}{\partial x_{ii}} = (1 - t_i) - 2x_{ii} - x_{ji} = 0; \quad (23)$$

$$\frac{\partial \pi_i}{\partial x_{ij}} = (1 - t_i)(g_i \pm g_i^2) + (1 - t_j)(1 - 2x_{ij} - x_{jj} - t_i g_i) = 0; \quad (24)$$

Suppose that $t_i \neq t_j$: By using equation (6) for g_i we can then express the latter first-order condition as

$$\frac{\partial \pi_i}{\partial x_{ij}} = (1 - t_i) \left(\frac{t_j - t_i}{2 \pm (1 - t_i)} \right) \pm \frac{t_j - t_i}{2 \pm (1 - t_i)} + (1 - t_j) \left(1 - 2x_{ij} - x_{jj} - t_i \frac{t_j - t_i}{2 \pm (1 - t_i)} \right); \quad (25)$$

If the firm is unable to manipulate the transfer price we know from equation (24) that $(1 - t_i) - 2x_{ij} - x_{jj} - t_i = 0$: Inserting this into (24) we have

$$\frac{\partial \pi_i}{\partial x_{ij}} = \frac{1(t_j - t_i)^2}{4 \pm (1 - t_i)} > 0 \text{ for } t_i \neq t_j \text{ and } \pm < 1;$$

The firm will choose to increase x_{ij} until the marginal profit of export is equal to zero, from which it follows that $x_{ij} > x_{ij}^s$ if $t_i \neq t_j$ and $\pm < 1$: Q.E.D.

Steps in deriving the equilibrium tax rate

$$\begin{aligned} \frac{\partial \pi_{ii}}{\partial t_i} &= 2x_{ii} \frac{\partial x_{ii}}{\partial t_i} + (g_i \pm g_i^2) \frac{\partial x_{ij}}{\partial t_i} + (x_{ij} - 2 \pm g_i x_{ij}) \frac{\partial g_i}{\partial t_i} \\ \frac{\partial \pi_{ji}}{\partial t_i} &= x_{ji} - \frac{1}{2} \frac{\partial x_{ji}}{\partial t_i} - \frac{\partial g_j}{\partial t_i} + (p_i - t_i - g_j) \frac{\partial x_{ji}}{\partial t_i}; \end{aligned}$$

In a symmetric equilibrium we have $t_A^s = t_B^s$; in which case it is optimal for the firms to set transfer prices equal to zero (i.e., $g_A^s = g_B^s = 0$): By differentiating equations (7) and (8) with respect to t_i we find that $\frac{\partial x_{ii}^s}{\partial t_i} = \frac{\partial x_{ji}^s}{\partial t_i} = 0$: This is due to the envelope theorem: domestic sales and exports are independent of the actual tax rates if $t_i = t_j$: Thus, a small increase in one of the tax rates from a symmetric equilibrium will not have any effect on the supplied quantities.⁶ The

⁶ Differentiating, we find $\frac{\partial x_{ii}^s}{\partial t_i} = \frac{1}{2} (t_i - t_j) (2 - t_i - t_j) = \frac{1}{2} (1 - t_i)^2 (1 - t_j)$ and $\frac{\partial x_{ij}^s}{\partial t_i} = \frac{\partial x_{ji}^s}{\partial t_i} = (t_i - t_j) (2 - t_i - t_j) = \frac{1}{2} (1 - t_i)^2 (1 - t_j)$:

changes in the profits of the domestic and foreign MNCs when t_i increases are

$$\begin{aligned} \frac{\partial \pi_{ii}^*}{\partial t_i} &= X_{ij}^* \frac{\partial g_i^*}{\partial t_i} = i \frac{1-i-2\zeta}{3} \frac{1}{2\pm(1-i-t^*)} < 0 \\ \frac{\partial \pi_{ji}^*}{\partial t_i} &= -i X_{ji}^* \frac{\partial g_j^*}{\partial t_i} = -i \frac{1-i-2\zeta}{3} \frac{1}{2\pm(1-i-t^*)} < 0: \end{aligned} \quad (26)$$

Proof that trade cost reduction may increase the equilibrium tax rate if $\zeta > 0$; $\zeta < 1$

By differentiating equation (11) with respect to ζ we find

$$\frac{\partial t^*}{\partial \zeta} = i \frac{6\pm(\zeta+1)(2-i-\zeta)}{(2-i-2\zeta+5\zeta^2)\pm+3\pm\{6\zeta-i\pm(1+\zeta)^2\}} \quad (\text{sign } \frac{\partial t^*}{\partial \zeta});$$

where $\text{sign} \frac{\partial t^*}{\partial \zeta} = \text{sign} (1+5\zeta-i-5\zeta^2) = \text{sign} ((\zeta+1)(2-i-\zeta))$: Since $\zeta \in [0, 1]$ we thus see that falling trade costs ($d\zeta < 0$) increase the equilibrium tax rate if $\zeta > \frac{1}{2}$: $\frac{\partial t^*}{\partial \zeta}$ is decreasing in ζ ; is equal to $\frac{1}{2}$ if $\zeta = 0$, and is equal to 1 if $\zeta = 1$: The term $(\text{sign } \frac{\partial t^*}{\partial \zeta})$ must therefore always be negative for $\zeta < \frac{1}{2}$, meaning that trade cost reduction unambiguously reduces the equilibrium tax rate.

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