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# Redistributive taxation, multinational enterprises, and economic integration

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**Abstract**

Increased activity of multinational firms exposes national corporate tax bases to cross-country profit shifting, but also leads to rising profitability of the corporate sector. We incorporate these two effects of economic integration into a simple political economy model where the median voter decides on a redistributive income tax rate. In this setting economic integration may raise or lower the equilibrium tax rate, and it is more likely to raise the tax rate of a low-tax country. The implications of the model are consistent with the empirical observations that effective corporate tax rates have not fallen in all OECD countries, and that corporate tax revenues have generally risen.

**Keywords:** redistributive taxation; profit shifting

**JEL Codes**: H20; F23.

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# 1 Introduction

One of the most pronounced trends in the world economy over the last decades has been the rise in foreign direct investment and multinational activity. In the United States, for example, foreign profits made up around 5 per cent of all corporate profits earned by U.S. firms until the late 1960s, but this share has meanwhile risen to more than 25 per cent, and is probably even higher (Desai and Hines, 2004). As a consequence of this development national corporate tax bases have become more sensitive to tax changes.[2] Most of the literature on international tax competition has therefore modelled economic integration as a pure increase in the mobility of the capital tax base. In these models the typical result is that increasing capital mobility leads governments to undercut each other's capital income tax rates, resulting in underprovision of public goods as well as relatively higher taxes on immobile factors (see Wilson, 1999 for a survey).

Empirical evidence in support of this theoretical prediction is mixed, however. Table 1 summarizes the development of corporate tax rates and tax revenues in a representative sample of OECD countries. Two stylized facts stand out. First, statutory corporate tax rates have been significantly reduced in most OECD countries since the 1980s, but tax bases have simultaneously been broadened. As a consequence, effective tax rates on profits have fallen by much less than statutory rates, and in several countries they have not fallen at all.[3] Second, an even more significant deviation from the standard theory of tax competition arises with respect to the development of tax revenue as a share of GDP. Corporate tax revenue has increased significantly in most countries since the early 1980s, despite the average fall in effective tax rates.[4]

The present short paper proposes a simple model to reconcile the theory of tax com-

[2] This tax sensitivity may arise either from the location and investment decisions of multinational firms, or from profit-shifting activities. The empirical evidence on the effects of taxes on firm location and profit-shifting is surveyed in Hines (1999) and, more recently, Devereux (2006).

[3] The measures shown in Table 1 are the *effective marginal tax rate* (EMTR) and the *effective average tax rate* (EATR). The EATR can be seen as a weighted average of the statutory tax rate and the EMTR, where the latter is the tax rate on an investment that just earns a net rate of return equal to the going interest rate. The weight of the statutory tax rate in the EATR rises with the profitability that is assumed for the underlying investment project. For a description of these measures and further details on the development of corporate taxation since the 1980s, see Devereux et al. (2002).

[4] The different time trends for different measures of corporate taxation also seem to be the main source of diverging results in the econometric literature that tests the relationship between economic integration and the level of corporate taxation. This relationship is typically negative if the latter is measured by statutory or effective average tax rates, but the negative sign disappears when tax revenue is the dependent variable. See Rodrik (1997), Bretschger and Hettich (2002), Swank and Steinmo (2002), Slemrod (2004) and Winner (2005).

**Table 1: Corporate income taxation (CIT) in OECD countries**

| | statutory tax rate[a] | | effective marginal tax rate[b] | | effective average tax rate[c] | | CIT revenue (% of GDP) | |
|---|---|---|---|---|---|---|---|---|
| Country | 1982 | 2005 | 1982 | 2005 | 1982 | 2005 | 1982 | 2004 |
| Australia | 50 | 30 | 32 | 24 | 37 | 26 | 2.7 | 5.7 |
| Austria | 61 | 25 | 25 | 20 | 37 | 22 | 1.2 | 2.3 |
| Belgium | 45 | 34 | 31 | 22 | 35 | 26 | 2.2 | 3.6 |
| Canada | 45 | 36 | 9 | 25 | 25 | 28 | 2.7 | 3.4 |
| Finland | 60 | 26 | 43 | 17 | 45 | 21 | 1.6 | 3.6 |
| France | 50 | 34 | 26 | 20 | 34 | 25 | 2.1 | 2.8 |
| Germany | 62 | 38 | 47 | 29 | 48 | 32 | 1.9 | 1.6 |
| Greece | 43 | 32 | 33 | 12 | 36 | 21 | 0.9 | 3.3 |
| Ireland | 10 | 13 | 0 | 10 | 5 | 11 | 1.5 | 3.6 |
| Italy | 39 | 37 | 18 | 19 | 26 | 26 | 2.9 | 2.8 |
| Japan | 55 | 40 | 42 | 28 | 44 | 32 | 5.2 | 3.8 |
| Netherlands | 48 | 32 | 35 | 21 | 38 | 25 | 2.8 | 3.1 |
| Norway | 51 | 28 | 34 | 22 | 38 | 24 | 6.8 | 10.0 |
| Spain | 33 | 35 | 23 | 21 | 26 | 26 | 1.2 | 3.4 |
| Sweden | 60 | 28 | 43 | 16 | 45 | 21 | 1.5 | 3.2 |
| Switzerland | 35 | 34 | 21 | 21 | 26 | 25 | 1.7 | 2.5 |
| United Kingdom | 52 | 30 | 0 | 20 | 26 | 24 | 3.7 | 2.9 |
| United States | 50 | 39 | 22 | 24 | 32 | 29 | 2.0 | 2.2 |
| OECD average | 47.2 | 31.7 | 26.9 | 20.6 | 33.5 | 24.7 | 2.5 | 3.5 |

[a] Including typical local income taxes and supplementary charges. In countries with more than one tax rate, the manufacturing rate was chosen.

[b] Investment in plant or machinery, financed by equity or retained earnings. Taxation at shareholder level not included. Real discount rate 10%, inflation rate 3.5%, depreciation rate 12.2%.

[c] Rate of economic rent: 10% (i.e. financial return 20%). Further assumptions as in [b].

Sources: - IFS tax data (www.ifs.org.uk/publications.php?publication_id=3210);
- OECD (2006): Revenue Statistics of OECD Member Countries 1965-2005, Table 12 (http://www.sourceoecd.org/rpsv/cw/vhosts/oecdthemes/99980169/v2006n7/contp1-1.htm)

petition with these empirical observations. Our central argument is that economic integration affects not only the mobility of the corporate tax base, but it simultaneously increases its size through a higher profitability of incorporated firms.[5] These twin effects of economic integration are embedded into a stylized political economy model. The simplicity of our framework allows us to derive reduced-form expressions for the optimal redistributive tax rates chosen by the median voter. In this model economic integration increases both the redistributive gains, but also the efficiency costs of taxation from the perspective of the median voter. Hence globalization may raise or lower the redistributive tax rate in the political economy equilibrium. Furthermore, we show that tax revenue may rise in the symmetric Nash equilibrium, even if the equilibrium tax rate is reduced.

Our argument that economic integration increases the profitability of firms is based, in particular, on the development of multinational enterprises (MNEs). Empirical evidence from the international trade literature shows that multinational firms are on average more productive than local firms (see e.g., Barba Navaretti and Venables, 2004). This difference in productivity and profitability can be explained, for example, by the ability of MNEs to utilize differences in international factor prices (Helpman and Krugman, 1985). Productivity growth and rising profits will thus arise at the industry level when economic integration reallocates market shares from domestic to more productive multinational firms (Melitz, 2003). Recent empirical evidence for the U.S. manufacturing industry shows that economic integration leads to productivity growth both at the firm and at the industry level (Bernard et al., 2006). Similar evidence is obtained for the United Kingdom, where the shift towards the service sector, and in particular towards the highly profitable banking, finance and insurance branches is one of the factors explaining the rise in corporate tax revenues over the last two decades (Devereux et al., 2004). With few exceptions, however, these developments have not yet been incorporated in the international tax literature.[6]

[5] Another argument why corporate tax bases may have increased is that a rising share of firms has chosen an organizational form that subjects them to corporate rather than personal income tax. We do not further pursue this argument here, but acknowledge that it plays a complementary role in explaining the increase in corporate tax bases. See Sørensen (2007, sec. 2.2) for further discussion.

[6] A partial exception are models of industry agglomeration where economic integration will, for some range of transports costs, increase the agglomeration rents that firms can earn in the core country and hence increase this country's taxing power (Kind et al., 2000; Baldwin and Krugman, 2004; Borck and Pflüger, 2006). However, in these models the increase in profitability in response to economic integration is limited to firms located in core countries, and it occurs only for a limited range of trade costs. A different approach to explain ambiguous tax responses to economic integration is pursued by Fuest (2005). In his model economic integration raises the share of foreign firm ownership and thus strengthens the incentive to tax the profits accruing to foreigners. However, this last effect can only

The basic model that underlies our analysis is presented in section 2. Section 3 analyzes the effects of economic integration on the redistributive tax rate and tax revenues in the Nash equilibrium. Section 4 concludes.

## 2 The model

We consider a model of two countries, denoted by subscript $i \in \{1, 2\}$, which are populated by two types of individuals, capitalists (superscript $C$) and workers (superscript $L$). The two countries are identical, except for the share of workers and capitalists in the overall population. To minimize notation, we assume that each worker exogenously supplies one unit of labour and consumes an aggregate consumption good whose price is normalized to one. In each country $i$ it takes one unit of domestic labour to produce one unit of the numeraire good. Competitive market conditions then determine that the wage rate equals one and each worker receives a gross wage income of unity, whereas the representative capitalist's profit income is zero when domestic labour is employed. However, each capitalist can set up a MNE and earn positive profits $\pi$ when a MNE headquartered in country $i$ sets up a subsidiary in the other country $j$ ($j \neq i$). In this case it takes only $w \leq 1$ units of the other country's labor to produce one unit of output. In a highly stylized way, this set-up captures either idiosyncratic efficiency gains accruing from a multinational structure, or a (symmetric) advantage for each country to obtain lower factor prices abroad.

Each country levies a proportional, comprehensive income tax at rate $t_i$ on all wage and profit income. The labour tax base is internationally immobile, whereas the profit tax base is responsive to tax differentials between the two countries. Hence capitalists in each country face two decisions: they choose ($i$) how much to produce abroad and ($ii$) how much profit to shift between the two countries. Both of these decisions have been extensively discussed in the literature. We incorporate them here in a way that keeps our argument as simple as possible.[7]

We first turn to the decision of how much output each MNE residing in country $i$ produces in the foreign country $j$. While foreign labour input is cheaper in efficiency

dominate the role of increased tax base mobility, if the government can also use import tariffs.

[7] Haufler et al. (2006) also consider the determination of income taxes in the presence of multinational firms. In their analysis, however, only the profit-shifting decision of the MNE is modelled. Hence, as in much of the tax literature, gains from globalisation are absent and the feedback effects of increased corporate profitability on tax policy, which are central to the analysis here, do not arise. Instead the focus of their analysis is to investigate, both theoretically and empirically, the effects that different country-specific variables have on the mix of wage and profit taxes in small open economies.

units, producing abroad adds extra transaction costs that must be given a wide interpretation (i.e, they apply to costs related to adopting to a new cultural and legal environment, information and monitoring costs etc.). We model these costs as being convex in the volume of foreign production reflecting, for example, increasing marginal monitoring costs when larger parts of production are outsourced.[8] For simplicity we specify quadratic costs of the form $\delta = x_i^2/(2\alpha)$, where $x_i$ is the volume of firm $i$'s production abroad and $1/\alpha$ is the cost parameter. We interpret the inverse of the cost parameter, $\alpha$, as a measure of economic integration. Increasing economic integration (a rise in $\alpha$) will reduce the transaction costs for foreign direct investment. With these specifications the before-tax profits of each firm, which equal the gross profits of capitalists in both countries, are given by

$$\pi_i = x_i(1-w) - \frac{x_i^2}{2\alpha} \quad \forall\, i. \tag{1}$$

The second decision of capitalists concerns the distribution of gross profits for tax purposes. We assume that the residence principle is legally in place so that profits are taxed in the country where the firm is headquartered. However, a MNE headquartered in country $i$ may be able to shift some of the profits earned to country $j$, either through transfer pricing or by using tax-efficient financing structures.[9] Let $\beta$ be the share of profits that is transferred to country $j$ in this way. As in the case of the firm's production decisions it is costly to engage in profit shifting activities and the deadweight costs are convex in the amount of profits transferred abroad. Hence, by analogy to the transaction costs incurred when firms produce abroad, the real resources spent when transferring profits are $\varepsilon = \beta^2\pi/(2\alpha)$. Assuming further that the transaction costs $\delta$ are tax-deductible in both countries, the after-tax income of each capitalist, $y_i^C$, is thus

$$y_i^C = \pi_i \left[ (1-\beta_i)(1-t_i) + \beta_i(1-t_j) - \frac{\beta_i^2}{2\alpha} \right] \quad \forall i, j,\ i \neq j, \tag{2}$$

where $\pi_i$ is given in (1).

It is seen from equation (2) that for each firm the output decision ($x_i$) is separated from the decision on profit shifting ($\beta_i$).[10] From (1) each MNE in country $i$ maximizes

[8] This is in line with some of the findings in the new theory of the multinational firm (see Marin and Verdier, 2003).

[9] Income can be shifted through borrowing and lending between the multinational's affiliates, because the interest paid on this internal loan is taxable in the lending country, but tax-deductible in the borrowing country. See Mintz and Smart (2004) for a detailed modelling of this tax avoidance mechanism.

[10] This results from the specification of the transaction cost functions $\delta$ and $\varepsilon$. With more general

its gross profits by choosing

$$x_i = \alpha\,(1 - w) \equiv \alpha\,\Delta w\,, \tag{3}$$

where we have introduced $\Delta w$ as a short-hand notation for the exogenous cost advantage of producing one unit of output abroad.

Substituting (3) in (1) yields the maximized gross profits of each firm

$$\pi_1^* = \pi_2^* = \frac{\alpha}{2}\,(\Delta w)^2 \equiv \pi^*. \tag{4}$$

From (3) and (4) the level of output produced abroad and maximized gross profits for each MNE are a rising function of the unit wage differential and of the degree of economic integration. Moreover maximized gross profits for each capitalist will be the same in countries 1 and 2, due to the symmetry assumptions made with respect to production.

To maximize net profits the optimal level of $\beta_i$ is derived from (2). This yields

$$\beta_i = \alpha\,(t_i - t_j) \quad \forall i, j,\ i \neq j. \tag{5}$$

It thus follows from (4) and (5) that economic integration (a rise in $\alpha$) will raise the gross profits of each firm, but at the same time it increases the share of profits that is shifted for any given international tax differential.

## 3 Tax equilibrium and economic integration

In each country $i \in \{1, 2\}$, the total population is normalized to unity and consists of $\mu_i$ workers and $(1 - \mu_i)$ capitalists. The share of workers $\mu_i$ is allowed to differ in the two countries. However, workers form the majority of the population in both countries $(1 > \mu_i > 0.5\ \forall\ i)$ and tax policy in each country is determined by the median voter. In line with the basic theory of optimal income taxation, we assume that overall tax revenue is redistributed, in equal per-capita terms, to the entire population. Hence we can simply maximize the after-tax income of the representative worker in each country. This is given by $y_i^L = (1 - t_i) + R_i$, where the gross wage income is unity and $R_i$ are per-capita tax collections.[11]

specifications, the output and profit shifting decisions will interact. Modelling this interaction would, however, significantly complicate the analysis without qualitatively changing our main results. The separation of output and profit-shifting decisions is a common assumption in the literature; see the survey by Gresik (2001).

[11] The latter equal total tax collections by our normalization of population size. Note that a well-defined optimal tax rate is obtained in our model, despite the linearity of the objective function, because the excess burden of taxation is strictly convex in the tax rate.

The tax base in country $i$ is wage income plus the shares of profit income from all firms that are reported in country $i$. Using the optimal tax avoidance decision of each capitalist [eq. (5)], total and per capita tax revenues in country $i$ are

$$R_i = t_i \left\{ \mu_i + \overbrace{(1-\mu_i)\pi^* \left[1-\alpha\left(t_i - t_j\right)\right]}^{(1)} + \overbrace{(1-\mu_j)\pi^* \alpha (t_j - t_i)}^{(2)} \right\} \quad \forall\, i, j,\ i \neq j. \quad (6)$$

In this expression, the overbraced term (1) denotes the profits of the MNEs headquartered in country $i$ that are reported in their country of residence whereas term (2) gives the profits of country $j$'s MNEs that are shifted to country $i$.

Using (6), the after-tax income of the representative worker in country $i$ is

$$y_i^L = (1-t_i) + t_i \left\{ \mu_i + (1-\mu_i)\pi^* - \pi^* \alpha (t_i - t_j) \left[ (1-\mu_i) + (1-\mu_j) \right] \right\} \quad \forall\, i, j,\ i \neq j. \quad (7)$$

The equilibrium policy maximizes $y_i^L$ with respect to the proportional income tax $t_i$. This yields the best response functions

$$t_i(t_j) = \frac{(1-\mu_i)(\pi^* - 1) + \alpha \pi^* t_j \left[ (1-\mu_i) + (1-\mu_j) \right]}{2\alpha\pi^* \left[ (1-\mu_i) + (1-\mu_j) \right]} \quad \forall\, i, j,\ i \neq j. \quad (8)$$

Hence best responses are upward-sloping in both countries. Moreover, in the simple model used here, tax rates in the asymmetric Nash equilibrium can be calculated in explicit form:

$$t_i^* = \frac{(\pi^* - 1) \left[ 2\,(1-\mu_i) + (1-\mu_j) \right]}{3\alpha\pi^* \left[ (1-\mu_i) + (1-\mu_j) \right]} \quad \forall\, i, j, \quad i \neq j, \quad (9)$$

where $\pi^*$ is given in (4). Note first that a necessary condition for the redistributive tax rates to be positive in both countries is that the gross profits earned by each capitalist exceed the gross wage (normalized to one) of the representative worker in each region. This will be assumed in what follows. Equation (9) further shows that the country with the higher share of workers will levy the lower redistributive tax rate. For concreteness assume $\mu_1 > \mu_2$ so that country 1 chooses a lower tax rate than country 2. The reason is that there are fewer capitalists and hence lower aggregate profits $(1-\mu)\pi^*$ in country 1 so that equality between the redistributive gains from the tax and the convex efficiency losses is reached at a lower tax rate. Finally, if the countries are symmetric, equation (9) immediately reduces to $t_1^* = t_2^* = (\pi^* - 1)/(2\alpha\pi^*) > 0$.

The core issue underlying our analysis is whether economic integration, as described by an increase in $\alpha$, leads to a rise or a fall in the Nash equilibrium tax rates. Differentiating (9) with respect to $\alpha$, using $d\pi^*/d\alpha = (\Delta w)^2/2$ from (4) and resubstituting

the tax rate in (9) yields

$$\frac{dt_i^*}{d\alpha} = -\frac{t_i}{\alpha} + \frac{[2(1-\mu_i)+(1-\mu_j)](\Delta w)^2}{6\alpha(\pi^*)^2\left[(1-\mu_i)+(1-\mu_j)\right]} \quad \forall\, i,j, \;\; i \neq j. \tag{10}$$

Equation (10) shows two counteracting effects of economic integration. The first term captures the increased efficiency costs of redistributive taxation when economic integration makes the domestic profit tax base more mobile internationally and increases international profit-shifting. This effect is unambiguously negative, if the equilibrium tax rate (9) is positive. The second effect describes the additional redistributive gains from the income tax when economic integration raises the profits of multinational firms and hence capitalists in both countries. Both the negative first effect and the positive second effect are larger in the high-tax country 2 (which has the larger number of capitalists). Depending on which of the two effects dominates, economic integration may thus either raise or lower the redistributive tax rate chosen by the median voter.[12] We summarize these results in the following proposition.

**Proposition 1** *Economic integration tends to increase (decrease) the redistributive income tax rate, if* $(i)$ *the equilibrium tax rate is small (large) in the initial equilibrium and* $(ii)$ *if the cost advantage of producing one unit of output abroad is large (small).*

Given the empirical evidence in Table 1 that overall corporate tax rates have been falling, the negative first effect in equation (10) seems to be dominating, on average. From Proposition 1 we should then expect to observe a less pronounced trend towards falling tax rates in the countries that have low taxes initially. A comparison with the country data collected in Table 1 shows that there is indeed support for this hypothesis. Those countries which lowered their effective average tax rates only marginally or not at all during the period 1982-2005 (Canada, Ireland, Italy, Spain, Switzerland, United Kingdom), were also the ones that started out with tax rates below the sample average. In contrast the countries with the highest statutory tax rates in 1982 (Austria, Germany and Sweden) all enacted severe cuts in statutory and effective tax rates. This convergence of tax rates in response to economic integration is consistent with the results of our model.

[12] Note the difference between our results and those derived in political economy models of strategic delegation (Persson and Tabellini, 1992; Gottschalk and Peters, 2003). In these models the working majority is able to mitigate the downward pressure on capital tax rates by delegating decisions to politicians that prefer a larger degree of redistribution than the median voter herself. Nevertheless, the only direct effect of economic integration is increased tax base mobility. As a consequence economic integration leads, in equilibrium, to an unambiguous decline in the level of redistributive taxation.

Finally we evaluate the effects of economic integration on tax revenue. Since the focus here is not on cross-country differences, but on the average relationship between tax rates and tax revenue collections, we confine the analysis to the case where countries are symmetric in all respects ($\mu_1 = \mu_2$). Hence tax rates are identical and no profit-shifting occurs in the Nash equilibrium. Using this in (6) and differentiating with respect to $\alpha$ gives

$$\frac{dR}{d\alpha} = [\mu + (1-\mu)\pi^*(1-2\alpha t)] \ \frac{dt^*}{d\alpha} + t^*(1-\mu) \ \frac{d\pi^*}{d\alpha}, \tag{11}$$

where the squared bracket in the first term must be positive to ensure that a tax rise increases revenues. Since the second term on the RHS of (11) is unambiguously positive from (4) this immediately establishes:

**Proposition 2** *In a symmetric Nash equilibrium, a positive effect of economic integration on the level of equilibrium tax rates is sufficient, but not necessary, for an increase in tax revenue.*

This result is easily explained. In our model economic integration simultaneously increases the elasticity of the tax base and increases its size by raising the profitability of multinational firms. While both of these effects determine the optimal adjustment of taxes (which is thus ambiguous, even in a symmetric equilibrium) the increase in the corporate tax base exerts a positive effect on tax revenue even if tax rates stay constant. Ignoring cross-country differences and hence profit shifting in equilibrium ensures that this tax base increase benefits both countries simultaneously. Applied to the empirical findings in Table 1 this proposition shows that it is possible to simultaneously observe decreasing (effective) corporation taxes and increasing corporate tax revenues as economic integration proceeds.

## 4 Conclusion

This paper has started from two fundamental effects that are associated with the rise in foreign direct investment and multinational firm activity. In contrast to nationally operating firms, multinationals have the opportunity to shift profits to low-tax countries, but they are also more profitable and thus raise the aggregate profitability in the corporate sector. Incorporating these facts into a simple political economy model we have shown that economic integration increases the efficiency cost of capital taxation, but it also increases the redistributive benefits of the tax from the perspective of the median voter. This result may help in explaining why several OECD countries have not reduced their effective rates of corporation tax since the 1980s. Moreover, our model

implies that corporate tax revenues may rise despite falling tax rates, a finding that is consistent with the experience of the majority of OECD countries during the last decades.

It goes without saying that the model put forth in this paper is stylized in many respects. In particular, core simplifications have been the assumptions of exogenous factor prices and productivity gains from a multinational operation, and the modelling of the (personal and corporate) income tax system through a single, proportional tax rate. We would argue, however, that the basic effects outlined above would still be present in a more complex model. At the same time we believe that incorporating a more detailed modelling of multinational firms into the analysis of taxation and other government policies is a promising area for further research.

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