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Taxing capital and labor when both factors are imperfectly mobile internationally

Hippolyte d'Albis[*], Agnès Bénassy-Quéré[†], Amélie Schurich-Rey[‡§]

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Abstract

We revisit the standard theoretical model of tax competition to consider imperfect mobility of both capital and labor. We show that the mobility of one factor affects the taxation of both factors, and that the race-to-the-bottom narrative (with burden shifting) applies essentially to capital exporting countries. We test our predictions for a panel of 28 OECD countries over 1997-2014. We find capital taxation to be less sensitive to capital mobility in net capital importing countries than for net capital exporters. We also show that labor mobility has a negative impact on labor taxation but a positive impact on capital taxation. Finally, we show evidence of a non-linear effect of labor mobility on capital taxation depending on the level of skills.

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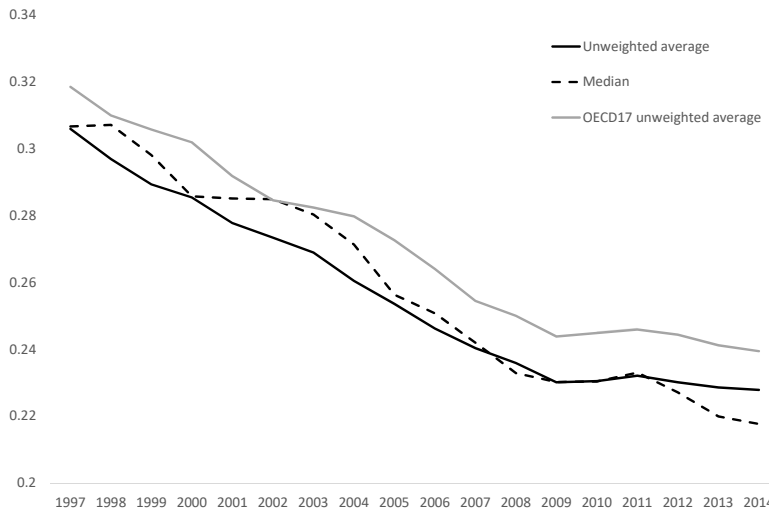
1 Introduction

The theoretical literature on tax competition generally finds that, when capital is mobile whereas land (or labor, or consumption) is not, it is optimal for a benevolent government not to tax capital, hence to finance the provision of public goods only through taxing immobile bases (see Zodrow and Mieszkowski, 1986, Wilson, 1999).[1] As a matter of facts, corporate tax rates have generally decreased in advanced economies since the 1980s (see Figure 1), while wealth taxes were hollowing out in most countries.

Figure 1: Effective Average Tax Rate on corporate income, 28 OECD countries*



*Australia, Austria, Canada, Chile, Czech Rep., Germany, Denmark, Spain, Finland, France, United Kingdom, Hungary, Ireland, Iceland, Israel, Italy, Japan, Korea, Mexico, Netherlands, Norway, Poland, Portugal Slovak Rep., Slovenia, Sweden, Turkey, United States. The OECD17 grouping restricts the sample to advanced economies.
Source: Oxford University Centre for Business Taxation.

Strikingly, though, the empirical literature has remained quite inconclusive on the impact of international capital mobility on the taxation of capital (see the meta analysis of Adam et al., 2013). This surprising non-result may be explained in different ways. First, the decline in tax rates has been compensated by rising capital returns - hence implicit tax rates have not declined following financial globalization. Second, higher inequalities re-

[1] Within a general equilibrium model, though, Mendoza and Tesar, 2005 show that capital mobility may not trigger a "race to the bottom" in capital taxation because taxing labor entails inefficiency costs.

sulting partly from globalization may have raised the demand for insurance against shocks (compensation effect of globalization, see Rodrik, 1998). Third, financial integration has come together with some forms of social and political integration, which may have had opposite effects on capital taxation (Dreher, 2006). Fourth, financial globalization has been concommittant to population ageing: even in autarky, an ageing median voter may have voted in favor of declining taxes on capital.[2] Finally, financial globalization has come along with increased fragmentation of global value chains that has also spurred an increase to trade to GDP, making it difficult to identify the specific impact of international capital mobility.

In this paper, we address the above-mentioned pitfalls and further explore two additional explanations for the apparent limited effect of financial globalization on capital taxation. The first one is the simultaneous increase in the mobility of labor. Although in general labor mobility has remained limited over the last three decades, the mobility of at least skilled labor has increased, especially within the European Union where legal barriers to labor mobility have been eliminated. Figure 2 compares a measure of de facto labor and capital mobility for OECD countries. From 1997 to 2014, labor mobility among OECD countries increased by 42% on average. This increase may appear modest compared to the rise in de facto capital mobility (+223% over the same period).[3] However, this increase is substantial per se, especially when considering that may be concentrated on a minority of skilled workers.

The literature on tax competition generally enphasizes the burden shifting impact of capital mobility, or equivalently the compensation effect of globalization, which both end up in reduced capital taxation and increased labor taxation following financial globalization (see, e.g. Adam and Kammas, 2007). However labor mobility may alter this result in two ways. First, labor mobility may put downward pressure on labor taxation, at least at relatively high levels of compensation. Liebig et al. (2007), Kleven et al. (2013) and Kleven et al. (2014) find very high elasticities for top-income foreign workers to tax

[2] Adam and Kammas (2007) find a significant, negative impact of the share of the population over 65 years on corporate income tax rates. In general, though, the empirical literature does not control for population ageing.

[3] Due to the high volatility of capital flows, we compare a flow measure of labor mobility to a stock measure of capital mobility. Averaging labor and capital mobility over 6-year windows, we find that gross capital flows increased in 2009-2014 by 158% compared to 1997-2002. During the same period, labor mobility increased by 38%.

differentials. Since foreign workers are a relatively small proportion of the high-income population, Piketty and Saez (2012) and Lehmann et al. (2014) retain an elasticity of 0.25 for top-income earners. Lehmann et al. (2014) show that, if the semi-elasticity of migration increases for higher incomes, then it is optimal to reduce the marginal tax rates on top-income earners. Second, to the extent that the skilled workers are in the position to take decisions concerning the location of capital (both at the firm level and as savers), labor and capital mobility are likely to be intertwined. More mechanically, labor and capital mobility interact since the marginal productivity of one factor depends on the quantity of the other factor (see Wilson, 1995).[4]

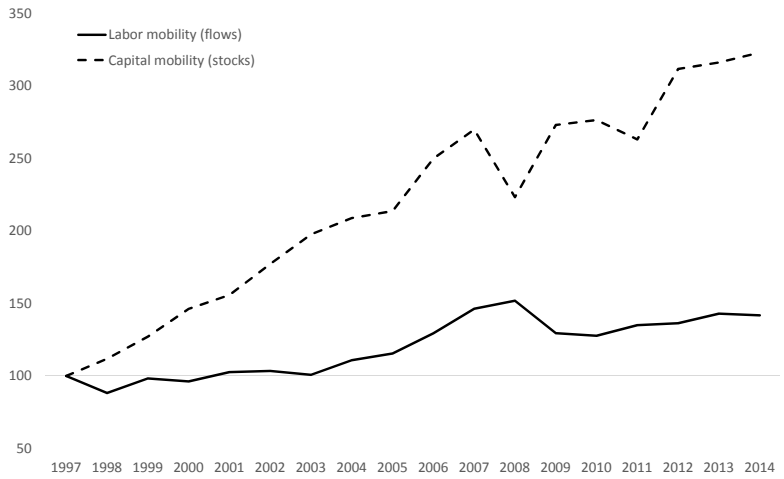
The second feature we would like to study is the fact that even capital is not perfectly mobile internationally: a large literature has measured and provided explanations for the home bias in international portfolio choices.[5] At the macroeconomic level, imperfect capital mobility translates into a wedge between after-tax returns across countries, depending on whether each country is a net capital exporter or importer. More capital mobility reduces this wedge, with ambiguous impact on tax rates. In contrast, the literature on tax competition generally considers capital as perfectly mobile, which leads to an equalization of after-tax returns. An exception is Lee (1997) who introduces transaction costs within a two-jurisdictions model. In his setting, tax competition may lead to higher capital tax rates because each jurisdiction disregards the fact that raising its own tax depresses the after-tax return in both jurisdictions. However the transaction cost is given, whereas in the macroeconomic literature, an indebted country will need to offer higher after-tax rerurn than the rest of the world if it wants to keep its foreign capital.

We consider a model of tax competition *à la* Zodrow and Mieszkowski (1986) where the benevolent government of a small open economy maximises a social utility that depends of the consumption of both a private good and of a public good. The latter good is financed through two taxes at the source: one on capital and the other one on labor. Both capital and labor are imperfectly mobile internationally. However, there is an asymmetry between

[4] In Bucovetsky and Wilson (1991) and Razin and Sadka (1991), labor supply is endogenous, which attenuates the standard result of taxation falling on the immobile base. However, to the extent that the elasticity of labor supply is finite, the mobile base stays under-taxed compared to the immobile one. These authors do not consider labor mobility across jurisdictions. Bucovetsky (2003) and Razin and Sadka (2012) do consider labor mobility, but they assume an heterogeneity between local and immigrant workers in terms of productivity or capital endowment.

[5] See the seminal paper by French and Poterba (1991), or the literature review by Lewis (1999).

Figure 2: De facto capital and labor mobility: OECD countries, 1997-2014



Note: Capital mobility is the sum of total assets and liabilities in percent of GDP (source: Lane and Milesi-Ferretti, 2004, updated); Labor mobility is the sum of inflows and outflows of non-nationals from other OECD countries, divided by the total population of the country (source: OECD database); The graph shows unweighted OECD averages.

capital and labor: while workers must be residents of the same country where they work, capital owners may be residents or non-residents.[6]

We first show that capital and labor taxation may coexist under reasonable conditions. We then study the impact of factor mobility on both tax rates. We find that the optimal tax rate on capital falls as a result of increased capital mobility (race to the bottom), and the optimal labor tax rate increases (burden shifting), but only for a country that is a net capital exporter. For a net capital importer, the race to the bottom story does not apply. In contrast, being a net exporter or importer of labor has ambigous effect on the impact of labor mobility because the international position of a country on the labor market needs to be considered in combination with its position on the capital market.

We then test our theoretical predictions on a panel of 28 OECD countries over the period 1997-2014, by successively studying the impact of factor mobility on the effective average tax rate on corporate capital and on the tax wedge on relatively high wages (gross

[6]This assumption, sometimes labeled "regional model" is standard in the literature, especially for international tax competition. However the literature on local tax competition has sometimes studied "metropolitan" models where individuals commute between home and work, see Braid (1996).

income representing 167% of average earnings). We pay careful attention to several other variables that may also have affected tax rates over this period, namely trade openness (which we instrument following the methodology proposed by Egger et al. (2016)) in order to control for colinearity with financial globalization), ageing, education, government spending, right-wing leadership, and real GDP. We also include country and time fixed effects, and we interact factor mobility with proxies of factor importing or exporting status.

We find evidence that capital mobility has a negative impact on capital taxation and a positive impact on labor taxation, but essentially for capital exporting countries. Symmetrically, we find evidence that labor mobility puts negative downward on labor taxation and upward pressure on capital taxation, and that these relationships do not depend on the international status of the country (exporter or importer) on capital and labor markets. Finally, we evidence a non-linear impact of labor mobility on capital taxation depending on the skilled level of the country: in relatively low-skilled countries, labor mobility puts upward pressure on capital taxation whereas in relatively high-skilled countries, labor mobility affects capital taxation negatively.

Although our measures of capital and labor mobility are not directional (since we add up assets and liabilities for capital mobility, migrant inflows and outflows for labor mobility), it cannot be ruled out that both forms of mobility are stimulated by low tax rates which would act as frictions. In order to circumvent this potential endogeneity problem, we provide robustness exercises where capital mobility is instrumented by its lagged value whereas labor mobility is instrumented by the laged value of inflows and outflows, consistent with the recommendations of Clemens and Hunt (2017).

We conclude that the mixed results obtained in the literature concerning the link between international capital mobility and capital taxation may be related to improperly controlling for other factors, notably trade openness and ageing, failing to account for labor mobility, and to the extreme assumption of full capital mobility versus full labor immobility.

Our results have several policy implications. First, they suggest that, unless there is international cooperation on the taxation of high labor incomes, increased labor mobility may well put downward pressure on labor taxation (e.g. through a flattening of tax schedules), perhaps even more than the impact of capital mobility on capital taxation.

Second, a country that opens up to capital inflows may be less vulnerable in its ability to tax capital than a country that opens up to capital outflows. Third, the combination of capital and labor mobility tends has also a balancing effect since they have opposite burden shifting effects.

The remainder of the paper is organized as follows. In Section 2, we outline the theoretical setting and derive the results. Section 3 introduces the empirical strategy and the data used. The econometric results are presented in Section 4. Section 5 concludes.

2 Theory

We consider a small open economy where production is achieved using two internationally mobile factors, capital and labor. A public good is financed through source taxation of capital and of labor. The government maximizes a utility function that depends on public spending and on the after-tax national income per inhabitant. All workers are supposed to live in the same country where they work, whereas they can invest their capital endowment in a different country.[7] The novelty of the model is to highlight the cross effects of the mobility of one factor on the taxation of the other factor. Furthermore, our setting allows us to contrast the impact of factor mobility depending on whether the economy is a net exporter or importer of capital or labor.

2.1 Production with imperfect factor mobility

Production is achieved using two internationally mobile factors, capital and labor, denoted K and L respectively. Each household is endowed with the same capital stock $\bar{k}$.[8] With L residents, the total capital available in the economy is $L\bar{k}$. In turn, the total labor endowment in the economy is fixed, denoted by $\bar{L}$. The production function is written as $F(K, L)$, where F satisfies constant returns-to-scale and is increasing and strictly concave in each arguments; thus: $F'_j > 0$ and $F''_{jj} < 0$ for $j = \{K, L\}$. We assume that capital and labor are taxed at the source at rates τ_j, and denote by r^*, w^* the international

[7] This asymmetry between labor and capital corresponds to the "regional model" of tax competition, as opposed to the "metropolitan model" which is less suited to international tax competition (see Wilson, 1999).

[8] We do not study specific results that could arise from heterogenous capital between natives and migrants (Razin and Sadka, 2012) nor from differentiated productivities (Bucovetsky, 2003).

remuneration of capital and labor, respectively.

In contrast with the usual existing literature on tax competition, we assume that both capital and labor are imperfectly mobile, and that the extent of mobility may differ for capital and labor. In Dynamic Stochastic General Equilibrium (DSGE) models, frictions in the international capital market are typically modelled as departures from the uncovered interest parity depending on the net foreign asset position of the country (see e.g. Lindé and Pescatori, 2017). Consistently, we assume that the stock of productive capital in the domestic economy, K, depends on the supply of capital by its residents $L\bar{k}$, and on the gap between the domestic, after-tax return on capital $F'_K - \tau_K$ and the international remuneration of capital r^*, which will influence the allocation of both domestic and foreign capital:[9]

$$K = L\bar{k} + \phi_K \left(F'_K - \tau_K - r^* \right), \tag{1}$$

where $\phi_K \geq 0$ represents the degree of capital mobility. A country can enjoy productive capital in excess of its domestic endowment ($K > L\bar{k}$, i.e. a negative net foreign asset position) if its after-tax return is greater than the international return on capital: $F'_K - \tau_K > r^*$.[10]

When $\phi_K = 0$, capital is immobile so we have $K = L\bar{k}$. Conversely, when $\phi_K \to \infty$, an infinitly small excess return is required to attract foreign capital, so at equilibrium the domestic after-tax return is equal to the international return: $F'_K - \tau_K = r^*$. For intermediate values of ϕ_K, the gap between the domestic after-tax return and its international level is given by:

$$F'_K - \tau_K = r^* + \frac{K - L\bar{k}}{\phi_K} \tag{2}$$

The literature on international migrations has also modelled the remuneration wedge between host and origin countries as a function of market frictions, here migration costs (see Borjas, 1989). By analogy with capital, we assume that the volume of labor in the domestic economy depends on labor endowment $\bar{L}$, and on the gap between its after-tax labor return $F'_L - \tau_L$ and the international remuneration of labor w^*:

[9] For simplicity, we consider the depreciation rate of capital to be equal to its price variation over one period, so that the user cost of capital is equal to its gross marginal return.

[10] Symmetricaly, $K < L\bar{k}$ is consistent with $F'_K - \tau_K < r^*$.

$$L = \bar{L} + \phi_L \left(F'_L - \tau_L - w^* \right) \tag{3}$$

where $\phi_L \geq 0$ represents the international mobility of labor. For $\phi_L = 0$, we have $L = \bar{L}$, while $\phi_L \to \infty$ corresponds to perfect labor mobility where $F'_L - \tau_L = w^*$. For intermediate levels of labor mobility ($\phi_L > 0$), there is a wedge between the domestic after-tax return and the international remuneration:

$$F'_L - \tau_L = w^* + \frac{L - \bar{L}}{\phi_L} \tag{4}$$

A net importer of labor ($L > \bar{L}$) needs to offer higher net labor income than the world level to attract labor.

For given K and L, the absolute size of the wedge in Equations (2) and (4) declines for higher factor mobility. For instance, higher capital mobility makes it easier for a net capital importer to attract foreign capital: the premium needed to attract foreign investors is reduced, and the capacity to tax is increased:

$$\left. \frac{\partial \tau_K}{\partial \phi_K} \right|_{K,L \text{ given}} = \frac{K - L\bar{k}}{\phi_K^2} \tag{5}$$

The sign of this partial derivative is positive if $K > L\bar{k}$ and negative in the opposite case. Hence, for a given level of capital, we expect the tax rate on capital to increase following an rise in capital mobility for a net capital importer, and decrease for a net capital exporter. The same reasoning applies to labor. Naturally, capital and labor will adjust to a change in factor mobility, hence it is not possible to conclude without a full resolution of the model.

2.2 The government's programme

The government is supposed to maximize the utility of the average household. This utility depends on national income net of taxes (or disposable income, or private income), denoted R, and public spending, denoted G, both quantities being then divided by the size of the population L so as to recover per capita volumes. The utility function, denoted $U\left(\frac{R}{L}, \frac{G}{L}\right)$, is increasing and concave in both arguments. It is additively separable and

satisfies $\lim_{R/L\to 0} U'_R = \lim_{G/L\to 0} U'_G = +\infty$.

Net national income (private income, hereafter) is given by output $F(K,L)$, minus taxes paid at the source on productive capital $\tau_K K$ and on productive labor $\tau_L L$, plus the remuneration of residents' net asset position, $r^*\left(L\bar{k} - K\right)$.[11] Private income thus can be expressed as:

$$R = F - \left(\tau_K + r^*\right) K - \left(\tau_L - r^*\bar{k}\right) L. \tag{6}$$

The homogeneity of the production function implies that $F(K,L) = F'_K K + F'_L L$. Hence, Equation (6) can be re-written:

$$R = \left(F'_K - \tau_K\right) K + \left(F'_L - \tau_L\right) L + r^*\left(L\bar{k} - K\right) \tag{7}$$

In a labor-importing country ($L > \bar{L}$), the net remuneration of labor is higher than its world level: $F'_L - \tau_L > w^*$, which pushes private income up. In a capital-importing country ($K > L\bar{k}$), the net remuneration of capital is also higher than the world level: $F'_K - \tau_K > r^*$. However, part of this remuneration is channelled abroad, depending on the net foreign asset position (last term is negative). Plugging Equation (2) into (7), we see that the net effect is positive:[12]

$$\left(F'_K - \tau_K\right) K + r^*\left(L\bar{k} - K\right) = \left(\frac{K - L\bar{k}}{\phi_K}\right) K + r^* L\bar{k} > 0$$

Hence, the net domestic capital income is higher in a capital importing country.

In turn, public spending is equal to total tax revenues (budget balance constraint):

$$G = \tau_K K + \tau_L L. \tag{8}$$

We assume that there is a minimum level of public spending per capita $\bar{g}$ corresponding to government's minimum provision of public services. The cost of these services is supposed to be proportional to the number of residents (no fixed cost, hence no scale economies in the provision of public goods). Hence, each new resident will cost at least $\bar{g}$

[11] Since we are interested in small deviations of K and L from the endowments, we neglect the second-order term in private income that would derive from the return premium applied to a negative net foreign asset position.

[12] It is also positive without our simplifying assumption that the cost of a negative net foreign asset position is r^*.

in terms of publig goods while also bringing new tax resources. The government's problem then is to set τ_K and τ_L so as to maximize $U\left(\frac{R}{L}, \frac{G}{L}\right)$ subject to Equations (2), (4), (6), (8), and $\frac{G}{L} \geq \bar{g}$.

2.3 Private and public incomes

Before coming to the optimal tax rates, it is useful to express Equations (7) and (8) as functions of K and L:

$$R = \left(\frac{K - L\bar{k}}{\phi_K}\right) K + \left(r^*\bar{k} + w^* + \frac{L - \bar{L}}{\phi_L}\right) L \tag{9}$$

$$G = F(K, L) - \left(r^* + \frac{K - L\bar{k}}{\phi_K}\right) K - \left(w^* + \frac{L - \bar{L}}{\phi_L}\right) L \tag{10}$$

Private income R happens to be a separable and convex function of capital and labor. Interestingly, when capital mobility is perfect ($\phi_K \to \infty$), private income no longer depends on productive capital K: to the extent that the domestic after-tax return on capital is equal to the world level, it does not matter for residents whether their assets are invested at home or abroad (they will receive the same after-tax return). In this case, capital income per capita is $r^*\bar{k}$. Conversely, when capital mobility is less than perfect, capital income per capita is higher than $r^*\bar{k}$ if $k > \bar{k}$ and lower than $r^*\bar{k}$ in the reverse case. The reason is that, if $k > \bar{k}$, capital is better remunerated at home than abroad. Although part of the remuneration goes to foreign capital owners, domestic residents earn more than r^* on each unit of their capital endowment invested domestically (see the discussion after Equation (7)).

When labor mobility is perfect ($\phi_L \to \infty$), private income is a linear function of labor: labor income per capita is is w^*. Like for capital, if labor mobility is less than perfect, labor income per worker is more than w^* if $L > \bar{L}$ and less than w^* in the reverse case. If the former case, domestic workers benefit from net wages that are higher than the world level.

In our model, workers relocate with their capital endowment, or stay home and just invest their endowment overseas. Hence there is an asymmetry between capital and labor: attracting a new worker will automatically attract a new capital endowment, whereas at-

tracting new capital will attract new workers only through the induced rise in the marginal productivity of labor.[13]

2.4 Model solution

We can now re-write the government's programme as:

$$\max_{k,L} U\left(\frac{R}{L}, \frac{G}{L}\right)$$
$$s.t. \left| \begin{array}{l} \frac{R}{L} = \frac{\left(k-\bar{k}\right)}{\phi_K} Lk + r^*\bar{k} + w^* + \frac{\left(L-\bar{L}\right)}{\phi_L} \\ \frac{G}{L} = f\left(k\right) - \left(r^* + \frac{\left(k-\bar{k}\right)}{\phi_K} L\right) k - \left(w^* + \frac{\left(L-\bar{L}\right)}{\phi_L}\right), \\ \frac{G}{L} \geq \bar{g} \end{array} \right.$$

where $k = \frac{K}{L}$ is the level of productive capital per worker in the economy, and $f(k) = \frac{F(K,L)}{L}$. We first study the interior solution. The first-order conditions are:

$$\left| \begin{array}{l} U'_R \left[\frac{\left(2k-\bar{k}\right)}{\phi_K} L\right] + U'_G \left[f'\left(k\right) - \left(r^* + \frac{\left(2k-\bar{k}\right)}{\phi_K} L\right)\right] = 0 \\ U'_R - U'_G = 0 \end{array} \right. \tag{11}$$

The $U'_R = U'_G$ condition arises because, for a given k, an extra worker costs, in terms of public good provision, exactly the same amount as he/her brings in terms of private income: the relative cost of the public good in terms of the private one is unity. Plugging $U'_R = U'_G$ into the first condition then involves the equality between the marginal productivity of capital and the world capital return:

$$f'\left(k\right) = r^* \tag{12}$$

Equation (12) states that the level of capital per worker k is entirely determined by the world capital return r^*. Then, the return gap related to imperfect capital mobility (Equation (2)) determines the tax rate on capital:

[13] Such asymmetry could be erased if workers were allowed to work and live in two different countries. Existing models of international tax competition generally disregard this possibility, but things could change with the expansion of cross-border telecommuting (see Baldwin, 2016).

$$\tau_K = -\frac{\left(k - \bar{k}\right) L}{\phi_K} \tag{13}$$

The taxation space is equal to the return gap between the small open economy and the rest of the world. It is positive for a net capital exporter, and negative in the opposite case. Using the homogeneity of the production function, and with k defined by Equation (12), we then have $F'_L = f(k) - kf'(k) = w^*$. Hence, the tax rate on labor is:

$$\tau_L = -\frac{\left(L - \bar{L}\right)}{\phi_L} \tag{14}$$

Again, the taxation space is equal to the remuneration gap related to imperfect labor mobility. It is positive for a net exporter of labor and negative in the reverse case.

Finally, the number of workers-residents, L, can be recovered from $U'_R = U'_G$. Assuming that U is additively separable, and using the theorem of implicit functions, we have, at the government's optimum:

$$\frac{dL}{d\phi_K} = \frac{\frac{\left(k-\bar{k}\right)}{\phi_K^2} Lk}{\frac{\left(k-\bar{k}\right)}{\phi_K} k + \frac{1}{\phi_L}} \tag{15}$$

$$\frac{dL}{d\phi_L} = \frac{\frac{\left(L-\bar{L}\right)}{\phi_L^2}}{\frac{\left(k-\bar{k}\right)}{\phi_K} k + \frac{1}{\phi_L}} \tag{16}$$

For limited deviations from the initial capital per worker endowment ($k \approx \bar{k}$) and limited labor mobility (ϕ_L relatively small), the denominator of these two expressions is positive. Hence, more labor mobility leads to a labor inflow if $L > \bar{L}$ and to an outflow in the opposite case.

Perhaps less intuitive is the impact of capital mobility on labor: higher capital mobility leads to a labor inflow if $k > \bar{k}$ and to a labor outflow in the opposite case. In the former case, more capital mobility will increase the capital per worker ratio k ex ante, hence it will increase the marginal productivity of labor and its remuneration, attracting new workers. In contrast, if $k < \bar{k}$, more capital mobility will give rise to a fall in k ex ante, hence to a fall in the marginal productivity of labor.

The impact of capital and labor mobility on both tax rates is finally obtained by

deriving Equations (13) and (14) with respect to ϕ_K and ϕ_L, and using (15) and (16):

$$\frac{d\tau_K}{d\phi_K} = \frac{\left(k-\bar{k}\right)L}{\phi_K^2}\left[\frac{\frac{1}{\phi_L}}{\frac{\left(k-\bar{k}\right)}{\phi_K}k+\frac{1}{\phi_L}}\right] \tag{17}$$

$$\frac{d\tau_K}{d\phi_L} = -\frac{\left(k-\bar{k}\right)}{\phi_K}\frac{\frac{\left(L-\bar{L}\right)}{\phi_L^2}}{\frac{\left(k-\bar{k}\right)}{\phi_K}k+\frac{1}{\phi_L}} \tag{18}$$

$$\frac{d\tau_L}{d\phi_K} = -\frac{1}{\phi_L}\frac{\frac{\left(k-\bar{k}\right)}{\phi_K^2}Lk}{\frac{\left(k-\bar{k}\right)}{\phi_K}k+\frac{1}{\phi_L}} \tag{19}$$

$$\frac{d\tau_L}{d\phi_L} = \frac{\left(L-\bar{L}\right)}{\phi_L^2}\left[\frac{\frac{\left(k-\bar{k}\right)}{\phi_K}k}{\frac{\left(k-\bar{k}\right)}{\phi_K}k+\frac{1}{\phi_L}}\right] \tag{20}$$

The impact of capital mobility on taxation depends on the gap $k-\bar{k}$. If $k<\bar{k}$, an increase in capital mobility leads to capital and labor outflows (see supra), and to a reduction in the capital return wedge. The tax rate on capital is reduced while that on labor is increased (burden shifting).

Conversely, if $k>\bar{k}$, an increase in capital mobility leads to capital and labour inflows, and to an increase in the taxation space for capital. Hence, the tax on capital increases while that on labor falls. This result is at odds with the usual race-to-the-bottom and burden shifting effect of capital mobility.

In turn, the impact of labor mobility on taxation depends not only on L relative to $\bar{L}$, but also on k relative to $\bar{k}$. Suppose we have $L>\bar{L}$ (labor importer). More labor mobility will trigger a labor inflow. However, if initially $k>\bar{k}$, each new worker will increase the absolute size of the capital remuneration wedge (Equation 2), requiring a lower tax rate on capital.[14] Conversely, if $k<\bar{k}$, then each newcomer contributes to increasing the space for taxing capital. The tax on labor moves in opposite direction.

Symmetrically, if $L<\bar{L}$, more labor mobility triggers an outflow of labor which would normally increase the space for taxing labor since more labor export is consistent with lower after-tax remuneration in the domestic economy. However, if at the same time we have $k>\bar{k}$, then the labor outflow increases the taxation space for capital. In this case,

[14] With more workers in the economy, there is a need to have more capital coming from abroad, hence a higher after-tax return on capital, and a lower capital tax.

more labor mobility leads to an increase in the tax on capital and a fall in the tax on labor.

In brief, capital mobility triggers a race to the bottom of τ_K and a shift of the tax burden on to labor (through an increase in τ_L) only for a capital exporting country ($k < \bar{k}$). In the opposite case, more capital mobility raises the space for taxing capital, and to reduce the burden on labor. The results for labor mobility are more complex as they combine the position of the country in terms of both capital and labor endowments. They are summarized in Table 1.

Table 1: Impact of factor mobility on the capital and labor taxation (in the vicinity of factor endowments)*

	Capital taxation		Labor taxation	
	$\frac{d\tau_K}{d\phi_K}$	$\frac{d\tau_K}{d\phi_L}$	$\frac{d\tau_L}{d\phi_K}$	$\frac{d\tau_L}{d\phi_L}$
		$L < \bar{L}$		
$k < \bar{k}$	$-$	$-$	$+$	$+$
$k > \bar{k}$	$+$	$+$	$-$	$-$
		$L > \bar{L}$		
$k < \bar{k}$	$-$	$+$	$+$	$-$
$k > \bar{k}$	$+$	$-$	$-$	$+$

*Here we assume $\frac{(k-\bar{k})}{\phi_K}k + \frac{1}{\phi_L} > 0$

However, the last line of Table 1 in fact corresponds to negative tax rates at equilibrium (see Equations (13) and (14)), which is incompatible with a minimum level of public good provision $G/R > \bar{g}$. More generally, there maybe cases where the constraints $\bar{g}$ binds. Hence we need also to study the constrained equilibrium on the top of the interior solution.

As detailed in Appendix A, in the case the $\bar{g}$ constraint is binding, we have $U'_R > U'_G$ (overprovision of public good) but the optimal tax rates behave similarly as with the interior solution with respect to factor mobility. The only difference is that the level of employment L adjusts downwards when the constraint $\bar{g}$ goes up:

$$\frac{dL}{d\bar{g}} = -\frac{1}{\frac{(k-\bar{k})}{\phi_K}k + \frac{1}{\phi_L}}$$

For a given level of capital mobility, the unconstrained capital tax rate depends on k in a linear way: derivating τ_K with respect to k (Equation 13) yields:

$$\left.\frac{\partial \tau_K}{\partial k}\right|_{\phi_K \text{ given}} = -\frac{L}{\phi_K} < 0 \tag{21}$$

For $k > \bar{k}$, the capital tax is negative (Equation (13)). In this case, the provision of public goods relies on the labor tax. For the latter to be positive, though, we need $L < \bar{L}$ (Equation (14)): the level of employment L falls until the labor tax given by Equation (14) is reached. One implication is that, for $\bar{g} > 0$, we cannot have at the same time $k > \bar{k}$ and $L > \bar{L}$: the last line of Table 1 is useless.

From Table 1 and Figure 3, we can derive two general propositions:

Proposition 1. *In a country with relatively high capital endowment ($\bar{k} > k$), more capital mobility induces a fall in the tax on capital and a simultaneous rise in the tax on labor; for low capital endowment, we get the opposite results.*

Proposition 2. *The impact of labor mobility on capital and labor taxation depends on capital and labor endowments in a non-linear way.*

In the following, we test our Proposition 1 empirically on a sample of OECD countries. We also use the data to study how labor mobility affects taxation, and whether the effect depends on factor endowments (Proposition 2).

3 Empirical strategy

Our empirical methodology is close to Adam and Kammas (2007) who estimate the impact of globalization on effective tax rates on capital and on labor, for 17 OECD countries over 1970-1997. They find trade openness to have a negative impact on capital taxation ("efficiency effect") but a positive impact on labor taxation ("compensation effect"). However, they only study the impact of trade openness, not capital nor labor mobility, and the sample stops before the steep increase in capital mobility.[15] We nevertheless follow their general methodology consisting in panel estimations with country and time fixed effects, and a range of control variables that includes ageing, public spending, GDP and

[15] The time sample is especially important in our case. Indeed, Adam et al. (2013) show that studies incorporating more recent years tend to find more negative impact of globalization on capital taxation.

the political orientation of the government. Contrasting with Adam and Kammas, 2007, we consider trade openness as a control rather than a variable of interest, and use specific measures of capital and labor mobility.

Our panel covers 28 OECD countries[16] over the period 1997-2014. The empirical specification is the following:

$$KTAX = a_0 + a_1 KMOB_{it} + a_2 LMOB_{it} + a_3 X_{it} + FE_i + FE_t + u_{it} \tag{22}$$

$$LTAX_{it} = b_0 + b_1 LMOB_{it} + b_2 KMOB_{it} + b_3 X_{it} + FE_i + FE_t + v_{it} \tag{23}$$

where $KTAX_{it}$ is the tax rate on capital for country i in year t, $LTAX_{it}$ the tax rate on labor, $KMOB_{it}$ is the mobility of capital, $LMOB_{it}$ is the mobility of labor, X_{it} is a vector of control variables, FE_i, FE_t are country and time fixed effects, and u_{it}, v_{it} are the residuals. Based on the existing theoretical literature, we expect $a_1, b_1 < 0$ ("race-to-the-bottom" effect for capital and labor taxation, respectively) and $a_2, b_2 > 0$ (compensation effect). However, we have shown that these effects may be influenced by the net international position of a country in terms of capital or labor. In a second stage, we interact capital mobility and labor mobility with proxies of factor endowments.

We now briefly describe the data sources used in the analysis, with special attention to the dependent, tax variables, and to the variables used to capture factor mobility.[17] We also detail the instrumentation of the trade openness variable, and the proxies for factor endowments.

3.1 Tax rates

Consistent with theoretical models of tax competition that focus on source taxes, the empirical literature on international tax competition has generally focused on the corporate income tax () and relied on the Effective Average Tax Rate (EATR) which accounts for tax allowances differing across countries (see Devereux and Griffith, 1998). Adam et al. (2013) note that studies based on implicit tax rates (e.g. corporate income tax revenues divided

[16] Australia, Austria, Belgium, Canada, Chile, Czech Republic, Germany, Denmark, Spain, Finland, France, United Kingdom, Hungary, Ireland, Iceland, Israel, Italy, Japan, Korea, Mexico, Netherlands, Norway, Poland, Portugal, Slovak Republic, Slovenia, Sweden, United States.

[17] The list of variables and data sources is summarized in Appendix B.

by GDP or gross operating surplus) tend to find a positive relationship with globalization, perhaps due to the impact of globalization on GDP and profits. More generally, implicit taxation raises an accute problem of endogeneity.

We use EATRs from the 2016 update of the Oxford University Centre for Business Taxation Tax Database developed by Bilicka and Devereux (2012). The EATR is calculated as the ratio of post-tax to pre-tax net present value of a composite investment yielding a 20% pre-tax return financed through a combination of debt, equity and auto-financing.

As for the taxation of labor, we use the average tax wedge for a single individual with no children, and earning a gross income representing 167% of average earnings. The tax wedge includes both the income tax and social security contributions paid, and therefore offer a more complete picture of labour taxation than the single statutory personal income tax rate. We choose to work on the tax rate applied on relatively high wages because labor mobility concerns mainly skilled labor across OECD countries. The data are taken from the comparative tables of the OECD taxing wages database.

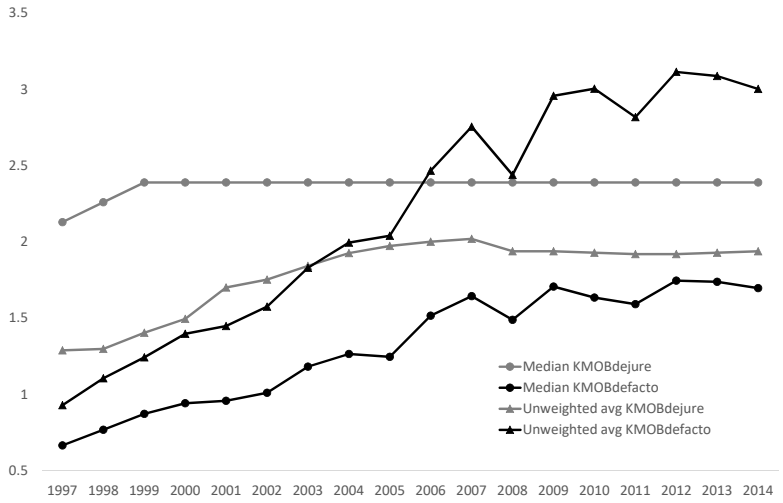
3.2 Factor mobility

In their meta-analysis of 23 studies and 233 observations, Adam et al. (2013) highlight the importance of how globalization is measured for the estimation of its impact on capital taxation. Some studies have used trade openness or broader measures of globalization that also cover political and social aspects (Dreher, 2006). Other studies have focused specifically on international capital mobility. In the latter case, two categories of measures have been used: de jure (based on existing restrictions to capital flows as reported by the International Monetary Fund), or de facto (based on actual cross-border capital flows or stocks).

Figure 4 compares the evolution of de jure and de facto capital mobility for our sample of 28 OECD countries, over 1997-2014. The de jure measure is the index constructed by Chinn and Ito (2006), and regularly updated, based on the Annual IMF's Annual Report on Exchange Arrangements and Exchange Restrictions. For de facto capital mobility, we calculate the sum of gross external assets and gross external liabilities based on Lane and Milesi-Ferretti (2007) (updated) and divide by GDP. The graph shows that most of our countries reach high de jure mobility very soon in our time sample, so the median and

average of the de jure measure are almost flat over time. In contrast, the de facto measure shows a clear upward trend that only stabilizes after the global financial crisis. Since we intend to estimate our model with time fixed effects, we select the de facto measure (denoted by KMOB), which offers the additional advantage of being more consistent with our measure of labor mobility, which is also de facto (see infra).[18]

Figure 3: De jure and de facto capital mobility: 28 OECD countries



Note: Countries: see Figure 1.
Source: Lane and Milesi-Ferretti (2007) and Chinn and Ito (2006) databases.

For labor mobility, there is no available de jure measure. The Migrant Integration Policy Index (MIPEX) developed by Huddleston et al. (2015) is one notable exception. Unfortunately, the index covers only a few years between 2004 and 2014, and only a few OECD countries. We rely on a de facto measure (LMOB), namely the sum of inflows and outflows of non-nationals from and to other OECD countries, divided by the total population of the country. Limiting our measure to intra-OECD gross flows allows us to focus on relatively skilled labor mobility. The data are taken from the OECD International Migration Database.

The European single market represents the most advanced experience of full capital

[18] We also used a Feldstein-Horioka measure of capital mobility, namely the absolute value of gross domestic savings (GDP net of final consumption expenditures) minus gross fixed capital formation as a percentage of GDP. We do not report the results with this proxy that turned out always non-significant.

and labor mobility. Hence we also include an EU dummy in our estimations (EU).

3.3 Trade openness

Our first control variable is trade openness, whose impact on tax rates has also been studied in the literature. Our measure of trade openness π_{it} is the average of exports and imports of country i divided by total absorption, all flows being expressed in current US dollars:

$$\pi_{it} = \frac{\sum_{j \neq i}(X_{ijt} + X_{jit})}{2N \times Absorption_{it}} \tag{24}$$

where X_{ijt} represents imports by country i from country j, $Absorption_{it}$ is total absorption in country i, and N is the number of partner countries. Absorption is calculated as GDP minus gross exports. Data sources are CEPII-Tradeprod, the UNIDO-Indstat4 (2015 edition) and World Bank World Development Indicators.

A problem with trade openness is its correlation with our two measures of factor mobility: although historically factor mobility has lagged behind trade openning up, over our time period (1997-2014), globalization has intensified in the different dimensions. Hence, introducing trade openness may make it difficult to identify the specific impact of factor mobility on tax rates. Furthermore, it can be argued that the expansion of trade is an important determinant of the expansion of cross-border capital and labor flows.

To circumvent this problem, we follow Egger et al. (2016) in building an instrument of trade openness that is anchored on structural general equilibrium models of trade.[19]

Denoting by π_{ijt} the share of goods from country j in the expenditures of country i in year t, we have:

$$\pi_{ijt} = \frac{X_{ijt}}{Absorption_{it}} \tag{25}$$

For $i = j$, X_{iit} represents internal trade. It is constructed as the production of country i net of its total exports, based on CEPII-Tradeprod data.

We sssume that X_{ijt} is proportional to the supply potential of country j, y_{jt}, and to

[19] The problem of endogeneity is not an issue here since our explained variables are de jure tax rates, not implicit rates calculated based on tax revenues; and openness variables are not directional, so more openness can equally arise from more outflows or more inflows.

a bilateral friction coefficient β_{ijt} :

$$X_{ijt} = y_{jt}\beta_{ijt} \tag{26}$$

For $i = j$, we have $\beta_{iit} = 1$ (no friction for infra-national trade). Hence we have:

$$\frac{\pi_{ijt}}{\pi_{iit}} = \frac{y_{jt}}{y_{it}}\beta_{ijt} \tag{27}$$

and:

$$\frac{\pi_{ijt}}{\pi_{iit}}\frac{\pi_{jit}}{\pi_{jjt}} = \beta_{ijt}\beta_{jit} \tag{28}$$

Equation (28) provides a measure of bilateral trade fictions each year. We recover a measure of average frictions for each country i as follows:

$$\beta_{it} = \sum_{j \neq i} \beta_{ijt}\beta_{jit} \tag{29}$$

We finally regress our measure of trade openness π_{it} on the friction variable β_{it} and use the projected value as an instrument for trade openness:

$$\ln(\pi_{it}) = c_0 + c_1 \ln \beta_{it} + c_2 X_{it} + FE_i + FE_t + w_{it} \tag{30}$$

where X_{it} is the same vector of controls used in our main estimations, FE_i and FE_t represent country and time fixed effects, and w_{it} is the residual term.

In the estimations, we alternatively use the logaritm of π_{it} or its instrumented value as a measure of trade openness (TRADE).

3.4 Factor endowments

Whether a country is a net capital importer or exporter can be observed through its net foreign asset position (the difference between gross foreign assets and gross foreign liabilities). Consistently, our first measure of the net capital position of a country is a dummy variable (KIMPORT) that is equal to unity when the net foreign asset position of the country is negative. The data is from Lane and Milesi-Ferretti (2007) (2017 update).

Although the KIMPORT dummy rarely changes for a given country over time, one

cannot exclude that it may be endogenous to capital taxation. To solve the endogeneity problem, we alternatively substitute the proportion of the population aged over 65 (65+) to the KIMPORT dummy, based on OECD data. Indeed, Masson et al. (1994) evidence a close relationship between ageing and the net foreign asset position of a country.

Another strategy, already followed by Hays (2003), consists in using the level of capital per worker in a remote year as a proxy for the capital endowment. Consistently, we interact the capital mobility variable with the stock of capital per worker in 1990 (k1990), given by the Penn World Tables[20] A country with relatively high capital per worker in 1990 is likely to export capital in the subsequent years. One advantage of this strategy is that it can be replicated for labor.[21] Hence, we use the level of employment over the total population in 1990 (L1990) as a proxy for labor endowment: a country with relatively high employment relative to its total population in 1990 is expected to export labor in the subsequent years.

3.5 Other control variables

In advanced economies, financial integration has been concommittant to population ageing, which may have favored cutting tax rates on capital income while increasing taxes on labor. Therefore, we control for the share of the population aged 65+ in total population (65+) using data from OECD population statistics. We also control for political cycles by adding a dummy variable RIGHT for a right-wing executive (World Bank Database of Political Institutions).[22]

In order to control for a possible "compensation effect" of globalization, we also control for general government spending in percent of GDP, GOVSPEND (April 2017 update of the IMF World Economic Outlook).[23] We also include the share of 25-64 years old with completed tertiary education (EDUC) taken from the OECD Education at a Glance database. High-skilled labor is generally considered as more mobile than low-skilled labor.

[20] The data is not available for all our countries before 1990.

[21] Given the lack of reliable and consistent data, it is not possible to calculate an equivalent of the net foreign asset position for labor.

[22] Other political variables such as the share of seats in Parliament held by the government party did not show up significant.

[23] Adam et al. (2013) show that including a measure of government spending in the regression significantly reduces the coefficient on globalization. Hence it is especially important to control for government spending.

Therefore, we also interact this variable with labor mobility.

As discretionary fiscal policy has been shown to often be pro-cyclical at least when evaluated with ex-post GDP data (see e.g. Cimadomo, 2016), we also control for country-specific business cycles[24] through the one-year lagged log of GDP, LGDP, in constant 2010 USD. We use data from the World Development Indicators database.

Finally, because the European Union's single market represents the most advanced example of trade, capital and labor mobility, we include an EU dummy based on information provided by the European Commission's website.

4 Econometric results

4.1 Baseline results

The baseline results are presented in Table 2 for capital taxation and in Table 3 for labor taxation. In each case, the first three columns report the results without instrumenting trade openness whereas the last three columns present the results when trade openness is instrumented.

Let us start with capital taxation (Table 2). Column (1) reports the results without introducing capital and labor mobility. Trade openness (which is not instrumented here) has insignificant impact on the effective tax rate on corporate income. A right-wing executive exerts significant downward pressure on the tax rate, so does the share of 65+ in total population. Government spending and tertiary education have no significant impact on the tax rate. Finaly, GDP has a negative (although weakly significant) effect on capital taxation, revealing pro-cyclical tax variations (i.e. governments tend to cut rates when GDP increases faster.

In Column (2), we introduce capital and labor mobility, plus the EU dummy. While the coefficients on the control variables remain broadly unchanged (except for GDP that turns insignificant), no mobility variable has any significant effect on the capital tax rate. Column (3) adds a variable that interacts labor mobility with tertiary education. The results are broadly unchanged.

[24] OECD-wide business cycles are captured by time fixed effects. As for the impact of country size on the ability to tax, it is captured through country fixed effects.

Columns (4) to (6) show the same estimations as (1)-(3) when trade openness is instrumented. The Cragg-Donald F-statistics is well above 10, which confirms the validity of our trade instrument since there is only one endogenous variable in the second stage (cf. Staiger and Stock, 1997). The Kleibergen-Paap test, which is robust to heteroskedasticity, also suggests that our instrument is valid at reasonable confidence level (according to the Stock-Yogo critical values). The reduction of trade frictions still has no significant effect on the corporate income tax. However, capital mobility now has a negative impact. Labor mobility and the EU dummy have no significant impact. The results concerning control variables are unchanged, except for tertiary education that now exerts positive pressure on the capital tax rate, and GDP that is no longer significant.

The last column of Table 2 suggests that more labor mobility in a country with relatively skilled workers exerts negative pressure on capital taxation, while at lower skills more mobility puts upward pressure on capital taxation. Hence, the "compensation" effect seems to work only for limited levels of skills, whereas there seems to be some complementarity between capital mobility and the mobility for higher skill levels. Given the upward trend in skills, the combined effect of labor mobility on capital taxation switches from positive to negative in 16 of of the 28 countries over time. In 9 countries, it remains positive during the whole period: Austria, Chile, Czech Rep., Hungary, Italy, Mexico, Portugal, Slovak Rep., Slovenia. And in 3 countries it is negative during the whole period: Canada, Israel, United States.

Hence, Table 2 evidences a negative impact of capital mobility on the corporate income tax after control variables such as trade openness, ageing or right-wing government are accounted for. It further highlights a possible non-linear impact of labor mobility on capital taxation. Ageing and political factors are also highly significant.

We now turn to labor taxation. In Table 3, Column (1) reports the results without factor mobility. Like for capital taxation, trade openness (which is not instrumented here) has no significant impact on labor taxation. While a right-wing executive has negative (although non-significant) impact on labor taxation, the impact of ageing, education and government spending are all positive and significant. Hence, a higher share of the population aged 65+ tends to increase labor taxation while reducing capital taxation, suggesting burden shifting. Like for capital taxation, we observe that the labor tax is cut when the

Table 2: Impact of factor mobility on the capital tax rate

	(1)	(2)	(3)	(4)	(5)	(6)
KTAX				IV	IV	IV
TRADE	-0.00754	-0.00527	-0.00339	-0.00230	-0.00205	-0.000439
	(0.0160)	(0.0170)	(0.0167)	(0.0101)	(0.0147)	(0.0133)
KMOB		-0.00281	-0.00205		-0.00359**	-0.00274*
		(0.00397)	(0.00386)		(0.00180)	(0.00166)
LMOB		0.670	11.50		0.702*	12.63***
		(0.618)	(8.307)		(0.422)	(3.678)
LMOB*EDUC			-34.47			-37.98***
			(26.07)			(11.46)
EU		0.00257	-0.00291	-0.00288	0.000125	-0.00586
		(0.0295)	(0.0274)	(0.0104)	(0.0109)	(0.0103)
GOVSPEND	0.0525	0.0510	0.0299	0.0396	0.0399	0.0155
	(0.0880)	(0.0885)	(0.0951)	(0.0430)	(0.0475)	(0.0490)
65+	-1.302**	-1.323**	-1.455**	-1.329***	-1.352***	-1.496***
	(0.547)	(0.543)	(0.566)	(0.215)	(0.221)	(0.231)
RIGHT	-0.0116**	-0.0105**	-0.0118**	-0.0113***	-0.00973***	-0.0110***
	(0.00493)	(0.00468)	(0.00439)	(0.00270)	(0.00277)	(0.00268)
EDUC	0.276	0.335	0.403*	0.307***	0.382***	0.457***
	(0.181)	(0.233)	(0.231)	(0.0844)	(0.106)	(0.107)
LGDP	-0.0158*	-0.0135	-0.0141	-0.0156*	-0.0134	-0.0140
	(0.00910)	(0.00964)	(0.00944)	(0.00891)	(0.00953)	(0.00896)
Cragg-Donald Wald F				184.7	170.3	110.9
Kleibergen-Paap rk F				14.960	13.589	8.810
Observations	429	418	418	420	409	409
R-squared	0.576	0.565	0.576	0.569	0.560	0.574
Number of countries	28	28	28	28	28	28

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

economy is booming.

Factor mobility and the EU dummy are introduced in Column (2). Labor mobility has significant, negative effect on labor taxation, whereas de capital mobility and the EU dummy have a positive impact. The other coefficients are broadly unchanged. When labor mobility is interacted with education (Column (3)), the coefficients are not significant, suggesting that, if there is heterogeneity, such heterogeneity does not follow the lines of education.

Columns (4) to (6) present the same estimations when trade openness is instrumented. The instrumented trade variable has a negative, highly significant impact on labor taxation. The other coefficients are broadly unchanged.

On the whole, the "race-to-the-bottom" narrative, according to which more factor mobility will induce lower factor taxation, seems to apply to labor taxation (Table 3) even more than to the corporate income tax (Table 2). Furthermore, there is evidence of burden shifting for capital mobility (that shifts taxation from capital to labor) and for labor mobility (that shifts taxation from labor to capital in relatively low-skilled countries). Finally, trade globalization seems to have had negative impact on labor taxation but not on capital taxation.

4.2 Net capital importers and exporters

According to Proposition 1, a country that is a net capital exporter will see its tax rate on capital fall and its tax rate on labor increase in response to higher capital mobility. Conversely, a country that is a net capital importer will experience the reverse pattern. We test this proposition here by interacting our measure of capital mobility with a dummy KIMPORT that is equal to unity when the country displays a negative net foreign asset position. The results are reported in Tables 4 and 5 for capital and labor tax rates, respectively. In all estimations, the trade openness variable is instrumented.

The first three columns of Table 4 reproduces the baseline results of Table 1, Column (3), with a negative impact of capital mobility and a positive impact of labor mobility on the capital tax rate. In Column (2) capital mobility is interacted with the dummy for capital importer. The coefficient on this interacted variable is positive and highly significant. Its absolute value is similar to that on the non-interacted capital mobility

Table 3: Impact of factor mobility on the labor tax rate

	(1)	(2)	(3)	(4)	(5)	(6)
LTAX				IV	IV	IV
TRADE	-0.00950	-0.0137	-0.0136	-0.0259***	-0.0277***	-0.0278***
	(0.00855)	(0.0107)	(0.0108)	(0.00784)	(0.00820)	(0.00828)
KMOB		0.00425**	0.00428**		0.00480***	0.00476***
		(0.00201)	(0.00201)		(0.00153)	(0.00151)
LMOB		-2.826***	-2.405		-2.872***	-3.410
		(0.511)	(4.632)		(0.344)	(2.441)
LMOB*EDUC			-1.345			1.722
			(15.11)			(7.808)
EU		-0.0131	-0.0133		-0.0102*	-0.00987*
		(0.0105)	(0.0103)		(0.00572)	(0.00572)
GOVSPEND	0.201**	0.167*	0.166*	0.192***	0.156***	0.158***
	(0.0791)	(0.0922)	(0.0925)	(0.0530)	(0.0514)	(0.0517)
65+	0.715**	0.749**	0.743**	0.741***	0.792***	0.799***
	(0.281)	(0.273)	(0.290)	(0.165)	(0.165)	(0.174)
RIGHT	-0.00568	-0.00644*	-0.00648**	-0.00558**	-0.00652***	-0.00647***
	(0.00374)	(0.00343)	(0.00314)	(0.00222)	(0.00203)	(0.00199)
EDUC	0.227*	0.255**	0.258**	0.231***	0.281***	0.277***
	(0.113)	(0.120)	(0.121)	(0.0604)	(0.0635)	(0.0650)
LGDP	-0.0120***	-0.00764*	-0.00767*	-0.0112***	-0.00680*	-0.00676*
	(0.00402)	(0.00437)	(0.00440)	(0.00300)	(0.00376)	(0.00380)
Cragg-Donald Wald F				198.0	112.7	112.2
Kleibergen-Paap rk F				15.899	8.860	8.825
Observations	440	422	422	431	413	413
R-squared	0.320	0.376	0.376	0.307	0.376	0.376
N of countries	28	28	28	28	28	28

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Impact of factor mobility on the capital tax rate: capital importers vs exporters

	(1)	(2)	(3)	(4)	(5)	(6)
KTAX	IV	IV	IV	IV	IV	IV
TRADE	-0.00205	0.00324	0.00402	-5.71e-06	0.00129	0.00360
	(0.0147)	(0.0143)	(0.0131)	(0.0140)	(0.0128)	(0.0143)
KMOB	-0.00359**	-0.00683***	-0.00574***	0.0121*	0.0109	-0.00882***
	(0.00180)	(0.00179)	(0.00167)	(0.00668)	(0.00668)	(0.00249)
KMOB*KIMPORT		0.00605***	0.00537***			0.00778***
		(0.00192)	(0.00189)			(0.00267)
KMOB*65+				-0.103**	-0.0894**	
				(0.0442)	(0.0438)	
LMOB	0.702*	0.982**	11.10***	0.569	12.17***	6.114*
	(0.422)	(0.414)	(3.716)	(0.419)	(3.674)	(3.318)
LMOB*EDUC			-32.32***		-36.89***	
			(11.54)		(11.38)	
LMOB*KIMPORT						-5.283
						(3.333)
EU	0.000125	-0.00251	-0.00731	-0.00184	-0.00740	-0.00179
	(0.0109)	(0.0106)	(0.0100)	(0.0110)	(0.0104)	(0.0104)
GOVSPEND	0.0399	0.0394	0.0187	0.0330	0.0102	0.0413
	(0.0475)	(0.0469)	(0.0479)	(0.0505)	(0.0516)	(0.0471)
65+	-1.352***	-1.240***	-1.375***	-1.177***	-1.340***	-1.233***
	(0.221)	(0.223)	(0.237)	(0.231)	(0.239)	(0.219)
RIGHT	-0.00973***	-0.0104***	-0.0114***	-0.00877***	-0.0101***	-0.0111***
	(0.00277)	(0.00271)	(0.00264)	(0.00278)	(0.00269)	(0.00265)
EDUC	0.382***	0.303***	0.376***	0.337***	0.415***	0.321***
	(0.106)	(0.112)	(0.116)	(0.107)	(0.109)	(0.112)
LGDP	-0.0134	-0.0137	-0.0142	-0.0138	-0.0143	-0.0140
	(0.00953)	(0.00970)	(0.00921)	(0.00961)	(0.00904)	(0.00932)
KIMPORT		-0.00752	-0.00667			-0.0105
		(0.00668)	(0.00678)			(0.00753)
Cragg-Donald Wald F	111.4	103.2	103.0	113.2	113.0	103.2
Kleibergen-Paap rk F	8.846	8.248	8.224	8.797	8.780	8.219
Observations	409	409	409	409	409	409
R-squared	0.560	0.578	0.588	0.564	0.577	0.582
N of countries	28	28	28	28	28	28

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

variable. Hence, more capital mobility has negative impact on capital taxation for a capital exporter, but not for a capital importer. Column (3) shows the same estimation when education is interacted with the labor mobility variable. The results are stable. In both cases, the KIMPORT dummy alone has no significant impact on capital taxation.

In Column (4), we interact capital mobility with the proportion of the population aged 65+. The interacted variable has significantly negative impact on the capital tax rate: for an older country (hence for a high-saving, low-investment country), capital mobility puts downward pressure on capital taxation. The non-interacted capital mobility variable has now positive, low-significant impact on capital taxation. Column (5) confirms this result when the non-linear effect of labor mobility (depending on education) is introduced.

In Column (6), we interact the labor mobility variable no longer with education, but with the KIMPORT dummy.[25] While the coefficient on labor mobility remains positive, that on the interacted variable is not significant: the upward pressure put by labor mobility on the capital tax does not seem to depend on the capital status of the country.

Table 5 reproduces the same estimations as Table 4 but for labor taxation. Capital mobility exerts upward pressure on labor taxation (Column (1)), but less so for capital importing countries (Columns (2) and (3)). This result is confirmed (although it is less significant) when the status of capital exporter is captured by the 65+ variable (Columns (4) and (5)). Tables 4 and 5 together validate our theoretical result: the "race-to-the-bottom" and "burden-shifting" narratives are a feature of capital-exporting countries, in line with Proposition 1.

Labor mobility has a negative impact on labor taxation, but only when the variable is not interacted with any measure of capital status or education level. This result, together with the linear impact of labor mobility on capital taxation (Table 4) is consistent with Proposition 2 which states that the capital status does not necessarily modify the way labor mobility afects tax rates.

We now perform the same estimations while replacing our capital importer dummy and 65+ variable by capital per worker in 1990 (k1990). We also interact both capital and labor mobility with the ratio of employment to total population in 1990 (L1990). The

[25] We do not interact labor mobility with the 65+ variable because of the direct effect of ageing on capital taxation through political economy effects.

Table 5: Impact of factor mobility on the labor tax rate: net capital importers vs exporters

	(1)	(2)	(3)	(4)	(5)	(6)
LTAX	IV	IV	IV	IV	IV	IV
TRADE	-0.0277***	-0.0386***	-0.0386***	-0.0294***	-0.0294***	-0.0386***
	(0.00820)	(0.00898)	(0.00902)	(0.00842)	(0.00849)	(0.00898)
KMOB	0.00480***	0.00916***	0.00912***	-0.00827	-0.00825	0.00901***
	(0.00153)	(0.00242)	(0.00243)	(0.00729)	(0.00728)	(0.00212)
KMOB*KIMPORT		-0.00566***	-0.00563***			-0.00553***
		(0.00202)	(0.00203)			(0.00171)
KMOB*65+				0.0853*	0.0850*	
				(0.0504)	(0.0503)	
LMOB	-2.872***	-2.860***	-3.241	-2.758***	-2.957	-2.474
	(0.344)	(0.325)	(2.366)	(0.405)	(2.492)	(2.496)
LMOB*EDUC			1.225		0.635	
			(7.426)		(7.875)	
LMOB*IMPORT						-0.401
						(2.499)
EU	-0.0102*	-0.00778	-0.00754	-0.00849	-0.00836	-0.00786
	(0.00572)	(0.00579)	(0.00574)	(0.00572)	(0.00576)	(0.00575)
GOVSPEND	0.156***	0.132***	0.133***	0.162***	0.163***	0.132***
	(0.0514)	(0.0448)	(0.0452)	(0.0468)	(0.0471)	(0.0448)
65+	0.792***	0.775***	0.781***	0.647***	0.650***	0.776***
	(0.165)	(0.162)	(0.169)	(0.180)	(0.189)	(0.162)
RIGHT	-0.00652***	-0.00608***	-0.00605***	-0.00732***	-0.00730***	-0.00612***
	(0.00203)	(0.00195)	(0.00193)	(0.00211)	(0.00207)	(0.00196)
EDUC	0.281***	0.294***	0.291***	0.318***	0.316***	0.296***
	(0.0635)	(0.0628)	(0.0627)	(0.0605)	(0.0613)	(0.0629)
LGDP	-0.00680*	-0.00641*	-0.00639*	-0.00647*	-0.00646*	-0.00644*
	(0.00376)	(0.00374)	(0.00378)	(0.00367)	(0.00369)	(0.00378)
KIMPORT		0.0342***	0.0342***			0.0340***
		(0.00669)	(0.00671)			(0.00616)
Cragg-Donald Wald F	112.7	104.4	104.2	114.6	114.4	104.6
Kleibergen-Paap rk F	8.262	8.248	8.238	8.812	8.794	8.234
Observations	413	413	413	413	413	413
R-squared	0.376	0.428	0.428	0.382	0.382	0.428
N of countries	28	28	28	28	28	28

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

results are presented in Table 6. The first three columns report the results for capital taxation while the last three are for labor taxation.

Table 6: Impact of factor mobility on the labor tax rate, depending on factor endowments

	(1) KTAX IV	(2) KTAX IV	(3) KTAX IV	(4) LTAX IV	(5) LTAX IV	(6) LTAX IV
TRADE	-0.00205	0.00421	0.00708	-0.0277***	-0.0310***	-0.0288***
	(0.0147)	(0.0146)	(0.0153)	(0.00820)	(0.00874)	(0.00890)
KMOB	-0.00359**	0.0637***	0.0908***	0.00480***	0.00509	0.0274**
	(0.00180)	(0.00878)	(0.0122)	(0.00153)	(0.00831)	(0.0132)
KMOB*k1990		-2.43e-07***	-2.67e-07***		-3.38e-09	-2.31e-08
		(3.04e-08)	(3.07e-08)		(2.99e-08)	(3.13e-08)
KMOB*L1990			-0.0488***			-0.0401**
			(0.0164)			(0.0183)
LMOB	0.702*	-8.232**	-5.466	-2.872***	-14.73***	-17.11*
	(0.422)	(4.173)	(14.57)	(0.344)	(3.690)	(8.900)
LMOB*k1990		3.64e-05**	3.95e-05*		5.33e-05***	6.07e-05***
		(1.85e-05)	(2.20e-05)		(1.65e-05)	(1.68e-05)
LMOB*L1990			-5.615			2.224
			(21.22)			(13.24)
EU	0.000125	-0.0257***	-0.0272***	-0.0102*	-0.00500	-0.00641
	(0.0109)	(0.00904)	(0.00926)	(0.00572)	(0.00621)	(0.00628)
GOVSPEND	0.0399	0.0435	0.0424	0.156***	0.182***	0.180***
	(0.0475)	(0.0476)	(0.0470)	(0.0514)	(0.0525)	(0.0544)
65+	-1.352***	-1.471***	-1.469***	0.792***	0.903***	0.903***
	(0.221)	(0.221)	(0.219)	(0.165)	(0.171)	(0.170)
RIGHT	-0.00973***	-0.00837***	-0.00818***	-0.00652***	-0.00493**	-0.00488**
	(0.00277)	(0.00283)	(0.00280)	(0.00203)	(0.00211)	(0.00216)
EDUC	0.382***	0.375***	0.339***	0.281***	0.310***	0.285***
	(0.106)	(0.110)	(0.112)	(0.0635)	(0.0619)	(0.0647)
LGDP	-0.0134	-0.0124	-0.0129	-0.00680*	-0.00502	-0.00535
	(0.00953)	(0.0102)	(0.0104)	(0.00376)	(0.00381)	(0.00362)
Cragg-Donald Wald F	111.4	110.1	108.5	112.7	111.2	109.5
Kleibergen-Paap rk F	8.846	8.659	8.340	8.671	8.794	8.353
Observations	409	409	409	413	413	413
R-squared	0.560	0.621	0.626	0.376	0.395	0.408
N of countries	28	28	28	28	28	28

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Let us start with capital taxation. Consistent with our previous tables, the coefficient on the interacted variable of capital mobility with capital endowment (capital per worker in 1990) is significant and negative, while the non-interacted coefficient is positive. Symmetrically, labor mobility has negative impact on capital taxaton, but less so when interacted with the capital endowment. Hence, a high capital endowment tends to reduce or even reverse the negative impact of financial globalization and the positive impact of labor mobility on capital taxation.

For labor taxation, we still find a positive impact of capital mobility and a negative impact of labor mobility, the latter being weaker in a country with high capital endowment.

The impact of labor endowment (employment to total population in 1990) is less convincing, as its interaction with labor mobility is never significant. However we find that, in a country with high labor endowment, the negative impact of capital mobility on both capital and labor taxation is more limited.

The contribution of capital mobility to the evolution of the corporate income tax in the different countries of the sample is summarized in Table 7, based in the estimates of Column (2). They show wide heterogeneity between capital exporters such as Belgium, Ireland or the Netherlands, and capital importers such as Eastern European countries.

Table 7: Contribution of capital mobility in the the evolution of EATRs from 1997 to 2014, in percentage points

Country	Variation of EATR	Contribution of capital mobility	Country	Variation of EATR	Contribution of capital mobility
Australia	-7.5	0.5	Iceland	-11.3	+4.7
Austria	-8.9	0.0	Israel	+22.6	+1.1
Belgium	-8.5	-2.6	Italy	-20.6	-1.2
Canada	-9.5	+0.6	Japan	-12.4	+2.8
Chile	+5.9	+3.6	Korea	+18.0	+2.0
Czech Rep.	+16.1	+0.9	Mexico	+26.1	+1.1
Germany	-23.4	+1.4	Netherlands	-13.0	-7.3
Denmark	-8.0	-0.1	Norway	-1.5	-2.3
Spain	+3.6	+0.2	Poland	-16.7	+2.2
Finland	-7.2	-0.2	Portugal	-10.2	+2.1
France	-4.8	-1.1	Slovakia*	-0.3	+1.5
United Kingdom	-7.3	+0.7	Slovenia	-4.8	+2.5
Hungary	+2.6	+6.7	Sweden	-5.7	0.2
Ireland	+2.0	-5.0	United States	-0.3	+0.5

Notes: contributions based on Column (2) of Table 6. *Slovakia: from 2003 to 2014.

On the whole, our results shed new light on the race-to-the-bottom narrative of financial globalization and subsequent shift of the tax burden to labor. We show that the narrative applies essentially to net capital exporters. We also find that similar narrative exists for labor mobility, although the linkk with factor endowments is less clear.

4.3 Robustness

Our measures of factor mobility are non-directional (since they are sums of inward and outward stocks or flows). However they are both de facto measures, hence one cannot exclude some endogeneity bias. For instance, one could perhaps argue that low taxation

reduces cross-border frictions, hence encourages capital and labor mobility. To address this problem, we can instrument capital and labor mobility by their first lags.[26] Clemens and Hunt (2017) argue that lagging the migrant-to-population ratio leads to a "blunt instrument" problem because the denominator of this ratio (total population) is almost constant from one year to the next one. This generates spurious correlation between labor mobility and its lagged value. They rather recommend to use the lagged value of the numerator (migrations) as an instrument. Consistently, we instrument labor mobility with the lagged value of the logarithm of the sum of migrant inflows and outflows.

For capital mobility, the denominator is GDP, which is less stable than population. Furthermore, we are dealing with asset and liability stocks rather than flows. Absent capital mobility, these stocks would be frozen to their given values, whereas absent labor mobility, the migration flows would go to zero. Hence we choose to instrument capital mobility by its lagged ratio rather than by the lagged value of the numerator.

The results are reported in Table 8 for capital taxation (first three columns) and for labor taxation (last three columns).[27] The number of instrumented variables is indicated on the top of the table (IV(3) or IV(4)). The Anderson-Rubin Wald F test and the Stock-Wright LM test both reject the null hypothesis of of jointly weak instruments, except in the first column of the table.

The results of the previous sections are generally found robust to the instrumentation. In particular, (i) capital mobility puts downward pressure on capital taxation and upward pressure on labor taxation, (ii) this is especially the case in capital exporting countries; (ii) labor mobility puts downward pressure on labor taxation with no marked effect on capital taxation.

Table 8 clearly shows the negative impact of a right-wing government and the positive impact of education on both tax rates, while ageing tends to shift the tax burden from capital to labor. More gevernment spending tends to be supported by labor rather than capital taxation. Finally, the EU dummy is never significant, suggesting that there is no specific effect of being a member of the European single market.

[26] Unfortunately, data limitations do not allow us to use remote lags.

[27] We limit ourselves to the model with only one interacted variables - between capital mobility and eigher the capital import dummy or the share of the 65+ in total population.

Table 8: Impact of factor mobility on capital and labor tax rates: robustness

	(1) KTAX IV(3)	(2) KTAX IV(4)	(3) KTAX IV(4)	(4) LTAX IV(3)	(5) LTAX IV(4)	(6) LTAX IV(4)
TRADE	-0.000108	0.00528	0.00178	-0.0244***	-0.0372***	-0.0251***
	(0.0169)	(0.0160)	(0.0164)	(0.00908)	(0.00997)	(0.00910)
KMOB	-0.00524**	-0.00893***	0.0145*	0.00795***	0.0126***	0.000431
	(0.00237)	(0.00236)	(0.00882)	(0.00222)	(0.00309)	(0.0123)
KMOB*KIMPORT		0.00664***			-0.00641***	
		(0.00146)			(0.00240)	
KMOB*65+			-0.128**			0.0483
			(0.0535)			(0.0789)
LMOB	1.968	2.783	2.118	-6.857***	-6.731***	-6.887***
	(2.489)	(2.526)	(2.496)	(1.807)	(1.825)	(1.811)
EU	0.00561	0.00321	0.00390	-0.00871	-0.00555	-0.00793
	(0.0121)	(0.0116)	(0.0122)	(0.00634)	(0.00642)	(0.00650)
GOVSPEND	0.0466	0.0445	0.0350	0.163**	0.138**	0.168***
	(0.0510)	(0.0520)	(0.0550)	(0.0658)	(0.0595)	(0.0621)
65+	-1.356***	-1.224***	-1.124***	0.751***	0.724***	0.663***
	(0.222)	(0.226)	(0.242)	(0.183)	(0.176)	(0.215)
RIGHT	-0.00900***	-0.00967***	-0.00790***	-0.00689***	-0.00750***	-0.00791***
	(0.00281)	(0.00279)	(0.00282)	(0.00230)	(0.00223)	(0.00243)
EDUC	0.395***	0.314***	0.341***	0.214***	0.238***	0.234***
	(0.116)	(0.120)	(0.120)	(0.0726)	(0.0696)	(0.0702)
LGDP	-0.0151	-0.0156*	-0.0155*	-0.00576	-0.00533	-0.00558
	(0.00921)	(0.00931)	(0.00931)	(0.00438)	(0.00439)	(0.00429)
KIMPORT		-0.00870			0.0351***	
		(0.00693)			(0.00778)	
Anderson-Rubin Wald F	1.97	5.73***	3.06**	9.04***	7.27***	7.35***
Stock-Wright LM	7.03*	14.02***	13.21**	25.97***	34.94***	28.66***
Observations	403	403	403	407	407	407
R-squared	0.558	0.571	0.560	0.274	0.275	0.275
N of countries	28	28	28	28	28	28

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

5 Conclusion

By relaxing the assumptions of perfect capital mobility and perfect labor immobility, we have shown that financial globalization does not necessarily lead to a race to the bottom of capital tax rates, whereas labor mobility does matter for both capital and labor taxation. Our theoretical results are supported by the econometric estimations run on a panel of 28 OECD countries over 1997-2014.

We find evidence that capital mobility has a negative impact on capital taxation and a positive impact on labor taxation, but essentially for capital exporting countries. Symmetrically, we find evidence that labor mobility puts negative downward on labor taxation and upward pressure on capital taxation, and that these relationships do not depend on the international status of the country (exporter or importer) on capital and labor markets. Finally, we evidence a non-linear impact of labor mobility on capital taxation depending on the skilled level of the country: in relatively low-skilled countries, labor mobility puts upward pressure on capital taxation whereas in relatively high-skilled countries, labor mobility affects capital taxation negatively.

We conclude that the mixed results obtained in the literature concerning the link between international capital mobility and capital taxation may be related to improperly controlling for other factors, notably trade openness and ageing, failing to account for labor mobility, and to the extreme assumption of full capital mobility versus full labor immobility.

Appendix A: Model solution when the public good constraint is binding

When the constraint $\frac{G}{R} > \bar{g}$ is binding, the problem is:

$$\max_{k,L} U\left(\frac{(k-\bar{k})}{\phi_K}Lk + r^*\bar{k} + w^* + \frac{(L-\bar{L})}{\phi_L}, f(k) - \left(r^* + \frac{(k-\bar{k})}{\phi_K}L\right)k - \left(w^* + \frac{(L-\bar{L})}{\phi_L}\right)\right)_l$$
$$+\lambda\left[f(k) - \left(r^* + \frac{(k-\bar{k})}{\phi_K}L\right)k - \left(w^* + \frac{(L-\bar{L})}{\phi_L}\right) - \bar{g}\right]$$

with $\lambda > 0$. The first-order conditions are

$$\left| \begin{array}{l} \left[U'_R - U'_G\right]\left[\frac{\left(2k-\bar{k}\right)}{\phi_K}L\right] + U'_G\left[f'(k) - r^*\right] + \lambda\left[f'(k) - \left(r^* + \frac{\left(2k-\bar{k}\right)}{\phi_K}L\right)\right] = 0 \\ \left[U'_R - U'_G - \lambda\right]\left[\frac{\left(k-\bar{k}\right)}{\phi_K}k + \frac{1}{\phi_L}\right] = 0 \\ \lambda\left[f(k) - \left(r^* + \frac{\left(k-\bar{k}\right)}{\phi_K}L\right)k - \left(w^* + \frac{\left(L-\bar{L}\right)}{\phi_L}\right) - \bar{g}\right] = 0 \end{array} \right.$$

With $\lambda > 0$, we have:

$$\left| \begin{array}{l} f'(k) - r^* = 0 \\ U'_R - U'_G = \lambda \\ f(k) - \left(r^* + \frac{\left(k-\bar{k}\right)}{\phi_K}L\right)k - \left(w^* + \frac{\left(L-\bar{L}\right)}{\phi_L}\right) - \bar{g} = 0 \end{array} \right.$$

Like with the interior solution, k is defined by $f'(k) - r^* = 0$. However, we now have $U'_R > U'_G$ (overprovision of public good). The tax rates are:

$$\begin{aligned} \tau_K &= -\frac{\left(k-\bar{k}\right)L}{\phi_K} \\ \tau_L &= -\frac{\left(L-\bar{L}\right)}{\phi_L} \end{aligned}$$

There are the same as with the interior solution. Finally, L is defined by the third condition. Using the theorem of implicit funtions, we have:

$$\begin{aligned} \frac{dL}{d\phi_K} &= \frac{\frac{\left(k-\bar{k}\right)}{\phi_K^2}Lk}{\frac{\left(k-\bar{k}\right)}{\phi_K}k + \frac{1}{\phi_L}} \\ \frac{dL}{d\phi_L} &= \frac{\frac{\left(L-\bar{L}\right)}{\phi_L^2}}{\frac{\left(k-\bar{k}\right)}{\phi_K}k + \frac{1}{\phi_L}} \end{aligned}$$

These partial derivatives are identical as the one obtained with the interior solution. The only diference here is the impact of $\bar{g}$ on L:

$$\frac{dL}{d\bar{g}} = -\frac{1}{\frac{\left(k-\bar{k}\right)}{\phi_K}k + \frac{1}{\phi_L}}$$

Appendix B: Data definitions and sources

Table 9: Data definitions and sources

Variable	Label	Definition	Source
Capital tax rate	KTAX	Effective average tax rate on corporate income	Oxford University
Labor tax rate	LTAX	Tax wedge on gross income representing 167% of gross earnings, single no children	OECD OECD
Capital mobility	KMOB	Gross external assets + liabilities /2GDP	Lane Milesi-Ferretti
Labor mobility	LMOB	Inflows+outflows of non-nationals from and to other OECD countries /total population	OECD
Trade openness	TRADE	Exports + Imports /2*Absorption	CEPII, UNIDO, WB
European Union	EU	Dummy = 1 if EU membership	Eur. Commission
Ageing	65+	Share of the population aged 65+	OECD
Right-wing executive	RIGHT	Dummy = 1if right-wing executive	World Bank
Government spending	GOVSPEND	Gerneral government spending /GDP	IMF
Lagged GDP	LGDP	Laged logarithm of GDP in constant 2010 USD	World Bank WDI
Tertiary education	EDUC	Share of the 25-65 having completed tertiary educ.	OECD
Capital importer	KIMPORT	Dummy = 1 if nef foreign asset position < 0	Lane Milesi-Ferretti
Capital endowment	k1990	Capital per worker in 1990 in USD mn of 2011	Penn World Tables
Labor endowment	L1990	Employment to population in 1990	Penn World Tables

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