Is Partial Tax Harmonization Desirable?

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Is Partial Tax Harmonization Desirable?*†

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Abstract

We consider a setting in which capital taxation is characterized by two distortions working in opposite directions. On one hand, governments engage in tax competition and are tempted to lower capital tax rates. On the other hand, they are unable to commit to future policies and, once capital has been installed, have incentives to increase taxes. In this setting, there exists a tax that optimally trades off the two distortions. We compare three possible tax harmonization scenarios: no tax harmonization (all countries set taxes unilaterally), global tax harmonization (all countries coordinate their capital taxes), and partial tax harmonization (only a subset of all countries coordinate capital taxes). We show that, if capital is sufficiently mobile, partial tax harmonization benefits all countries compared to both global and no harmonization.

KEY WORDS: Tax Competition, Commitment, Partial Coordination.

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1 Introduction

This paper addresses the question of whether a group of countries as a whole can gain from harmonizing capital taxes if the rest of the world does not follow suit. This question is motivated by the recent debate about corporate tax harmonization in the European Union (EU). There have been various attempts to coordinate some aspects of business taxation within the EU. In particular, in 2003 the EU Council adopted a voluntary Code of Conduct against harmful tax competition and more ambitious proposals for corporate tax harmonization have been put forward, including the introduction of a single EU corporate tax (see Bond *et al.*, 2000). However, EU member states are divided about whether or not to pursue further corporate tax harmonization.[1] For this reason, the idea of an Enhanced Cooperation Agreement (ECA)—whereby only a *subset* of European countries would coordinate their corporate tax policies—has recently gained ground. The question of the implications of partial tax harmonization is not only relevant within the EU, due to the possible creation of an ECA, but also between the EU and the rest of the world, due to fears that tax coordination among European countries may shift capital income to third countries.[2]

We examine the implications of partial tax harmonization, in a setting in which capital taxation suffers from the two distortions working in opposite directions: on one hand, governments compete with each other for mobile capital and are thus tempted to offer corporate taxes that are too low; on the other hand, they are unable to commit to future policies and have incentives, once capital has been installed, to levy corporate taxes that are too high.

It is often argued that increasing integration of economic activities generates a "race to the bottom" in capital income taxation, a view that is supported in the literature on tax competition (see Wilson (2003) for a review of this literature). The general concern is that tax competition will result in a shift away from taxes on mobile capital toward taxes on labor.[3]

At the same time, it is well known that potential time consistency problems can generate an upward bias in capital taxation (see Fischer (1980), Rogers (1987), Chari *et al.* (1989), Benhabib and Rustichini (1997)): when investment decisions have yet to be made, optimizing governments recognize that capital taxes discourage investment; if they could commit to policy plans, they would thus wish to minimize the taxation of capital in the long run; however, once investment has taken place, they have incentives to raise capital taxes, since the taxation of capital is weakly distortionary in the short run. Hence, in the absence of credible commitment mechanisms, a policy of low capital taxation is time inconsistent.[4] Indeed, though much of the optimal tax literature recommends capital income tax rates close to zero (see Stiglitz (1987) and Lucas (1990), among others), actual rates are often very high (see Devereaux *et al.*, 2005).

To examine the welfare implications of a partial tax agreement, we compare three alternative

policy scenarios: no tax harmonization (governments choose taxes unilaterally), global tax harmonization (all governments coordinate their policy choices), and partial tax harmonization (only a subset of governments coordinate their tax choices). Our analysis shows that, when capital taxation suffers from a commitment problem, the creation of a partial tax agreement can benefit all countries compared to both no tax coordination and global coordination. The intuition behind this result is that partial harmonization reduces harmful tax competition, while maintaining some discipline on policymakers—who would otherwise be tempted to charge higher-than-optimal capital tax rates. Harmonization of corporate taxes by a group of countries might thus be desirable not *despite* but rather *because of* its partial nature.

Previous studies have mostly focused on the interaction between tax competition and other distortions. For example, Edwards and Keen (1996), following the spirit of Brennan and Buchanan (1980), have argued that tax competition can help to restrain the rent-seeking activities of politicians, bureaucrats and special interest groups. The interaction between tax competition and time inconsistency problems has been considered by Kehoe (1989), who has provided an example of counterproductive fiscal coordination in a two-country model of tax competition. However, Kehoe (1989)'s analysis cannot be applied to the current debate on European tax harmonization, since it focuses only on the extreme cases of no tax harmonization and global tax harmonization, without considering the scenario in which only a subset of countries coordinate their policy choices.

The remainder of the paper is organized as follows. Section 2 describes the basic model in a three-country framework. Sections 3 and 4 focus on the scenarios of no tax harmonization and global tax harmonization. Section 5 considers partial tax harmonization. Section 6 examines the question of the stability of tax coordination agreements. Section 7 concludes.

2 The Model

Consider three symmetric countries, each populated by a large number of identical consumers. For simplicity, we analyze a two-period economy. Consumers are assumed to take consumption-savings/investment decisions in the first period and consumption-labor decisions in the second. In the first period, the representative consumer in each country receives an exogenous disposable income Y, which can be consumed or saved. Savings, S, can be invested and result in an equal amount of capital, K. In the second period, the consumer has a time endowment equal to unity, which she can use for labor (L) or leisure ($1 - L$).

Capital and labor are inputs in production. For simplicity, production in both countries is represented by a separable, linear production function, $f(L, K) = rK + wL$. In a competitive

equilibrium, the wage rate must equal the marginal product of labor, w, and the gross-of-tax rate of return to savings must equal the marginal product of capital, r.

Consumer preferences can be represented by a quasilinear, inter-temporal utility function, $U(C_1, C_2, L) = C_1 + \delta(C_2 + v(1-L))$, where C_1 and C_2 are respectively first- and second-period consumption and v is assumed to be increasing and concave. For simplicity, in the analysis that follows we shall set the discount rate to unity, implying that the socially efficient level of savings is $S = Y$.[5]

We assume that labor is completely immobile, while capital is partially mobile across countries. We use superscripts (subscripts) to refer to the country of origin (destination); so K_i^i denotes the capital that the representative consumer in country i invests domestically, while the capital that she invests in the other two countries, indexed by j and h, is denoted by K_j^i and K_h^i, respectively. It is widely acknowledged that foreign investment involves extra costs compared to domestic investment—to gather extra information, overcome market-specific regulations, hire foreign employees, etc. As in Persson and Tabellini (1992), Bacchetta and Espinosa (1995) and Slemrod *et al.* (1997), we assume convex costs of investing abroad: specifically, when investing K_j^i abroad, a home consumer incurs costs

$$\Omega(K_j^i) = \frac{\alpha}{2}\left(K_j^i\right)^2. \tag{1}$$

The parameter α will play a crucial role in the analysis that follows, since it captures the degree of capital mobility and hence the severity of tax competition between countries.

Governments are unable to commit to future policies and face the problem of optimally financing an exogenous stream of public spending G by levying a combination of proportional capital and labor income taxes, denoted by t_K and t_L, respectively. Capital taxes are levied according to the source principle, e.g. the home country's government levies a proportional tax, at rate t_K^h, on all capital invested in its jurisdiction.

Given an initial income Y, a representative consumer in country i will choose C_1^i, S^i, K_i^i, K_j^i, K_h^i C_2^i and L^i to maximize

$$C_1^i + C_2^i + v(1 - L^i) \tag{2}$$

subject to

$$C_1^i \leq Y - S^i, \tag{3}$$

$$K_i^i + K_j^i + K_h^i \leq S^i, \tag{4}$$

$$\Omega(K_{j,h}^i) = \frac{\alpha}{2}\left(K_{j,h}^i\right)^2, \tag{5}$$

$$C_2^i \leq (1 - t_K^i) r K_i^i + (1 - t_K^j) r K_j^i + (1 - t_K^h) r K_h^i + (1 - t_L^i) w L^i. \tag{6}$$

The objective of country i's government is to maximize the welfare of its representative consumer (equation (2) above) subject to an exogenous revenue requirement G in the second period:

$$G \leq t_K^i r (K_i^i + K_i^j + K_i^h) + t_L^i w L^i. \tag{7}$$

We assume $G > rY$, i.e. the required revenues cannot be raised by capital taxation only. Notice that, if policymakers could avoid taxing labor income, no commitment problem would arise in our model, since there would be no ex-post incentives to raise capital income taxes.

The timing of events is as follows: in the first period, consumers decide how much to consume and how much to save; then governments set tax rates; finally, consumers decide where to invest. This sequencing implies that capital is footloose, in the sense that it locates in response to tax rates: if it is taxed too heavily in one country, it can flee to countries with lower tax rates. In the second period, consumers choose to work up to the point at which the net-of-tax labor income equals the marginal utility of leisure, i.e. $(1 - t_L) w = v'$, where we use primes to denote derivatives. This identifies an implicit function for labor supply $L(t_L)$.

In the absence of a commitment mechanism, policy choices will occur after consumption-savings decisions. Consider the first-period consumption-savings decision of a representative consumer in country i, and define $R^i(S^i)$ as her expected best marginal return to investment when the investment is S^i.[6] How much she will save will depend on how $R^i(S^i)$ compares with the return to first-period consumption (equal to unity): if $R^i(S^i) < 1$ for any $S^i \leq Y$, all initial income will be consumed and there will be no investment ($C_1^i = Y$ and $S^i = 0$); if $R^i(S^i) > 1$ for any $S^i \leq Y$, all initial income will be saved ($C_1^i = 0$ and $S^i = Y$); if $R^i(S^i) = 1$ for some $S^i < Y$, consumers will save some of their initial income and consume the rest ($C_1^i > 0$ and $S^i > 0$); finally, if $R^i(S^i) = 1$ for any $S^i \leq Y$, any combination of first-period consumption/saving will be rational.

Given a certain amount of savings S^i, governments will select capital and labor taxes, and capital will go wherever it can get the highest return. Therefore, capital will move until it earns the same marginal return everywhere, taking into account taxes and mobility costs, i.e. until $(1 - t_K^i) r = (1 - t_K^j) r - \alpha K_j^i = (1 - t_K^h) r - \alpha K_h^i$.

The model described above is characterized by the presence of a coordination problem between governments (international tax competition) as well as a coordination problem between each government and the investors in its jurisdiction (the lack of domestic policy commitment).[7] Before moving to the analysis of alternative policy scenarios, we shall first solve for the optimal policies that would be chosen in the absence of these two distortions. Since it is socially

efficient to invest all initial income, if policymakers could commit to future policies and did not engage in tax competition they would set capital taxes at the maximum rate which supports an investment choice of $S = Y$:

$$t_K^* = \frac{r-1}{r}; \tag{8}$$

this would allow them to maximize capital tax revenues and to minimize the labor tax rate necessary to raise the rest of their budget requirement:

$$t_L^* = \frac{G - Y(r-1)}{wL(t_L^*)}. \tag{9}$$

This optimal policy combination[8] yields a payoff of

$$\Pi^* = (1 - t_K^*)rY + (1 - t_L^*)wL(t_L^*) + v(1 - L(t_L^*)). \tag{10}$$

In Sections 3-5, we shall compare this benchmark case with scenarios in which policymakers are unable to commit vis-à-vis their investors and might also engage in tax competition.

3 No Tax Harmonization

Consider the case in which governments select policies unilaterally. In the Appendix, we derive the following expression for capital income taxes in a symmetric three-country non-cooperative regime:

$$t_K^N = \frac{\alpha S(\Lambda - 1)}{2\Lambda r}, \tag{11}$$

where $\Lambda = 1/(1+\mu)$, with μ denoting the elasticity of labor supply with respect to labor income taxation. As expected, non-cooperative capital taxes decrease with the degree of capital mobility, i.e. higher capital mobility (lower α) exacerbates fiscal competition.[9]

In a perfect-foresight equilibrium, investors will correctly anticipate the ex-post optimal capital tax choice of the government, t_K^N. This implies that they will save an amount $S = Y$ only if the equilibrium capital tax does not exceed t_K^*. Comparing (8) and (11), we can see that this is only true as long as α does not exceed

$$\alpha^* = \frac{\Lambda(r-1)}{Y(\Lambda - 1)}. \tag{12}$$

If instead mobility costs are above this critical threshold, consumers will choose a level of S for which the marginal return to investment equals the return to first period consumption, i.e. $(1 - t_K)r = 1$. We can thus distinguish two regimes:

(1) $0 \leq \alpha \leq \alpha^*$: in this case, savings will be equal to $S^N = Y$, non-cooperative capital and labor taxes will be given by

$$t_K^N = \frac{\alpha Y(\Lambda - 1)}{2\Lambda r} \leq t_K^*, \tag{13}$$

$$t_L^N = \frac{G - r t_K^N S^N}{wL(t_L^N)} \geq t_L^*, \tag{14}$$

and countries will obtain a payoff of

$$\Pi^N = (1 - t_K^N) r S^N + (1 - t_L^N) wL(t_L^N) + v(1 - L(t_L^N)) \leq \Pi^*; \tag{15}$$

(2) $\alpha^* < \alpha \leq \infty$: in this case, savings will be equal to

$$S^N = \frac{2\Lambda(r-1)}{\alpha(\Lambda - 1)}, \tag{16}$$

non-cooperative capital and labor taxes will be given by

$$t_K^N = t_K^*, \tag{17}$$

$$t_L^N = \frac{G - r t_K^N S^N}{wL(t_L^N} > t_L^*, \tag{18}$$

and countries will obtain a payoff equal to

$$\Pi^N = Y - S^N + (1 - t_K^N) r S^N + (1 - t_L^N) wL(t_L^N) + v(1 - L(t_L^N)) < \Pi^*. \tag{19}$$

Notice that, although we cannot directly compare countries' payoffs across the two regimes,[10] we can compare welfare levels as a function of capital mobility cost within each of the regimes. If $\alpha < \alpha^*$, then payoffs are increasing in capital mobility costs, reaching a maximum of Π^* at $\alpha = \alpha^*$. For values of α above α^*, payoffs decrease in capital mobility costs. Therefore, regime 1 is characterized by *too much* tax competition, while in regime 2 there is *too little* tax competition.

4 Global Tax Harmonization

When taxes are selected non-cooperatively, as in the case considered in the previous section, competition to attract mobile capital reduces the ex-post incentives to raise taxes. This has a disciplining effect on policymakers. In this section, we show that such an effect is completely eliminated when taxes are selected cooperatively by *all* countries.

Suppose policymakers of the three countries coordinate the choice of capital and labor taxes. We assume that the objective of the centralized government is to maximize the joint welfare of the representative consumers of the three countries, subject to raising a revenue requirement equal to $3G$.

Absent any fear of capital flight, once capital has been installed, the centralized government will have incentives to set capital taxes to the maximum rate of

$$t_K^G = 1 > t_K^*. \tag{20}$$

Anticipating this, consumers will consume all their initial income, there will be no investment ($S^G = 0$), and all revenues will have to be raised by labor taxation:

$$t_L^G = \frac{G}{wL(t_L^G)} > t_L^*, \tag{21}$$

resulting in a payoff equal to

$$\Pi^G = Y + (1 - t_L^G)wL(t_L^G) + v(1 - L(t_L^G)) < \Pi^*. \tag{22}$$

We can thus state the following result:

Proposition 1 *When policymakers cannot credibly commit to future taxes, global tax harmonization is never beneficial compared to no tax harmonization.*

PROOF: For $0 \leq \alpha < \infty$, global tax harmonization leads to lower levels of investment and higher labor taxation—and hence lower countries' payoffs—than no tax harmonization, i.e. $S^G < S^N$, $t_L^G > t_L^N$, and $\Pi^G < \Pi^N$. Only in the extreme case in which $\alpha = \infty$, no harmonization and full harmonization would yield the same levels of investment and welfare. □

Therefore, under full fiscal coordination—when capital cannot escape domestic taxation by relocating to neighboring countries—the time-consistent tax rate on capital will be prohibitively high and no investment will occur. Hence, the complete elimination of the disciplining effect of tax competition can never be desirable.[11]

5 Partial Tax Harmonization

We can now turn to the analysis of partial tax coordination, considering a scenario in which two of the three countries form a tax union (denoted by U) to coordinate their policy choices, while the third country (denoted by j) chooses its taxes unilaterally.[12] This situation is equivalent

to tax competition between a large country (the union) and a small country (the excluded country). As before, we assume convex costs of investing abroad.[13]

It can easily be shown that it would never be optimal for the excluded country j to set capital income taxes above the rate set by the union; hence, the asymmetric Nash equilibrium will always be characterized by $t_K^U \geq t_K^j$, with the larger country (the tax union) exporting capital to the smaller country. The intuition behind this result is that countries with a relatively large domestic tax base have less incentive to undercut taxes compared to countries with a relatively small tax base, that benefit more from setting lower tax rates to attract foreign capital (see also Kanbur and Keen, 1993).

In the Appendix, we show that, if mobility costs are low enough ($\alpha \leq \alpha^U$), there will be an equilibrium in which all initial income Y will be saved in both the union members and the excluded country j and non-cooperative capital income taxes will be given by

$$t_K^{N,U} = \frac{5\alpha Y(\Lambda - 1)}{6\Lambda r} > t_K^{N,j} = \frac{4\alpha Y(\Lambda - 1)}{6\Lambda r}. \tag{23}$$

Comparing (11) with (23), it is straightforward to verify that the creation of a tax union leads to an increase in capital tax rates relative to the scenario of no tax harmonization. This implies that, for a given level of savings, tax harmonization entails higher capital tax revenues, lower labor taxes and higher welfare for both the union members and the excluded country. Hence, when $\alpha \leq \alpha^U$, the creation of a tax union reduces *harmful* tax competition between countries, unambiguously benefiting all countries.

What if mobility costs are high ($\alpha > \alpha^*$)? Then, investment in the no harmonization equilibrium is suboptimal. In this case, the creation of a tax union leads to a further reduction in the level of investment and to lower payoffs in both the union members and the excluded country. Hence, when mobility costs are so high that only some of the initial income is saved, partial tax harmonization unambiguously hurts all countries. The intuition for this result is that, when mobility costs are very high, the creation of a tax union reduces *beneficial* tax competition, leading to lower investment and welfare overall.

For intermediate levels of mobility costs ($\alpha^U < \alpha < \alpha^*$), savings will differ between union members and the excluded countries and the welfare implications of partial tax harmonization will be ambiguous.[14]

To summarize the above results, we have three cases:

(i) Low capital mobility costs, $0 \leq \alpha \leq \alpha^U$: in this case, the creation of the tax union is beneficial to all countries, since it allows both union and non-union countries to maintain high levels of investment while reducing labor taxation;

(ii) Intermediate capital mobility costs, $\alpha^U < \alpha < \alpha^*$: here the creation of a tax union has an ambiguous effect on the welfare of union members and of the non-member country;

(iii) High capital mobility costs, $\alpha^* \leq \alpha \leq \infty$: in this case, the creation of the tax union hurts both member and non-member countries, since it leads to lower levels of investment and higher labor taxation.

We can thus state the following:

Proposition 2 *For low enough capital mobility costs, partial tax harmonization will benefit all countries, compared to both global and no tax harmonization.*

Proposition 2 shows that, if policymakers cannot credibly commit to capital taxes before investment decisions are made, partial tax coordination can only be beneficial if capital mobility costs are sufficiently low. The intuition for this result is that, when capital mobility costs are low enough, there remains enough capital tax competition after the creation of the tax union to discipline policymakers.

6 The Stability of Tax Agreements

We can now turn to the determination of which tax agreements will be formed in equilibrium. We have laid the groundwork for this analysis in the previous three sections where we have examined the welfare consequences of various types of tax agreements.

To determine which regimes may emerge in equilibrium, we can think of tax negotiations as a two-stage game, in which binding tax agreements are formed in the first stage and policies are selected in the second stage—cooperatively among countries participating in an agreement and non-cooperatively between countries belonging to separate agreements. Equilibrium coalition structures can then be identified by applying the concept of the Core—the set of agreement structures that are robust to objections by alternative coalitions.

Applying this equilibrium concept to our three-country model of tax competition, we obtain the following results concerning the stability of alternative tax agreements:

For very low levels of mobility costs ($0 \leq \alpha \leq \alpha^U$), partial tax harmonization will be the only stable outcome;

For intermediate mobility costs ($\alpha^U < \alpha < \alpha^*$), either no tax harmonization or partial tax harmonization will be the stable outcome;

Finally, for very high mobility costs ($\alpha^* \leq \alpha \leq \infty$), no tax harmonization will be the only stable agreement structure.

It follows that

Proposition 3 *When capital mobility is high enough, partial tax harmonization will be both desirable and sustainable.*

This result is in striking contrast to the traditional literature on tax competition—which assumes that governments can credibly commit to capital taxes. When governments can commit, then global tax coordination is the agreement structure which maximizes world welfare. However, the "grand tax coalition" is never a stable outcome because there is always an incentive for countries to defect from the agreement. Therefore, this literature reaches the rather pessimistic conclusion that the most desirable outcome is never sustainable. In our model, we are able to reach a much more optimistic conclusion: when governments cannot commit vis-à-vis investors not to raise capital taxes in the future, it turns out that whichever agreement structure is most desirable from the point of view of world welfare—no tax harmonization or partial tax harmonization, depending on the extent of the mobility costs—will also be sustainable.

7 Conclusions

In this paper we have shown that, when capital taxation suffers from a policy commitment problem, partial tax harmonization can benefit all countries compared to both no tax coordination and global coordination. Hence a group of countries can gain from harmonizing capital taxes not despite but because the rest of the world does not follow suit. Furthermore, if desirable, partial tax coordination is also feasible, since it does not encounter any objection by member or non-member countries.

Our analysis has important implications for the ongoing debate on European tax harmonization. It suggests that, if an agreement were to be put forward by a subset of European countries to coordinate their choice of corporate taxes, EU authorities should not oppose it, on the grounds that it would benefit members and non-members of the agreement alike, thus not posing a conflict for the EU as a whole.[15] Moreover, our results point our that the fears that corporate tax harmonization within Europe may hurt EU member countries because of capital flight to the rest of the world is not justified; rather, such threat of capital flight is precisely what makes European tax harmonization desirable.

Notes

[1]Only "20 of the EU's 25 members are supportive of the idea: Britain, Ireland, the Czech Republic, Slovakia and Estonia are opposed" (*Financial Times*, November 24, 2005).

[2]The concern is that investors may be "increasingly considering using business structures outside the EU because of the threat of removal of tax incentives" (press release by Deloitte & Touche, June 6, 2003).

[3]In the EU, the fear is that tax competition could undermine the foundations of Europe's welfare state (see, for example, EU Commission, 1998 and 2001). Fears of harmful tax competition have been increasing since the accession of new member states, as old member states struggle to come to terms with lower corporate taxes in Eastern Europe. For example, "The competitive threat from the new EU members, almost all with significantly lower corporate taxes, last year forced Austria to act. From January 2005, company tax was slashed to 25 per cent from 34 per cent in response"(*Financial Times*, November 24, 2005).

[4]In some European countries, commitment problems in capital taxation may be linked to political considerations. Governments may announce low capital taxes to encourage investment; however, once factories have been built, they may find it politically tempting, on distributional grounds, to meet their budget requirements by increasing capital taxation and lowering labor taxation. Politicians find it harder to lower capital taxes, since it is "impossible to get popular support for a tax-cutting policy that gives the impression it was designed to ease the burden for a small group of high earners and would be funded by cutting welfare programmes for low earners" (*Financial Times*, November 24, 2005).

[5]Our analysis carries through for lower discount rates, as long as δ exceeds $1/r$ and it is thus socially efficient to save all initial income (implying $r > 1$).

[6]Defining domestic and foreign expected capital taxes as $\hat{t}_K^i$, $\hat{t}_K^j$ and $\hat{t}_K^h$, this is equal to $R^i(S^i) \equiv \max\{(1-\hat{t}_K^i)r, (1-\hat{t}_K^j)r - \alpha S^i, (1-\hat{t}_K^h)r - \alpha S^i\}$.

[7]For a more general analysis of the interaction between international coordination and domestic policy commitment, see Conconi and Perroni (2006).

[8]It should be stressed that the policy combination (t_K^*, t_L^*) is a only a constrained optimum, since the first-best policy would involve financing the revenue requirement by a lump-sum tax.

[9]Our prediction of positive non-cooperative capital taxes is in contrast with Kehoe (1989)'s prediction of a race to the bottom in capital taxes; this is because Kehoe assumes that capital is costlessly mobile across countries ($\alpha = 0$), so governments have always incentives to undercut each other; if instead there are frictions to international capital movements, as we assumed in our analysis ($\alpha > 0$), governments are somewhat sheltered from such cutthroat tax competition.

[10] The only direct welfare comparison is between the extremes of the two regimes, $\alpha = 0$ and $\alpha = \infty$:

in both cases, there are no capital tax revenues and labor income taxes are equal to $t_L = G/(wL(t_L)$; however, countries' payoffs are higher when there are no mobility costs ($\alpha = 0$) and investment is high ($S^N = Y$) than when mobility costs are prohibitive ($\alpha = \infty$) and no investment occurs ($S^N = 0$).

[11]This result is in line with the findings of Kehoe (1989). However, while Kehoe's analysis is limited to the case of perfect capital mobility ($\alpha = 0$), we consider the more general setup in which exporting capital can be costly ($\alpha \geq 0$).

[12]Other studies have examined the welfare implications of partial tax coordination, assuming that policymakers can credibly commit to capital taxes (e.g. Konrad and Schjelderup, 1999; Sørensen, 2000).

[13]Crucially, we assume that the tax union implies policy coordination among union members but does not alter the cost of moving capital within the union.

[14]In some cases, all countries will loose or gain; in others, only the excluded country j will gain, while the union countries will lose. Notice that the excluded country is able to "free ride" and thus benefits more from partial the creation of the tax union than the member countries. This rules out scenarios in which partial tax harmonization hurts the excluded country j, while benefiting the union countries.

[15]Traditionally, the EU has allowed some of the members to go on with further integration and others to opt out, at least temporarily. The European Monetary Union and the Shengen Treaty are the best known examples of this strategy. Recently, EU members have agreed on the introduction of well-defined procedures to allow sub-unions of countries to coordinate their policies on a particular issue—forming an Enhanced Cooperation Agreement (ECA)—while the remaining states continue to decide autonomously. The rules for forming ECAs in the EU were introduced in the Treaty of Amsterdam (1997). The Treaty of Nice (ratified in 2003) removed the veto power which the former treaty left to each country, thus making the implementation of ECAs much easier. Presently, to form an ECA at least eight EU members must be involved and the ECA must be approved by a qualified majority in the Council of Ministers. Furthermore, the European Commission must assess the compatibility of the proposed ECA with the other institutions governing the Union.

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Appendix

No Tax Harmonization

In the absence of commitment mechanisms, governments will select taxes after consumption-savings decision have been made and will thus have incentives to raise capital taxes. However, policymakers will know that an increase in taxes will give rise to capital flight. This implies that (for $\alpha < \infty$) it will never be optimal to set capital taxes above the rate t_K^*, since this would lead to no capital being invested domestically. Therefore we can exclude scenarios in which the expected return to investment for the home consumer is $R^i < 1$ and there is no investment and focus on scenarios in which the expected return to investment is $R^i \geq 1$ and at least some of the initial income is invested.

Consider first a capital-exporting country i, whose taxes are at least as high as those prevailing in the other two countries, indexed by j and h (i.e. $t_K^i \geq t_K^j$, $t_K^i \geq t_K^h$). Its government will choose t_K^i so as to maximize

$$\begin{aligned}\Pi^i(t_K^i, t_L^i, t_K^j) &= C_1^i + (1-t_K^i)rK_i^i + (1-t_K^j)rK_j^i + (1-t_K^h)rK_h^i - \frac{\alpha}{2}\Big(K_j^i\Big)^2 - \frac{\alpha}{2}\Big(K_h^i\Big)^2 \\ &\quad + (1-t_L^i)wL(t_L^i) + v(1-L(t_L^i)),\end{aligned} \tag{24}$$

subject to

$$G \leq t_K^i rK_i^i + t_L^i wL(t_L^i), \tag{25}$$

where

$$K_j^i = \frac{r}{\alpha}(t_K^i - t_K^j), \tag{26}$$

$$K_h^i = \frac{r}{\alpha}(t_K^i - t_K^h), \tag{27}$$

$$K_i^i = S^i - K_j^i - K_h^i. \tag{28}$$

Totally differentiate G^i and set $dG^i = 0$ to get

$$\partial t_L^i / \partial t_K^i = \frac{r(Y - \frac{r}{\alpha}(4t_K^i - t_K^j - t_K^h))}{(1+\mu)wL}, \tag{29}$$

where $\mu < 0$ denotes the elasticity of labor supply with respect to labor income taxation. Using (29) and the fact that optimum labor supply decisions imply $(1-t_L^h)w = v'(1-L)$, we can write the first-order condition for the maximization of i's payoff as

$$-rS^i + \frac{r^2}{\alpha}(2t_K^i - t_K^j - t_K^h) + \Lambda r(S^i - \frac{r}{\alpha}(4t_K^i - t_K^j - t_K^h)) = 0, \tag{30}$$

where $\Lambda = 1/(1+\mu) > 1$. From From (30), we obtain the best-response function of country i:

$$t_K^i = \frac{(1-\Lambda)(r(t_K^j + t_K^h) + \alpha S^i)}{2r(1-2\Lambda)}. \tag{31}$$

We can now look at the incentives of a capital-importing country. Consider, for example, the case in which country j's capital tax does not exceed the taxes prevailing in the other two countries ($t_K^j \leq t_K^i$, $t_K^j \leq t_K^h$). Then, we can derive the following first-order condition for the maximization of j's payoff:

$$-rS^j + \Lambda r(S^j - \frac{r}{\alpha}(4t_K^j - t_K^i - t_K^h) = 0, \tag{32}$$

which yields the best-response function

$$t_K^N = \frac{\Lambda(r(t_K^i + t_K^h) + \alpha S^j) - \alpha S^j}{4\Lambda r}. \tag{33}$$

We can now use (31) and (33)—assuming that the third country is either an importer or an exporter and imposing symmetry of savings—to solve for capital income taxes in this three-country non-cooperative equilibrium:

$$t_K^N = \frac{\alpha S(\Lambda - 1)}{2\Lambda r}. \tag{34}$$

Partial Tax Harmonization

Consider a scenario in which there are three ex-ante symmetric countries and two of them form a tax union (denoted by U) to coordinate their policy choices, while the third (denoted by j) chooses its taxes unilaterally.

It can be shown that it can never be optimal for the government of the country with the smallest tax base, country j, to set capital taxes above t_K^U. Therefore, we need only consider scenarios in which $t_K^j \leq t_K^U$.

Suppose that expected returns are such that all initial income Y is saved in all countries. In this case, investment levels will be given by $K_j^U = r/\alpha(t_K^U - t_K^j)$, $K_U^U = Y - K_j^U$, and $K_j^j = Y$; the tax union will choose t_K^U so as to maximize

$$2\Pi^U(t_K^U, t_L^U, t_K^j) = 2(1-t_K^U)rK_U^U + 2(1-t_K^j)rK_j^U - \frac{\alpha}{2}(2K_j^U)^2 + 2\Big((1-t_L^U)wL(t_L^U) + v(1-L(t_L^U))\Big), \tag{35}$$

subject to

$$2G \leq 2\Big(rt_K^U K_U^U + t_L^U wL(t_L^U)\Big). \tag{36}$$

The first-order condition for maximization of the union's payoff can thus be written as

$$-2rY + \Lambda 2r\Big(Y - \frac{r}{\alpha}(2t_K^U - t_K^j)\Big) = 0, \tag{37}$$

which we can solve to get U's reaction function:

$$t_K^U = \frac{\alpha Y(\Lambda - 1) + \Lambda r t_K^j}{2\Lambda r}. \tag{38}$$

We now turn to the derivation of the best-response function of the country excluded from the tax union. Its government will choose t_K^j so as to maximize

$$\Pi^j(t_K^j, t_L^j, t_K^U) = (1 - t_K^j) r K_j^j + (1 - t_L^j) w L(t_L^j) + v(1 - L(t_L^j)), \tag{39}$$

subject to

$$G \leq r t_K^j (K_j^j + 2K_U^j) + t_L^j w L(t_L^j). \tag{40}$$

The first-order condition for maximization of the union's payoff can be written as

$$-rY + \Lambda r \Big(Y - \frac{r}{\alpha}(4t_K^j - 2t_K^U) \Big) = 0, \tag{41}$$

which yields the following reaction function for the capital-importing country:

$$t_K^j = \frac{\alpha Y(\Lambda - 1) + 2\Lambda r t_K^U}{4\Lambda r}. \tag{42}$$

Combining (38) and (42), we obtain capital tax rates in the asymmetric Nash equilibrium:

$$t_K^{N,U} = \frac{5\alpha Y(\Lambda - 1)}{6\Lambda r} > t_K^{N,j} = \frac{4\alpha Y(\Lambda - 1)}{6\Lambda r}. \tag{43}$$

From the above expression of $t_K^{N,U}$ we can derive the critical level of mobility costs below which all initial income will be invested in all countries:

$$\alpha^U = \frac{6\Lambda(r - 1)}{5Y(\Lambda - 1)}. \tag{44}$$

Notice that α^U is smaller than α^*, the critical level of mobility costs below which all initial income is saved in the case of no tax harmonization (see equation (12) above).