Can Safe Haven Country Gain from International Capital Tax Co-ordination?

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Abstract

This paper focuses on the issue of welfare gains from inter-jurisdictional co-operation in capital tax rates by means of a two-country general equilibrium model in which capital is internationally imperfectly mobile. We investigate whether it is welfare improving for the safe haven country to co-ordinate its capital tax policy with the other countries when jurisdictions move away from the non co-operative equilibrium to the co-operative equilibrium. This work attempts to extend the literature on asymmetric tax game to the fiscal environment in which welfare gains from the co-operative tax game are basically affected by the asymmetric preferences of individuals for domestic savings. Welfare analysis of tax competition and tax co-ordination is carried out under the source principle of taxation using numerical simulations.

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1. Introduction

The question of international policy co-ordination has become the subject of major theoretical and practical interest in recent times. Several attempts are devoting increasing attention to investigating whether co-ordination of fiscal policies in fact generates substantial welfare gains. At least three approaches to the study of this topic are identified. The traditional approach, heavily influenced by the works of Peggy MUSGRAVE (1969) and Richard MUSGRAVE (1969), tends to concentrate on the problem of inter-jurisdictional double taxation and the question of the optimal method of double taxation relief. A second approach, exemplified by KEEN (1989), studies the effects of tax harmonisation, asking whether mutual welfare gains can be reaped by an equalisation of approximation of effective tax rates. The third branch of the literature, pioneered by HAMADA (1966), views the formulation of tax policies as a game between the national governments involved. This approach is referred to as the game-theoretic approach.

RAZIN and SADKA (1991) focus on the structure of taxation for countries which are engaged in tax competition and on potential gains from tax harmonisation. They consider a two-country model with perfect capital mobility. They show that each competing country can readjust capital exports with the rest of the world in order to offset any fiscal policy that the other competing country may implement. That is, fiscal policy of each country has no effect on the other competing one. Thus, if the competing countries are sufficiently co-ordinated with the rest of the world then tax competition leads each country to apply the residence principle and there are no gains from tax harmonisation. The simplest environment in which RAZIN and SADKA study is characterised by the exogenous nature of the international real interest rate results from the fact that the life-time utility of the representative agent in each country depends solely on its own policy. There are no individuals or group externalities and hence the co-ordinated solution is identical to the non co-ordinated one; there are no gains from co-ordination.

CORREIA (1992) focuses on (i) the analysis of the existence of co-ordination gains when the international real interest rate is exogenous to the group of countries that is being considered, (ii) how some features of Nash equilibrium depend crucially on the analysis being partial rather than general. Results suggest that (i) If a group of economies cannot influence the level of the interna-
tional real rate of interest, there exist no gains of co-ordination. Tax competition is the optimal solution and the optimal system of capital taxation implemented under this institutional arrangement depends on the available set of factor taxes; (ii) When we allow for general equilibrium considerations the results change dramatically: gains from co-ordination are always positive and increase with the level of competition;

GERARD and HADHRI (1994) introduce imperfect capital mobility to the tax competition literature. They analyse the sensitivity of welfare gains from inter-jurisdictional co-ordination in capital and labour tax rates to the degree of imperfect capital mobility in a two-country model with exogenous interest rates. A special feature of their work is the link between mobile capital and immobile labour. They focus on the effects of the tax game on the provision and financing of public goods, the distribution of the tax burden between immobile labour and (relatively or even perfectly) mobile saving, and the level of unemployment. Results show that tax competition leads to negative capital tax rates in equilibrium, so that each jurisdiction has to use labour-income tax revenue to subsidise job creating investment income in order to attract savings. The non co-operative tax game generates a harmful welfare effect, especially because it has a negative effect on the utility of the immobile worker and on the provision of public goods. This welfare destructive effect is especially at work when mobility is perfect. However other tax systems might be superior though they require some degree of co-operation. The fiscal game is therefore welfare improving when played in a co-operative way.

Most of these models analyse the effects of tax competition and tax co-operation among identical countries (a perfectly symmetric environment). Great attention is focused in the last few years on the welfare analysis of asymmetric fiscal games. This include works by JENSEN (1994), HADHRI and GERARD (1995), EGGERT and HAUFLER (1996), LOPEZ, MARCHAND, and PESTIEAU (1996), HADHRI (1997b,c), and HADHRI (1998).

JENSEN (1994) focuses on the issue of gains from co-operation in public spending when countries differ in population size. Using a simple static general equilibrium model depicting a world with two countries, he demonstrates that national heterogeneity (incorporated as a simple matter of population size) plays an important role for the countries' gains from inter-jurisdictional policy co-
operation, and – just as important – for the incentives to break the co-operative agreement. Three important questions are addressed in his research. First, will rich countries gain through co-operation with poor countries? Second, will low productivity countries gain from co-operation with high productivity countries? Third, will small countries gain from co-operation with large countries? Results show that, in the case of symmetric countries and equal bargaining power, expenditure levels are lower under co-operation than under non co-operation. Under non co-operation government spending is excessive, as each government ignores the negative externalities of its policies upon consumers abroad [this is the analogue to JOHNSON’s (1954) familiar result on optimal tariffs]. Under co-operation, such externalities are internalised, and spending is lower. Both countries’ welfare will be higher.

HADHRI and GERARD (1995) focus on the welfare effects of capital and labour tax rates when asymmetric countries co-operate with each other compared with tax competition. The co-operative equilibrium is formulated as a situation in which capital is taxed at the same rate in the two countries (capital tax harmonisation) while labour is allowed to be taxed differently. The model is a two-period and two-factor one, in which two categories of household are assumed to occur in each country: a stockholder and a worker. Jurisdictions are assumed to differ in their preferences for (i) the private consumption, (ii) the public spending, (iii) the utility of the stockholder and the worker. Several insights are derived from their analysis. First, identical countries can both gain from undertaking a co-ordinated symmetric increase in public expenditure financed by a higher capital tax and a lower labour tax. Second, unlike in the symmetric case, Nash equilibrium among asymmetric countries results in a higher capital tax in the country where jurisdictions exhibit a stronger preference for public services compared with the other country. However, tax competition is expected to result in a lower capital tax rate and a higher labour tax in the country whose jurisdiction has a stronger preference for the utility of the stockholder.2

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2 These jurisdictions gain relatively little in terms of public spending from tax co-operation and they are expected therefore to gain less from tax co-ordination. Their work ought to be developed further in several directions. First, the modelling of imperfect capital mobility is to be improved by using the net mobility costs of investing abroad pioneered by PERSSON and TABELLINI (1992), and specified explicitly in GERARD and HADHRI (1996). Second, one can analyse how the welfare effects of tax co-operation may be affected by the degree of tax co-operation. The distinction between them is argued in HADHRI (1997b,c) as especially critical and interesting in the context of asymmetry.
EGGERT and HAUFLER (1996) consider a static model of two countries which are identical in all respects except for population size. Capital is imperfectly mobile among countries whereas labour is immobile. They study the conditions under which the smaller of two otherwise identical countries prefers the non-cooperative Nash equilibrium to a situation of fully harmonised tax rates. A standard two-country model of capital tax competition is used allowing for the following extensions, (i) transaction costs, (ii) additional countries, and (iii) additional tax instruments. Results show that in the case of identical countries, the more countries there are playing the tax competition game, the higher the (perceived) elasticity of each country's tax base is. All countries must necessarily lose in the case of symmetric tax competition. Furthermore, numerical simulations suggest a rather high chance for the smaller country to win in tax war, in particular under the 'plausible' assumption that government revenue needs are rigid.

LOPEZ, MARCHAND, and PESTIEAU (1996) analyse the issue of asymmetric tax competition and inefficient redistribution [see also CREMER and PESTIEAU (1995)]. They consider a two-country model with mobile capital and immobile labour, in which there are two classes of individuals; the workers and the capital owners. A source-based tax on capital income is incorporated into their model to finance transfers towards workers. The focus of their paper is to examine in particular the positive issue of whether a country competing with other less equity-oriented countries will find it more or less difficult to achieve its redistributive goals (redistribute resources from mobile capital to immobile labour). They examine how tax competition affects the redistributive policies of the two countries which are heterogeneous in terms of preferences for equity, population size, and social composition.

The non-cooperative equilibrium capital income is shown when countries are homogenous in all respects to be under-taxed, relative to the autarkic situation where capital is taken as a fixed factor and full redistribution prevails. Results suggest that when countries are heterogeneous, (i) the less redistributive (or inequality averse) a country is, the more difficult it is for the other country to redistribute income. In addition, the more equity-oriented country has also the more unequal distribution of income; (ii) when countries differ in inequality and population size, the size of the labour force is significantly smaller in one country (A) as compared with the other one, (B), causing a large capital flow to occur
from the former to the latter. Nash equilibrium results in this case in a lower tax rate in country A than in country B.

HADHRI (1997c) examines the scope for inter-jurisdictional profit tax competition and tax co-operation in a context in which there exist pure profits and where strategic interactions between firms cannot be ignored. A two-country model is considered to stress the important role of imperfect competition among firms in evaluating welfare gains from tax competition and tax co-operation when capital is imperfectly mobile across countries. The key question is to examine how welfare effects of tax co-operation can be affected compared with tax competition by the asymmetric preferences of jurisdictions for public services, the size of the capital mobility costs, and the degree of tax co-operation (tax co-ordination or tax harmonisation).

Results demonstrate that tax competition among identical countries is welfare decreasing. Tax co-ordination results in a uniform decrease in the profit tax rates and public services in all jurisdictions compared with tax competition which increases social welfare in each country. Welfare gains for countries are negatively affected by the size of the capital mobility costs of investing abroad. Unlike the symmetric case, welfare gains from tax co-ordination among asymmetric countries are confirmed as negatively affected by the preferences of jurisdictions for public services. The size of welfare changes from tax co-operation is basically affected by the degree to which countries are intended to co-operate with each other [see also HADHRI (1997b) for the asymmetric tax game when countries differ in their preferences for the private good].

Most of these contributions did not examine the way in which welfare gains from the inter-jurisdictional capital tax game can be affected by (i) the degree of imperfect capital mobility, and (ii) the asymmetric preferences of residents for domestic savings. The incorporation of these factors may be important for the evaluation of welfare gains. This omission may be potentially serious. First, the degree of capital mobility is argued in the literature to play a crucial role in open economy models. GOULDER, SHOVEN and WHALLEY (1983) show that the incorporation of inter-jurisdictional capital mobility into their model may change substantially the tax policy analysis compared with immobile capital; actually it may reverse the sign of the national welfare effects associated with the introduc-
tion of consumption tax as a substitute to income tax [see e.g., EICHENGREEN and GOULDER (1989)].

Second, one might expect that attachment to the home country would be of special importance for culturally diverse systems. It would be reasonable to assume that individuals would have a preference for a particular country for cultural or nationalistic reasons. To take an example, at the end of 1989 US investors held 94% of their equity portfolio in US stocks and the Japanese held 98% of their equity portfolio in Japanese stocks.

In addition, the political safety is often considered as a factor of attractiveness of the safe haven country as a place to invest not only for residents but also for non-residents. As mentioned in PAPKE (1989) the political safety is a factor of attractiveness indicating that large direct and portfolio capital flows [to the U.S.] reflect the relative attractiveness of the U.S. as a place to invest both for U.S. and foreign residents. This attractiveness clearly includes the relative political stability and safety that investors perceive in the U.S. compared with the uncertain climate in many parts of the world, including Europe and Canada. THALMANN, DELORME, and GOULDER (1996) argue that, even when rates of return in other countries are equivalent to, or higher than, the domestic rates, households exhibit some strong preference for domestic assets.

Our work attempts to extend the literature on inter-jurisdictional tax competition to the case where capital tax game is assumed to occur among the safe haven country (referred to as the home country in which individuals exhibit a higher preference for domestic savings) and the foreign country. The economy is composed of two countries (home and foreign) linked by imperfect capital mobility. Fiscal equilibria are numerically computed and compared to each other under the source principle by means of a general equilibrium model using numerical simulations. Unlike the literature our research focuses on the scope for inter-jurisdictional capital tax competition and tax co-ordination under imper-

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3 The estimations of the degree of capital mobility among member States of the E.U. are proposed e.g. by ARGIMON and ROLDAN JOSE (1991) who suggest that European countries can be divided into two groups, Germany, the Netherlands and the United Kingdom on the one hand, characterised by a high degree of capital mobility, and Spain, France, Denmark, Belgium and Ireland on the other hand, characterised by low capital mobility. They also suggest that where capital controls are applied, the volume of capital flows is very low, so that the degree of capital mobility could be used as an acceptable proxy of the effectiveness of capital controls.
fect capital mobility and where countries differ in the preferences of their residents for domestic savings. A two-country framework is considered to stress how heterogeneity and the size of capital mobility may change the sign and magnitude of welfare gains when countries move away from the non co-operative equilibrium to the co-operative equilibrium.

The layout of this paper is organised as follows. The model is featured in section two. The inter-jurisdictional capital tax games (co-operative and non co-operative) are described in section three. Data are described in section four. The numerical analysis of fiscal equilibria is provided in section five. Summary and concluding comments are provided in section six.

2. The Model

Our model is a two-factor, two-period, two-country one with one agent per country, a holder of immobile labour and a relatively mobile capital respectively. In both countries technology obeys a constant return to scale production function. Taxation is ruled by the source principle according to which capital income is taxed only in the country where it is produced irrespective of whether it is paid out to residents or non-residents. In addition, capital income of residents produced abroad is therefore not taxed by the home jurisdiction, and non-residents are taxed at the same rate as residents on income originating in the home country.

Let us denote $\tau$ and $\tau^*$ respectively the tax rate levied by the home jurisdiction and the foreign one on domestic source income.

The net rate of return on domestic savings is given by,

$$r_d = r(1 - \tau)$$

and the net return on foreign savings is,

$$r_d = r^*(1 - \tau^*)$$

where $r$ and $r^*$ stand respectively for the gross rate of return in the home country and the foreign one. The household is assumed to receive one unit of
saving endowment in the first period, and it has to determine how much to save at home and how much to save abroad. Private consumption is assumed to be financed by the net return from domestic savings, foreign savings, and the net labour earnings:

(3) \[ c = \alpha(1 + rd) + (1 + \alpha)(1 + rf) + wn, \quad wn = (1 - t)w \]

The first two terms in (3) stand for the net savings earning. Utility of the household is specified as a function of the private consumption, the portfolio satisfaction, and public spending:

(4) \[ U(c, As, g) = c + As(\alpha) + v(g) \]

where

\[ A_3(\alpha) = (\alpha/2\mu)(2\alpha_0 - \alpha) \geq 0, \quad a_0 = 1 - \mu\gamma > 0 \quad \text{and} \quad v(g) = \phi g \geq 0 \]

\( c \) is the private consumption, \( \phi \) is the preference of resident for public consumption, \( As(\alpha) \) is the portfolio satisfaction function defined in a similar way to BACCHETTA and ESPINOSA (1995). The parameter \( \mu \) stands for the degree of capital mobility (a large value of \( \mu \) implies a high degree of capital mobility), \( \gamma \) represents the benefit from saving abroad in addition to the net return, and \( \alpha_0 \) is the preference of resident for saving at home\(^4\).

\(^4\) It is easy to show that \( A_3'(\alpha) = (\alpha_0 - \alpha)/\mu = -\eta'(\alpha) \) where \( \eta \) is the net cost of foreign investment used in BACCHETTA and ESPINOSA (1995) and specified as follows: \( \eta(\alpha) = (2\mu)^{-1}(1 - \alpha) - \gamma(1 - \alpha) \).
The Portfolio Satisfaction Curve

The curve that relates $\alpha$ and $A_s^*$ is composed of two parts. The first one on the left hand side corresponds to positively sloped section in which $\alpha$ and $A_s^*$ move in the same direction. Thus, reducing the home tax will increase both $\alpha$ and $A_s^*$.

\[(4b) \quad A_s^*(\alpha) = (\alpha_0 - \alpha) / \mu \geq 0 \text{ when } \alpha \leq \alpha_0\]

The second part corresponds to the to the interval where $\alpha$ and $A_s^*$ move in the opposite way. The portfolio function is specified in such a way that international capital tax difference is not the only reason for households to invest abroad. The household has to hold a positive fraction of his endowment abroad, even if tax rates are equal in the two countries. He is assumed to take as given the supply of public services. He does not take into account the impact of his portfolio decision on public consumption.

We show that:

\[(4c) \quad \alpha_0 = \text{Arg} \max A_s (\alpha) \text{ and } A_s (\alpha_0 - \varepsilon) = A_s (\alpha_0 + \varepsilon) \quad \forall \varepsilon \geq 0\]

Solving the consumer’s problem involves:

\[(5) \quad \alpha = \alpha_0 + \mu (r_d - r_f)\]

The public consumption is:

\[(6) \quad g = r\tau k + twl, \quad k = \alpha + 1 - \alpha^*\]
On the production side, technology is described by a constant returns to scale production function. Domestic output is produced from "domestic capital stock" and labour supplied by residents. Technology is specified as:

\[ y = \left( \lambda^{1-p} k_d^p + (1-\lambda)^{1-p} l_d^p \right) , \quad \rho = 1 - (1/\sigma) \]

It turns out from such a process that at equilibrium:

\[ l_d = \sigma(w, r)k_d(w, r, y) , \quad \sigma(w, r) = \left( \frac{1-\lambda}{\lambda} \right) \left( \frac{1+r}{w} \right)^\sigma \]

where is the labour-capital ratio parameter standing for the level of labour demand by domestic firms per unit of capital stock. The incorporation of such a relationship is important since it allows analysing the impact of a tax policy on factor demand. Using the zero profit assumption, the gross wage rate is expressed as a decreasing function of the rate of return. This involves:

\[ w(r) = \left[ 1-\lambda \left( 1 + r^H \right)^{1-\sigma l} \right]^{(1/(1-\sigma l))} (1-\lambda) \quad \text{and} \quad \sigma(w, r) = \sigma(r) \]

The exogenous labour force is assumed to be always fully employed. It is easy to see that when the rate of return goes down, the capital stock demanded by firms increases and so the labour-capital ratio goes down enhancing the equilibrium real wage rate. This effect might be large if the elasticity of substitution between labour and capital is high. When the interest rate goes up the capital stock, and so the marginal product, of labour is reduced lowering the equilibrium real wage rate. That is:

\[ w'(r) < 0 , \quad \sigma'(r) > 0 \quad \text{and} \quad k'(r) < 0 \]

In equilibrium, the aggregate demand for labour, capital, and commodities are equal to the aggregate supply. An equilibrium is defined as a price vector of both labour and capital in the two countries. The price of the private good is the Numeraire. Total capital supply in a given jurisdiction is equal to the savings that the residents of the one jurisdiction decide to locate at home and to the savings that the residents of the other jurisdiction decide to locate abroad, and similarly for the other country; a * sign above a variable indicates that it refers to the other country. The capital market equilibrium condition is satisfied when capital demand is equal to national savings plus net capital imports. If net capital flows are zero then the economy of each country is financed by its own savings.
The capital and labour markets equilibrium conditions may be consolidated into a single equilibrium condition for each country, using equality between capital demand and supply in each country:

(11) \[ \sigma(r)k(\tau, \tau^*, r) = l \]

and symmetrically for the other country:

(12) \[ \sigma(r^*)k^*(\tau, \tau^*, r^*) = l^* \]

Then it is easy to show that these equations determine equilibrium interest rates which in turn determine equilibrium wage rates, and therefore all the endogenous variables of the model given the exogenous capital and labour tax rates.

(13) \[ r = r(\tau, \tau^*) \text{ and } r^* = r^*(\tau, \tau^*) \]

where

\[ r'(\tau) \geq 0 \text{ and } r'^*(\tau) \leq 0 \]

These equations are of great importance, since they allow us to investigate the response of the gross rate of return for changes in capital and labour-income tax rates in the two countries.

The level of public spending is:

(14) \[ g = \theta(\tau)l, \theta(\tau) = r\tau + tw(r)\sigma(r) \]

The first term on the right hand side of (14) stands for the capital income tax revenue obtained from savings of residents and non-residents invested in the home jurisdiction. The second term on the right hand side is labour-income tax revenue levied by the home government; it depends on the domestic pre-tax wage rate, on the labour supplied by residents in the second period, as well as on the labour-income tax rate.

The resource constraint of the economy constraint faced by the home country is:

(15) \[ c + g + e = y(k, \sigma(r)k) \]
which states that output generated by domestic capital stock and labour supply is equal to the private and public consumption and income paid to net capital imports (principal and interest) \( e \). A symmetric constraint occurs for the foreign country. Summing up the constraints we have the following equilibrium condition on the commodity market:

\[
(16) \quad c + e^* + g + g^* = y(k, \sigma(r)k) + y(k^*, \sigma(r^*)k^*)
\]

which is satisfied.

3. International Capital Tax game

The inter-jurisdictional tax competition works as follows: each country’s jurisdiction maximises a social welfare function (specified in equation 4) by choosing optimally its capital tax rate, taking the other jurisdiction’s tax rate as given. So doing, it accounts for the effect of its tax rate on the portfolio decision of household and the general equilibrium conditions.

The problem of the home jurisdiction is:

\[
(17) \quad \text{Max } U[\tau, \alpha(\tau, \tau^*), \alpha^*(\tau, \tau^*)]
\]

\(<\tau>\)

subject to (3), (5), (9), (13), and (14). The first-order derivative w.r.t. for an interior solution can be written as:

\[
(18) \quad \left( \frac{\partial c}{\partial \tau} + \nu \frac{\partial g}{\partial \tau} \right) + \left( \frac{\partial c}{\partial \alpha} + \frac{\partial A}{\partial \alpha} + \nu \frac{\partial g}{\partial \alpha} \right) \frac{d\alpha}{d\tau} \left( \frac{\partial c}{\partial \alpha^*} + \nu \frac{\partial g^*}{\partial \alpha^*} \frac{d\alpha^*}{d\tau} \right) \frac{d\alpha^*}{d\tau} = 0
\]

The first order condition for the foreign country is:

\[
(19) \quad \left( \frac{\partial c^*}{\partial \tau^*} + \nu \frac{\partial g^*}{\partial \tau^*} \right) + \left( \frac{\partial c^*}{\partial \alpha^*} + \frac{\partial A^*}{\partial \alpha^*} + \nu \frac{\partial g^*}{\partial \alpha^*} \right) \frac{d\alpha^*}{d\tau^*} \left( \frac{\partial c^*}{\partial \alpha} + \nu \frac{\partial g^*}{\partial \alpha} \frac{d\alpha}{d\tau^*} \right) \frac{d\alpha}{d\tau^*} = 0
\]

Each jurisdiction chooses its own tax rate taking into consideration both direct and strategic effects. Solving the two optimal tax rules expressed in (18) and (19) involves the non co-operative equilibrium in tax rates \( \tau \) and \( \tau^* \).
(20) \[ \tau = \tau(\tau^*, r, r^*) \text{ and } \tau^* = \tau^*(\tau, r, r^*) \]

Three effects are to be analysed regarding the optimal tax rule in each country: the "direct" welfare effect, the "own" strategic welfare effect, and the "cross" strategic welfare effect. The first expression in (18) stands for the direct welfare effect stemming from the impact of on \( \tau \) welfare, at the initial value of savings invested by each household (home and foreign). That effect is equal to the direct private effect, (negative) and the direct public effect, (positive).

The second expression is referred to as the "own" strategic welfare effect originating from the indirect impact of capital income taxation on social welfare through the response of \( \alpha \) to \( \tau \) an increase in \( \alpha \). An increase in the home tax rate changes the amount of capital saved domestically by residents, and affects therefore welfare in the home country. The first two terms of that expression are equal to zero: from the consumer’s optimisation problem we have \( \frac{\partial c}{\partial \alpha} + \frac{\partial A_c}{\partial \alpha} = 0 \), i.e. by the envelope theorem the effect on of a change in is second order. The own strategic welfare effect is equal therefore to the "own" strategic public (or revenue) effect generated from the indirect impact of \( \tau \) on the home jurisdiction’s tax revenue.

The last expression referred to as the "cross" strategic welfare effect stemming from the indirect impact of the home tax on social welfare via the response of the portfolio choice of non residents \( \alpha^* \) to an increase in \( \tau \). That effect can be broken as the sum of the "cross" strategic private effect, and the "cross" strategic public effect.

We turn now to the co-operative behaviour of jurisdictions formulated as a situation in which the capital tax rates in the two countries are to be selected by the central government to maximise welfare of the collectivity taking into account the spill-over effects of tax rates. Thus governments will jointly set \( \tau \) and \( \tau^* \) in order to maximise the joint welfare function; subject to (3), (5), (9), (13), (14) and its counterparts for the other jurisdiction.
4. Data

Fiscal equilibria are numerically computed and compared with each other using numerical simulations with reasonable values for the parameters. Results are carried out using the GAMS programme [see, e.g. BROOKE and MEBERAS (1988)]. The model has many parameters that must be assigned numerical values. These are chosen on the basis of the literature on optimal taxation, as well as on some econometric studies. We assume the following set of parameters:

\[ \mu = 6; \ r = 0.15; \ \gamma = 0.083; \ \alpha_0 = 0.50; \]
\[ \lambda = 0.60; \ \sigma = 0.80; \ \tau = 0.40; \ t = 0.30 \]
\[ \phi = 1.30. \]

The degree of international capital mobility and the gross rate of return \( r \) are set by reference to BACCHELLA and ESPINOSA (1995). The benefit from investing abroad \( \gamma \) is calibrated to obtain \( \alpha_0 = 1/2 \) as in GERARD and HADHRI (1994). This parameter stands for the preference of the household for domestic savings. The evidence on this parameter is scarce. FRENCH and POTERBA (1991) estimate that the percentage of equity portfolio invested in domestic firms is 98% for Japan, 94% for the U.S., and 82% for the U.K. in December 1989. The elasticity of the production function \( \sigma \) and the capital cost parameter \( \lambda \) are determined by referring to HADHRI (1997a). The capital tax rate is set to 40% by analogy to the cross-country estimates of tax rate provided in MENDOZA, RAZIN, and TESAR’s (1994, table 5) work where the average tax rate varies between 24% and 56% in the U.K. Labour tax rate is set to 30%.

5. Welfare Analysis

We focus now on the analysis of fiscal equilibria which are compared with each other using numerical simulations. We show first how social welfare of each country can be improved from tax co-ordination when (identical) countries move away from the non-cooperative equilibrium to the co-operative equilibrium. Second is the co-operative equilibrium tax rate higher or lower than the non-cooperative one? Third, do tax competition results in under-provision of
public goods, i.e. tax rates and expenditure levels that are lower than optimal. Fourth we examine how welfare gains from the co-operative tax game can be affected by the asymmetric preferences of households for domestic savings.

*Case 1: Symmetric Jurisdictions*

To understand the numerical results it is first necessary to well understand the underlying mechanism: A decrease of the capital tax rate in the home country is likely to generate a negative effect on welfare in the foreign country. That is, a lower source-based capital tax makes the home jurisdiction more attractive as a place to invest. Reducing the capital tax rate will attract capital from abroad, and reduce the capital supply in the foreign country which in turn substantially increases the interest rate, decreases the foreign gross wage rate, and generates less public services in that country. The net labour earning in the foreign country will be reduced due to the cut in the gross wage rate. By contrast, the net saving earning will be increased due to the lower tax rate in the home country.

**TABLE 1**

<table>
<thead>
<tr>
<th>Key Variables</th>
<th>Nash Solut.</th>
<th>Co-op. Solut.</th>
<th>Co-op. / Nash$^5$</th>
</tr>
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<tbody>
<tr>
<td>Capital tax rate</td>
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<td>0.250</td>
<td>104.9</td>
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<tr>
<td>Gross wage rate</td>
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<td>0.812</td>
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<td>Private consump</td>
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<td>1.606</td>
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<td>0.250</td>
<td>22.7</td>
</tr>
<tr>
<td>Utility</td>
<td>1.753</td>
<td>1.936</td>
<td>10.4</td>
</tr>
</tbody>
</table>

Table 1 reveals that in the non co-operative case, tax rates and public spending are lower (compared with the co-operative case) as each jurisdiction ignores the negative externalities of their tax policies upon changes in private and public consumption abroad. Under the co-operative case, such externalities are internalised, which means that each jurisdiction takes into account the negative

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$^5$ Co-op/Nash stands for the relative changes of the co-operative solution to the Nash equilibrium (%) (for example, 10.4% means an increase from 1.753 to 1.936). The co-operative welfare function is specified as the sum of welfare of each country.
«welfare effect» of the lower tax rate on the other jurisdiction. Each country will be better-off by undertaking a harmonised symmetric increase in public services financed by a higher capital tax rate with the other country. Numerical results suggest that the size of the capital mobility cost is likely to generate a small effect on the magnitude of welfare gains in the two countries. Welfare gains from tax co-ordination are negatively affected by the size of the capital mobility costs of investing abroad. A higher degree of mobility costs is likely to reduce the incentives of household for investing abroad due to a change in the home tax rates. Fiscal externalities induced by tax competition tend to be reduced when the capital mobility cost is increased.

*Case 2: Safe Haven Country*

The inter-jurisdictional tax game is assumed to occur among the Safe Haven country (home) and the other country (foreign). The former is characterised by a better economic and financial climate compared with the latter. Households in the two countries are assumed to exhibit a stronger preference for investing in the home country\(^6\). That is,

\[
\alpha_0 > 1/2 \; \text{and} \; \alpha_0^* < 1/2
\]

The asymmetric preferences for savings are expected to imply differences in the magnitude of the following effects: (i) the «direct» welfare effect stemming from the impact of tax rate on the private and public consumption at the initial value of savings invested by each household (home and foreign); (ii) the «own» strategic public effect generated from the impact of the tax rate on public expenditure via the level of capital invested domestically by residents; (iii) and the «cross» strategic welfare effect induced by the impact of the tax rate on the private and public consumption through the level of capital domestically invested by foreigners. Heterogeneity between countries is likely to induce different choices of fiscal policy and involves therefore tax differences.

\(^6\) We set \(\alpha_0 = 0.65\) and \(\alpha_0^* = 0.35\).
TABLE 2A
Asymmetric Fiscal Equilibria: The Safe Haven Country

<table>
<thead>
<tr>
<th>Key Variables</th>
<th>Nash Solut.</th>
<th>Co-op. Solut.</th>
<th>Co-op / Nash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital tax rate</td>
<td>0.11</td>
<td>0.250</td>
<td>127</td>
</tr>
<tr>
<td>Net rate of return</td>
<td>0.014</td>
<td>0.026</td>
<td>85.71</td>
</tr>
<tr>
<td>Net savings earning</td>
<td>1.405</td>
<td>1.376</td>
<td>-2.10</td>
</tr>
<tr>
<td>Gross wage rate</td>
<td>0.979</td>
<td>0.920</td>
<td>-6.00</td>
</tr>
<tr>
<td>Private consump</td>
<td>1.665</td>
<td>1.620</td>
<td>-2.70</td>
</tr>
<tr>
<td>Public spending</td>
<td>0.260</td>
<td>0.261</td>
<td>0.30</td>
</tr>
<tr>
<td>Utility</td>
<td>2.038</td>
<td>1.994</td>
<td>-2.20</td>
</tr>
</tbody>
</table>

TABLE 2B
Asymmetric Fiscal Equilibria: The Foreign Country

<table>
<thead>
<tr>
<th>Key Variables</th>
<th>Nash Solut.</th>
<th>Co-op. Solut.</th>
<th>Co-op / Nash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital tax rate</td>
<td>0.000</td>
<td>0.102</td>
<td>-</td>
</tr>
<tr>
<td>Net rate of return</td>
<td>0.142</td>
<td>0.063</td>
<td>-55.7</td>
</tr>
<tr>
<td>Net savings earning</td>
<td>1.262</td>
<td>1.275</td>
<td>1.00</td>
</tr>
<tr>
<td>Gross wage rate</td>
<td>0.814</td>
<td>0.902</td>
<td>10.8</td>
</tr>
<tr>
<td>Private consump</td>
<td>1.414</td>
<td>1.443</td>
<td>2.10</td>
</tr>
<tr>
<td>Public spending</td>
<td>0.152</td>
<td>0.174</td>
<td>14.60</td>
</tr>
<tr>
<td>Utility</td>
<td>1.621</td>
<td>1.679</td>
<td>3.60</td>
</tr>
</tbody>
</table>

Results suggest that Nash equilibrium results in the safe haven country in a relatively higher capital tax rate compared with the foreign one characterised by a lower preference for domestic savings. The main reason is that savings supply in the home country is relatively inelastic compared with the foreign country. The imposition of a capital income tax rate when the country is engaged in the non-cooperative game will have a small welfare cost. The home government is therefore free to impose a source based tax to raise more revenue affecting slightly the domestic interest rate.
A country with a lower preference for savings will have less incentive for increasing the tax rate than the other country. By contrast, the foreign savings supply is highly elastic in the foreign country. Capital income should not be therefore highly taxed since they can escape taxation. The foreign government has to reduce the capital tax rate in order to preserve savings at home. Unlike in the symmetric case again, both countries cannot gain by harmonising their tax policies. Tax co-ordination is social welfare decreasing for the Safe Haven country and welfare improving for the other country.

The results are however subject to a series of limitations. First, the welfare gains from co-ordination are expected to be in particular a function of mobility factors between each country in the study and the rest of the world. The tax burden of some taxes may be shifted from countries to the rest of the world. This result depends in particular on the modelling of the rest of the world's behaviour, on the degree to which capital is internationally mobile, as well as on the international wedge in capital income taxes. Second, in analysing the welfare effects of co-ordination, it might be worth considering the possibility of compensating transfers, both across countries and across classes.

6. Summary and Concluding Comments

The traditional literature on tax competition shows that non co-operative behaviour of jurisdictions will lead to inefficient low tax rates and levels of public spending [see WILSON (1986) and ZODROW and MIESZKOWSKI (1986)]. Many of these works analyse the issue of tax competition in the ‘purely competitive’ case where the number of identical jurisdictions is large. A number of studies departs from the framework of pure and symmetric competition to examine the inter-jurisdictional tax game in a small-number and asymmetric environment where strategic interactions between non-identical jurisdictions cannot be ignored. These include contributions by CREMER and PESTIEAU (1995), EGGERT and HAUFLER (1996), LOPEZ, MARCHAND and PESTIEAU (1996), and HADHRI (1997b,c).

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7 We are indebted to M. KEEN, M. MARCHAND, and P. PESTIEAU for this suggestion.
Most of these contributions did not examine the way in which welfare gains from the inter-jurisdictional capital tax game can be affected by (i) the degree of imperfect capital mobility, and (ii) the asymmetric preferences of residents for domestic savings. The incorporation of these factors may be important for the evaluation of welfare gains. This omission may be potentially serious. Our work attempts to extend the literature on inter-jurisdictional tax competition to the case where capital tax game is assumed to occur among the Safe haven country (home) and the foreign country in an economy featured by imperfect capital mobility. Individuals (home and foreign) are assumed to exhibit a stronger preference for investing in the home market compared with the foreign one. Fiscal equilibria are numerically computed and compared to each other under the source principle by means of a general equilibrium model.

Results suggest that asymmetric preferences of savings are likely to be important and should be taken into account when designing the optimal level of tax co-ordination. Welfare gains from tax co-ordination among asymmetric countries are confirmed as negatively affected by the preferences for savings, and positively influenced by the degree of capital mobility. The safe haven country is expected to gain less from tax co-ordination compared with the other country.
References


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