Tax Competition and Coordination in the Context of FDI

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Basic Principles of International Taxation of Capital Income

- **Residence Principle**
  (1) Place of Residency of the taxpayer is the basis for assessment of tax liabilities.
  (2) Residents of a country are taxed uniformly on their worldwide income regardless of the source of income (domestic or foreign).
  (3) Non Residents are not taxed by the home country on their income originating in that country.

Basic Principles of International Taxation of Capital Income

- **Source Principle**
  (1) Source of income of the taxpayer is the basis for assessment of tax liabilities.
  (2) Income originating in a country is uniformly taxed regardless of the residency of the income recipient.
  (3) Residents of a country are not taxed by it on their foreign source income.

Explaining the Principles

- Countries adopt a mixture of these two pure polar principles of international taxation.
- I will explain this in a standard two country (Home (H) and Foreign (F)) setup.

Notations

- Interest Rates r and r^*
- 3 different effective tax rates on interest income
  1. τ_D - tax rate levied on residents on their domestic source income.
  2. τ_F - effective tax levied on residents on their foreign source income, in addition to the tax already levied in the foreign country.
  3. τ_{ND} - tax rate levied on non-residents on their interest income originating in the home country.
  4. Similarly τ_D^*, τ_F^*, τ_{ND}^* for the foreign country.

Implication of Financial Integration

Complete Integration of Capital markets between two countries gives the no-arbitrage conditions:

(1)

$$r(1 - \tau_D) = r^*(1 - \tau_{ND}^* - \tau_F)$$

(2)

$$r(1 - \tau_{ND} - \tau_F^*) = r^*(1 - \tau_D^*)$$

What does this imply for the Residence Principle?

(1) If the two countries adopt Residence Principle, then

$$\tau_D = \tau^*_{ND} + \tau_F$$

$\implies$ Residents of H is levied the same tax rate whether she invests at H (τ_D) or F ($\tau^*_{ND} + \tau_F$)

(2)

$$\tau^*_D = \tau_{ND} + \tau^*_F$$

$\implies$ Same condition as above for the residents of F.

(3)

$$\tau_{ND} = \tau^*_{ND} = 0$$

$\implies$ No Source Taxation by any country on nonresidents.

What does this imply for the Source Principle?

(1)

$$\tau_D = \tau_{ND}$$

(2)

$$\tau_D^* = \tau_{ND}^*$$

(3)

$$\tau_F = \tau_F^*$$

Motivation of the Issue of Tax Competition and Coordination

- Financial Globalization creates a tax problem, e.g. with *FDI* the tax base can shift from high tax to low tax country creating fiscal externality.
- Governments in order to attract *FDI* compete in tax cut. This results in less than optimal provision of public goods, referred in the literature as *"race to the bottom"* $\Longrightarrow$ competition between nations over investment capital leads to progressive dismantling of regulatory standards and less than efficient level of public goods provision.

Motivation of the Issue of Tax Competition and Coordination

- We want to take a look at the implication of *FDI* flows for the effects of taxation and for tax bases in a source-host country setup.
- We saw before how source and host country tax rate affects *FDI* flows asymmetrically, here we analyze this asymmetry to explain the coexistence of high-tax, high public expenditure source countries and low-tax, low public expenditure host countries.
- Here we will show in details how Tax Competition can lead to Pareto inferior outcome, as compared to the situation when countries go for Tax-Coordination in the context of *FDI* flows.

A Source-Host Country Model of Taxes and Public Goods

Production Side of the Host Country

(1) Continuum of firms normalized to 1. Each firm is characterized by the productivity parameter $\varepsilon > -1$.

(2) ε is not random, but known before any economic decision is made.

(3) Density Function - g, Cumulative Distributive Function - G.

(4) Initial Capital Stock of each firm is 0.

Model - Production Side

(5) A firm with productivity factor ε employs a capital stock of K in period 1 and produces an output $A_H F(K)(1+\varepsilon)$ in period 2.

(6) F exhibits Diminishing Marginal Productivity of capital ($F' > 0$, $F'' < 0$).

(7) As before, there exists fixed setup costs, so firms with productivity above a threshold level of ε, say ε_0 will make new investments.

(8) The cutoff level of the productivity factor is a function $\varepsilon_0(\tau_H, \tau_S)$ of τ_H an τ_S, defined implicitly by

$$V_H(\varepsilon, \tau_H) - (1 - \tau_S)C^* = 0$$

$\implies$ An ε_0 firm is indifferent between investing and not investing.

Model - Production Side

(9) We assume Foreign direct investors have the cutting edge advantage over domestic investors with regard to the setup costs, so they acquire control over domestic firms.

(10) Price a foreign direct investor pays for an ε - firm ($\varepsilon > \varepsilon_0$) to the domestic owner is

$$V_H(\varepsilon, \tau_H) - C^*(1 - \tau_S)$$

where $V_H(\varepsilon, \tau_H)$ is defined by: $V_H(\varepsilon, \tau_H) =$

$$\max_K \left[\frac{A_H F(K)(1+\varepsilon)(1-\tau_H) + \tau_H \delta'_H K + (1-\delta)K}{1+(1-\tau_H)r} - K \right]$$

Model - Production Side

(11) C^* is the setup cost carried by the foreign investor.

(12) It is borne in the Source country and tax deducted there.

(13) The Source country effectively subsidizes the Host country through the tax deductibility of the fixed setup costs, the amount of subsidy is $\tau_S C^* \{1 - G[\varepsilon_0(\tau_H, \tau_S)]\}$.

Model - Production Side

(14) δ and δ'_H denote the physical and tax rate of depreciation.

(15) τ_i denote the corporate tax rate for country $i = H, S$.

(16) Financial Integration fixes the rate of interest at the world rate r.

(17) $F.O.C$ for the optimal capital stock of an ε firm is :

$$A_H F'(K)(1+\varepsilon) = r + \delta + \frac{\tau_H}{1-\tau_H}(\delta - \delta'_H)$$

for firms with $\varepsilon \geq \varepsilon_0$.

(18) This gives the optimal capital stock $K^H(\varepsilon, \tau_H)$ as a function of its productivity factor and the corporate tax rate.

Comparative Statics

(1) Since $\delta'_H < \delta$, τ_H depresses the stock of capital of each investing firm.

(2) τ_H reduces the number of investing firms or increases ε_0. $\Longrightarrow$ Increase in host corporate tax rate (τ_H) reduces the total stock of capital in the host country.

(3) τ_S increases the number of investing firms or lowers ε_0. $\Longrightarrow$ Increase in source corporate tax rate (τ_S) raises the capital stock in the host country.

Modeling the Production Structure in the Source Country

- We assume setup cost in the source country are 0, and all firms invest.
- The value of an ε firm is $V_S(\varepsilon, \tau_S) =$

$$\max_K \left[\frac{A_S F(K)(1+\varepsilon)(1-\tau_S) + \tau_S \delta'_S K + (1-\delta)K}{1+(1-\tau_S)r} - K \right]$$

- The optimal stock of capital ε-firm is given by:

$$A_S F'(K)(1+\varepsilon) = r + \delta + \frac{\tau_S}{1-\tau_S}(\delta - \delta'_S)$$

- $\implies$ optimal stock of capital is a function $K_S(\varepsilon, \tau_S)$ of ε, τ_S

Private Consumption

- A representative consumer in country $i = S, H$ has initial endowment I_i in period-1 and utility function $u[(v(x_1, x_2), P]$ over
  (i) period-1 consumption (x_1),
  (ii) period-2 consumption (x_2) and
  (iii) public expenditures (P).
- **Assumptions**
  (i) Identical Preference on H and S, i.e. same u and v for both countries.
  (ii) $\nRightarrow$ countries have same demand for P, since $I_S > I_H$.

Utility Maximization Problem

- Utility Maximization yields the individual consumption demands for periods 1 and 2:
  $X_j[W_i, (1-\tau_i)r]$, $j = 1, 2, i = H, S$
  W_i is the income of the representative consumer in country i.
- Income of rep consumer in H country = Initial Endowment + Proceeds from the sales of domestic firms (with $\varepsilon > \varepsilon_0$) to the foreign direct investors $\implies W_H(\tau_H, \tau_S) =$

$$I_H + \int_{\varepsilon_0(\tau_H,\tau_S)}^{\infty} V_H(\varepsilon, \tau_H) g(\varepsilon) d\varepsilon - (1-\tau_S) C^* \{1 - G[\varepsilon_0(\tau_H, \tau_S)]\}$$

Utility Maximization Continued

- Income of the representative consumer in the S country (who also retains all the firms in this country) is

$$W_S(\tau_S) = I_S + \int_{-1}^{\infty} V_S(\varepsilon, \tau_S) g(\varepsilon) d\varepsilon.$$

Government - Host Country

- Each country government balances its budget $\Longrightarrow$ tax revenues=public expenditures. By Walras's Law the government budget constraint can be replaced by an economy wide constraint.
- Economy wide resource constraint of Host country is

$$P_H = I_H + (1+r)^{-1} \int_{\varepsilon_0(\tau_H,\tau_S)}^{\infty} \{A_H F[K_H(\varepsilon,\tau_H)](1+\varepsilon) + (1-\delta)K_H(\varepsilon,\tau_H)\} g(\varepsilon) d\varepsilon$$

$$- \int_{\varepsilon_0(\tau_H,\tau_S)}^{\infty} K_H(\varepsilon,\tau_H) g(\varepsilon) d\varepsilon - (1-\tau_S) C^* \{1 - G[\varepsilon_0(\tau_H,\tau_S)]\}$$

$$-X_1[W_H(\tau_H,\tau_S),(1-\tau_H)r] - (1+r)^{-1} X_2[W_H(\tau_H,\tau_S),(1-\tau_H)r]$$

Explanation of the Host Country Budget Constraint

- Representative consumer sells an ε-firm at a price $V_H(\varepsilon, \tau_H) - (1 - \tau_S)C^* \implies$ cash flow of ε-firm, after taxes are paid to the **Host Country** government.
- $\implies$ from host country perspective, resources available must include this price (including taxes) paid by the foreign direct investor.
- $\implies$ host country extracts from the foreign direct investor the before tax flow of the purchased ε-firm given by:

$$(1+r)^{-1}\{A_H F[K_H(\varepsilon, \tau_H)](1+\varepsilon)+(1-\delta)(K_H(\varepsilon, \tau_H)\}-(1-\tau_S)C^*$$

$\implies$ S subsidizes H through tax deductibility of the fixed setup costs, subsidy amount being $\tau_S C^*\{1 - G[\varepsilon_0(\tau_H, \tau_S)]\}$

Government - Source Country

- Economy wide resource constraint in the Source country is

$$P_S = I_S + (1+r)^{-1} \int_{-1}^{\infty} \{A_S F[K_S(\varepsilon, \tau_S)](1+\varepsilon) + (1-\delta) K_S(\varepsilon, \tau_S)\} g(\varepsilon) d\varepsilon$$

$$- \int_{-1}^{\infty} K_S(\varepsilon, \tau_S) g(\varepsilon) d\varepsilon - \tau_S C^* \{1 - G[\varepsilon_0(\tau_H, \tau_S)]\}$$

$$-X_1[W_S(\tau_S, (1-\tau_S) r], -(1+r)^{-1} X_2[W_S(\tau_S, (1-\tau_S) r]$$

$\Longrightarrow$ Source Country subsidizes the host country by the amount of tax deductions allowed for the fixed setup costs.

Tax Competition - Host Country

- Each government maximizes the welfare of its representative consumer, by taking the policy of the other government as given.
- So we want to look at a Nash Equilibrium of the two country tax competition game.
- Government of Host country chooses the corporate tax rate τ_H to maximize the utility of the representative consumer,

$$u(v\{X_1[W_H(\tau_H, \tau_S), (1-\tau_H)r], X_2[W_H(\tau_H, \tau_S), (1-\tau_H)r]\}, P_H)$$

- P_H is given by the economy-wide resource constraint of H, and τ_S is taken exogenous.

Tax Competition - Source Country

- Source Government chooses τ_S to maximize

$$u(v\{X_1[W_S(\tau_S), (1-\tau_H)r], X_2[W_S(\tau_S), (1-\tau_H)r]\}, P_S)$$

- P_S is given by the economy-wide resource constraint of S, and τ_H is taken exogenous.

Optimal Tax Policies by the Countries

- The optimal corporate tax rate chosen by the Host country depends on the Source country tax rate τ_S.
  $\implies$ This policy is the best response function of τ_S, denoted by $\hat{\tau}_H(\tau_S)$.
- Similarly best response function of the source country is $\hat{\tau}_S(\tau_H)$
- A Nash Equilibrium is a pair of tax policies (τ_H^*, τ_S^*) such that

$$\tau_H^* = \hat{\tau}_H(\tau_S)$$

and

$$\tau_S^* = \hat{\tau}_S(\tau_H)$$

Numerical Solutions

- We resort to numerical solutions in order to characterize the Nash Equilibrium and study the effect of the source-host income gap I_S/I_H and setup cost C^* on the divergence or convergence of the tax-expenditure policies.
- We employ Cobb-Douglas production function $F(K) = K^\alpha$, with $\alpha = 2/3$.
- $A_H = A_S = 1$

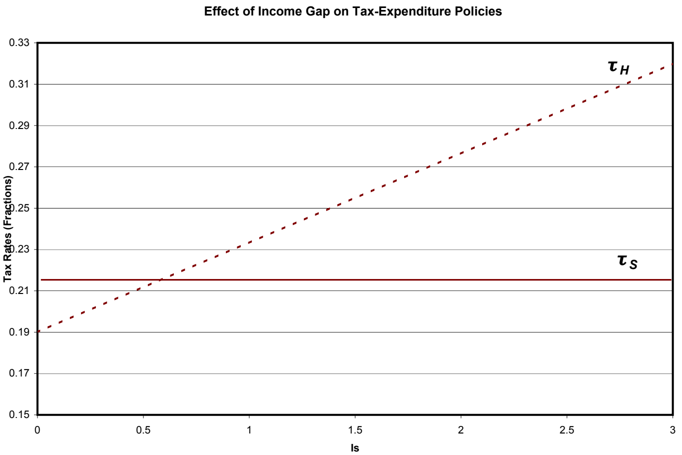
Setting Parameter Values

- Utility Function: $u = lnx_1 + \beta lnx_2 + \gamma lnP$
- $\beta = 0.99$ and $\gamma = 0.95$.
- $\delta_H = \delta_S = 0.2$
- $\delta'_H = \delta'_S = 0.1$
- $r = 0.05$
- $I_H = 1$

Effect of a Rise in Initial Endowment of Source Country I_S on Nash Equilibrium Tax-Expenditure Policies

- Setup Cost $C^* = 1$
- Host Country tax rate τ_H and public expenditure P_H are not affected by I_S
- As source country becomes richer (I_S rises), its tax rate and expenditure rise, yielding
  (i) an equilibrium with low-tax, low expenditures in the poor Host country
  (ii) High tax and high expenditure in the relatively rich Source country.

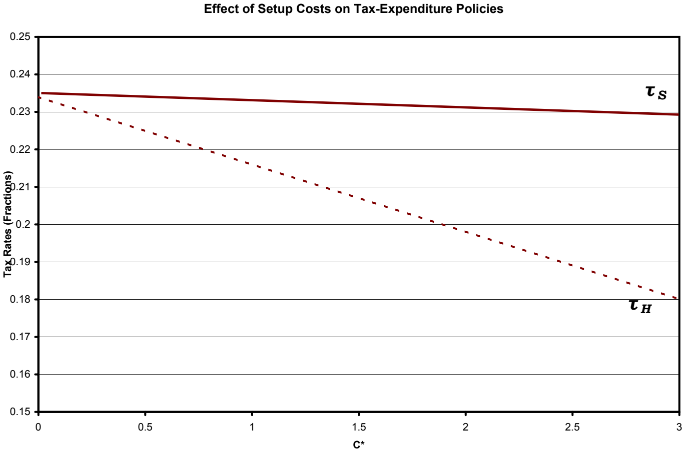
Effect of (I_S/I_H) on Nash Equilibrium Tax Expenditure Policies



Effect of a Rise in Setup Cost C^* on Nash Equilibrium Tax-Expenditure Policies

- Set Initial Endowment of Source country $I_S = 1$
- With $C^* = 0$, $\tau_H = \tau_S$ at about 23.5%.
- As C^* rises, both τ_H and τ_S fall, but τ_H falls more sharply
- In equilibrium we get a low-tax, low-expenditure host country and a high-tax, high-expenditure source country.

Effect of Setup Cost C^* on Nash Equilibrium Tax Expenditure Policies



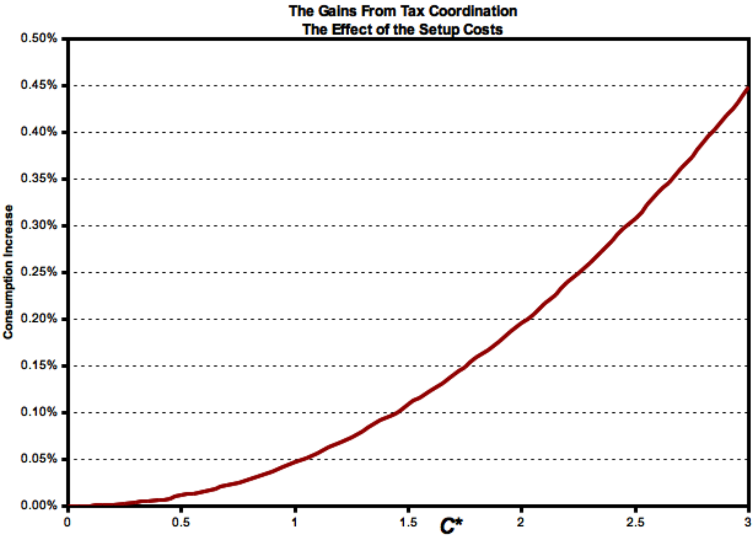
The Issue of Tax Coordination

- Tax Competition yields a Pareto-inefficient outcome from the point of view of both the Source and Host countries.
- The fixed setup costs associated with *FDI* in the Host country are subsidized by the Source country through the deductibility of these costs.
- Amount of subsidy is $\tau_S C^*\{1 - G[\varepsilon_0(\tau_H, \tau_S)]\}$.
- Amount of subsidy if negatively affected by the Host country corporate tax rate τ_H.
- Tax Coordination yields Pareto-improvement.

Numerical Simulations Showing Gains from Tax Coordination

- In doing numerical simulations, we use the same parametric specifications as before.
- Countries coordinate their tax-expenditure policies, but abide by country specific resource constraints.
- We consider the policies that assign all gains to the Host country and representative consumer utility level for the Source country.
- We measure of gains from tax coordination by equivalent percentage increase in X_1, X_2 and P.

Gains from Tax Coordination for Various Values of C^*

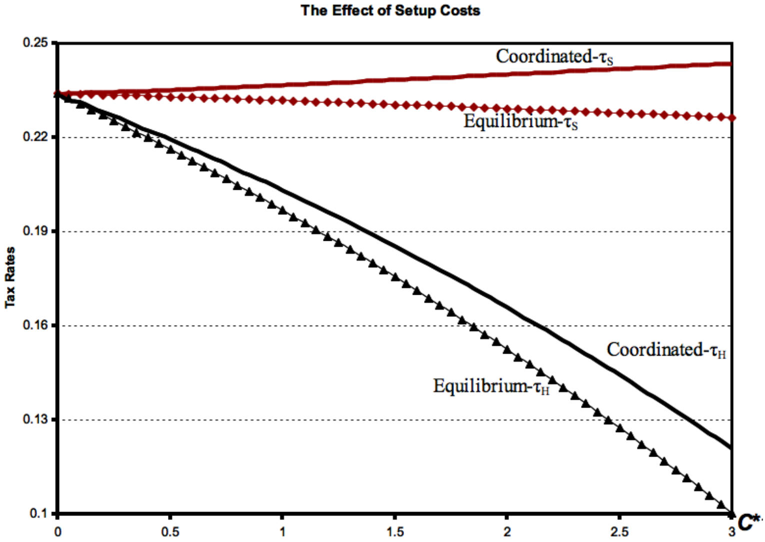


C^* *rises* $\Longrightarrow$ *gains from coordination rise*

Gains from Various Values of Income in Source Country

Higher $I_S \implies$ *higher Gains with Coordination*

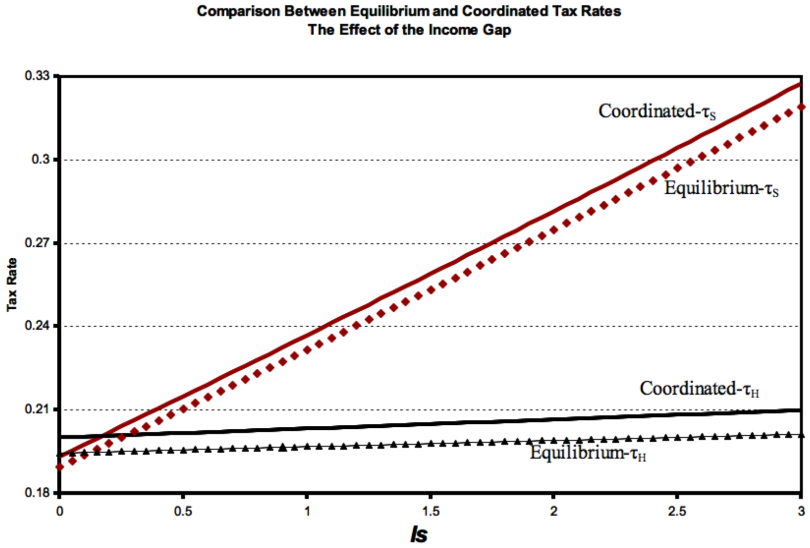
Comparison Between Competitive and Coordinated Tax Rates - Effect of C^*



Comparison Between Competitive and Coordinated Tax Rates - Effect of C^* - Intuition

In Tax-Coordination, amount of subsidy the Source country grants depends positively on C^* and τ_S.
Recall: Under Competition, as C^* rises, Source country cuts τ_S to reduce amount of subsidy.

Comparison Between Competitive and Coordinated Tax Rates - Effect of Income Gap



Conclusion

- The idea of this tax coordination literature is to show that coordination among Source and Host countries can actually lead to "race to the top" or efficient provision of public goods rather than the much argued "race to the bottom".
- The 2004 enlargement of *EU* with 10 new economies provides a stylized analogue of the model. There was a marked difference between the tax rates of the original *EU*-15 and the 10 accession countries. The latter had significantly lower rates of taxation, e.g Estonia has no corporate tax whereas Belgium, France, Germany, Greece, Italy and Netherlands range from 33% to 40%.

Conclusion-Continued

- The tax rates used for simulation purposes are *statutory* rates. An important extension could be to work with *effective* tax rates. Some work with regard to that has already been done by Jakubiak and Markiewicz (2005) - they show that the ratios of corporate tax revenues to *GDP* in *EU*-15 are higher than the accession economies.
- Given the fiscal externalities we saw, tax normalization is beneficial to all countries involved, and therefore could be taken as an important policy proposal. However, policy makers need to be careful so that the policy does not benefit some countries at the expense of others.

Thank You!