On tax competition, public goods provision, and jurisdictions’ size

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Research questions

- Relationship between size of jurisdiction (population=resources) and attractiveness for mobile entrepreneurs
Tax Competition Literature

Two are the main topics discussed by scholars:

- (i) the characteristics that a country should possess to be the destination of investors and foreign consumers (Wilson (1991), Kanbur and Keen (1993), Barros and Cabral (2000)), (Bjorvatn and Eckel (2005), Haufler and Wooton (1999));

As far as it concerns size:

- *Small* countries select low capital tax rates to attract foreign tax base, winning competition (Wilson (1991), Kanbur and Keen (1993)). The reason for this stands in the eventual big move from the big versus the small country.

- Non fiscal competition argument: residents democratically decide a lax tax system for themselves (Hansen and Kessler (2001)).
Marceau, Mongrain and Wilson (2007) using data from 1991 to 1999, show this is not the case.

...the correlation between the size-population-of a country and its tax rate is not clear. .... the predictions of the asymmetric tax competition literature do not appear to be realized in the real world equilibrium.

Data (Devereux et al, 2008) of effective corporate taxes show that some small countries like Belgium, Netherlands or Serbia set very low tax rates, even lower than countries of smaller size as Luxembourg. Some medium-sized countries like Austria set high rates as some large countries. Large countries are also divided in clusters of high taxes (Argentina, China, Russia, US, France) and low taxes (Bulgaria, Ukraine, Poland).
The model we develop allows for a non-monotonic pattern of capital tax rates by assuming that countries of unequal size compete for foreign capital with taxes and public goods that improve firms’ productivity.
Other explanations

- Barros and Cabral (2000) one country attracts FDI to alleviate unemployment
- Bjorvatn and Eckel (2005) one country is in weak position with respect to the technological frontier
- Haufler and Wooton (1999) tax competition literature is combined with international trade elements like trade costs to capture ”home market bias” effect (location-specific rents for the large country).
Public goods (input) and tax competition

- Public goods differentiation can help to relax competition (Zissimos and Wooders (2008)).
- The stratification of countries in different classes of tax levels can be explained by the argument in Justman, van Ypersele, Thisse (2001) of public goods quality differentiation.
- We analyze which is the successful instrument for the small country and which for the big one, given the degree of mobility.
Description of the model

- Two jurisdictions of uneven size: Size refers to population. Jurisdictions behave strategically.
- One to one relationship between a firm, an entrepreneur/worker and a unit of capital (productive resource).
- Entrepreneurs are heterogeneous according to their willingness to move in a foreign country (we may also think of a ranking according to the effect of public goods on their productivity as in Zissimos and Wooders (2008)).
- According to the public good level offered and taxes levied, entrepreneurs decide their location of where to invest capital.
- Taxes and public goods level are selected in a two stage game.
The model

- Denote by $s_i$ and $s_j$, the densities where $s_i + s_j = 1$. From now on the index $i$ denotes the capital exporting country.
- An entrepreneur of type $x$, $x \in (0,1)$, either invests one unit of physical capital in his own country $i$, or she invests in the foreign jurisdiction $j \neq i, (j, i = h, f)$. Profit:

$$\pi_i(x) = \begin{cases} 
q + a_i - t_i \\
q + a_j - t_j - kx
\end{cases}$$

- Indifferent entrepreneur $x_i = \frac{1}{k} [(a_j - a_i) + (t_i - t_j)]$
- Tax $t$ is on unit of capital invested. Public goods enhance the productivity of firms who locate in the jurisdiction. According to the public good level offered and taxes levied entrepreneurs decide their location.
- Cost of public investment: $C(a_i) = a_i^2$
Tax h(e)avens and tax hells: high or small taxes on capital

- capital supplies:

\[ S_i(t_i, t_j, a_i, a_j) = s_i \left( 1 - \frac{1}{k} ((a_j - a_i) + (t_i - t_j)) \right), \]

\[ S_j(t_i, t_j, a_i, a_j) = 1 - s_i \left( 1 - \frac{1}{k} ((a_j - a_i) + (t_i - t_j)) \right) \]

Accordingly we obtain the following tax elasticities:

\[ \epsilon_i = \frac{\partial S_i}{\partial t_i} \frac{t_i}{S_i} = - \frac{1}{k} \frac{t_i}{1 - \frac{1}{k} ((a_j - a_i) + (t_i - t_j))} \]

\[ \epsilon_j = \frac{\partial S_j}{\partial t_j} \frac{t_j}{S_j} = - \frac{1}{k} s_i \frac{t_j}{s_i \left( 1 - \frac{1}{k} ((a_j - a_i) + (t_i - t_j)) \right)} \]
If taxes are equalized and public goods are not differentiated, we recover Kanbur and Keen (1993) \( t_i = t_j = t; a_j = a_i \), the smallest jurisdiction will face the most elastic capital supply since, \( |\epsilon_f| = \frac{1}{k} \frac{t}{1-s_h} < |\epsilon_h| = \frac{1}{k} \frac{t}{s_h} \).

Assume \( a_h - a_f > 0 \). If sufficiently high, we may get
\[
|\epsilon_f| = \frac{1}{k} \frac{t}{1-s+h} \frac{1-t}{k(a_f-a_h)} > |\epsilon_h| = \frac{1}{k} \frac{t}{s+h} \frac{1-t}{k(a_h-a_f)}
\] for \( h = f = t \).

It is the big jurisdiction that cut its taxes.

Small jurisdictions can be tax hells, or big jurisdictions can be tax havens.

Which one is the capital importing/exporting?
• Jurisdictions decide first the level of public service (goods) to supply, and secondly the level of taxes.

• Payoffs, jurisdictions max their budget:

\[ B_i(a_i, a_j, t_i, t_j) = s_i(1 - x_i)t_i - a_i^2, \]
\[ B_j(a_i, a_j, t_i, t_j) = (1 - s_i) + sx_i) t_j - a_j^2. \]

Substituting the indifferent entrepreneur:

\[ B_i(a_i, a_j, t_i, t_j) = -\frac{1}{k}s_i t_i^2 + \left[ \frac{1}{k}s_i (a_i - a_j + t_j) + s \right] t_i - a_i^2, \]
\[ B_j(a_i, a_j, t_i, t_j) = -\frac{1}{k}s_j t_j^2 + \left[ \frac{1}{k}s_i (a_j - a_i + t_i) + 1 - s_i \right] t_j - a_j^2. \]
Tax subgame

In the second stage jurisdictions take the level of public goods as given and max rents w.r.t to taxes:

\[
\begin{align*}
    t_h(t_f) &= \frac{t_f}{2} + \frac{(a_h - a_f)}{2} + \frac{1}{2} k, \\
    t_f(t_h) &= \frac{t_h}{2} + \frac{(a_f - a_h)}{2} + \frac{1}{s} \frac{k}{2}.
\end{align*}
\]

Notice

1. negative strategic effect of public good: the higher its own investment on public goods the higher the likeliness of tax cutting behavior of the rival.
2. tax rates are strategic complements
Public goods subgame

In the first stage of the game, jurisdictions anticipate the second stage competition in taxes, max wrt to public goods levels. From the first order conditions, the resulting best replies write as

\[ a_i(a_j) = -\frac{s_i}{9k - s_i} a_j + \frac{k(1 + s_i)}{9k - s_i}, \]
\[ a_i(a_j) = -\frac{s_i}{9k - s_i} a_i + \frac{k(2 - s_i)}{9k - s_i}. \]
Introducing equilibrium public services into equations of taxes yields equilibrium tax rates

\[ a_i^*(s_i, k) = \frac{1}{3} \frac{3k(1 + s_i) - s_i}{9k - 2s_i} \]
\[ a_j^*(s_i, k) = \frac{1}{3} \frac{3k(2 - s_i) - s_i}{9k - 2s_i} \]
Lemma:

The capital importer is the large country \( f(x^*_h > 0) \) if

\[
k \in \left( \frac{s_h}{3(1 + s_h)}, \frac{s_h}{3} \right),
\]

The capital importer is a small country \( (x^*_f > 0) \) if

\[
k \in \left\{ \left( \frac{1 - s_h}{9}, \frac{1 - s_h}{3(2 - s_h)} \right) \cup \left( \frac{1 - s_h}{3}, \frac{1}{3} \right) \right\}
\]
Proposition: If a big jurisdiction attracts foreign capital it may only be attractive in terms of public-goods.

Proposition: A small jurisdiction is attractive to foreign investors:

(i) in terms of public goods, notwithstanding its high taxes if the cost level of mobility is intermediate.

(ii) in terms of taxes, notwithstanding its low public goods supply if mobility cost is high.