University of Pretoria
Department of Economics Working Paper Series

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Working Paper: 2016-32
April 2016

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A note on home bias and the gain from non-preferential taxation

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April 20, 2016

Abstract

In a symmetric model of tax competition, we support the claim in Haupt and Peters (2005) that a non-preferential regime generates higher tax revenues compared to a preferential regime when investors have home bias. Further, we show that a complete ban on preferential taxation is desirable even when the capital bases are infinitely elastic.

Keywords: Tax competition; Nash Equilibrium; Non-preferential regime.
JEL classification: C72; F20; H26

1 Introduction

Haupt and peters (2005) find that "home bias" can explain the gain from having a non-preferential agreements between two countries over two capital bases of equal size which are elastic with respect to the difference in tax rates of competing countries. A capital base is considered to have home bias in favor of a particular country if for an equal tax rate, a larger fraction of the capital base locates in the country in favor of which it has home bias.

It has been shown in the literature that asymmetry in the size of capital bases between countries enhance competition, since a small country (a country with a smaller share in a capital base) is more aggressive[1]. In Haupt and Peters (2005) under a non-preferential agreement, a smaller share in one of the two capital bases is offset by the larger share in the other capital base. Hence, a

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[1]For instance, see Janeba and Peters (1999).

non-preferential regime induce symmetry and reduce competition. On the other hand, under a preferential regime, competing countries set tax rates on two capital bases independent of each other; hence, a country obtaining a smaller share of capital base is more aggressive, which reduces tax revenues of competing countries from both capital bases.

In this paper, we identify the gains from a non-preferential regime due to home bias in separation from heterogeneity in the size of capital bases. For doing so we adopt a model which captures the main idea of Haupt and Peters (2005). Further, we do not impose restrictions to insure a pure strategy Nash equilibrium. Thus our model also extends Janeba and Peters (2005) for the case when two capital bases are perfectly mobile[2]. Another realistic feature of our model is that in equilibrium both competing countries can obtain mobile capital with a positive probability even if they set different tax rates.

2 Model

There are two identical countries/governments labeled as A and B. Each country consists of homogeneous agents of unit mass who are imperfectly mobile between two countries and each agent is endowed with one unit of capital. Governments maximize tax revenues and agents maximize net after tax returns on capital. We assume that the net return on capital is identical in two countries which is equal to 1. We assume that the maximum tax rate a country can impose is equal to 1 as well. The capital base owned by agents who are residents of country i is denoted as i^c, where $i = A,\ B$. A fraction λ of the capital base i^c is located in country i, while $1-\lambda$ is located in country j ($j = A,\ B,\ i \neq i$). Owners of capital base i^c have home bias in favor of country i which is captured by the term $f \in (0,1)$. To explain the role of home bias, let t^i and t^j be the tax rates on capital base i^c by country i and j, respectively. If $t^j > t^i - f$, then the capital base i^c locates completely in country i. On the other hand if $t^j \leq t^i - f$, then the capital base i^c locates completely in country j. Below, we describe the nature of the game under a non-preferential and a preferential regime.

Under a preferential regime, in stage one, competing countries simultaneously announce different tax rates applicable to capital bases A^c and A^c. In stage two, agents decide whether to relocate after observing the tax rates set by two countries. After investments decision are made, investors pay the tax in the country where their capital is invested. The game under a non-preferential regime is similar to a preferential regime except that, in stage 1, countries announce an equal tax rate applicable for both capital bases.

[2] We observe that most of FDI (Foreign Direct Investments) is carried out by big multinationals. Jenses, Bernard and Schott (2008) find that importing and exporting are closely related, more than 50 percent of the firms in the United States that import also export and these firms account for close to 90 percent of US trade. Their investment decision based on differences in tax rates are likely to be highly correlated which in reality may lead to violation of conditions insuring pure strategy Nash equilibirum. Article 24 of OECD (1997) Model of Tax Competition prevents differences in tax treatments which are solely based on certain spefic grounds.

The payoffs of competing countries and investors are fully determined by the tax rates set by countries in stage one. Hence, we model the tax competition as a symmetric one shot simultaneous move game.

3 Non-preferential regime

Let t^A and t^B be tax rates set by country A and B, respectively. The revenue function of country i can be written as

$$R_{np}^{i}\left(t^{i},t^{j}\right)=\left\{\begin{array}{c} 2t^{i} \;\; if\; t^{i}\leq t^{j}-f \\ t^{i} \;\; if\; \left|t^{i}-t^{j}\right|<f \\ 0 \;\; if\; t^{i}\geq t^{j}+f \end{array}\right. \tag{1}$$

where $i,\ j=A,\ B$ and $i\neq j$. When $\left|t^{i}-t^{j}\right|<f$, the capital base i^c locates completely in country i, therefore country i obtains the tax revenue equal to t^i. When $t^i\leq t^j-f$, both capital bases locate in country i, in that case country i earns tax revenue equal to $2t^i$. If $t^i\geq t^j+f$ then both capital bases locate in country j and country i receives zero tax revenue.

If home bias is not too large ($f<1/2$), a pure strategy Nash equilibrium does not exist. A government desire a low tax rate when the competitor's tax rate is high and also desire a high tax rate when the competitor's tax rate is low. We follow the method in Kishore (2015) to find the mixed strategy Nash equilibrium. In the mixed strategy Nash equilibrium, a country sets a high tax rate when competitor's tax rate is low and set a low tax rate when competitor's tax rate high. As the cost of mobility (f) decreases, competition for mobile capital increases and tax revenues of competing countries decreases.

Proposition 1 *Under a non-preferential regime if $f\geq 1/2$, a pure strategy Nash equilibrium exists. Both countries set the tax rate equal to* 1 *and receive tax revenues equal to* 1. *When $f<1/2$, a pure strategy Nash equilibrium does not exist, however, a mixed strategy Nash equilibrium exist. When $1/\left(1+\sqrt{2}\right)<f<1/2$, in a symmetric mixed strategy Nash equilibrium countries earn tax revenue equal to $\Omega\equiv 1-\Psi$. In the mixed strategy Nash equilibrium both countries randomize over the interval $\{(1-\Psi-f,\ 1-f),\ (1-\Psi,\ 1)\}$. There is a probability mass of m at* 1, *where*

$$\begin{aligned} \Psi &= 1-f/2-(1/2)\sqrt{f^2+4f} \\ m &= \frac{\Omega-(1-f)}{1-f}>0 \end{aligned}$$

Equilibrium strategy of countries, i.e., the distribution of tax rate over the support is

$$G\left(t\right)=\left\{\begin{array}{c} 1-\frac{\Omega-(t+f)}{t+f}\; for\; t\in\left(1-\Psi-f,\ 1-f\right) \\ 1-\frac{\Omega-(t-f)}{t-f}\; for\; t\in\left(1-\Psi,\ 1\right) \end{array}\right.$$

When $f\leq 1/\left(1+\sqrt{2}\right)$, countries earn tax revenues equal to $\Phi\equiv f\left(1+\sqrt{2}\right)$. Countries randomize over the interval $(\tau,\ \tau+2f)$ and there is no probability *mass anywhere on the support. The distribution of tax rates over the support in the equilibrium is*

$$G(t) = \begin{cases} 1 - \frac{\Phi}{t+f} & \text{for } t \in (\tau,\ \tau + f) \\ 1 - \frac{\Phi - (t-f)}{t+f} & \text{for } t \in (\tau + f,\ \tau + 2f) \end{cases}$$

where

$$\tau = f\left(1 + \sqrt{2}\right) - f.$$

Proof. The proof is similar to proposition (3) in kishore (2015). ■

The mixed strategy Nash equilibrium described in the proposition (1) has many desirable properties which relate to observed facts. When the cost of capital relocation is high, i.e., $f > 1/\left(1 + \sqrt{2}\right)$, both countries set very high tax rate with strictly positive probability, explaining high tax rates on mobile capital in many countries. Also, both countries obtain mobile capital even if their tax rate differ as long as the difference is not too large.

4 Preferential regime

Under a preferential regime maximization of tax revenues requires a country setting a lower tax rate on the capital base which has bias in favor of the competing countries. This reciprocal discounts by competing countries results in low tax rates on both capital bases, thereby reducing tax revenues.

Proposition 2 *Under a preferential regime, in a symmetric pure strategy Nash equilibrium country i sets tax rates f and 0 on capital bases i^c and j^c, where $i,\ j = A,\ B$. In the equilibrium competing countries earn tax revenue equal to f.*

Proof. Proof is simple. ■

It is trivial to argue that no country can get better by a unilateral deviation from the proposed strategy in proposition (2). The zero tax rate on the capital with positive bias in favor of competing country is instructive. One of the "key factors" proposed by OECD (1997) to identify "harmful preferential regimes" is "a low or zero effective tax rates on specific kinds of income".

5 Comparison

Table (1) below list tax revenues under a preferential regime (R_p) and a non-preferential regime (R_{np}). The result further strengthen the claim in Haupt and Peters (2005) , that, home bias itself can explain the gain from having a non-preferential regime when capital bases are highly elastic. Further, while Haupt and Peters (2005) show that only a partial ban on a preferential regime is desirable, our result shows that a complete ban on a preferential regime increases tax revenues of competing countries.

	R_{np}	R_p	$R_{np} - R_p$
$f \geq 1/2$	1	f	$1 - f \geq 0$
$1/\left(1+\sqrt{2}\right) < f < 1/2$	$f/2 + (1/2)\sqrt{f^2+4f}$	f	$(1/2)\left(\sqrt{f^2+4f} - f\right) > 0$
$f \leq 1/\left(1+\sqrt{2}\right)$	$f\left(1+\sqrt{2}\right)$	f	$f\left(\sqrt{2}\right) > 0$

Table 1

6 Conclusion

This paper strengthen the claim in Haupt and Peters (2005) that the result of Keen (2001) may reverse if capital owners have home bias. Further, we also show that a complete ban on a preferential regime is desirable even when the capital bases are infinitely elastic.

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