

Dynamic Inconsistency and Non-preferential Taxation of Foreign Capital

Kaushal Kishore*

Southern Methodist University, Dallas, Texas, USA.

Santanu Roy†

Southern Methodist University, Dallas, Texas, USA

June 18, 2013

Abstract

In a two period model of capital income taxation where a single host government faces heterogenous foreign investors and capital is sunk after it is invested, the government has a strong incentive to set low preferential taxes in the second period in order to attract less eager investors. This induces investors to wait rather than invest in the initial period, and leads to loss of tax revenue. The dynamic inconsistency problem is resolved if the host government unilaterally commits to non-preferential taxation in each period (even if it does not commit to future tax rates).

Keywords: Dynamic Inconsistency; Foreign Investment; Non-preferential Taxation.

*E-mail: kkishore@smu.edu. This author is currently affiliated with the National Council of Applied Economic Research, New Delhi, India.

†Corresponding Author. Address: Department of Economics, Southern Methodist University, 3300 Dyer Street, Dallas, TX 75275-0496; Tel: (+1) 214 768 2714; E-mail: sroy@smu.edu.

1 Introduction

Economists have long recognized that important barriers to foreign investment arise from dynamic inconsistency in determination of policies by the host government. In particular, there are two aspects of dynamic inconsistency when foreign investment is partially or entirely irreversible and the government cannot credibly commit to future policy.¹ First, the host government has a strong incentive to expropriate all returns on capital after the investment is sunk (the holdup problem) and this deters foreign investment. Second, after the current round of foreign investment is sunk, the host government has a strong incentive to selectively offer more favorable policy terms to investors that did not invest in the past (presumably because they have better outside options); this, in turn, may motivate current investors to withhold their investment to take advantage of such favorable terms in the future. These two aspects are closely related. Preferential terms to attract new investors and a highly extortionary policy towards sunk capital are both facilitated when the host government is free to engage in policy discrimination between different vintages of capital. While the first aspect of dynamic inconsistency mentioned above viz, expropriation of returns on sunk investment, has been extensively analyzed in the literature,² the second aspect related to the incentive to offer more lucrative policy terms to new investors over time has received scant attention and is the main focus of the current paper.

We consider a simple two period model where a host government imposes capital income taxes. There is a continuum of foreign investors that differ in their return on capital at home (their outside option). Investors may invest in either period or never. Once invested in the host economy, capital is fully sunk. We use this stark framework to highlight the problem of dynamic inconsistency resulting from preferential taxation of new investors and show how it makes it more difficult to attract foreign investment leading to loss of tax revenues to the host government (relative to the outcome under full commitment where the government can credibly commit to future tax rates).

Next, we show that this dynamic inconsistency problem can be fully resolved³ if the government can make a limited commitment to not engage in preferential treatment of new investors i.e., to have uniform taxation of all capital at each point of time regardless of vintage or whether capital is mobile or sunk. Note that such limited commitment does not prevent the government from intertemporal tax discrimination i.e., lowering the tax in the future to attract new investors. Further, it requires no commitment to specific tax rates. Despite that, the equilibrium outcome is one where the full commitment levels of investment and tax revenue are attained. An important mechanism for such commitment by a host government may be provided by international treaties or conventions such as the OECD that actively promote dismantling of preferential taxation of foreign and mobile capital among

¹As there is always a "sovereign risk" of the host government easily violating any agreement with private investors, it is difficult to address these dynamic inconsistency problems through contracts between private foreign investors and the government.

²Solutions to this problem include self-enforcing agreements between individual investors and the host government through long term interaction (see, among many others, Eaton and Gersovitz 1983, Thomas and Worrall 1994, Doyle and van Wijnbergen 1994, Schnitzer 1999) as well as multilateral treaties between sovereign nations.

³Note that as individual investors are small (atomless), long term interaction with the host government does not lead to better outcomes.

its members.⁴

It is important to differentiate the dissipation of tax revenue due to dynamic inconsistency highlighted in our paper from the effects of tax and policy competition between multiple governments to attract more investment. As is well known, the latter can lead to a race to the bottom in tax rates (and other policy instruments) and lead to partial or even complete dissipation of tax revenue (or other gains to the host country from investment). Under certain conditions, commitment to non-preferential taxation or non-discrimination by all competing governments can soften competition between governments and lead to revenue gains for all countries.⁵ In contrast, the problem we focus on can arise in the absence of any competition between governments; indeed, in our model, there is a single host government that faces a set of heterogeneous potential foreign investors. The tax competition literature emphasizes the value of multilateral commitment by governments to non-preferential taxation and this is echoed in the rationale behind the OECD's identification of preferential taxation as harmful practice (see, OECD 1999). In contrast, our results indicate the value of *unilateral* commitment to non-preferential taxation.

Finally, the problem of dynamic inconsistency highlighted in this paper bears a close resemblance to the Coase conjecture regarding intertemporal price discrimination by a monopolist that faces heterogeneous consumers in a durable good market⁶. The seller has an incentive to reduce future prices in order to sell to lower valuation buyers (that did not buy in the past) and this creates an incentive for buyers to wait leading to downward pressure on prices and profit. However, there are significant differences with our framework. In the durable good market, the utility of a buyer who purchases in the current period is not directly affected by future prices (while the return to a current investor depends directly on future taxes). Indeed, as buyers have no interaction with the seller after they buy, there is no natural analogue of non-preferential taxation in the durable good market framework.

Our paper is organized as follows. Section 2 describes the model. Section 3 discusses the solution under full commitment. Section 4 discusses the no commitment case and highlights the dynamic inconsistency problem caused by preferential taxation. Section 5 discusses the outcome with limited commitment to non-preferential taxation. Section 6 concludes.

2 Model

Consider a two period economy ($t = 1, 2$) where the host government wishes to attract foreign investment. In order to focus on taxation of capital income and to compare the tax revenue implications of alternative structures, we assume that the government's objective is to maximize the total tax revenue over both periods. Further, we assume for simplicity

⁴OECD (2004) reports that among 47 preferential regimes identified among the OECD member countries in 2000; 18 countries chose to adopt non-preferential regimes and 14 countries accepted amendments in their treatment of foreign capital. The number of non-member countries agreeing to cooperate on the principle of non-preferential taxation had increased to 33.

⁵A very large literature on tax competition (and other forms of policy competition) has examined various aspects of this issue. See, among many others, Janeba and Peters (1999), Keen (2001) Janeba and Smart (2003), Haupt and Peters (2005), Wilson (2005), Konrad and Kovenock (2009) and Marceau, Mongrain and Wilson (2010).

⁶See, for instance, Coase (1972) and Stokey (1982).

that the economy has no domestic capital. There is a continuum of foreign investors whose total mass is equal to 1; each investor is endowed with a unit of capital. Each unit of capital invested in the economy yields return equal to $\rho > 0$ in each period. An investor that does not invest in the economy is guaranteed a certain net return (for instance, by investing in the source country); we assume that this external (per period) *net* return on capital varies across investors and is distributed according to a distribution function $F(r)$ whose support is the interval $[0, \rho]$; there is no loss of generality in ignoring investors with external return higher than ρ . We assume that $F(r)$ is twice continuously differentiable on $[0, \rho]$, $F'(r) > 0$ and

$$(\rho - r) \frac{F''(r)}{F'(r)} < 2. \quad (1)$$

(1) is always satisfied if F is concave. Each investor's payoff is the sum of net returns over both periods. There is no discounting.

We study the rational expectations equilibrium of this model under various assumptions on the commitment ability of the government.

Let $\phi(r)$ be the function defined on $[0, \rho]$ by

$$\phi(r) = (\rho - r)F(r) \quad (2)$$

$\phi(r)$ is the tax revenue in the one period version of the model when the tax rate t is such that r is the external return of the marginal investor (all investors with external return below r invest in the host economy) i.e., $r = \rho - t$. Assumption (1) ensures that there is a unique $r^* \in (0, \rho)$ that maximizes $\phi(r)$ on $[0, \rho]$ and the optimal one period tax is $\rho - r^*$. The first order condition $\phi'(r^*) = 0$ implies:

$$(\rho - r^*)F'(r^*) - F(r^*) = 0. \quad (3)$$

This one period solution is useful for characterizing the dynamic outcome.

3 Benchmark: Full Commitment Outcome

We begin with the benchmark case where the government can fully commit to future tax rates. The optimal outcome is described in the following lemma:

Lemma 1 *Whether or not the government can extend preferential treatment to new investors, the optimal full commitment tax scheme is one where all investors with external return below r^* invest in period 1, and no new investment occurs in period 2. The optimal full commitment tax revenue is $G^C = 2\phi(r^*)$.*

Proof. Let (t_1, t_2) be the tax rates in periods 1 and 2 faced by investors that invest in period 1. Let t^N be the tax rate faced by new investors in period 2. If the government cannot extend preferential treatment to new investors then $t^N = t_2$. Let r_1, r_2 be the external returns of the marginal investors in periods 1 and 2 respectively. Now, suppose that $r_1 < r_2$ i.e., the government attracts new investors in period 2. Then,

$$\rho - t^N = r_2. \quad (4)$$

Further, the marginal investor in period 1 must be indifferent between investing in period 1 and waiting out for one period to invest in period 2

$$2\rho - (t_1 + t_2) = r_1 + (\rho - t^N). \quad (5)$$

The total tax revenue of the government is then

$$\begin{aligned} & (t_1 + t_2)F(r_1) + t^N(F(r_2) - F(r_1)) \\ = & (2\rho - (r_1 + r_2))F(r_1) + (\rho - r_2)(F(r_2) - F(r_1)), \text{ using (4) and (5)} \\ = & \phi(r_1) + \phi(r_2) < 2\phi(r^*), \end{aligned}$$

where the last inequality follows from the fact that $r_1 < r_2$ implies that both r_1 and r_2 cannot be equal to r^* which is the unique maximizer of $\phi(r)$ on $[0, \rho]$. The government can always raise revenue equal to $2\phi(r^*)$ by committing to a uniform tax rate of $\rho - r^*$ on all capital over both periods. It follows that it is never optimal to attract new investors in period 2. Now, if no new investors are attracted in period 2, the marginal investor (with external return r_1) in period 1 must be indifferent between investing and staying out for both periods i.e., $2\rho - (t_1 + t_2) = 2r_1$. The total tax revenue is then given by:

$$2(\rho - r_1)F(r_1) = 2\phi(r_1)$$

which is maximized at $r_1 = r^*$ (yielding total tax revenue $2\phi(r^*)$). The optimal full commitment tax revenue is therefore $2\phi(r^*)$. ■

Lemma 1 indicates that the optimal tax scheme under full commitment essentially replicates the outcome in the one period version of the problem. The intuition behind Lemma 1 is straightforward. In order to attract new investors in period 2, the government must offer them a tax deal that also creates incentives for some investors in period 1 to stay out and instead enter in period 2. The consequent loss of revenue in period 1 dominates the revenue gain in the second period.

4 Outcome with No Commitment

Consider the situation where the government cannot make any credible commitment in period 1 about the the taxes it will impose in period 2. In particular, the government can discriminate between sunk capital and new investment in the second period. In fact, the government has every incentive to fully expropriate the returns on existing investment (made by investors in period 1), and also attract new investors by extending preferential treatment. This, in turn, makes it more difficult to attract investment in period 1 (as investors with moderately high external returns prefer to wait till period 2) and this eventually leads to loss of total tax revenue (compared to the full commitment solution). This is the basic dynamic inconsistency problem summarized in the following proposition:

Proposition 1 *Suppose the government cannot make any credible commitment about future taxes and, in particular, can engage in preferential taxation to attract new investors. Then, there is a loss of tax revenue (relative to the full commitment solution) due to dynamic inconsistency and G^N , the total tax revenue raised by the government in this case, satisfies $G^N < G^C$.*

Proof. First, consider the problem at the beginning of period 2. Let r_1 be the external return of the marginal investor in period 1. The government imposes a tax $t_2 = \rho$ on the investors that invest in period 1. It is easy to check that for any $r_1 < \rho$, the government can attract new investors by imposing a preferential tax $t^N \leq \rho - r_1$. The net return of the marginal investor in period 2 is then given by $r_2 = \rho - t^N$ and amount of new investment is $F(r_2) - F(r_1)$. The optimal preferential tax in period 2 is then derived by solving:

$$\max_{r_2 \in [r_1, \rho]} (\rho - r_2)(F(r_2) - F(r_1)).$$

It is easy to check that under the assumptions imposed in Section 2, for any $r_1 < \rho$ there is a unique solution $\widehat{r}_2(r_1) \in (r_1, \rho)$ to this maximization problem that satisfies:

$$(\rho - \widehat{r}_2(r_1))F'(\widehat{r}_2(r_1)) - (F(\widehat{r}_2(r_1)) - F(r_1)) = 0. \quad (6)$$

Also, $\widehat{r}_2(r_1)$ is differentiable on $[0, \rho)$ and

$$\widehat{r}'_2(r_1) > 0. \quad (7)$$

The optimal preferential tax in period 2 is given by

$$\widehat{t}^N(r_1) = \rho - \widehat{r}_2(r_1). \quad (8)$$

Next, consider the problem at the beginning of period 1. As all sunk investment is fully taxed in period 2, the total net return for an investor that invests in period 1 is $\rho - t_1$ where t_1 is the tax in period 1. Let r_1 be the external return of the marginal investor in period 1; such an investor must be indifferent between investing in period 1 and waiting to invest in period 2 which implies:

$$\begin{aligned} \rho - t_1 &= r_1 + \rho - \widehat{t}^N(r_1) \\ &= r_1 + \widehat{r}_2(r_1), \text{ using (8)} \end{aligned} \quad (9)$$

i.e.,

$$t_1 = \rho - (r_1 + \widehat{r}_2(r_1)). \quad (10)$$

The reduced form total tax revenue of the government (over two periods) is then:

$$\begin{aligned} & (t_1 + \rho)F(r_1) + \widehat{t}^N(r_1)(F(\widehat{r}_2(r_1)) - F(r_1)) \\ &= [2\rho - (r_1 + \widehat{r}_2(r_1))]F(r_1) + (\rho - \widehat{r}_2(r_1))(F(\widehat{r}_2(r_1)) - F(r_1)), \text{ using (8) and (10)} \\ &= (\rho - r_1)F(r_1) + (\rho - \widehat{r}_2(r_1))F(\widehat{r}_2(r_1)). \end{aligned}$$

The first period optimal tax setting problem can then be restated as:

$$\max_{0 \leq r_1 \leq \rho} [(\rho - r_1)F(r_1) + (\rho - \widehat{r}_2(r_1))F(\widehat{r}_2(r_1))] \quad (11)$$

Using (6), the derivative of the maximand in (11) with respect to r_1 is :

$$\begin{aligned} & (\rho - r_1)F'(r_1) - F(r_1)[1 + \widehat{r}'_2(r_1)] \\ & < 0, \text{ for all } r_1 \geq r^* \text{ (using (1), (3) and (7)).} \end{aligned}$$

Thus, if \hat{r}_1 is an optimal solution to the maximization problem in (11), then

$$\hat{r}_1 < r^* \tag{12}$$

so that:

$$\begin{aligned} G^N &= [(\rho - \hat{r}_1)F(\hat{r}_1) + (\rho - \hat{r}_2(\hat{r}_1))F(\hat{r}_2(\hat{r}_1))] \\ &= \phi(\hat{r}_1) + \phi(\hat{r}_2(r_1)) \\ &< 2\phi(r^*), \end{aligned}$$

using (12) and the fact that r^* is the unique maximizer of $\phi(r)$ on $[0, \rho]$. The proposition then follows from Lemma 1. ■

5 Limited Commitment: Non-preferential Taxation

Finally, consider the situation where the government commits to not extend any preferential treatment to new investors i.e., to not discriminate between sunk (immobile) capital and new investors (mobile capital) at any point of time. Note that the government does not pre-commit to future tax rates nor does it commit to not lower its taxes over time. However, with this kind of limited commitment, a second period tax reduction to attract new investors requires the government to reduce the tax on existing investment by the same amount. So, unless the range of investors that invest in the first period is smaller than that in the static outcome (i.e., the marginal investor in the first period is one whose external return is less than r^*), it is not optimal for the government to attract new investors in the second period (better to fully expropriate existing investors by setting tax equal to ρ). But that, in turn, makes it optimal to set the first period tax (may be a subsidy) at a level so that a marginal investor whose external return is r^* is just induced to enter knowing that she will be fully expropriated next period thereby replicating the full commitment outcome. Thus:

Proposition 2 *Commitment to non-preferential taxation (with no commitment to future tax rates) is sufficient to eliminate the dynamic inconsistency highlighted in Proposition 1 and optimally yields as much total tax revenue as under full commitment.888*

Proof. Let G^L denote the optimal tax revenue of the government under the limited commitment described in the proposition. It is sufficient to show that with this limited commitment, it is feasible for the government to collect total tax revenue equal to G^C so that $G^L \geq G^C$. As optimal tax revenue can never be higher than that under full commitment, we then have $G^L = G^C$. Consider the problem of optimal taxation in period 2 given that the external return of the marginal investor in period 1 is $r_1 \in [0, \rho]$. The government has two options in period 2: (a) not attract any new investor and fully expropriate the existing investors whose capital is sunk in the economy and (b) attract new investors in period 2. Under option (a), the government sets optimal tax equal to ρ . Under option (b), the government sets the tax at some $t_2 \leq \rho - r_1$ and the external return r_2 of the marginal investor in period 2 is then given by $r_2 = \rho - t_2$ yielding current revenue $F(r_2)(\rho - r_2)$ so that the optimal tax $\tilde{t}_2(r_1)$ is given by

$$\tilde{t}_2(r_1) = \rho - \tilde{r}_2(r_1) \text{ where } \tilde{r}_2(r_1) = \arg \max_{r_2 \in [r_1, \rho]} F(r_2)(\rho - r_2)$$

Using assumption (1) and (3),

$$F'(r)(\rho - r) - F(r) \leq 0 \text{ if, and only if, } r \geq r^*$$

which implies that for $r_1 \geq r^*$, option (a) is optimal i.e.,

$$\tilde{t}_2(r_1) = \rho \text{ for } r_1 \geq r^*. \quad (13)$$

Further, if option (b) is optimal for some $r_1 < r^*$, then $\tilde{r}_2(r_1) = r^*$ i.e., $\tilde{t}_2(r_1) = \rho - r^*$. Thus, under both options (a) and (b), the tax in period 2 satisfies:

$$\tilde{t}_2(r_1) \geq \rho - r^* \text{ for all } r_1 \in [0, \rho]. \quad (14)$$

Now, suppose that in period 1, the government sets tax

$$t_1 = \rho - 2r^* \quad (15)$$

(which may be negative). An investor obtains a total net return of at least $\rho - t_1 = 2r^*$ if she invests in period 1 (the net return in period 2 is at least zero). An investor whose external return is r^* therefore must weakly prefer to invest in period 1 rather than stay outside for both periods. Such an investor also cannot gain strictly by staying out for one period and investing in period 2 as that would yield a return of

$$\begin{aligned} & r^* + \rho - \tilde{t}_2(r_1) \\ & \leq r^* + \rho - (\rho - r^*) = 2r^*. \end{aligned}$$

It follows that all investors with external return $r \in [0, r^*)$ strictly prefer to invest in period 1 i.e., $r_1 \geq r^*$. Therefore, using (13) and (15), by imposing taxes $t_1 = \rho - 2r^*$ in period 1 which leads to a tax rate of $\tilde{t}_2(r_1) = \rho$ in period 2, the government's total tax revenue is at least as large as:

$$\begin{aligned} & (\rho - 2r^*)F(r^*) + \rho F(r^*) \\ & = 2(\rho - r^*)F(r^*) = 2\phi(r^*) \\ & = G^C, \text{ using Lemma 1.} \end{aligned}$$

This concludes the proof. ■

6 Conclusion

When governments that seek to attract foreign investment cannot credibly pre-commit to future tax rates on capital, they can gain by committing to non-preferential taxation as the latter can help resolve the dynamic inconsistency problem and the associated loss of tax revenue. We have shown this in a simple two-period model that highlights the key argument. Though the model assumes full irreversibility of investment and absence of domestic capital, our results continue to hold with partial irreversibility of investment and presence of domestic capital as long as these are not too large.

References

- [1] Haupt, A., Peters, W., 2005. Restricting preferential tax regimes to avoid harmful tax competition. *Regional Science and Urban Economics* 35, 493–507.
- [2] Doyle, C., van Wijnbergen, S., 1994. Taxation of foreign multinationals: A sequential bargaining approach to tax holidays. *International Tax and Public Finance* 1, 211–225.
- [3] Eaton, J., Gersovitz, M., 1983. Country risk: Economic aspects. In: Herring, R.J. (Ed.), *Managing International Risk*. Cambridge University Press, Cambridge, pp. 75–108.
- [4] Janeba, E., Peters, W., 1999. Tax evasion, tax competition and the gains from nondiscrimination: the case of interest taxation in Europe. *The Economic Journal* 109, 93–101.
- [5] Janeba, E., Smart, M., 2003. Is targeted tax competition less harmful than its remedies? *International Tax and Public Finance* 10, 259–280.
- [6] Wilson, J.D., Marceau, N., Mongrain, S., 2010. Why do most countries set high tax rates on capital? *Journal of International Economics* 80, 249-259.
- [7] Wilson, J.D., 2005. Tax competition with and without preferential treatment of a highly-mobile tax base. In: Alm, J., Martinez-Vazquez, J., Rider, M. (Eds.), *The Challenges of Tax Reform in a Global Economy*, Springer.
- [8] Keen, M., 2001. Preferential regimes can make tax competition less harmful. *National Tax Journal* 54,757-62.
- [9] Schnitzer, M., 1999. Expropriation and control rights: A dynamic model of foreign direct Investment. *International Journal of Industrial Organization* 17, 113-1137.
- [10] Stokey, N.L.,1982. Rational expectations and durable goods pricing. *Bell Journal of Economics* 12, 112-128.
- [11] Thomas, J., Worrall, T., 1994. Foreign direct investment and the risk of expropriation. *Review of Economic Studies* 61, 81-108.
- [12] Coase, R.H., 1972. Durability and monopoly. *Journal of Law and Economics* 15,143-149.
- [13] OECD, 1998. *Harmful Tax Competition: An Emerging Global Issue*. OECD.
- [14] OECD, 2004. *Project on harmful tax practices: 2004 progress report*. Centre for Tax Policy and Administration, OECD.