Institutional quality and capital taxation in developing economies

Luis Araújo
Paulo Arvate
In this article we describe the optimal taxes and the optimal taxation regime in the presence of uncertainty on the part of foreign investors with respect to the institutional quality in a developing economy. We obtain that, even if the choice of taxes in the developing economy does not affect the behavior of the government in the developed economy, the government of the developing economy may still choose a non-preferential regime of taxation.

1 Introduction

There is an extensive literature on capital taxation in environments where governments face a mobile tax base. Not surprisingly, in this literature much emphasis is given to the strategic interaction between the governments.\footnote{Wilson (1986) and Zodrow and Mieszkowski (1986) are seminal references. See also Persson and Tabellini (1992), Janeba (1998, 2000), Baldwin and Krugman (2004), Wilson and Janeba (2005), Slemrod and Wilson (2009), and Marceau, Mongrain, and Wilson (2010).} We do not dwell on the importance of this component. However, we believe that in many cases the strategic interaction between governments may be of lesser importance. For instance, in the interaction between a large developed economy (say, the US) and a small developing economy (say, Argentina) one should expect that, while the government in Argentina takes into account the choice of capital taxes in the US when deciding her own
capital taxation, as this affects the behavior of American investors, the same is less true for the US government.

In this paper we posit that, more than the strategic interaction between the government in the developed economy and the government in the developing economy, what is particularly important is the perception of investors located in the developed economy with respect to the quality of the institutions in the developing economy. In fact, a survey of opinion conducted by the World Bank (Lamech and Saeed, 2003) shows that, when deciding whether to invest in a developing economy, investors in developed countries are particularly concerned about (i) the legal framework defining the rights and obligations of private investors, (ii) the independence of regulatory institutions and processes from arbitrary government interference, and (iii) the degree of perceived judicial independence from government influence.\(^2\)

More precisely, we study capital taxation in a developing economy that compete with a developed economy for a mobile tax base, in a context where investors located in the developed economy are uncertain about the ability of the developing economy to protect their capital. We capture this uncertainty by assuming that institutions in the developing country either have high quality or low quality, and by assuming that a positive measure of investors located in the developed economy is uncertain about the underlying institutional quality. The presence of uncertainty about the quality of the institutions in the developing economy is a key dimension in which our model differs from previous work on the interplay between institutions and tax competition.\(^3\) We also consider two distinct taxation regimes: a preferential regime, where taxes can be conditioned on the origin of the capital (domestic or foreign) and a non-preferential regime where such conditioning is not possible.

Our first result is that, absent any uncertainty by foreign investors, the preferential regime

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\(^2\)There a number of papers that attest the impact of local institutions on foreign direct investment (FDI). See, for example, Schneider and Frey (1985), Jun and Singh (1996), Brunetti, Kisunko and Weder (1997), Buthe and Milner (2008), Seyoun (2011), and An (2011). In turn, the fact that institutions differ greatly across developing countries is made clear by the measurement of governance produced by Kaufmann, Kraay, and Zoido-Lobaton (1999).

\(^3\)Albeit quite different, the work that is closest to ours is Janeba (2000, 2002). Janeba considers a setting in which the uncertainty of investors comes not from the unobserved quality of the institutions but from the possibility that the governments change taxes after the investment decisions are made (lack of commitment). Kessing, Konrad, and Kotsogiannis (2009) also look at the role of institutions on tax competition. They relate weak institutions with the inability of the government to offer a common tax structure within a federalist country, and exploit the adverse effect of this weakness on the ability to attract foreign direct investment. In their setting, there is no uncertainty with respect to the quality of institutions.

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dominates the non-preferential regime in terms of tax revenue. Intuitively, there is no actual competition in taxes between the developing and the developed economy, i.e., when choosing her tax, the government in the developed economy does not take into account the behavior of the developing economy. As a result, when making her decision, the government of the developing economy is only concerned about the relative mobility of capital, i.e., it is not concerned about the response of the government in the developed economy. Thus, the optimal tax scheme involves high taxation of the domestic capital and low taxation of the foreign capital. This is true irrespective of the quality of the institutions in the developing economy.

Our main result is that, in the presence of uncertainty about the quality of institutions in the developing economy, the non-preferential regime may dominate the preferential regime if the institutions in the developing economy are of high quality. The reason is that, under the preferential regime, there is no equilibrium where the tax on foreign capital varies with the institutional quality of the developing economy; while such equilibrium exists under the non-preferential regime. Intuitively, the non-preferential regime, by imposing the same tax on domestic (immobile) capital and foreign (mobile) capital, makes it too costly to reduce taxes when institutions are of low quality simply to mimic the taxes chosen when institutions are of high quality. Now, the existence of an equilibrium where taxes on foreign capital vary with the institutional quality implies that the choice of taxes reveal information about the underlying institutions, which increases the revenue of the government when institutions are of high quality. This increase is particularly pronounced, and may dominate the revenue achieved under a preferential regime, if the measure of uninformed foreign investors and the difference between high and low quality institutions is sufficiently large.

A potential drawback in the analysis above is the assumption that taxation regimes as exogenously given. Naturally, since the revenue from taxation depends on the regime in place, one may wonder what happens if we allow for an endogenous choice of regime. We undertake this step in

\footnote{We should point out that ours is not the first work to obtain that the non-preferential regime may dominate the preferential regime. Janeba and Peters (1999) obtain a similar result in an environment where governments actively compete for a mobile tax base. They show that, if one of the tax bases becomes perfectly mobile, the non-preferential regime may act as a deterrent of the fierce competition that would ensue if governments could perfectly discriminate between the distinct tax bases. See also Janeba and Smart (2003), Wilson (2005), Konrad (2007), and Marceau, Mongrain and Wilson (2010). A key difference in our approach is that the non-preferential regime may dominate despite the fact that the governments are not actively competing for the mobile tax base.}
the last part of the paper. Precisely, we endogenize the choice of taxation regime and we pro-
vide conditions under which the unique equilibrium involves the choice of the preferential regime if
institutions have low quality and the choice of the non-preferential regime if institutions have
high quality. Hence, our model offers a rationale for the choice of a non-preferential regime that is
not linked to the strategic competition between countries but is instead driven by the uncertainty
associated with investing in a developing economy.

The paper is organized as follows. In the next section we present the model. We consider first
the case of complete information and then the case of incomplete information. We then endogenize
the choice of taxation regime. In the last section, we make our final remarks and point out directions
for future research. All proofs are in the Appendix.

2 Model

2.1 Environment

Consider an environment with two countries, Home and Foreign. Home is a small developing
economy inhabited by a measure $\omega$ of agents. Foreign is a large developed economy, inhabited by
a continuum of groups of agents distributed over a circle of length one and where, for each group,
there is a $[0, 1]$ continuum of agents. Throughout, we think of Home as a developing economy and
of Foreign as a developed economy. Each agent in Home is endowed with one unit of an indivisible
and immobile capital. In turn, agents in Foreign come in two types: there exists one group of
agents that is endowed with one unit of an indivisible and mobile capital. All remaining agents are
endowed with one unit of an indivisible and immobile capital.

Immobile capital can only be invested in the country of origin while mobile capital may be
invested abroad. We normalize the revenue (cost) of investing in the country of origin to one
(zero). In turn, every agent in Foreign with a mobile capital (henceforth called investor) obtains a
revenue $v$ and faces a cost $\delta c$ if he chooses to invest in Home, where $\delta \in \{\delta, \overline{\delta}\}$ and $c$ is a random
draw from a uniform distribution in the interval $[0, 1]$. The probability that $\delta = \overline{\delta}$ is equal to $\theta$. The
factor $\delta$ captures the overall quality of institutions in Home, for instance it captures Home’s ability
to protect property rights. The larger $\delta$ is, the lower is the quality of institutions in Home. In turn,
the constant $c$ is a standard cost of capital reallocation. We capture asymmetries of information with respect to the institutional setting in Home by assuming that a measure $1 - \lambda \in [0, 1]$ of investors do not observe the value of $\delta$.

Capital is taxed by the government in each country, and the objective of each government is to maximize tax revenues. There are two systems of taxation: a non-preferential regime where the government taxes capital irrespective of its origin and a preferential regime where the government taxes capital based on its origin.

The sequence of events in the economy is as follows. First, the institutional cost $\delta$ is randomly drawn by nature and observed by the Home government. Then, the Foreign government and the Home government choose their taxes. Each agent then observes taxes and decides where to locate his capital.

2.2 Equilibrium

2.2.1 Complete Information

As a benchmark, we initially consider the case where all investors know the realization of $\delta$, that is, $\lambda = 1$. First, note that the government in Foreign has a strictly dominant strategy, i.e., tax all available capital irrespective of the realization of $\delta$. In fact, with the exception of a set of measure zero, all capital available in Foreign is immobile. We solve for the remaining decisions by backward induction, starting with the decisions of investors.\footnote{Clearly, we only need to deal with the decisions of investors as agents with immobile capital have no choice but to invest in their country of origin.} An investor chooses to locate his capital in Home if and only if

$$[1 - t_f (\delta)] v - \delta c > 0,$$

where $t_f (\delta)$ is the tax of Foreign capital in Home as a function of the institutional cost $\delta$. We can rewrite this condition as

$$c < \frac{[1 - t_f (\delta)] v}{\delta}.$$

Naturally, the measure of agents that invest in Home is a decreasing function of the tax $t_f (\delta)$ and the institutional cost $\delta$. We now move to the decision of the Home government. Her choice depends on the regime under place. We consider each case separately, starting with the preferential regime.
**Preferential Regime**  Let $t_h(\delta)$ be the tax of Home capital in Home as a function of the institutional cost. The revenue of the Home government is

$$t_h(\delta) \omega + \frac{[1 - t_f(\delta)]v}{\delta} t_f(\delta)v.$$ 

Clearly, in the preferential regime, the Home government fully taxes the Home capital, irrespective of the institutional cost. In turn, the revenue from taxing Foreign capital is given by the total measure of investors that choose to locate their capital in Home, $\frac{[1 - t_f(\delta)]v}{\delta}$, times the tax revenue of each unit of capital $t_f(\delta)v$. Thus, the value of $t_f(\delta)$ that maximizes revenue is $t_f(\delta) = \frac{1}{2}$, and the total revenue is

$$r_p(\delta) = \frac{v^2}{4\delta} + \omega.$$

The revenue of the Home government is a decreasing function of the institutional cost $\delta$. This is due to the negative effect of the institutional cost on the measure of investors that choose to locate their capital in Home.

**Non-preferential Regime**  In the non-preferential regime, that tax $t(\delta)$ is the same for both Home and Foreign capital. Thus, the Home government solves

$$\max_{t(\delta) \in [0,1]} \left\{ t(\delta) \omega + \frac{[1 - t(\delta)]v}{\delta} t(\delta)v \right\}.$$ 

The optimal tax is given by

$$t(\delta) = \min \left\{ \frac{1}{2} \left( 1 + \frac{\omega \delta}{v^2} \right), 1 \right\}.$$ 

In the non-preferential regime, the Home government imposes a higher tax on Foreign capital in order to obtain a higher revenue from the Home capital. Note that, if the measure of agents in Home is large enough, the Home government chooses to tax all available capital and a measure zero of investors choose to locate their capital in Home. In order to avoid this uninteresting scenario, henceforth we assume that

$$A1 : \omega < \frac{v^2}{\delta}.$$ 

This implies

$$t(\delta) = \frac{1}{2} + \frac{1}{2} \omega \frac{\delta}{v^2},$$
and the measure of investors that choose to locate their capital in Home is

\[ \frac{1}{2v} \left( \frac{v^2}{\delta} - \omega \right). \]

Intuitively, a higher institutional cost leads to an increase in taxes since it reduces the benefit of lowering taxes in order to attract investors. In turn, the combined effect of higher taxes and a higher institutional cost reduces the measure of investors that choose to locate their capital in Home. Finally, the revenue of the Home government is

\[ r_{\text{np}}(\delta) = \frac{\delta}{4v^2} \left( \frac{v^2}{\delta} + \omega \right)^2. \]

Assumption A1 implies that the revenue of the Home government is decreasing in the institutional cost.

It is immediate that, irrespective of the institutional cost \( \delta \), the revenue under the preferential regime is always higher than the revenue under the non-preferential regime. This is intuitive and reflects the idea that the preferential regime allows the Home government to discriminate between agents according to the mobility of their capital.

### 2.2.2 Incomplete Information

We now consider the case where \( \lambda < 1 \) and a measure \( 1 - \lambda > 0 \) of investors in Foreign do not observe the realization of \( \delta \). Then, if we let \( \delta^e \) denote the belief of an uninformed investor about the realization of \( \delta \), then this investor chooses to locate his capital in Home if and only if

\[ c < \frac{1 - tf(\delta)}{\delta^e} v. \]

As in the complete information case, we consider each regime separately, starting with the preferential regime.

**Preferential Regime**  In the preferential regime, the revenue of the Home government is

\[ \bar{r}_p(\delta) = t_h(\delta) \omega + tf(\delta) \left[ 1 - tf(\delta) \right] \left[ \frac{\lambda v^2}{\delta} + (1 - \lambda) \frac{v^2}{\delta^e} \right]. \]

In the absence of complete information about the institutional cost, the tax on Foreign capital affects not only the direct cost of investing in Home but, for uninformed investors, it may also affect their
beliefs about the underlying institutional cost. Thus, in principle, there may be equilibria where the Home government under a low institutional cost chooses a tax on Foreign capital different than the one chosen by the Home government under a high institutional cost, just to reveal information about $\delta$. In Proposition 1 we show that this is not the case. Precisely, we show that there exists no equilibria where the tax on Foreign capital conveys information about the institutional cost.

**Proposition 1** In the preferential regime, there is no equilibrium where the tax on Foreign capital varies with the institutional cost $\delta$.

**Proof.** See Appendix A. ■

Our next result shows that there exists equilibria where taxes do not reveal information about the institutional cost. In these equilibria, not only the tax on Foreign capital but also the tax on Home capital does not vary with the institutional cost.

**Proposition 2** In the preferential regime, there exists equilibria where taxes do not reveal information about the institutional cost. In particular, there exists an equilibrium where the taxes are exactly the same as in the complete information case, i.e., $t_h(\delta) = 1$ and $t_f(\delta) = \frac{1}{2}$.

**Proof.** See Appendix A. ■

The equilibrium in Proposition 2 implies the same choice of taxes obtained under complete information. However, since some agents cannot infer the actual realization of the institutional cost by observing the choice of taxes, the overall revenue of the Home government is given by

$$\tilde{r}_p(\delta) = \omega + \frac{1}{4} \left\{ \lambda \frac{\nu^2}{\delta} + (1 - \lambda) \left[ \theta \frac{\nu^2}{\delta} + (1 - \theta) \frac{\nu^2}{\delta} \right] \right\},$$

which is decreasing in the institutional cost. As compared to the revenue under complete information, there is a decrease in revenue when $\delta = \tilde{\delta}$, and an increase in revenue when $\delta = \check{\delta}$. Finally, it is clear that, since $t_h(\delta) = 1$ and $t_f(\delta) = \frac{1}{2}$, there is no other equilibrium in the preferential regime that achieves a higher revenue.\(^6\)

\(^6\)The claim that there is no equilibrium in the preferential regime that achieves a higher revenue implicitly assumes that there can be no equilibria where taxes vary with the institutional cost $\delta$ that induces a higher revenue. In principle, however, there may exist equilibria where the Home government under a low institutional cost does not
Non-preferential Regime  In the non-preferential regime, the revenue of the Home government is given by

\[ \tilde{r}_{np}(\delta) = t(\delta) \omega + t(\delta) [1 - t(\delta)] \left[ \lambda \frac{v^2}{\delta} + (1 - \lambda) \frac{v^2}{\delta^2} \right]. \]

We show that there exists an equilibrium that conveys information about the institutional cost. This equilibrium induces the same choice of taxes, thus the same revenue, obtained under complete information. Clearly, there can be no other equilibrium that achieves a higher revenue in the non-preferential regime.

**Proposition 3** In the non-preferential regime, there exists an equilibrium with \( t(\delta) = \frac{1}{2} + \frac{1}{2} \frac{\delta \omega}{v^2} \), where \( \delta \in \{ \delta, \bar{\delta} \} \).

**Proof.** See Appendix A. □

The revenue of the Home government implied by the equilibrium in Proposition 3 is

\[ \tilde{r}_{np}(\delta) = \left( \frac{1}{2} + \frac{1}{2} \frac{\delta \omega}{v^2} \right) \omega + \left( \frac{1}{2} + \frac{1}{2} \frac{\delta \omega}{v^2} \right) \left( \frac{1}{2} - \frac{1}{2} \frac{\delta \omega}{v^2} \right) \left[ \lambda \frac{v^2}{\delta} + (1 - \lambda) \frac{v^2}{\delta^2} \right], \]

which can be rewritten as

\[ \tilde{r}_{np}(\delta) = \frac{\delta}{4v^2} \left( \frac{v^2}{\delta} + \omega \right)^2. \]  

Note that this revenue is always lower than the revenue achieved under the equilibrium described in Proposition 2. In fact, the introduction of uncertainty about the institutional environment increases the revenue under a preferential regime if the institutional cost is high. Intuitively, taxes are the same as in the complete information case but a larger measure of investors choose to locate their capital in Home. However, the same is not true if the institutional cost is low. A corollary of Proposition 3 is that there exists a region of parameters where the Home government under a low institutional cost achieves a higher revenue under the non-preferential regime, even though this regime constrains her ability to discriminate between immobile Home capital and fully tax Home capital, even though such capital is immobile. Intuitively, a lower tax on Home capital may constitute a costly way through which the Home government under a low institutional cost can credibly communicate her type. In fact, we show that there exists a unique equilibrium with this property. However, a feature of this equilibrium is that the revenue of the Home government under the low institutional cost is equal to the revenue of the Home government under the high institutional cost. Thus, from the point of view of the Home government, this equilibrium is inferior to the one in Proposition 2. The proof of this result is in the Appendix B (Proposition 5).
mobile Foreign capital. Intuitively, the existence of an equilibrium where taxes on foreign capital vary with the institutional quality implies that the choice of taxes reveal information about the underlying institutions, which benefits the government when institutions are good. This benefit is particularly pronounced, and may dominate the revenue achieved under a preferential regime, if the measure of uninformed foreign investors and the difference between high and low quality institutions is sufficiently large.

**Corollary 1** If the institutional cost is low, the Home government achieves a higher revenue under the non-preferential regime iff

$$(1 - \lambda) (1 - \theta) > \frac{\overline{\delta}\delta}{\overline{\delta} - \underline{\delta}} \left(2 - \frac{\omega}{v^2}\right) \frac{\omega}{v^2}.$$  

The inequality in corollary 1 is clearly satisfied if the institutional cost is more likely to be high ($\theta \approx 0$), if a large measure of investors do not know the institutional cost ($\lambda \approx 0$), and if the difference in institutional costs is large ($\overline{\delta} \approx 1$ and $\underline{\delta} \approx 0$).

### 2.3 Endogenizing the choice of the taxation regime

We now extend the previous set up by introducing a first stage where, upon observing her institutional cost, the Home government chooses the taxation regime. In the discussion that follows, we assume that, conditional on the taxation regime chosen by the Home government and the beliefs of investors that is induced by this choice, the equilibrium outcome in the ensuing interaction between the government and the investors is the one that produces the highest revenue for the Home government. This implies that revenues under a preferential regime are given by the equilibrium in Proposition 2 and revenues under a non-preferential regime are given by the equilibrium in Proposition 3.

In this modified setting, the strategy of the Home government includes a function

$$\sigma : \{\underline{\delta}, \overline{\delta}\} \rightarrow \{\text{preferential, non-preferential}\}$$

describing the choice of the taxation regime as a function of the institutional cost. There are four possible scenarios, and the matrix below helps understand the equilibrium outcome induced by each scenario.
If \( \sigma(\tilde{\delta}) = \sigma(\delta) = \text{preferential} \) or if \( \sigma(\tilde{\delta}) = \sigma(\delta) = \text{non-preferential} \), then the choice of taxation regime does not reveal any information about the institutional cost. Thus, the belief of uninformed investors before taxes are chosen is still given by their initial prior. Then, according to Proposition 2, in the preferential regime equilibrium taxes are given by \( t_h(\delta) = 1 \) and \( t_f(\delta) = \frac{1}{2} \), and the resulting revenue is \( \tilde{r}_p(\delta) \). In turn, in the non-preferential regime, the tax is \( \frac{1}{2} + \frac{1}{2} \frac{\delta \omega}{v^2} \) and the resulting revenue is \( \tilde{r}_{np}(\delta) = r_{np}(\delta) \). Now, if \( \sigma(\tilde{\delta}) \neq \sigma(\delta) \), the choice of the taxation regime allows investors to identify the underlying institutional cost, and the measure of uninformed investors drops to zero. Thus, equilibrium taxes and revenues are the same as in the complete information case.

Note that it is strictly dominant for the Home government under a high institutional cost to choose the preferential regime. In fact, irrespective of her choice under the low institutional cost, the preferential regime gives her the highest revenue. This implies that the optimal choice of the Home government under the low institutional cost depends on whether condition (1) holds or not. If it does not hold, it is best to choose the preferential regime. Otherwise, it is best to choose the non-preferential regime. Proposition 4 summarizes the result.

**Proposition 4** If there is complete information about the institutional cost \( (\lambda = 1) \), then the Home government chooses the preferential regime, irrespective of her type. If, instead, there is incomplete information about the institutional cost \( (\lambda < 1) \), then (i) if (1) does not hold, the Home government chooses the preferential regime, irrespective of her type, (ii) if (1) holds, then the Home government chooses the preferential regime if the institutional cost is high and chooses the non-preferential regime if the institutional cost is low.

### 3 Conclusion

In this paper, we studied capital taxation in a developing economy under a mobile tax base, in a context where institutional quality matters to the behavior of the government in the developing
economy and to the behavior of foreign investors. We contribute to the existing literature by examining the implications of uncertainty on the part of foreign investors with respect to the institutional quality in the developing economy.

Our main result is that, even when the choice of taxes in the developing economy does not affect the behavior of the government in the developed economy, it may still be the case that a non-preferential regime of taxation is superior to a preferential regime. We further contribute to the literature by endogenizing the choice of the taxation regime.

References


4 Appendix A

PROOF OF PROPOSITION 1: Consider a candidate equilibrium where taxes convey information about the institutional cost. It is immediate that if the equilibrium values of $t_h$ and $t_f$ reveal the underlying institutional cost, the choices of the Home government under the high institutional cost must be the same as her choice under perfect information. Thus, $t_h(\tilde{\delta}) = 1$ and $t_f(\tilde{\delta}) = \frac{1}{2}$. Now, if the choice of the Home government under the low institutional cost is given by $(t_h(\tilde{\delta}), t_f(\tilde{\delta}))$, then it must be that

$$\omega + \frac{1}{4} \frac{v^2}{\delta} \geq t_h(\tilde{\delta}) \omega + t_f(\tilde{\delta}) [1 - t_f(\tilde{\delta})] \left[ \lambda \frac{v^2}{\delta} + (1 - \lambda) \frac{v^2}{\delta} \right],$$

and

$$t_h(\tilde{\delta}) \omega + t_f(\tilde{\delta}) [1 - t_f(\tilde{\delta})] \frac{v^2}{\delta} \geq \omega + \frac{1}{4} \left[ \lambda \frac{v^2}{\delta} + (1 - \lambda) \frac{v^2}{\delta} \right].$$

We can rewrite these inequalities as

$$[1 - t_h(\tilde{\delta})] \omega \geq t_f(\tilde{\delta}) [1 - t_f(\tilde{\delta})] \left[ \lambda \frac{v^2}{\delta} + (1 - \lambda) \frac{v^2}{\delta} \right] - \frac{1}{4} \frac{v^2}{\delta}, \quad (2)$$

and

$$[1 - t_h(\tilde{\delta})] \omega \leq t_f(\tilde{\delta}) [1 - t_f(\tilde{\delta})] \frac{v^2}{\delta} - \frac{1}{4} \left[ \lambda \frac{v^2}{\delta} + (1 - \lambda) \frac{v^2}{\delta} \right]. \quad (3)$$
Thus, a necessary condition is that
\[ t_f (\delta) [1 - t_f (\delta)] \frac{\nu^2}{\sigma} - \frac{1}{4} \left[ \frac{\lambda \nu^2}{\delta} + (1 - \lambda) \frac{\nu^2}{\sigma} \right] \geq t_f (\delta) [1 - t_f (\delta)] \left[ \frac{\lambda \nu^2}{\delta} + (1 - \lambda) \frac{\nu^2}{\sigma} \right] - \frac{1}{4} \frac{\nu^2}{\sigma}, \]
which can be rewritten as
\[ \frac{1}{4} \leq t_f (\delta) [1 - t_f (\delta)]. \]
This can only be true if \( t_f (\delta) = \frac{1}{2} \). That is, in any equilibrium where the values of \( t_h \) and \( t_f \) reveal the underlying institutional cost, it must be that \( t_f (\delta) = t_f (\delta) = \frac{1}{2} \).

PROOF OF PROPOSITION 2: In an equilibrium where taxes do not reveal information about the institutional cost, it must be that, for all \((t_h, t_f) \in [0, 1]^2\),
\[ t_h \omega + t_f (1 - t_f) \left[ \frac{\lambda \nu^2}{\delta} + (1 - \lambda) \frac{\nu^2}{\sigma} \right] \geq t'_h \omega + t'_f (1 - t'_f) \left\{ \mu \left( t'_h, t'_f \right) \left[ \frac{\lambda \nu^2}{\delta} + (1 - \lambda) \frac{\nu^2}{\sigma} \right] \right\} \]
and
\[ t_h \omega + t_f (1 - t_f) \left[ \frac{\lambda \nu^2}{\delta} + (1 - \lambda) \frac{\nu^2}{\sigma} \right] \geq t'_h \omega + t'_f (1 - t'_f) \left\{ \mu \left( t'_h, t'_f \right) \frac{\nu^2}{\sigma} + \left[ 1 - \mu \left( t'_h, t'_f \right) \right] \left[ \frac{\lambda \nu^2}{\delta} + (1 - \lambda) \frac{\nu^2}{\sigma} \right] \right\} \]
where \( \mu \left( t'_h, t'_f \right) \) is the posterior belief that the institutional cost is low when the profile of taxes is \( \left( t'_h, t'_f \right) \neq (t_h, t_f) \). Deviations are less likely if investors attach probability one that the underlying institutional cost is high after observing \( \left( t'_h, t'_f \right) \). Thus, after some manipulation, we can rewrite (4) and (5) as
\[ t_h \omega + t_f (1 - t_f) \left[ \frac{\lambda \nu^2}{\delta} + (1 - \lambda) \frac{\nu^2}{\sigma} \right] \geq t'_h \omega + t'_f (1 - t'_f) \frac{\nu^2}{\sigma} \]
and
\[ t_h \omega + t_f (1 - t_f) \left[ \frac{\lambda \nu^2}{\delta} + (1 - \lambda) \frac{\nu^2}{\sigma} \right] \geq t'_h \omega + t'_f (1 - t'_f) \left[ \frac{\lambda \nu^2}{\delta} + (1 - \lambda) \frac{\nu^2}{\sigma} \right]. \]
Now, let us consider the existence of a pooling equilibrium where \( t_h = 1 \) and \( t_f = \frac{1}{2} \). In this case, we can rewrite (6) and (7) as
\[ \omega + \frac{1}{4} \left[ \frac{\lambda \nu^2}{\delta} + (1 - \lambda) \frac{\nu^2}{\sigma} \right] \geq t'_h \omega + t'_f (1 - t'_f) \frac{\nu^2}{\sigma}, \]
and
\[ \omega + \frac{1}{4} \left[ \frac{\lambda \nu^2}{\delta} + (1 - \lambda) \frac{\nu^2}{\sigma} \right] \geq t'_h \omega + t'_f (1 - t'_f) \left[ \frac{\lambda \nu^2}{\delta} + (1 - \lambda) \frac{\nu^2}{\sigma} \right]. \]
Clearly, since \( t' \left(1 - t'_f\right) \leq \frac{1}{4} \) and \( \frac{v^2}{\delta} < \frac{v^2}{\bar{\delta}} < \frac{v^2}{2} \), the Home government has no incentive to deviate, irrespective of the institutional cost.

**PROOF OF PROPOSITION 3:** We need to show that

\[
t (\bar{\delta}) \omega + t (\bar{\delta}) \left[1 - t (\bar{\delta})\right] \frac{v^2}{\delta} \geq t (\bar{\delta}) \omega + t (\bar{\delta}) \left[1 - t (\bar{\delta})\right] \left[\lambda \frac{v^2}{\delta} + (1 - \lambda) \frac{v^2}{\bar{\delta}}\right],
\]

and

\[
t (\bar{\delta}) \omega + t (\bar{\delta}) \left[1 - t (\bar{\delta})\right] \frac{v^2}{\delta} \geq t (\bar{\delta}) \omega + t (\bar{\delta}) \left[1 - t (\bar{\delta})\right] \left[\lambda \frac{v^2}{\delta} + (1 - \lambda) \frac{v^2}{\bar{\delta}}\right].
\]

We can rewrite the first condition as

\[
[t (\bar{\delta}) - t (\bar{\delta})] \omega \geq t (\bar{\delta}) \left[1 - t (\bar{\delta})\right] \left[\lambda \frac{v^2}{\delta} + (1 - \lambda) \frac{v^2}{\bar{\delta}}\right] - t (\bar{\delta}) \left[1 - t (\bar{\delta})\right] \frac{v^2}{\bar{\delta}},
\]

and the second condition as

\[
[t (\bar{\delta}) - t (\bar{\delta})] \omega \leq t (\bar{\delta}) \left[1 - t (\bar{\delta})\right] \frac{v^2}{\delta} - t (\bar{\delta}) \left[1 - t (\bar{\delta})\right] \left[\lambda \frac{v^2}{\delta} + (1 - \lambda) \frac{v^2}{\bar{\delta}}\right].
\]

Both conditions can be satisfied as long as

\[
t (\bar{\delta}) \left[1 - t (\bar{\delta})\right] \left[\lambda \frac{v^2}{\delta} + (1 - \lambda) \frac{v^2}{\bar{\delta}}\right] < t (\bar{\delta}) \left[1 - t (\bar{\delta})\right] \frac{v^2}{\bar{\delta}} - t (\bar{\delta}) \left[1 - t (\bar{\delta})\right] \left[\lambda \frac{v^2}{\delta} + (1 - \lambda) \frac{v^2}{\bar{\delta}}\right],
\]

which can be rewritten as

\[
t (\bar{\delta}) \left[1 - t (\bar{\delta})\right] > t (\bar{\delta}) \left[1 - t (\bar{\delta})\right].
\]

Substituting for the value of \( t (\delta) \), this condition becomes

\[
\frac{v^2}{\delta} < \frac{v^2}{\bar{\delta}},
\]

which is always true.

### 5 Appendix B

**Proposition 5** Consider a preferential regime under incomplete information and assume that

\[
\bar{\delta} < \frac{v^2}{\omega} < \frac{4}{1 - \lambda} \frac{\bar{\delta}}{\hat{\bar{\delta}} - \bar{\delta}}.
\]
Then, there exists a unique equilibrium where taxes convey information about the institutional cost. In this equilibrium

\[ t_f(\delta) = t_f(\hat{\delta}) = \frac{1}{2}, \quad t_h(\delta) = 1 \quad \text{and} \quad t_h(\hat{\delta}) = 1 - \frac{(1 - \lambda)(\delta - \hat{\delta})v^2}{4\delta \hat{\delta} \omega}. \]

**Proof.** First, Proposition 1 implies states that, in any equilibrium where taxes convey information about the institutional cost, it must be that \( t_f(\delta) = t_f(\hat{\delta}) = \frac{1}{2} \). Substituting \( t_f(\delta) = t_f(\hat{\delta}) = \frac{1}{2} \) in the required conditions for the existence of an equilibrium, that is,

\[ \omega + \frac{1}{4} \frac{v^2}{\delta} \geq t_h(\delta) \omega + t_f(\hat{\delta}) [1 - t_f(\hat{\delta})] \left[ \lambda \frac{v^2}{\delta} + (1 - \lambda) \frac{v^2}{\hat{\delta}} \right] \]

and

\[ t_h(\delta) \omega + t_f(\hat{\delta}) [1 - t_f(\hat{\delta})] \frac{v^2}{\hat{\delta}} \geq \omega + \frac{1}{4} \left[ \lambda \frac{v^2}{\delta} + (1 - \lambda) \frac{v^2}{\hat{\delta}} \right], \]

we obtain that there exists a unique value of \( t_h(\hat{\delta}) \) consistent with both inequalities, given by

\[ t_h(\hat{\delta}) = 1 - \frac{(1 - \lambda)(\delta - \hat{\delta})v^2}{4\delta \hat{\delta} \omega}. \]

It remains to specify beliefs out of the equilibrium path. We assume that, whenever \( t_h \in (t_h(\hat{\delta}), 1) \), the investors attach probability one that the underlying institutional cost is high. This ensures that, irrespective of its institutional cost, the Home government will have no incentive to deviate from the equilibrium path. ■
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