Finite-Lived Politicians and Yardstick Competition*

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Abstract

The introduction of finite-lived politicians in a life cycle model raises the well-known last period problem. An opportunistic incumbent who is carrying out his last mandate will not be punished for setting out high taxes. In other respects, tax competition is often considered as yardstick. Changes in tax rate in one jurisdiction is influenced by changes in tax rate in neighboring jurisdictions. Bringing together these two ideas yields the conclusion that a Leviathan politician in office is not tamed if the incumbent of the neighboring jurisdiction holds office for the last time. We formalize the dynamics of the yardstick competition as a Markov chain process. We show that finite-livedness increases the long run expected tax rate but that the increase is lowered as the number of jurisdiction raises.

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1 Introduction

This paper studies the behavior of finite-lived politicians in a life cycle model when politicians are Leviathan. In that case, the introduction of finite-livedness raises the well-known last period problem. This question has been recently discussed in various papers via the term limitation issue (see Lopez, 2003 for a survey). Many countries impose term limits on President. This is for example the case in the United States and practically in all the Latin American countries. This is also the case for most governors in the United States. Moreover, term limits are in discussion in some European countries, for example in France. It usually prohibits the reelection of the incumbent or limits the number of the consecutive terms a politician is allowed to carry out. Since the late 80's, a few empirical studies have addressed this issue. The main focus of these papers has been to assess the impact of term limits on the behaviour of politicians, for example in Lott (1987) and Lott and Bronars (1993). More recently, Besley and Case (1995) studied the consequences of term limits on tax setting and public expenditure choices. They find significant effects of term limits on taxes. In particular, they show that when a US Governor faces a term limit, sales taxes per capita will be 7 to 8 dollars higher in all years of the final term. The theoretical explanation of this result is straightforward. The existence of term limits reduces the expected payoff of holding office, thus inducing the incumbent to reveal his true preferences. More generally, a bad incumbent who is carrying out his last mandate will not be punished for setting out high taxes.

Concurrently, literature on yardstick in a framework of fiscal federalism has grown rapidly. In a world of imperfect and asymmetric information, voters have restricted possibilities to evaluate the performance of the representatives in their polity. Selfish representatives aim at gathering political rents and hence have incentives to keep information about their opportunistic behavior hidden from voters. However, voters can draw inferences on politicians behavior by comparing it to the performance of governments and parliaments in neighboring jurisdictions. Other things being equal, these neighbors serve as yardsticks for the voters' evaluation. A worse performance in their own jurisdiction compared to other jurisdictions leads to a punishment of representatives by throwing them out of office in the next elections. In such a concept, public choice would not only be driven by information gathering from neighboring jurisdictions, but also by mimicking behavior. Because representatives anticipate the yardstick mechanism, they are able

to stay in power by adapting to the policies of their neighbors. Empirical studies of this hypothesis tend to confirm the existence of such a mimicking behavior in most countries, for example, Besley and Case (1995) for the USA, Bordignon, Cerniglia and Revelli (2002) for Italy, Solé Ollé (2003) for Spain and Feld, Josselin and Rocaboy (2003a,b) for France. As regard to tax setting, the studies find that changes in tax rate in one jurisdiction is influenced by changes in tax rate in the neighboring jurisdictions.

The goal of this paper is to join these two streams of studies. Bringing together the literature on finite-livedness and the one on yardstick competition yields the conclusion that a Leviathan politician in office is not tamed if the incumbent of the neighbouring jurisdiction holds office for the last time. This hypothesis results in creating political cycle. We formalise the dynamics of the political competition as a Markov chain process. We show that finite-livedness increases the long run expected tax rate but that the increase is lowered as the number of jurisdiction raises. The remainder of this paper is as follows. Section 2 describes the theoretical background and section 3 analyses the dynamics of yardstick competition.

2 The theoretical background

The basic model used in this paper is close to the one in Feld, Josselin and Rocaboy (2003). We first present the model and then give a numerical illustration of the main results using a particular specification of the (re)-election probability function.

2.1 The model

The framework of the model consists of two jurisdictions i and j providing public goods financed through local taxation. Each jurisdiction is represented by an elected politician. The politicians are constitutionally limited to serve two terms in office with an election taking place at the end of the first term. For each period, the representative of a jurisdiction is supposed to commit himself to provide the voters with the same quantity of public good. By assumption, this quantity is equivalent to the public expenditure. To finance it, each local government relies on the taxation of a base B . The tax base is the same for the two periods. We suppose that the public expenditure is a stochastic variable taking two values. The first one is high and is denoted $\bar{\theta}$.

It corresponds to a negative shock in the local economic conditions which may occur with probability p . The second value of the public expenditure is low and equal to $\underline{\theta}$ with probability $(1 - p)$, corresponding to a positive shock. The politicians do observe this variation in their public expenditures but the voters do not. For sake of simplicity, we suppose that the distribution of shocks is the same for the two periods. Distinctions between the two jurisdictions thus reduce to tax rate policies t_i and t_j . The minimum value of the tax rates is assumed to be such that $\underline{t} = \underline{\theta}/B$ and the maximum value $\bar{t} = \bar{\theta}/B$. We denote δ the discount factor.

The probability of politician i to be elected or re-elected depends on the tax rate in his jurisdiction compared to the tax rate in jurisdiction j . The yardstick competition hypothesis is introduced in the model through this probability function. This probability also depends on the intensity of the political competition denoted A . In the following, the (re)-election probability function of politician i is written as: $R_i(t_i, t_j, A)$ with $\frac{\partial R_i}{\partial t_i} < 0$, $\frac{\partial R_i}{\partial t_j} > 0$, and $\frac{\partial R_i}{\partial A} < 0$. The opportunist politician is assumed to maximize the revenue extracted from his activity in office. This revenue is measured by the difference between tax receipt and the local public expenditure. Since the number of mandates is limited to two, having nothing to lose, the reelected representative will systematically behave strategically by always choosing the highest tax rate $\bar{t}$ during his second and last mandate, whatever the local economic conditions. Therefore the tax rate choosen by politician i in the first period is solution to:

$$\max_{\{t_i\}} EG_i = (t_i B_i - E\theta) + \delta R_i(t_i, t_j, A)(\bar{t} B_i - E\theta) \quad (1)$$

whith $E\theta$ the mathematical expectation of θ . The first order condition is given by:

$$\frac{-\partial R_i(t_i, t_j, A)}{\partial t_i} \delta(\bar{t} B_i - E\theta) = B_i \quad (2)$$

By replacing $E\theta$ by its value, we get:

$$\frac{-\partial R_i(t_i, t_j, A)}{\partial t_i} \delta(1 - p)(\bar{t} - \underline{t}) = 1 \quad (3)$$

and the second order condition:

$$\partial^2 R_i(t_i, t_j, A) / \partial^2 t_i < 0 \quad (4)$$

The left hand side of equation 2 measures the discounted loss of the period 2 expected payoff due to a marginal increase in the tax rate in period 1 whilst the right hand term measures the period 1 gain due to this marginal increase. Consequently, a raise in the expected local public expenditure yields a decrease in the period 2 expected payoff, thus inducing an increase in the equilibrium tax rate of the first period. Moreover, the equilibrium tax rate in period 1 is an increasing function of the political competition intensity if $\partial^2 R_i(t_i, t_j, A)/\partial t_i \partial A < 0$. The first order condition is the reaction function of jurisdiction i . By applying the implicit function theorem on this first order condition, we obtain the slope of the jurisdiction i reaction curve:

$$\frac{dt_i}{dt_j} = \frac{-\partial^2 R_i(t_i, t_j, A)/\partial t_i \partial t_j}{\partial^2 R_i(t_i, t_j, A)/\partial^2 t_i} \quad (5)$$

The slope of the reaction curve is different from zero if $\partial^2 R_i(t_i, t_j, A)/\partial t_i \partial t_j \neq 0$. This condition is important because it is necessary to the existence of strategic interactions between the tax policies conducted in the two jurisdictions. Before studying the dynamics of the yardstick competition process, we give a numerical illustration of the basic fiscal game equilibrium.

2.2 A numerical illustration of the basic fiscal game equilibrium

In the following numerical illustration, we retain the specification of the re-election function proposed by Bodenstein and Ursprung (2001). This function is derived from the ‘Contest Success Function’ from Tullock (1980):

$$R_i(t_i, t_j, A) = \frac{1}{1 + A \frac{u_i(t_j, g)}{u_i(t_i, g)}} \quad (6)$$

where $u_i(t_i, g)$ is the satisfaction of voter i from the tax policy in i whilst $u_i(t_j, g)$ is the utility of the same voter if he would have been living in j . Moreover, we assume that $A \in]0, 1]$. Thus in the case where $t_i = t_j$, the (re)-election function depends only on the intensity of the political competition. If the political competition is maximal ($A = 1$), the (re)-election function is equal to $1/2$. It means that even in the case of a perfect tax mimicking behaviour, the politicians in the jurisdictions in competition are not systematically re-elected. In that way, the variable A can be considered as a political competition index inside each jurisdiction. For sake of simplicity, we suppose

that the utility function is as follows: $u_i(t_i, g) = (\bar{t} - t_i)g$. This specification is similar to a loss function. For a given amount of local public goods, the closer the tax rate to its maximal value, the lower the satisfaction of the voter. Taking into account this specification yields:

$$R_i(t_i, t_j, A) = \frac{1}{1 + A \frac{\bar{t} - t_j}{t - t_i}} \quad (7)$$

There exists two symmetrical Nash equilibria in this game:

$$\bar{t} \quad \text{and} \quad t^* = (1 - p) \frac{A}{(1 + A)^2} \delta \underline{t} + (1 - (1 - p) \frac{A}{(1 + A)^2} \delta) \bar{t} \quad (8)$$

We can easily show that the only stable solution is the interior solution. This can be an argument for t^* as the likely solution of this game. We will assume herein that the interior solution is the equilibrium of the yardstick competition game when all the incumbents hold office for the first time. The solution is a convex linear combination of $\underline{t}$ and $\bar{t}$. The regulatory effect of yardstick competition then depends on different parameters. The lower p i.e. the lower the probability of a large local public good expenditure, the closer t^* to $\underline{t}$. Should the discount rate δ be high, the equilibrium is close to $\underline{t}$. Since the politician gives a high value to the future payoff, he will be induced to moderate his fiscal policy in the first period in order to increase the probability of being re-elected. Finally, the larger the political competition A , the smaller t^* . These two Nash equilibria are depicted in figure 1 for $A = 1$, $\delta = 1$, $p = 0.1$, $\underline{t} = 0.3$ and $\bar{t} = 0.7$.

3 The dynamics of Yardstick Competition

We will first examine the dynamics of yardstick competition when there are two jurisdictions. Secondly, the dynamics will be analysed in the presence of three jurisdictions along with a given spatial structure.

3.1 The dynamics with two jurisdictions

We study the dynamic effect of yardstick competition on the tax rates (t_i, t_j) in each period of the fiscal game. This dynamics is formalized by using a Markov chain. At the beginning of the first period, the politicians in jurisdiction i and j are assumed to be new incumbents. Then, at the end of each period after the election, the country is in one of the following situations:

- State I: Both incumbents are re-elected and are allowed to carry out the second and last mandate. As previously postulated, this is the end of the game for both politicians and they do not have any incentives to maintain the tax rate at a low level. The Nash equilibrium is then $(\bar{t}, \bar{t})$.
- State II: The incumbent in jurisdiction i carries out his first mandate whilst the one in jurisdiction j carries out his second mandate. Since the politician in j stops holding office, he sets the higher possible tax rate to maximize the rent of the last period in office. In the presence of yardstick competition, the politician in i is induced to mimic his neighbor. Therefore, the tax rate in each jurisdiction is maximal and the Nash equilibrium is $(\bar{t}, \bar{t})$.
- State III: The politician in i holds office for the second and last mandate while the politician in j is in his first term. The Nash equilibrium is $(\bar{t}, \bar{t})$.
- State IV: Both politicians are new incumbents. The yardstick competition has a regulatory effect and the fiscal equilibrium is (t^*, t^*) .

The transition from one state to another is a discrete stochastic process where each period denoted $N = \{0, 1, \dots, n-1, n, n+1, \dots\}$ corresponds to a political mandate. The state space E is finite: $E = \{I, II, III, IV\}$ and describes the four possible states that the country could ever be in. The Markov assumption holds for this stochastic process denoted (X_n) . This assumption can be summarized as follows:

$$P(X_{n+1} = i_{n+1} | X_0 = i_0, \dots, X_n = i_n) = P(X_{n+1} = i_{n+1} | X_n = i_n) \quad (9)$$

with $i_0, \dots, i_{n+1} \in E$. Then, the state in which the country is in period $n+1$ depends only on the state the country was in period n . In other words, the future behavior depends probabilistically only on the current state and not on any past behavior. The Markov transition matrix which express the one-step transition probabilities of this stationary, discrete Markov transition process can be written:

$$\mathbf{M} = \begin{pmatrix} 0 & 0 & 0 & 1 \\ 0 & 0 & R & (1-R) \\ 0 & R & 0 & (1-R) \\ R^2 & (1-R)R & (1-R)R & (1-R)^2 \end{pmatrix} \quad (10)$$

The element in the i th row ($i = 1, \dots, 4$) and the j th column ($j = 1, \dots, 4$) is the probability of transition from state i to state j at each period of time. For instance, the transition from state I at time n to state IV at time $n+1$ is equal to 1. A few comments on this transition matrix can be made. Being in state VI at period n , the state where the politicians carry out their first mandate, the country can be in one of the four possible states at the following period of time. However, the sweeter the political competition (R is high), the higher the probability of being in state I at period $n+1$ i.e. the state where both incumbents are re-elected for the last time. Yet, the transition probability from state I to state IV being equal to 1, the process may oscillate between these two states. In matter of fiscal policy, it means that the country will often have a period of high tax rates followed by a period of low tax rates. In other respects, if at a period of time the country is in state II, should the political competition be weak, the probability to wave from state II to state III is high. In that case the voters of the country would have to pay high taxes at each period of time.

The definition of the transition probabilities yields: $P(X_n = k) = \sum_{l \in E} P(X_n = k | X_{n-1} = l) P(X_{n-1} = l)$. Then: $\pi_{k,n} = \sum_{l \in E} \pi_{l,n-1} M(l, k)$ with $M(l, k)$ the element in the l^{th} row and k^{th} column of the transition matrix. This latter expression can be written in matrix notation: $\pi'_n = \pi'_{n-1} M(l, k)$. Then the stationary distribution of this chain is solution of: $\pi' = \pi' M(l, k)$. After computation, this stationary distribution is equal to:

$$\pi = \left(\frac{R^2}{(1+R^2)}, \frac{R}{(1+R^2)}, \frac{R}{(1+R^2)}, \frac{1}{(1+R^2)} \right) \quad (11)$$

This result gives the probability of being in one state after a large period of time. For instance, if the Markov chain starts in state IV, i.e. in the only regulatory state of the state space, the probability of being in that state after a large number of steps is equal to $\frac{1}{(1+R)^2}$ and the probability of being in one of the remaining states is $1 - \frac{1}{(1+R)^2}$. By using this stationary distribution, we compute the long run expected tax rate of the country:

$$Et = \frac{1}{(1+R)^2} t^* + \left(1 - \frac{1}{(1+R)^2} \right) \bar{t} \quad (12)$$

This tax rate depends on the intensity of the political competition. Should this intensity be larger, the long run expected tax rate drops. This is due to: first a decrease in t^* and second to an increase in the probability of being

in the regulatory state. By considering the Tullock reelection function, the limiting stationary distribution is:

$$\pi = \left(\frac{1}{(A+2)^2}, \frac{A+1}{(A+2)^2}, \frac{A+1}{(A+2)^2}, \frac{(A+1)^2}{(A+2)^2} \right) \quad (13)$$

and the long run expected tax rate:

$$Et = \frac{A\delta(1-p)}{(A+2)^2} \underline{t} + \left(1 - \frac{A\delta(1-p)}{(A+2)^2}\right) \bar{t} \quad (14)$$

3.2 The dynamics with three jurisdictions

We now consider the case of a country with three jurisdictions. The geographical structure of the country is as follows:

Jurisdiction i	jurisdiction j	jurisdiction k
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For sake of simplicity, we assume that the incumbent in jurisdiction j compares his tax rate with the average tax rate of jurisdictions i and k , so that the probability of re-election of the politician in j can be written as: $R_j = R_j(t_j, (t_i + t_k)/2, A)$. Then, there exists eight different possibilities:

- State I: The three incumbents are re-elected and carry out their second mandate. The Nash equilibrium is then $(\bar{t}, \bar{t}, \bar{t})$.
- State II: The incumbents in jurisdiction i and k carry out their second mandate whilst the one in jurisdiction j carries out his first mandate. The Nash equilibrium is $(\bar{t}, \bar{t}, \bar{t})$.
- State III: The incumbents in jurisdiction j and k carry out their second mandate whilst the one in jurisdiction i carries out his first mandate. The Nash equilibrium is $(\bar{t}, \bar{t}, \bar{t})$.
- State IV: The politician in k carries out his second mandate whilst the politicians in i and j are new incumbents. In that state, the yardstick competition has a regulatory effect and the fiscal equilibrium is $(t_1, t_2, \bar{t})$.
- State V: The incumbents in jurisdiction i and j carry out their second mandate whilst the one in jurisdiction k carries out his first mandate. The Nash equilibrium is $(\bar{t}, \bar{t}, \bar{t})$.

- State VI: The politician in i carries out his second mandate whilst the politicians in j and k are new incumbents. State 6 is a regulatory state and the fiscal equilibrium is $(\bar{t}, t_2, t_1)$.
- State VII: The politician in j carries out his second mandate whilst the politicians in i and k are new incumbents. The fiscal equilibrium is $(\bar{t}, \bar{t}, \bar{t})$.
- State VIII: The three politicians are new incumbents. The regulatory effect of yardstick competition is maximal and the fiscal equilibrium is (t^*, t^*, t^*) .

As previously, the stochastic process which moves from state to state is Markov. The stationary distribution is given by the vector of probabilities: $\pi = (\pi_I, \pi_{II}, \pi_{III}, \pi_{VI}, \pi_V, \pi_{VII}, \pi_{VIII})$. In that case the long run expected tax rate is equal to:

$$Et = \pi_{VIII}t^* + 2\pi_{IV}\frac{t_1 + t_2 + \bar{t}}{3} + (1 - \pi_8 - 2\pi_4)\bar{t} \quad (15)$$

The values of π_{IV} , π_{VIII} , t_1 and t_2 are too complicated and are not given in the paper. To illustrate the effect of raising the number of jurisdictions on tax rates, a numerical example is presented. The long run expected tax rates and the tax rate in the regulatory states are depicted in Figure 2 for $\delta = 1$, $p = 0.1$, $\underline{t} = 0.3$ and $\bar{t} = 0.7$. The values of these tax rates depend on the intensity of the political competition. The long run tax rate with two jurisdictions is always larger than the one with three jurisdictions. This is mainly due to the fact that the number of regulatory states in the case of three jurisdictions is higher than in the case of two jurisdictions. When the number of jurisdictions increases, so does the number of neighbors serving as yardsticks for the voters' evaluation, and the probability of having at least one neighboring politician holding office for the first time raises. In that case, in the long run, yardstick competition to tame the leviathan becomes more efficient.

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Figure 2: Long run expected tax rates