ALTERNATION AND COOPERATION IN A TWO-PARTY SYSTEM

Implications for Resource-Based Developing Economies

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ALTERNATION AND COOPERATION IN A TWO-PARTY SYSTEM: IMPLICATIONS FOR RESOURCE-BASED DEVELOPING ECONOMIES

Pablo Astorga Junquera

Abstract: This paper studies cooperation in a political system dominated by two opportunistic parties competing in a resource-based economy. Since a binding agreement as an external solution might be difficult to enforce due to the close association between the incumbent party and the government, the paper explores the extent to which co-operation between political parties that alternate in office can rely on self-enforcing strategies to provide an internal solution. We show that, for appropriate values of the probability of re-election and the discount factor cooperation in maintaining the value of a state variable is possible, but fragile. Another result is that, in such political framework, debt decisions contain an externality element linked to electoral incentives that creates a bias towards excessive borrowing.

Key words: Political Economy, Non-cooperative Games, Resource-based Economies

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1. INTRODUCTION

The main motivation of this paper is the experience of Venezuela during the period of 1968-1992 when politics and policy in the country were dominated by a two-party system that was in charge of administering generous oil revenues.[1] However, in many ways the windfalls received during the 1970s and early 1980s were a lost developmental opportunity, since they did not result in lasting economic growth and improved living standards. The GDP per capita at the end of the last century was roughly at the 1960 level. And the bill for this waste did not take too long to arrive. During the last twenty years or so the country experienced the loss of political stability and witnessed the emergence of a strong polarisation. The detonator of this new political landscape was a failed military coup in 1992, led by Colonel Hugo Chávez. Although the military uprising did not succeed in overthrowing the government, it set in motion a process that undermined severely the traditional parties. After being imprisoned for a few years and then pardoned by the same system he once wanted to destroy, Mr. Chávez pursued a legitimate and less risky route to the presidency. He was first elected in 1998 with strong popular support and has been in office since (with a third re-election in early October 2012), enjoying a high concentration of powers and without a significant political opposition.

We provide a simple set-up to study the possibility of co-operative behaviour in a political system dominated by two opportunistic parties. It draws from two standard results of non zero-sum games with direct implications to the analyses of political competition. First, that the fewer the number of players the better the conditions for the emergence of co-operation; and, second, that the repetition of the game allows for reciprocity and the emergence of co-operation. Thus a two-party democracy appears as the more favourable case for the development of tacit co-operation among political parties. Hence, if they do not heavily discount the future, the possibility of punishment coming from voters or other parties would create enforcement mechanisms allowing for the emergence of co-operation in the politic-economic game. This is important because a binding agreement as an external solution is unlikely due to the close link between the incumbent party and the government. Therefore, co-operation may need to rely on self-enforcing strategies to provide an internal solution.[2]

The link between the efficiency of the system, its legitimacy, and the likelihood of survival of the party system is a key feature of the game. Non-cooperative behaviour between parties can result in inefficiencies that accumulate at an increasing rate over time, which potentially can lead to political instability prompted by economic deterioration. These inefficiencies can arise because of shortermism and as a result of a political business cycle (Nordhaus, 1975).[3] But equally the questioning of legitimacy can be associated to corruption, the erosion of the institutional fabric and the perversion

1. After more than half a century dominated by dictatorship, the country began a democratic period in 1958. During the second half of the XXth century, oil has represented, on average, 25% of GDP, 80% of export revenues and 70% of fiscal revenues.
2. The internal solution (self-policing) is basic in the sense that understanding the prospects for and obstacles in the way of this solution helps to see what sort of external solution is necessary.
3. Astorga (1996) provides evidence of a political business cycle in Venezuela during the 1968-1988 period.

of democracy (e.g., Collier, 2008). The main threat to both parties is the possible intervention of a dictator who will end the democratic game. Here the dictator is a source of enforcement but without a strategic role to play. Although the possibility of dictators is irrelevant in industrialised economies and stable democracies, it is an important element to considered when the focus is on developing countries with young democracies or/and weak institutions.[4]

The incentives for defection are related to the incumbent's desire to secure re-election and the alternation nature of the game. The incumbent is tempted to draw from the stock of resources currently available to secure re-election before the other party will.[5] Another possible source of temptation is borrowing today as much as possible because, due to the alternative character of the game, the incumbent borrower may not pay fully for the debt in the future, both in political and economic terms. The probability of re-election and the length of the game are endogenously determined by the strategic interaction of the parties.

The analysis is particularly relevant for resource-based, developing economies, in which foreign revenues constitute a significant part of fiscal and external revenues and where, due to public ownership of the natural resource, such revenues accrue directly to the government. Economic efficiency and growth prospects depend on the decisions related to its use - for instance the share between investment and consumption and the quality and opportunity of such decisions - and the incumbent's willingness to postpone consumption when electoral incentives are present. However, this general situation is of a greater level of complexity than the one studied here due mainly to the reproductive nature of capital and the need to differentiate between types of expenditure. In order to keep the problem manageable, while still keeping the link between a state variable and the incumbent's spending decisions, we focus on the stock of international reserves. This variable plays a central role in developing and open economies in determining the need for stabilisation measures, which in most cases undermine growth prospects and political stability.

This work relates to the already well-established political economy literature – which was particularly prolific during the 1990s – that adopts game theory to analyse the economic repercussions of the strategic interaction of agents such as political parties and pressure groups. For instance, Alesina and Rodrik (1994) and Persson and Tabellini (1994) deal with issues of economic growth under a democratic framework; whereas other contributions focus on economic transition and policy reform (e.g., Rodrik 1996) and the politics of stabilisation (Alesina and Drazen, 1991). The consequence of alternation for co-operation has received relatively little attention. One example closer to the spirit of the present paper is McKibbin, Roubini and Sachs (1987). The authors offer a method of solving linear quadratic two-party games with state variables by numerical

4. On the issue of the economic consequences of dictators see Olson (1993 & 2000), and Wintrobe (1998). For a recent empirical contribution focusing on the link with development see Papaioannou and Van Zanden (2012). Regarding the strategic role of dictators, Overland, Simons and Spagat (2005) developed a model in which the dictator faces in each period an endogenous probability of political breakdown that would extinguish the regime's wealth extraction ability.
5. For instance, by overspending resources from a stabilisation fund created to deal with a volatile flow of revenues.

simulation. But one important difference is that they adopt the partisan assumption and that the probability of re-election is exogenous. Other contributions such as Alesina and Tabellini (1990), Aghion and Bolton (1990) and Milesi-Ferreti and Spolaore (1994) explore the implications of majority voting rule for the public debt when political competition is dominated by ideologically motivated parties.

This work also has a bearing on sequential games dealing with resource extraction and dynamic duopoly competition. In the former the joint exploitation of a productive asset by several economic agents may result in an over exploitation of the asset.[6] In the duopoly case there is an interesting parallel, though with a different interpretation, with models where the control variable is the rate of investment of each firm in its own capital. Both firms would be better off if they could co-operate (collude) in gaining higher profits by reducing the total level of investment, and in consequence total output. This is identified as an early-stopping equilibrium (Maskin and Tirole, 1988a & 1988b).

The paper is divided into four main sections. The first introduces the main assumptions and discusses the general set up. The second one is devoted to the analysis of co-operation between both parties, defined in terms of the possibility of reaching an early stopping equilibrium based on grim strategies. The third section deals with decisions on external borrowing under electoral incentives. Finally, a section of conclusions is presented, together with comments on some policy and empirical implications of the game and a caveat on the "goodness" of dictators. An appendix provides an informal proof of the existence of equilibrium in the game.

2. DESCRIPTION OF THE GAME

In this section the players, strategies, equilibrium concept, and the pay-off function of the game are presented, together with discussion about the rationale for the simplifying assumptions necessary to make the interaction between the parties tractable.

2.1 General set up

In the game there are two opportunistic parties and a dictator. A party is defined as *opportunistic* if enjoyment of power is its only source of utility and its overriding objective is to maximise the expected discounted gains of being in office. Opportunistic parties do not have an incentive to appropriate part of the public

6. On resource extraction see Benhabib and Radner (1992), and Dutta and Sundaram (1988).

resources for themselves, as in the case where parties are selfish. Hence, eventually, voters are going to receive all the rents.[7]

The parties and the electorate

The two parties are called *Party I* (she) and *Party II* (he). Depending on the electoral result, each of them can play one of two roles: *incumbent* or *opposition*. It is assumed that at the beginning of the game Party I is the incumbent and Party II the opposition. During each electoral period the incumbent enjoys K utils. There is no utility for the party in opposition. Prior to the election the incumbent chooses an action x. This action can be interpreted as expenditure on public goods.

The probability of being re-elected $p(x)$ is an increasing function of x. It is assumed that $\frac{\partial p(x)}{\partial x} > 0$ and $\frac{\partial^2 p(x)}{\partial x^2} < 0$. The concavity of $p(x)$ is due to diminishing marginal political returns of expenditure.

Voters are assumed to assess the incumbent's performance retrospectively. During the electoral period the utility of the voters is directly related to x. There are N voters (N very large), each of them getting a utility of $V_i(x)$. Their strategy is to co-operate with the incumbent (vote for it) as far as the incumbent performs satisfactorily; otherwise to punish her by electing the opposition party. Note that when using this strategy, although acting rationally, voters do not make any prediction about the future effects of the incumbent's present decisions. Issues or ideologies do not count; only results matter.

External revenues and the stock of reserves

Each electoral period the incumbent receives r units of external revenues with electoral value. The total amount of revenues accruing to the incumbent during the period is assumed to be known.[8] If she spends this amount, she can get a probability $p(r)$ of re-election whereas if she spends $x = x^e$ she will be certain of being re-elected, that is $p(x^e) = 1$. It is assumed that $r < x^e$. For the case $r >= x^e$, the solution is trivial: the incumbent spends $x = x^e$ in every election and remains in power forever.

We give a prominent role to the incumbent's advantage in deciding on spending with electoral value. This reflects a key feature of mining economies, in general, and of oil economies in particular, where the revenues generated by the exploitation of the natural resource tend to go directly to the public coffers. And because of the strong link between receipts related to the export sector and government spending, it is usually the case that the outcome of an election is significantly affected by the

7. For an example of a game with selfish parties see Freejohn (1986).
8. As a way of illustration, the average amount of external revenues accruing to the government in Venezuela during the 1970s and 1980s was of about US$12bn per year (aprox. 12% of GDP), which represents about US$60bn for an electoral 5-year term (or US$160 at dollars of 2012, after adjusting the figures for the US CPI inflation between 1980 and 2012).

availability of foreign revenues - which improves simultaneously the fiscal and the current accounts. This means that the best chances for the opposition, which plays a passive role in the game, are when the incumbent is hit by an external shock (a drastic fall in *r*). Moreover, the primary principle ruling the link between the incumbent and society is the distribution of such rents, making possible a considerable public expenditure without the generation of significant re-distributive conflicts.[9]

For a given realisation of *r* and a decision on *x*, the equation governing the evolution of the stock of reserves *W* at time *t* is:[10]

$$W_{t+1} = W_t + r - x .$$

For a given W_t, $n = INT\left[\frac{W_t}{(x^e - r)}\right]$ gives the number of consecutive elections that the incumbent can be certain of having the voter's approval, the dictator permitting.[11]

In this game we abstract from the issue of uncertainty in external revenues. However, terms of trade volatility is a key feature of many developing economies, and particularly in resource-based economies. One likely consequence of uncertainty in external revenues is that, given the rigidities of the budgetary process, the problem for the incumbent lies in deciding on spending levels before actual income is known. The incentive to increase expenditure in order to improve popular support creates potential balance of payment crises (under fixed or multiple foreign exchange rate regimes), as the private sector decides on the mix between domestic and foreign financial assets. Another possible implication of relaxing the assumption of revenue certainty is that a risk-averse incumbent will set a higher-than-optimal level of reserves, whereas an incumbent with a propensity to take risks will lead to the opposite bias.

The dictator's role

There is a dictator whose intervention in related to the depletion of the country's stock of international reserves. The probability that a dictator takes over at time *t* is negatively related to the stock of reserves W_t. This probability is expressed as $d(W_t)$. Once the dictator intervenes, he stays in power forever.

It is assumed that $d(W_t)$ is a convex function with respect to W_t. That is to say:

$$\frac{\partial d(W_t)}{\partial W_t} < 0 \;\; ; \;\; \frac{\partial^2 d(W_t)}{\partial W_t^2} > 0 .$$

9. Voters can easily see the personal benefits derived from additional expenditure at election time but they tend to ignore the future implications of this financing option – e.g., future adjustment cost in times of low revenues
10. We are leaving out of the analysis any interest payments generated by international reserves.
11. INT[...] stands for an integer operator, guaranteeing that n refers to whole electoral periods.

The rationale for the link between the likelihood of a take-over and the stock of international reserves can be developed in two steps. First by pointing out the link between reserves and recessions and, second, by noting the causality between recessions and abstention. The line of argument is as follows: a low level of reserves would call for an adjustment programme to be implemented in the coming administration; or, another possibility is that the lower the amount of reserves the greater the chance of a currency crisis, which is generally followed by a recession.[12]

Once the country enters a recession, a period of popular discontent is expected, which can be expressed as a decline in the support for the established parties and/or in an increase in the abstention rate. This situation can boost the dictator's incentive to intervene, either because he is concerned about the popular clamour, or if he associates it with a low level of civil support for the system. Additionally, a situation of high abstention can create the conditions for the arrival of new parties with electoral chances, reducing the expected gains of the established parties. Both repercussions of reserve depletion can be modelled as an increase in the political discount factor.

The overall discount factor

The total discount factor is defined as the complement of the probability of a dictator (political discount) times a constant term μ accounting for the incumbent's pure myopia (which is not related to the probability of a take-over).

$$\delta_t = \delta(W_t, \mu) = [1 - d(W_t] \ \mu .$$

Here, a distinction is made between two components of the discount factor. The first one finds its justification in the political arena, reflecting the chances the incumbent party has to be in office again. The second component is included to measure parties' impatience. It ranges from $\mu = 0$ (short-sighted incumbent) up to $\mu = 1$ (far-sighted incumbent). Apart for being more precise about sources of discounting in the game, introducing this distinction will facilitate the study of co-operation later in the paper.

$\delta(W_t, \mu)$ is a concave function in W_t: $\frac{\partial \delta(W_t, \mu)}{\partial W_t} > 0$; $\frac{\partial^2 \delta(W_t, \mu)}{\partial W_t^2} < 0$.

The total discount factor will remain fixed ($\delta_t = \delta_{t+1} \ldots = \delta_{t+n} = \overline{\delta}_t$) while $x_{t+i} = r$, i=1... n, that is to say, as long as expenditure equals current revenues.

12. Venezuela offers examples of both situations. In 1989 a drastic adjustment was introduced by the new administration after the depletion of international reserves as the result of electoral-driven policies of the previous incumbent. As an illustration of the latter, in 1983 a massive capital flight forced the government to devalue and implement contractionary measures, which cost the incumbent party its re-election.

To complete the definition of the game, the players' strategies and payoff functions have to be specified. This is next.

2.2 Strategies and Equilibrium Concept

Suppose that the game begins in period 0, with the null history h^0. For $t > 1$, let $h^t = \{x^0, x^1, ..., x^{t-1}\}$ be the realised choices of actions at all electoral periods before t, and let $H^t=(X)^t$ be the space of all possible period-t histories. I will restrict the attention to strategies in which the past h^t influences current decisions x_i only through its effect on the state variable (W_t), which summarises the direct effect of the past on the present environment. This class of strategies are called *Markov strategies*. So a pure strategy s_i for player i (i=I,II) is a sequence of maps s_i^t -one for each electoral period- from values of the state variable at time t (W_t) into the action set of spending decisions X (i.e., $s: W \rightarrow X$). A *Markov perfect equilibrium* is a profile of Markov strategies (s_I^*, s_{II}^*) that yields a Nash equilibrium in every proper sub-game. This equilibrium concept has the property of being empty-threat proof because each player's strategy is the best response for every possible state.

In this game *grim strategies* will be used to explore the possibility of "early-stopping" equilibrium, which will be associated with co-operative behaviour between both players. These strategies are of the form: 'Play $x_t = r$ in period t, and continue to play $x_t = r$ so long as the realised action in the previous period x_{t-1} was r. If not, play the *minimax strategy* for the rest of the game, that is to say, try to secure as many elections as possible.[13]

The payoff function is $\sum_{t=0}^{\infty} \cdot {}^t g(W_t, x_t)$, which given the assumptions stated before becomes $\sum_{t=0}^{\infty} \cdot {}^t p(x_t)[1 - d(W_t)]K \cdot$

At time $t = 0$ (current electoral period), Party I is the incumbent and enjoys K utils. During this period she spends x_0 and obtain a probability of being re-elected p. Thus, during the second electoral period she will be in office with probability p, or in the opposition with probability (1 - p). The expected discounted payoff for this second period is then equal to δ [pK + (1 - p)0]. The analysis of the third period includes four possible cases, in two of them Party I is in office with her payoff being equal to δ^2 (1 - 2p + 2p^2). For periods occurring far into the future the probability of being in office converges to a half. Also, note that due to the presence of discounting, expected gains get lower as time goes on. In general, at time t the total expected pay-off for the incumbent (I_t^1) is given by:

13. By playing minimax the incumbent (Player I) plays the best response assuming that the opposition party (Player II), once in office, will play that strategy that gives the worse result for her. That is, player II will try to minimise player I's pay-off once he has the turn to play. Under this assumption, the best that Player I can do while she has the turn to play is to minimise the chances of Player II getting into office (consequently, minimising the opposition party's pay-off).

(1) $I_t^1 = p(x_t)\delta_{t+1} I_{t+1}^1 + [1 - p(x_t)]\delta_{t+1} I_{t+1}^0 + K$,

(2) $I_{t+1}^0 = [1 - p(x_{t+1})]\delta_{t+2} I_{t+2}^1 + p(x_{t+1})\delta_{t+2} I_{t+2}^0$,

where: $I_t^1 = I^1(W_t)$; $I_{t+1}^1 = I^1(W_t + r - x_1)$; $I_{t+2}^1 = I^1(W_t + 2r - x_1 - x_2)$;

I_{t+1}^0 is the expected pay-off for Party I acting as opposition party at time *t+1*

Likewise, at time *t* the opposition party (Party II) expects to obtain:

(3) $II_t^0 = [1 - p(x_{t1})]\delta_{t+1} II_{t+1}^1 + p(x_t)\delta_{t+1} II_{t+1}^0$,

(4) $II_{t+1}^1 = p(x_{t+1})\delta_{t+2} II_{t+2}^1 + [1 - p(x_{t+1})]\delta_{t+2} II_{t+2}^0 + K$,

where: $II_{t+1}^1 = II^1(W_{t+1} + r - x_1)$; $II_{t+2}^1 = II^1(W_{t+1} + 2r - x_1 - x_2)$;

II_t^0 stands for the expected gains for Party II being in opposition at time *t*.

An amount of expenditure (*x*) different from current revenues (*r*) has two contrary effects on the incumbent's discounted expected revenues. The first effect is related to the value of the dictator factor. When the incumbent spends more than she receives she finances the extra spending with reserves, otherwise she accumulates reserves. A drop(increase) in reserves increases(decreases) the probability of a dictator's take over and consequently reduces(increases) the expected gains. The second one is linked to the probability of re-election. An increase(decrease) of expenditure over *r* improves(worsens) the incumbent's chances of re-election, and consequently the expected gains, but worsens(improves) the expected pay-off of the opposition party.

Player I(II)'s problem at time *t* is to maximise her(his) expected pay-off, taking into account the decision of Party II(I) in that case where he(she) happens to be in office, subject to the no-borrowing constraint $\sum_{i=1}^{\infty}(x_i - r_i) \leq W_0$ and the motion equation $W_t = W_{t+1} + r\text{-}x_t$.

The solution of the parties' maximisation problem is too complex to solve analytically, particularly during the transitory state in which the optimal spending (with players acting unilaterally) differs from current revenues. However, the game converges towards a unique Nash equilibrium (see Appendix) characterised by a stationary state for the level of reserves (W^E), at which $x = r$. Of particular interest for the analysis is the expected pay-offs the incumbent will obtain when the stock reaches a stationary state, i.e., a value of W^E that will be preserved once it is achieved. This resting point corresponds naturally to the economic notion of long-run equilibrium[14].

14. From now onwards, we will refer to this non-cooperative long-term rest position as the stationary Nash equilibrium or simply the equilibrium position.

2.3. The Stationary Nash Equilibrium

During the stationary state the incumbent sets $x_t = r. \forall t$, in which case $I_t^i = I_{t+1}^i = I_{t+2}^i ..... = I^{iS}$ for $i = 0$ and $1; \delta_{t+i} = \delta_{t+i+1} = \delta_s = \delta(W_{t^s}, \mu) \quad \forall i$; where the symbol *S* is used to mean stationary state. Also, $p(r) = q(r)$, i.e., it is expected that for a given expenditure both parties will obtain the same probability of re-election and will implement the same strategy once in office. The time t^S at which $x_t = r$, depends on the path followed by the incumbents as reflected in the history of the game h^t.

Regarding the incumbent party at time t^S (which it is assumed to be Party I), the continuation pay-off becomes:

$$(5) \quad I^{1S} = p(r)\delta_s I^{1S} + [1 - p(r)]\delta_s I^{0S} + K,$$

$$I^{0S} = [1 - p(r)]\delta_s I^{1S} + p(r)\delta_s I^{0S},$$

$$(6) \quad I^{0S} = \frac{[1 - p(r)]\delta_s}{[1 - p(r)\delta_s]} I^{1S}.$$

After substituting (6) into (5), we find the expression for the total expected pay-off for the incumbent party in the stationary state:

$$(7) \quad I^{1S} = \frac{[1 - p(r)\,\delta_s]K}{(1 - \delta_s)[1 + \delta_s - 2\delta_s . p(r)]}.$$

On the other hand, following a similar procedure, we obtain the expected pay-off at time t^S for the party in opposition (*Party II*).

$$(8) \quad II^{0S} = [1 - p(r)]\delta_s II^{1S} + p(r)\delta_s II^{0S},$$

$$II^{1S} = p(r)\delta_s II^{1S} + [1 - p(r)]\delta_s II^{0S} + K,$$

$$(9) \quad II^{1S} = \frac{[1 - p(r)]\delta_s II^{0S} + K}{[1 - p(r)\delta_s]}.$$

After substituting (9) into (8), the expression for the total expected pay-off at time t^S for the opposition party is obtained:

$$(10) \quad II^{0S} = \frac{[1 - p(r)]\delta_s K}{(1 - \delta_s)[1 + \delta_s - 2\delta_s p(r)]}.$$

Finally, the total discounted pay-off for both parties is given by:

$$I^{1S} + II^{0S} = \frac{K}{(1 - \delta_s)}, \quad \text{where} \quad \delta_s = \delta(W_{t^s}, \mu) \quad .$$

From this last expression the efficient result for the level of reserves $\overline{W}$ can be derived. This corresponds to the level that makes the total discount factor equal to pure myopia, i.e., set $W = \overline{W}$ such that $\delta_s(W, \mu) = \mu$. This implies $d(\overline{W}) = 0$. Efficiency in this context refers to the lack of electoral incentives in the use of reserves. The solution resembles a case in which both parties delegate to a social planner the decision on the optimal level of spending. This level is enough to preserve democracy and keep the dictator at bay, either because the dictator in waiting agrees with the policies implemented by the social planner - in the case of a benevolent dictator - or because economic stability implies a low popular support for a takeover.

Having introduced the game and characterised its non-cooperative equilibrium, the next step is to present the conditions for the emergence of co-operation between both parties.

3. THE POSSIBILITY OF CO-OPERATION

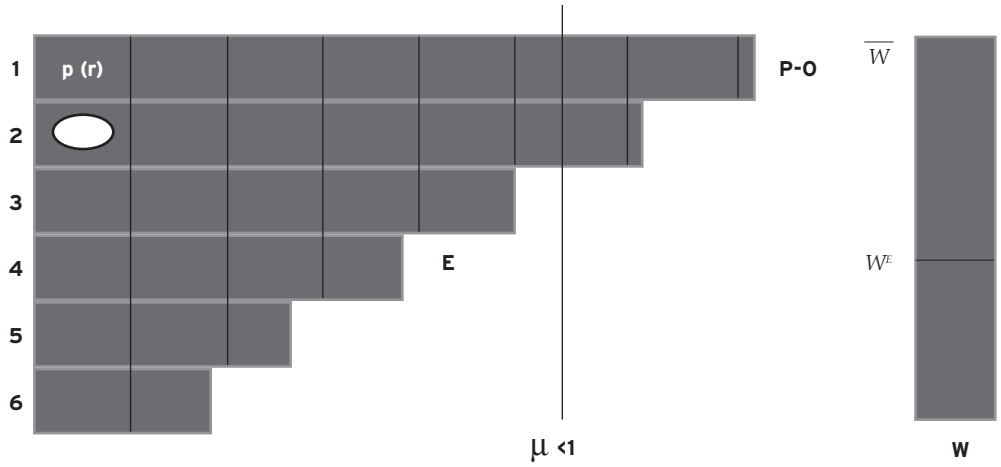
Sequential games differ significantly from repeated games because there is a state variable that changes in response to players' actions. Therefore, in the former class of games, the likelihood of enforcing an early-stopping equilibrium[15] by using grim strategies depends not only on the discount rate but also on the level of the state variable. In our game the discount factor becomes partially an endogenous variable being determined by the level of reserves. In addition, there are mutual gains if both parties decide to co-operate in maintaining or improving the level of reserves and, in that way, reducing the risk of a takeover. As an illustration of the co-operative problem consider the following metaphor.

"Driving on a highway"

There is a car with two occupants, both wanting to be the driver. They are on a highway with lanes of different length. The driver has an expected driving period equal to *p(r)*, which she can increase(reduce) by moving down(up) to the immediate lane below(above). There are two special lanes in the highway: a lane in which there is no incentive to change (stationary lane), and the longest lane (*efficient result/social planner optimum*). Due to myopia, the driver might not distinguish lanes of different length, as illustrated in Figure 1 with lanes 1 and 2 at the point marked by the dotted line. For an amount of reserves lower than W^E, the incumbent has the incentive to increase the stock unilaterally and, consequently, to generate a move in the direction of the equilibrium position. By contrast, when the level of reserves is above W^E, the incumbent is tempted to consume part of the stock in order to boost her electoral prospects. This behaviour causes a downward movement towards the stationary lane.

15. Here associated with an efficient equilibrium of the supergame.

Figure 1



Two incentives for co-operation can be distinguished:

i) For a given stock of reserves, both parties can co-operate in maintaining constant the probability of a dictator (keep driving in the same lane). In that way they can avoid increasing the risk of a takeover.

ii) Both parties would be better off if they could co-operate in building up reserves in order to reduce the probability of a takeover (moving to a longer lane). But the incumbent will be worse off if, after building reserves, the opposition party wins the election and consumes part of the newly built reserves in order to guarantee his re-election. In both cases, in order to sustain co-operation, the parties may adopt grim strategies that contemplate as a punishment path the reversion to W^E (the stationary lane) as soon as possible.[16]

However, any level of reserves within the interval $[W^E, \overline{W}]$ (i.e., any of the lanes above the stationary one) can be selected as the level to be sustained through co-operative behaviour. This wide range of possibilities creates a problem of multiplicity of equilibria.[17] But, in contrast to a situation where both players play simultaneously, in this game the co-ordination problem might not be so serious. The reason is that the incumbent player has a privileged position in the sense of being able to show a commitment to co-operate, which then can be followed by the opposition party once in office.

16. It is assumed, as in the case of the supergame, that this threat is always credible (Friedman 1971). So, if a deviant incumbent is re-elected, she will not do better than to implement the punishment first. This, however, is a strong assumption because it implies that even after a small deviation has occurred the next incumbent will be willing to carry the punishment through, which would be an unreasonable thing to do. This problem is due to the continuity of the pay-off function that contrast with the supergame case. Within the framework of complete information games this assumption is questionable. A better argument for deterrence against small changes can be found by allowing some elements of irrationality in the game.
17. The *folk theorem* of repeated games assures that, for a sufficiently small discount rate, any point of the efficient frontier can be sustained as a *subgame-perfect equilibrium*. The good news is that a better result than the inefficient equilibrium can be achieved; the bad news is that any point can be sustained. The resulting multiplicity of equilibria creates a well-recognised co-ordination problem.

In what follows we look for those conditions required to sustain co-operation in keeping constant the probability of a takeover, which is the more basic of the two. The second case (increasing the stock of reserves) will not be considered here.[18] In the latter situation, co-operation is based on the possibility of making sacrifices in the present in order to lengthen the life of the game and requires far-sighted parties. However, when myopia dominates, co-operation on piling up reserves is very unlikely to emerge.

3.1. Keeping Constant the Risk Factor in the Game

The study of the conditions for the emergence of co-operation is based on the standard procedure that checks for the presence of incentives for defection. The focus is placed on the *Incentive Compatibility Condition* (*ICC*), which consists of the difference between the pay-off the incumbent expects to receive if she deviates (I^{1D}) and what she will receive if co-operation is maintained (I^{1C}).

In order to obtain the gains of defection, it is assumed that if the incumbent deviates she will try to secure as many elections as possible. Thus the punishment phase is characterised by the implementation of a *minimax* or *myopic strategy* ($s^{m)}$. During the period of deviation (not necessarily equal to one electoral period) the incumbents will increase the pace of expenditure reducing the stock of reserves in W^d equal to ($W_0 - W^E$), assuming that deviation occurs at *t=0*. By following a myopic strategy, the deviant incumbent will stay in office with certainty *n* electoral periods.

$$n = INT\left[\frac{(W_0 - W^E)}{(x^e - r)}\right]$$

Assuming that *n* is an integer, (i.e., that in the period $t = n+1$[19] expenditure will be set at *x=r*) the incumbent expects to obtain a pay-off after defecting equal to:[20]

$$(11)\quad I^{1D} = K[1 + (\delta_1)p_e + (\delta_2)p_e + \ldots] + \delta_n[I^{1N}]$$

$$\text{being } \mathrm{I}^{1\mathrm{N}} = \left[\frac{(1 - p_r\delta_N)K}{(1 - \delta_N)[1 + \delta_N - 2\delta_N . p_r]}\right]$$

18. To co-operate in building up the stock, two conditions should be satisfied: i) a *feasibility condition* that demands that the future benefit of co-operation of an electoral sacrifice has to outweigh the opportunity cost in terms of re-election chances today, assuming that there is no incentive to deviate once a greater level of reserves has been reached; ii) a credibility constraint that demands that in the face of a higher stock of reserves, the temptation for the next incumbent to deviate (which ever party it will be) cannot be greater than the gains for continuing co-operation – discarding any further increase in reserves. The task, then, is to evaluate whether there are values for the parameters such that the build up of reserves is both feasible to be generated by the current incumbent, and credible to be kept by the next one.
19. The subscript (n+1) indicates the electoral period at which the system would rest again in stationary Nash equilibrium if a deviation occurred in the current period.
20. For the deviant case in which $x_{n+1} > r$, the gains of defection will be greater; therefore, by assuming *n* as an integer the temptation will be underestimated. However, a probability of re-election at *t=n+1* different than *p(r)* will complicate the algebra without changing the conclusion of the analysis.

I^{1N} is the expected pay-off for the incumbent party in the stationary equilibrium and $p_e = p(x^e) = 1$ means that the incumbent's re-election is certain. The sequence of discount factors during the deviation period reflects the fall of reserves. They are expressed as:

$$\delta_1 = \delta\left[W_0 - (x^e - r), \mu\right] \; ; \; \delta_{n-1} = \delta_{n-2}.\delta\left[W_0 - (n-1)(x^e - r), \mu\right]; \; \delta_n = \delta_{n-1}.\delta\left[W^E, \mu\right]$$

In comparison, in a situation where parties play co-operatively, the incumbent's expected pay-off is given by:[21]

$$(12) \quad \mathrm{I}^{1\mathrm{C}} = \left[\frac{(1 - p_r\delta_c)K}{(1-\delta_c)[1+\delta_c - 2\delta_c.p_r]}\right]$$

Note that, regarding the incumbent's discounting, a difference is made between three values for the political factor: in the first place, $\delta_N = \delta(W^E, \mu)$ stands for the discount that applies when the system is at stationary equilibrium with reserves equal to W^E; in the second place, the discount factors during the period of deviation during which reserves are falling; finally, $\delta_c = \delta(W_0, \mu)$ is the value for the discount factor under co-operation, assuming that reserves are kept constant at the level shown at *t=0*.[22]

How can co-operation be sustained?

Co-operation can emerge in this game if appropriate values for the parameters of interest (combinations of μ and *p(r)*) can be found that make the gains of co-operation equal or greater than those of defection. To check under which circumstances this is the case, we study the incentive compatible condition:

$$(13) \qquad I^{1D} - I^{1C} = 0,$$

which, after substituting (11) and (12) and rearranging, results in:

$$(1+\delta_1 \ldots + \delta_{n-1}) + \delta_n\left[\frac{(1 - p_r\delta_N)}{(1-\delta_N)[1+\delta_N - 2\delta_N p_r]}\right] - \left[\frac{(1 - p_r\delta_c)}{(1-\delta_c)[1+\delta_c - 2\delta_c.p_r]}\right] = 0. \quad (14)$$

The *ICC* is expressed as the combination of three terms; from left to right:

i) The gains the incumbent expects to receive for remaining in office without interruption after deviation has occurred. This term captures the *temptation* for

21. This expression is obtained following the same procedure employed to obtain equation (7).
22. As was noted earlier, in the particular case of $W = \overline{W}$, the discount factor only accounts for time preferences (i.e., $\delta_c = \mu$)). This coincides with the solution given by the social planner.

$\overline{W}$

breaking co-operation, being positively related to the initial stock of reserves and current revenues.

ii) The non co-operative pay-off for the party currently in office from period $t=n+1$ onwards.

iii) The expression for the incumbent's expected gains under co-operation.

The aggregation of the last two terms gives the size of the *enforcement*, which size is considerably affected by discounting, both due to political reasons or time preferences. The balance between temptation and enforcement determines the prospects for the emergence or break up of co-operation and this balance is the result of a combination of various effects of contrary direction and magnitude. Some numerical calculations based on equation (14) provide useful information about the consequences of changes in the probability of re-election and the level of myopia.

3.2. Two Scenarios of Co-operation

In what follows the results of two calculations based on (14) are presented. They differ in the assumed size of the temptation, that is to say, the stock of reserves above the level of long-run equilibrium at the disposition of the current incumbent. In the first calculation (shown in Figure 2) at $t=0$ the incumbent by defecting has just enough reserves to improve significantly her probability of re-election for a second mandate. The second (Figure 3) reflects a situation in which the electoral value of the stock, if spent, would allow the incumbent to have a very good chance of retaining office during two consecutive periods.[23]

In both figures the two-dimensional projection of the *ICC* is plotted for combination of values of $p(r)$ and μ. The white area stands for all those values of $p(r)$ and μ where temptation exceeds enforcement (values greater than zero). The shadowed area forms the co-operative region, where a move to a darker zone indicates that the co-operative result is less likely to be altered by changes in the parameters of interest. Additionally, we have superimposed a grid on both figures in order to highlight a number of cases of special interest represented by the corners and the centre of the squared grid.

23. The scenario depicted in Figure 2 is consistent with a low initial value of reserves (e.g., import cover of four months) and a low value of the political discount under co-operation (e.g.,$\delta_c = 0.7$); whereas Figure 3 is consistent with a high stock of reserves (e.g., eight months of imports) and a very low political discount at $t=0$ (e.g. $\delta_c \cong 1$). The figures are generated using the simulation package *Mathematica*.

Figure 2

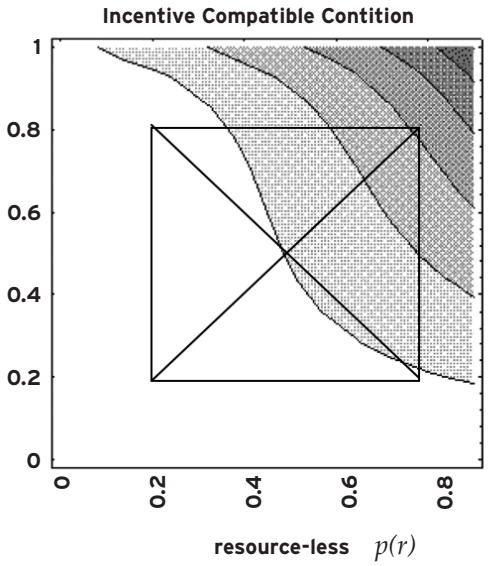


Figure 3

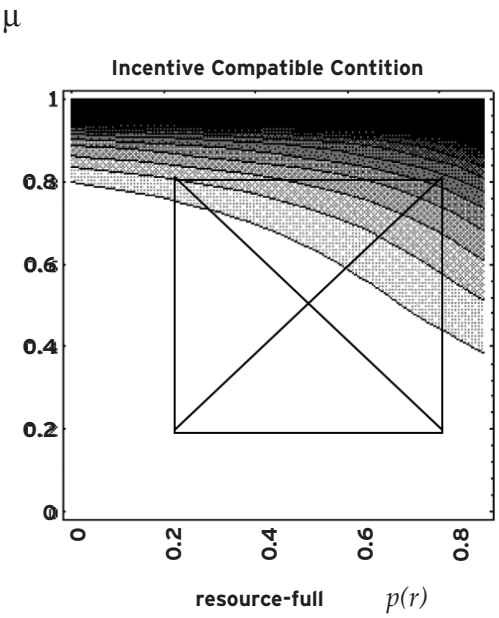


Table 1 summarises co-operation outcomes for three values of $p(r)$ and μ (low = 0.2, medium = 0.5 and high = 0.8). Each of the cells is divided into two areas, the left hand side accounts for the decision associated with the poor incumbent and the right hand side for the outcome of the wealthy one. The two possible decisions are C = co-operate and D = defect. A question mark stands for borderline situations in which the incumbent faces a dilemma whether to co-operate or defect. The shaded areas represent those cases in which both incumbents may take different decisions for the same level of $p(r)$ and μ.

Table 1

p u	0.2		0.5		0.8	
0.2	poor D	D rich	D	D	D	C
0.5	D	D	?	D	C	C
0.8	?	D	C	C	C	C

C= Cooperation ; D= Defection ; ? = Borderline

Some conclusions can be drawn from the graphical analysis:

i) For appropriate parameters ($\mu \geq 0.8$ *and* $p \geq 0.5$), co-operation can be the result of the game under both initial conditions for the stock of reserves. Both incumbents are also willing to show restraint when their chances of re-election are very good (p ≥

0.8) and their level of discounting moderate ($\mu \geq 0.5$). In addition, the wealthy and far-sighted incumbent will also co-operate even when facing a low winning probability.

ii) However, incumbent's myopia undermines the incentives for co-operation. Thus defection is the outcome for when $\mu \leq 0.2$ *and* $p \leq 0.5$. Meanwhile, when the probability of re-election is high ($p \geq 0.8$), while the myopic wealthy incumbent will also defect, the myopic poor incumbent is in a borderline situation, hesitating whether to show restraint – avoiding increasing the risk of a take over – or secure the election. The resource-less incumbent faces a similar dilemma when the electoral chances are even and the level of myopia moderate ($\mu = 0.5$).

iii) A final observation concerns the robustness of co-operation. This is represented by the intensity of the gradation from white to black. As the co-operative zone gets darker, co-operation is more robust to small changes in the values of the parameters. This tends to be more the case for the resourceful incumbent than for the poor one.

In general, the higher the value of current revenues, and consequently $p(r)$, the better the prospects for the emergence of co-operation. In other words, facing a buoyant external context, the incumbent is more willing to co-operate than in a period of low external revenues. Similarly, the lower the level of pure discounting the better the prospects for co-operation. For the middle case ($p = \mu = 0.5$) that reflects conditions in a competitive election with relatively far-sighted parties, the graphical analysis shows that the resource-less incumbent is more willing to co-operate.

To what extent can the conclusions derived from the two calculations be generalised? In the absence of an analytical solution to the *ICC*, we think it is fair to say that these patterns can be taken as representative of the behaviour of the co-operative solution of the game. Similar qualitative results are obtained in calculations made with intermediate values for the temptation (level of reserves), and in that sense they are robust.

4. EXTERNAL BORROWING UNDER ELECTORAL COMPETITION

So far the incumbent's only source of financing is the country's own revenues. This is a quite restrictive an unrealistic assumption, and relaxing it will allow us to deal with the consequences of political alternation for the country's debt burden. When the overriding objective of the incumbent is vote-maximisation there is an incentive to borrow resources in order to finance expenditure and increase electoral support. External borrowing is one of the best sources in terms of political gains, not

only because in this way the incumbent avoids crowding out private investment, but also because, in the short-term, it increases the stock of reserves and improves the credibility on the sustainability of the exchange rate.

This section explores the implications of the externality nature of borrowing when decisions are made in a political framework characterised by alternation of opportunistic parties. The basic idea is that the current government, via decisions on a state variable, can change to its own benefit the incentives and constraints faced by future governments. When the incumbent increases the debt in order to win the current election, she is at the same time buying chances of being back in office in case she loses the current election. These chances are measured as a decrease in the opposition party's probability of being re-elected due to the debt service during the next electoral period. This expected investment in electoral chances may be cancelled out by the negative effect which the increase in foreign debt will have on her prospects of winning future elections if re-elected today. However, discounting makes it likely that the incumbent will disregard this future political cost of today's borrowing decisions.

4.1. General Formulation

The situation under consideration is as follows. During the current electoral period (t=0), and only at this time, the incumbent has an option to issue a consol [24] that would allow her to borrow an amount of resources B from an external source. The additional resources are destined to finance inefficient expenditure such as the execution of projects with a low economic return but with a high short-term political return – e.g., prestige projects. It is assumed that:

i) If contracted, the whole amount of debt is spent during the current electoral period and will be serviced out of future current revenues, with the service payments equal to i^*B, where i stands for the international interest rate.

ii) The level of reserves (W) and the discount factor remain constant throughout the game ($W_{t+1} = W_t$ and $\delta_t = \delta(W_t) = \delta \quad \forall t$). Thus the risk of a military coup remains the same. This last assumption is necessary to make the problem tractable by avoiding the complications introduced by a changing level of reserves and consequently the political discount factor.[25]

The probability of re-election at t=1 is $p_1(b)$, with $b= r + B$. From the subsequent periods the incumbent's winning chances are $p_t(s)$, with $s= r - i^*B$.

24. A consol is a debt instrument that offers a yield in perpetuity and no principal payment.
25. An alternative extreme formulation results after assuming that the debt is serviced out of the stock of reserves, and, consequently, its main effect is on the expected length of the game (i.e., $p(b) = p(r + B)$; $p(s) = p(r)$; $W_{t+1} = W_t - B$). However, a more realistic version would assume that borrowing has two alternative uses: to boost popularity and to build reserves (i.e., $p(b) = p(r+B)$; $W_1 = W_0 + (1-a)B$; with $0 < a < 1$, in which case the incumbent not only has to decide on the optimal amount B^*, but also on the optimal division of the loan between both uses a^*.

If the debt option is taken, the incumbent party obtains a current benefit in terms of her probability of re-election but produces a cost in the future that is going to lower the incumbent's popularity, whichever party it will be. The debt service is an exogenous variable beyond the control of the incumbent. Renegotiation or moratoria are not considered. If they were included, the timing and amount of the debt service will be endogenously determined as the result of a bargaining process with the foreign creditors. Under this set of assumptions the decision on the amount of borrowing can be analysed as follows:

Regarding the incumbent party at time *t*=0 (which is assumed to be *Party I*) the equation governing her expected pay-off under borrowing is:

$$(15) \quad I^{1B} = p(b)\delta.I^{1} + [1 - p(b)]\delta.I^{0} + K\cdot$$

If acting as opposition party during the period when the service of the debt will start, the expected pay-off for the current incumbent at *t=1* is:

$$I^{0} = [1 - p(s)]\delta.I^{1} + p(s)\delta.I^{0},$$

$$(16) \quad I^{0} = \frac{[1 - p(s)]\delta}{[1 - p(s)\delta]} I^{1},$$

whereas if re-elected

$$I^{1} = p(s)\delta.I^{1} + [1 - p(s)]\delta.I^{0} + K,$$

$$(17) \quad I^{1} = \frac{[1 - p(s)\delta]K}{(1-\delta)[1 + \delta - 2\delta.p(s)]}.$$

Finally, after substituting (16) and (17) into (15) and applying algebra, the expression for the total expected pay-off for the incumbent contracting debt at *t*=0 is:

$$(18) \quad I^{1B} = \frac{[1 + p(b)\delta(1-\delta) + p(s)\delta(\delta - 2)]K}{(1-\delta)[1 + \delta - 2\delta p(s)]}.$$

When deciding on the amount to borrow the incumbent will try to set *B* in order to balance the increase in utility resulting from a greater popularity obtained with new borrowing and the discounted expected political loss due to the future service of this debt.

Following a similar procedure, the expected pay-off at *t*=0 for the party in opposition (*Party II*) is derived. Being a passive player his pay-off is subject to *Party I*'s borrowing decision.

$$(19) \quad II^{0B} = [1 - p(b)]\delta . II^{1} + p(b)\delta . II^{0}.$$

If he is elected for the next electoral period:

$$II^{1} = p(s)\delta . II^{1} + [1 - p(s)]\delta . II^{0} + K,$$

$$(20) \quad II^{1} = \frac{[1 - p(s)]\delta . II^{0} + K}{[1 - p(s)\delta]},$$

whereas, if he continues in opposition:

$$II^{0} = [1 - p(s)]\delta . II^{1} + p(s)\delta . II^{0},$$

$$(21) \quad II^{0} = \frac{[1 - p(s)].\delta K}{(1 - \delta)[1 + \delta - 2\delta p(s)]}.$$

After substituting (21) and (20) into (19), the expression for the total expected pay-off at time t=0 for the opposition party is obtained:

$$(22) \quad II^{0B} = \frac{[1 + p(b)(\delta - 1) - \delta\ p(s)(2 - p(s)\delta) - p(b)p(s)\delta(\delta - 1)]\delta\ K}{(1 - \delta)(1 - p\delta)[1 + \delta - 2\delta\ p(s)]}.$$

Finally, the total discounted pay-off for both parties is given by:

$$I^{1B} + II^{0B} = \frac{K}{(1 - \delta)}.$$

4.1. Optimal Borrowing Decision

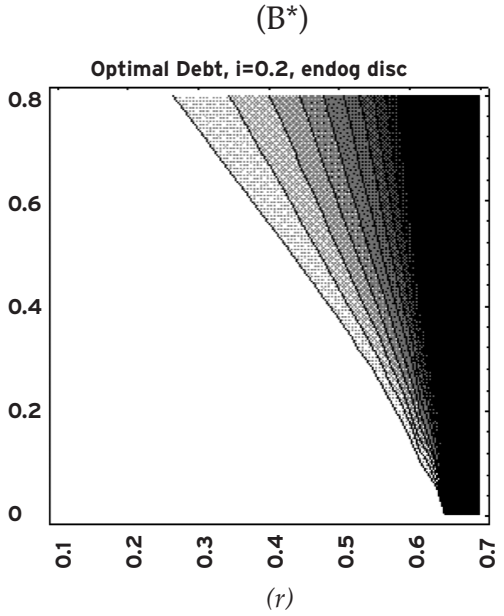
The expression for the optimal borrowing requires solving the first order condition (FOC): $\partial I^{1B} / \partial B = 0$. However, given the difficulties in obtaining an analytical solution, we use graphical analysis to explore the incumbent's decision. The values of optimal borrowing B^* for different values of current revenues r and for a given interest rate are shown in Figure 4. The optimal locus is defined by all those points forming the limit between the white and the dark regions (corresponding to the solutions of the FOC).[26]

The graphical analysis shows that, as expected, B^* and r are negatively related. The more likely the incumbent's re-election by using current revenues is, the lower the amount of debt she is willing to contract to finance inefficient projects. For

26. For the simulation we chose a quadratic function for $p(.)$ of the form $p = 2x - x^2$, $0 <= x <= 1$. The debt service for the period is 0.2 (based on an interest rate of 0.05 per year).

values of r less than 0.65 (corresponding approximately to $p(r) = 0.9$) contracting debt is a dominant strategy for the incumbent. Also note that, due to the reduction in $p(.)$ due to the debt service, the higher the value of foreign debt the more likely the alternation of both parties in office in the long term. Only when the incumbent has a very good change of being re-elected by spending current revenues ($p > 0.9$), the incumbent will abstain from borrowing (this correspond to the area to the right of $r = 0.65$ and $B^* = 0$ in Figure 4).

Figure 4



In order to establish that each optimal point is a maximum the second order condition (SOC) test is required. Given the analytical complications of this test in this model, we take as a representative example the case where $p(r)$ approaches 1/2. In this particular case, the denominator of equation (18), $(1-\delta)[1+\delta-2\delta . p(s)]$, can be simplified as $(1-\delta)$. The expected pay-off if debt is contracted then becomes:

$I^{1B} = [1+p(b)\delta(1-\delta)+p(s)\delta(\delta-2)]K \big/ (1-\delta)$, with a second derivative equal to:

$$\frac{\partial^2 I^{1B}}{\partial B^2} = \delta\, p''(r+B) + \delta(\delta-2)/(\delta-1)(i)^2\, p''(r-iB) < 0.$$

To establish that the above expression is negative it is enough to note that $p''(.) < 0$, and that (δ -2) < 0, (δ -1) < 0. Hence, for this particular case the optimal borrowing is associated with a maximum of the pay-off function.

A more realistic case can be modelled where the incumbent can borrow in more than one electoral period and where the access of new loans is negatively related to

the debt stock. In this wider setting, when opting for borrowing in the current period, the incumbent will consider the impact of previous debt on the availability of future loans. However, as in the situation analysed above, it is unlikely that this effect would restrain the incumbent from borrowing, even if the future is not discounted. Again, the reason lies in the fact that contracting external debt is a dominant strategy for the incumbent. When the incumbent increases the debt in order to win the current election she is at the same time constraining the availability of new loans, if the opposition party happens to be in office.

5. CONCLUSIONS

This paper provides a simple set-up in which to analyse the alternation of two political parties that face the threat of the intervention of a dictator. The key link between the parties and the dictator is the management of a stock of resources in the economy. More explicitly, the incumbent faces a trade-off between using resources to increase its re-election chances and maintaining the stock of resources at a level that is consistent with sustained economic growth.

The basic question addressed in this paper is whether an internal solution exists for the preservation of democracy and the promotion of long-term growth, or if it would require a centralised solution to guarantee formal agreements between both parties. Based on numerical simulations we show that, for appropriate values of the probability of re-election and the discount factor, it is possible to rely on reciprocity to sustain an early-stopping equilibrium. However, co-operation is undermined by low values of re-election probability out of current revenues and party myopia. In those circumstances the self-policing solution might not be viable and an external solution would be necessary. For instance, this can take the form of delegating the incumbent's authority to an independent agency responsible for stabilising the level of reserves, or the imposition of constitutional restrictions on external borrowing.

Another finding is that the willingness to co-operate depends on the initial stock of resources. We presented two cases to study the decisions – whether to co-operate or defect – taken by a poor and a wealthy incumbent for different values of the discount factor and the re-election probability out of current revenues. Although for many combinations of the parameters both incumbent types take similar decisions, there are a number of cases in which they would act differently. For instance, the wealthy and far-sighted incumbent co-operates even when facing a low winning probability, while the poor type defects. And when parties are myopic and the probability of re-election is high, the wealthy type defects whereas the poor incumbent is in a borderline situation, hesitating whether to show restraint – avoiding increasing the risk of a takeover – or secure the election.

Regarding decisions on public debt, we have explored the externality nature of external borrowing when decisions are made in a political framework characterised by the alternation of opportunistic parties. The analysis on the optimal amount of borrowing shows that unless the incumbent's electoral chances without recurring to external borrowing are significantly high, the incumbent, acting unilaterally, will always be willing to contract debt to finance projects with high political returns even though they may not be justified on economic grounds.

Policy and empirical implications

A standard policy prescription is that most of the cost associated with a stop-go economy in developing countries can be avoided if the economy is isolated from the instability and uncertainty of the main source of external income. In the absence of markets to cover the risk involved, the best solution implies a rule of saving and expenditure that provides a mechanism of self-insurance through the creation of a stabilisation fund (Hausmann et al, 1993). However, one implication of the model presented in this paper is that the optimal response to windfalls based on smoothing via a stabilisation fund or by saving abroad part of a bonanza would not be compatible with electoral incentives. Given that a condition for the success of such a fund is the possibility of isolating its management from the discretion of the government, the alternation of parties in office and the potential electoral value of the resources of the fund, generates a problem of credibility.

If a centralised decision is not possible because of a problem of the type '*who guards the guardian?'*, then what is left is a self-policing solution. As was shown, tacit co-operation in maintaining a stock of reserves is possible; yet it would be undermined when the incumbent faces a drastic fall in current revenues or when in need of improving popularity. This implication is consistent with the experience in managing windfalls in oil democracies in Latin America such as Ecuador, Venezuela, Mexico and, to some extent, Colombia.[27]

As to a wider empirical relevance of the situation studied in this paper, the fact that most resource-based developing economies are autocracies or dictatorships (particularly oil countries), reduces its empirical reach. However, despite the use of restrictive assumptions, it sheds some light on understanding the apparent paradox of some mineral-rich democracies - such as the recent experiences of Venezuela and Ecuador – where the countries fail to use the resources at hand to secure sustained growth and improve standards of living in the longer term. And where the deterioration of economic conditions gives rise to political instability and the surge of the threat of dictatorship.

27. See in Harberger (1994) a recount of his experience as an external advisor to the governments of Venezuela and Mexico on the management of oil windfalls during the 1970s and early 1980s.

Caveat

Under the political business cycle hypothesis, elections and electoral incentives result in the generation of economic cycles and policy uncertainty. When these problems are studied in the context of industrialised economies with stable democracies, the solutions under consideration are all in the direction of improving the system, not replacing it. For example, common suggestions as to what should be done are: lengthening the electoral period; creating an independent central bank, informing the electorate, etc. However, there is a risk that when the same problem arises in a developing country with weak institutions or incipient democracy, there could be a strong incentive to question the legitimacy of the political arrangement, and in some cases to seek the "solution" outside the established political framework.

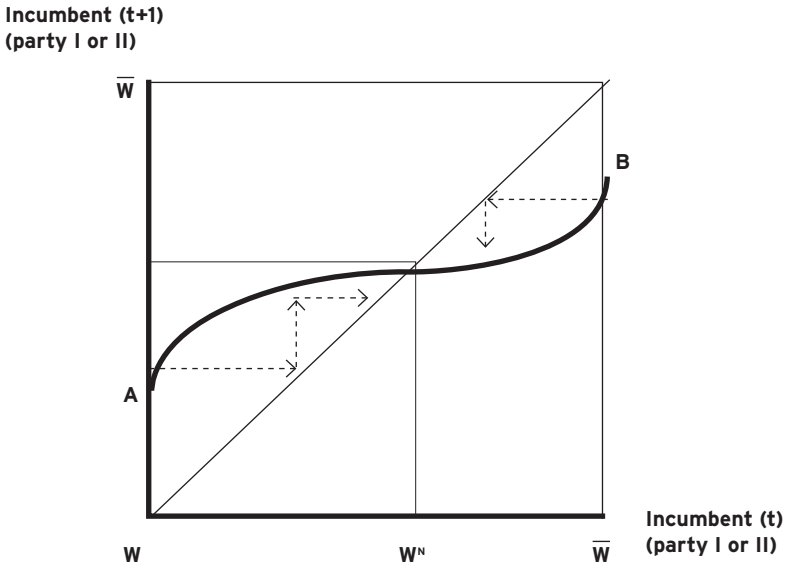
In this paper we introduce the dictator as a source of enforcement, giving him a positive role in a democracy. However, we do not deal with the behaviour - or misbehaviour - and results associated with an incumbent dictator. In general, if the overriding objective of the government is that of regime survival, the nature and amount of inefficiencies might be similar or indeed greater. All regimes require legitimacy to rule, and legitimacy is based on winning political support by granting distributive or re-distributive favours to key groups.[28] And indeed there is no evidence to show that the authoritarian option can produce better economic results than democracies (Przeworski & Limongi, 1993; Przeworski, 2004). Moreover, one important difference is that dictators are more ready to consolidate their power through the use of repression, whilst another disadvantage of non-democratic regimes is that there is usually a high cost to pay when the regime collapses. And, finally, the combination of bad decisions, repression and sudden political breakdowns is likely to outweigh any losses in economic efficiency associated with democracies.

APPENDIX: EXISTENCE AND STABILITY OF EQUILIBRIUM

In this appendix we provide an informal proof of the existence of a unique equilibrium in this game.[29] A case of a unique equilibrium is depicted in Figure A1, showing the dynamic behaviour of the system for a given value of revenues, r, and time preferences, μ. It is assumed that the players follow pure Markov strategies, that is to say, a mapping from values of the state variable into the action set of spending decisions ($s: W \rightarrow X$). The strategies can be interpreted as real reaction functions, i.e., parts of equilibrium strategies that correspond to the solution of the maximisation problem during the transitory state.

28. See Ames (1987) for evidence of the inefficiencies associated with the political survival of dictators in Latin America.
29. A formal proof of existence in a more general framework based on fixed point theorems is provided by Amir (1991) for stochastic games with uncountable state space and infinite horizon.

Figure A1

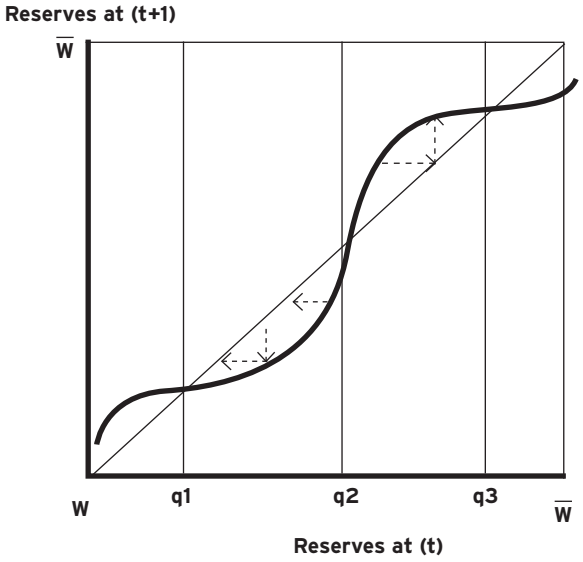


The values of the stock of reserves W are assumed to belong to the closed interval $[\underline{W}, \overline{W}]$. The higher(lower) limit corresponds to a stock such that the probability of a take over is equal to $e(1\text{-}e)$, for an arbitrarily small value of e. The system will rest on a stationary equilibrium (W^N) when the incumbent party does not have any incentive to deviate from the rule of spending $x = r$, given that the next incumbent will not deviate unilaterally. This corresponds to the intersection between the reaction function and the diagonal ($W_t = W_{t+1}$). Two conditions for the existence of such fixed point are: i) for an initial position at (t) equal to the higher level $\overline{W}$, the incumbent at ($t+1$) will leave a level of reserves (B) lower than$\overline{W}$. ii) In contrast, if the lower level $\underline{W}$ is taken as starting point, the incumbent at ($t+1$) will leave a value (A) higher that $\underline{W}$. If conditions (i) and (ii) are satisfied, the reaction curve will cross the diagonal at least in one point.

With regard to the number of stationary positions under non-cooperative behaviour, multiplicity can be discarded as long as the reaction function satisfies the *single crossing condition*. The interpretation of this condition is that, other things being equal, a higher state variable makes more desirable a higher action (more spending). Multiplicity of equilibria would mean that spending is not monotonic with respect to the level of reserves.[30] In order to support case of uniqueness, we provide an argument against multiplicity. A situation of multiplicity of equilibria is shown in Figure A2 for a given time preferences and current revenues. There are three possible values ($\mathbf{q}^1$, $\mathbf{q}^2$, $\mathbf{q}^3$) for the stock at which the system can rest in equilibrium. The lower and the higher points work as local attractors whereas the position at the middle is unstable.

30. For a treatment of the issues related to characterisation of equilibrium in dynamic games, see Fudenberg and Tirole (1991) chapter 13 and references therein.

Figure A2



In order to make our case, we compare two points one above the lower equilibrium point (**q**[1]) and another below the intermediary one (**q**[2]), such as (**a**) and (**b**). Because of the presence of a local attractor, there is a tendency of the system to converge to **q**[1]. Therefore, for any initial position within this interval, during the current electoral period the incumbent is consuming an amount of resources higher than current revenues which results in a reduction of the stock. The incumbent in a position **a** is poorer than the one in **b**. In these circumstances it would be expected for the incumbent with a higher stock to spend at a higher rate than one with a lower level; however, the rate of depletion is higher in **a** than it is in **b** (reflected by the distance respect to the diagonal). So it implies that, for the same μ and r, a more resourceful incumbent would be willing to sacrifice her chances to enjoyed being in office more (i.e., by expending less) than a poorer one, which runs against intuition. In addition, we have performed numerical calculations showing that the structure of the game is consistent with the existence of one equilibrium position. Finally, the game implies a positive relationship between W^E, on one hand, and p (r) and μ on the other. These comparative statics can be expressed as:

$$\frac{\partial W^E(p_r, \mu..)}{\partial r} > 0 \; ; \quad \frac{\partial W^E(p_r, \mu..)}{\partial \mu} > 0$$

The better the chance of re-election given by r, the greater the equilibrium level of reserves at which the incumbent will, unilaterally, spend only current revenues. Similarly, the lower the discounting due to time preferences (higher μ), the higher is the position of the non-cooperative equilibrium.

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