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A PARTISAN MODEL OF POLITICAL MONETARY CYCLES

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This paper develops a political economy model of monetary policy that incorporates electoral economic programs into a rational non-opportunistic partisan framework. The model predicts the likely existence of expansionary monetary policy in pre-election periods and of permanent partisan differences in monetary policy. These results are consistent with empirical findings of Alesina, Cohen, and Roubini (1992, 1993) for a sample including three decades in 19 OECD countries.

1. Introduction

Conventional wisdom suggests that in pre-election periods governments have incentives to stimulate the economy by misusing policy instruments to enhance their prospects of re-election. In a recent series of papers, Alesina and Roubini (1992) and Alesina, Cohen, and Roubini (1992, 1993) have looked for evidence of this type of opportunistic behavior in a large sample of 18 OECD countries. They found some evidence of political monetary cycles, that is, expansionary monetary policy in pre-election periods and of systematic partisan differences in monetary policies.

Apart form the manipulative model of Nordhaus (1975), there exists a new generation of theoretical rational political business cycle models that might account for some of the empirical findings of Alesina, Cohen and Roubini. In particular, building upon earlier work of Rogoff and Sibert (1988) and Rogoff (1990), two political economy models of monetary policy have been constructed by Persson and Tabellini (1990) and Fratianni, von Hagen, and Waller (1993). In these papers, governments have the same utility function as private agents but they are also opportunistic. That is, governments care about winning elections and do not have partisan motivations. Moreover,

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different governments are characterized by different levels of competence and the government is more informed than the voters about its own level of competence. As a consequence, the incumbent government has an incentive to signal its competence by engaging in pre-electoral manipulations of monetary policy.

However, both models share a fairly implausible assumption about the timing of events, namely that voters observe the output but not the level of inflation before the election. This is problematic on two grounds. First, it can be argued that in the real world prices are observed with a shorter lag than output. Second, these models state that the way in which monetary policy affects output is precisely through the observed rate of inflation. As a consequence, at this time the economic literature lacks a sound opportunistic model that could account for the existence of political monetary cycles.

Similarly, rational partisan models like Alesina (1987) and Alesina and Sachs (1988) can explain partisan differences in monetary policies but cannot account for expansionary monetary policies in pre-election periods.

The purpose of this paper is to construct a non-opportunistic political monetary model that might account for expansionary monetary policy in pre-election periods and partisan differences in monetary policies across parties. However, we do not claim that our non-opportunistic model provides a realistic explanation of the actual pattern of monetary growth in the OECD countries. Instead, we want to raise some doubts about the relevance of governmental opportunistic behavior in, explaining why governments do inflate more before elections.

Our approach will be to combine a rational bipartisan model with the model of policy announcements developed by Cukierman and Liviatan (1991). Specifically, it centers upon the two competing political parties elaborating and electoral economic program to be presented to the voters before the elections are held.

Moreover, economic agents know each party's objective function but they are not able to fully determine what kind of policymaker –dependable (who always lives up to his declarations) or non-dependable (who fulfills previously announced plans only if such a course of action is *ex post* efficient)– will be in charge of monetary policy.

The paper is structured as follows. Section 2 presents a justification for the model used and lays down the basic structure of the model itself. Section 3 shows the different types of equilibria (separating, pooling and mixed) and characterizes the conditions for each type of equilibrium to arise, relating equilibrium types to initial reputation, electoral chances and the rate of time preference. Section 4 shows the time paths and the partisan paths for money growth. Concluding remarks follow.

2. The model

Conventional wisdom in macroeconomics implies that employment and output can be influenced by unanticipated inflation and therefore by unanticipated money growth. This can result from either the existence of Fischer (1977)-Taylor (1980) long-term contracts or a Lucas (1973) type short-run Phillips curve. To the extent that monetary policymakers find the natural level of employment too low, the may be tempted to create monetary surprises in order to push employment above its natural level even at the cost of some inflation.

The recent literature provides several explanations for the dissatisfaction of policymakers with the existing natural level of employment. One approach views policymakers as benevolent social planners who conduct monetary policy so as to maximize a single well-defined social welfare function (Kydland and Prescott, 1977; Barro and Gordon, 1983a, 1983b; Rogoff, 1985; Canzoneri, 1985). The rationale for this social welfare approach rests on the notion that, due to distorsionary taxes or union power or both, employment is lower than its socially optimal level, and on the social costs of inflation. The negative effect of inflation (or money growth) on social welfare results from the familiar loss of consumer surplus that inflation produces through the decrease in the public's real money balances.

Another approach views monetary policymakers as being at least partially responsive to political pressures arising from distributional considerations. In this view, policymaker's preferences for a level of employment above the natural rate are due to the fact that a sufficiently important part of each of their constituencies is adversely affected by a low level of employment (Weintraub, 1978; Beck, 1982; Wooley, 1984); Cukierman and Meltzer, 1986; Havrilesky, 1987; Mayer 1990). In this approach the importance assigned to preventing inflation relative to stimulating the economy depends on the relative influence on the monetary authorities of the pro-stimulation and anti-inflation advocates within government and the private sector.

Moreover, in most countries monetary policy may respond at least partially to electoral and other considerations. Electoral influences on monetary policy can be viewed as a segment of the more general area dealing with electoral influences on policy in general, which has become known as the political business cycle. The segment dealing with such influences on monetary policy can be referred to as the political monetary cycle. Two basic approaches to the political monetary cycle can be distinguished. One views parties as being only office motivated. The other views them as trying to implement particular ideologically motivated platforms. This «partisan» view suggests that although parties also try to appeal to voters at large, different parties assign different weights to the welfare of different groups. In particular, left-wing parties are willing to tolerate higher inflation in order to achieve higher levels of employment in comparison to right-wing parties. The reason is that the lower middle class, which mostly supports the left, tends to suffer more during recessions than the upper middle class. Thus left- and right-wing parties cater to the distributional desires of different constituencies.

Redistribution of income can obviously be performed by mean of policy instruments other than monetary policy. Fiscal policy and regulation are prime examples. Havrilesky (1987, 1990) has proposed the hypothesis that monetary policy is often used to offset the incentive and other politically adverse effects of non-monetary, distributionally motivated policies. This point of view provides a different perspective on the higher degree of monetary permissiveness of leftist parties; since they engage in more redistribution, left-wing parties trigger a larger amount of undesirable side-effects that have to be mitigated by higher rates of monetary growth.

These partisan arguments provide a rationale for the model below.

Consider an economy where two distinct political parties (a left-wing party, denote by L and a right-wing party, denoted by R) compete periodically for control of the government. Each period of time the parties' preferences are described by the objective functions

$$u_t^L\ (m_t, m_t^e) = b\,(m_t - m_t^e) - \frac{1}{2}\, m_t^2\,, \qquad [1]$$

$$u_t^R\ (m_t, m_t^e) = z\,(m_t - m_t^e) - \frac{1}{2}\, m_t^2 \qquad [2]$$

where m_t and m_t^e are the actual and rationally expected money growth rates, and $b > z > 0$. Following the partisan theory of monetary policy, it is assumed that the left-wing party cares relatively more about surprise money growth.

Assume further that the winning party directly controls monetary policy. Elections take place every two periods (1, 2) and are held at the beginning of period 1. Thus, period 1 is the post-electoral period and period 2 is the pre-electoral one. The probability distribution of electoral outcomes is taken to be exogenous and, like the objective functions, is common knowledge: party L faces a constant probability, p, of being elected.

The literature about the behavior of «strong» and «weak» monetary policymakers shows a tendency to interpret this difference on the grounds of their different relative preferences for monetary surprises (Vickers, 1986; Ayuso, 1991). However, it can be argued that the literature on partisan policies considers this type of interpretation by conceiving a right-wing policymaker as strong and a left-wing one as weak.

Nevertheless, as in Barro (1986) and Cukierman and Liviatan (1991), there exists an alternative way of seeing those differences. In these papers, both types of policymaker have identical preferences but differ in their ability to precommit to the announcements they make *ex ante* their being in office[1]. Here we encompass both interpretations of the policymaker's type by dividing the policymakers from each party (L, R) into two groups: those who always live up to their promises (dependable, denoted by D) and those who fulfill previously announced plans only if it is *ex post* efficient (non-dependable, denoted by N). This alternative approach considers that a dependable policymaker incurs a prohibitive cost if his previous announcements are not met and, accordingly, his announcements are binding. On the contrary, a non-dependable policymaker incurs no cost if previous announcements are not honored and, accordingly, this policymaker is free to renege on them.

The public does not know how large this cost is because dependability differs across policymakers and is private information. The distribution of policymakers by their level of dependability may reflect the general norms of society. The adherence to previous announcements varies across individuals in a society (and, therefore, across policymakers) and is, at least *a priori*, information private to each individual. Since policymakers are drawn from the society where they live there are similar individual variations in dependability across policymakers. The general public is, at least initially, not fully informed about the dependability of the policymaker in office for the same reason that the dependability of a randomly drawn individual is not known with certainty. Given existing norms each individual is informed *a priori* about the distribution of the population but not about the dependability of particular other individuals (Cukierman and Liviatan, 1991).

In the electoral model I incorporate the assumption that within each party (L, R) the monetary policymaker may be dependable or non-dependable. The public knows this feature but at the time expectations are formed, it does not know which type of policymaker (D or N) the winning party will put in charge of monetary policy. Moreover, we assume that the events «party X is elected» ($X = L, R$) and «party Y's policymakers are dependable» ($Y = L, R$) are independent.

Since the dependability of a policymaker cannot be ascertained until he is in office, his own party is uninformed about that personal characteristic as it is the general public. Accordingly, the winning party may appoint either a dependable or a non-dependable monetary policymaker without knowing for sure which type he is.

The probability held by the public before the beginning of period t, $t = 1,2$, that the future monetary authority in such a period t will be dependable is denoted by α_t. Since being dependable is assumed independent from being leftist or rightist, we will assume that α_t applies to both lef-wing and right-wing future policymakers. α_1 is the given exogenously prior while α_2 will depend on the monetary policy observed in period 1.

[1] Backus and Driffill (1985) are somewhat less explicit about the source of the differences between strong and weak policymakers; these authors consider a strong policymaker as one who never inflates. This may be due to his not being concerned about monetary surprises or to his being irrevocably committed to a zero money growth rate.

Each party elaborates an electoral economic program announcing its stance on monetary policy (i. e., the money growth rates for periods 1 and 2)[2].

The sequence of events in the model is the following:

Period 0:

a) Pre-electoral polls reveal that party L will win with probability p and party R with probability 1-p.

b) Both parties elaborate and announce their electoral programs.

Period 1:

c) The public forms money growth expectations for period 1.

d) The election is held.

e) The policymaker chooses period 1 money growth.

Period 2:

f) The public sets money growth expectations for period 2.

g) The policymaker chooses period 2 money growth.

This sequence of events assumes that electoral programs do not affect the probability of being elected, because this probability p is known before the programs are elaborated and announced. Moreover, p is assumed to be exogenous and therefore independent of previous policies. One way to rationalize that neither announcements nor previous policies affect p is by assuming that monetary policy is only a small part of total policy.

After the election held at the begininng of period 1 a party is in office. One of the two types of policymaker from the party elected runs monetary policy for his two periods in office, but the public does not know the type with certainty. However, the first-period monetary policy observed may convey to the public information about the type of policymaker in office. As a result, the public, having observed period 1 policy, updates its probability of the event that the policymaker is dependable. Therefore, in choosing first-period money growth, a non-dependable policymaker takes into account the effect of this monetary stance on his second-period reputation.

3. Monetary policy with electoral programs

Each electoral term the objetive of both types of policymaker within each party is to maximize the present value of utility

[2] The announcement of electoral economic programs can be made optional rather than compulsory. In such a case, however, the political parties have an incentive to effectively announce the economic programs and the results woulds be exactly the same.

$$UL = u_1^L\ (m_1, m_1^e) + \delta\, u_2^L\ (m_2, m_2^e),\ \delta > 0, \qquad [3]$$

$$UR = u_1^R\ (m_1, m_1^e) + \lambda\, u_2^R\ (m_2, m_2^e),\ \lambda > 0, \qquad [4]$$

where δ and λ are the left-wing and right-wing rates of time preference, respectively. The analysis will be performed by assuming that party D is elected. The results can be easily extended to a party R electoral victory.

Given the sequence of events within the model, we have a dynamic game of imperfect information. The appropiate equilibrium concept for this kind of game is Perfect Bayesian Equilibrium (PBE) since it introduces explicitly a player's belief about what may have transpired prior to his move as a means of testing the sequential rationality of the player's strategy[3]. In our particular framework, the public has a prior belief (α_1) about the policymaker type and this belief may be updated to α_2 after observing period 1 monetary policy. A set of strategies and a belief function $\alpha_2 \in [0, 1]$ giving the public's probability assessment that the policymaker is dependable after observing period 1 monetary policy is a Perfect Bayesian Equilibrium (PBE) if

a) the policymakers' strategies are optimal given the public's strategy (its money growth expectations), and

b) the belief function is derived from the policymakers' strategies using Bayes' rule when possible.

The policymakers' strategy vectors (announcement and actual monetary stance, respectively) of the two types of left-wing policymaker (LD, LN) for each period are

$$S^{LD} = \{m_1^{LDa}, m_1^{LD}, m_2^{LDa}, m_2^{LD}\}, \text{ and } S^{LN} = \{m_1^{LNa}, m_1^{LN}, m_2^{LNa}, m_2^{LN}\}$$

with

m_t^{LDa} : money growth announcement for period t by a dependable policymaker.

m_t^{LD} : actual money growth in period t under a dependable policymaker.

m_t^{LNa} : money growth announcement for period t by a non-dependable policymaker.

m_t^{LN} : actual money growth in period t under a non-dependable policymaker.

It is important to note that the monetary announcements for both periods are made (and contained within an electoral program) before the election is held.

[3] See, for instance, Mas-Colell, Whinston and Green (1995) or Fudenberg and Tirole (1991).

We are now ready to determine the equilibrium strategies for the two types of policymakers. We begin our analysis at the end of the game. Consider the behavior of a non-dependable left-wing policymaker (LN) in period 2. Since he incurs no cost for reneging on the announcement, he always creates money at the discretionary rate. This rate is given by maximizing u_2^L in equation [1], which gives.

$$m_2^{LN} = b. \quad [5]$$

However, he may not necessarily pick *b* in period 1 if he feels it is disadvantageous to be revealed as non-dependable by his choice of first-period monetary stance. That depends on the relationship between the benefit in the first period of choosing *b* rather than mimicking the dependable policymaker and the cost of being revealed as non-dependable already at the beginning of period 2. If the cost is smaller than the benefit, such a *LN* policymaker chooses *b* in period 1, producing a separating equilibrium. If the cost is larger than the benefit, he mimics the behavior of the dependable left-wing policymaker (*LD*) in period 1 producing a pooling equilibrium. Moreover, the non-dependable policymaker can randomize between mimicking the dependable one and separating from him. Each type of equilibrium will arise depending on the values of the left-wing discount factor, δ, of the initial reputation, α_1, and of the probability of being elected, *p*. It is useful to consider separately the three different types of equilibria that might arise.

3.1 Separating equilibrium

Suppose there exists a configuration of parameters (α_1, δ, *P*) so that a separating equilibrium arises. Since the public knows these parameters, it also knows that the monetary authority will reveal his type by the end of period 1.[4] This implies that the non-dependable policymaker will not mimic the dependable one in the first period. Given this fact, the best choice of actual money growth for *LN* is the discretionary rate, b, and this is common knowledge. However, the identity of the monetary authority is not known by the public prior to the realization of m_1.

Consider now the following strategy for the LD policymaker. At the start of period 1 he announces a rate of money growth m_1^{LDA}. Since he is dependable he also delivers this rate during the period and this fact is known by the public. Hence, the expected money growth rate for period 1 is

$$m_1^e = pm_1^{Le} + (1-p)m_1^{Re} = p\,[\alpha_1\, m_1^{LDa} + (1-\alpha_1)\, b] + (1-p)m_1^{Re}. \quad [6]$$

[4] The separation occurs in period $t = 1$, when choosing actual money growth. As we will demonstrate below, the LN policymaker has an incentive to mimic the announcement of the LD policymaker in period 0, so that separation does not occur at the announcement stage.

A necessary condition for maximization of UL by LD is the maximization of utility in period 1. Substituting [6] into [1] and noting that $m_1^{LDa} = m_1^{LD}$, this problem can be rewritten as

$$max \left\{ -\frac{1}{2} (m_1^{LDa})^2 + b[(1- p\alpha_1)m_1^{LDa} - p(1-\alpha_1)b - (1-p)m_1^{Re}\right\}, \quad [7]$$

whose solution is

$$m_1^{LDa} = b(1 - p\alpha_1) \quad [8]$$

The corresponding value of his utility is

$$u_1^L (m_1^{LDa}, m_1^e) = b^2 \left[\frac{1}{2} - p + \frac{1}{2} (p\alpha_1)^2\right] - b(1-p)\, m_1^{Re}.$$

In the second and last period type LD is known to be himself with certainty when he is in office, because it is known both which party was elected and the monetary stance in period 1. In any PBE, beliefs on the equilibrium path must be correctly derived from the equilibrium strategies using Bayes' rule. Here this implies that upon seeing period 1 actual money growth $m_1^{LDa} = b(1-p\alpha_1) = m_1^{LD}$, the public must assign probability $\alpha_2 = 1$ to the policymaker being dependable. Therefore, his announcement for the second period is fully believed and $m_2^e = m_2^{LDa}$. Hence, when the monetary authority is a LD policymaker, the second-period utility function reduces to

$$max \left\{-\frac{1}{2} (m_2^{LDa})^2\right\}, \quad [9]$$

This program is maximized for $m_2^{LDa} = 0$ provided the LD policymaker announces within an electoral program that this is the rate of money growth to which he is commited.

Now we examine the behavior of the LN policymaker in period 0 (at the announcement stage). Since equilibrium is separating, such a policymaker knows that the will choose b already in the first period. But he can improve utility by mimicking the announcement, m_1^{LDa}, of the dependable policymaker in period 0. The reason is that otherwise his first-period utility is $u_1^L [b, pb + (1-p)\, m_1^{Re}]$ since expectations would adjust already at the start of period 1. However, if m_1^{LDa} is announced, expectations are given by [6] and utility in period 1 is

$$u_1^L(b, m_1^e) = b^2 \left\{\frac{1}{2} - p[\alpha_1 (1 - p\alpha_1) - p(1 - \alpha_1)]\right\} - b(1-p)\, m_1^{Re}$$

which exceeds $u_1^L[b, pb + (1-p)\, m_1^{Re}]s$.

The LN policymaker picks the discretionary rate b in the second period because he no longer is able to affect expectations. Since in any PBE the beliefs are updated using Baye's rule, then the public, upon seeing period 1 actual money growth b, must assign probability $\alpha_2 = 0$ to the policymaker being dependable. For this reason his second-period announcement has no effect on expectations. As a consequence, in order to not being revealed as non-dependable already in period 1, such a *LN* policymaker will pick the same second-period announcement chosen by the dependable policymaker. Hence, we find a sole electoral program elaborated by party *L*. This program contains two monetary announcements: a first-period announcement and a second-period announcement.

Summing up, the equilibrium strategies of the two types under separation are

$$S_s^{LD} = \{m_1^{LDa}, m_1^{LD}, m_2^{LDa}, m_2^{LDa}\} = \{b(1-p\alpha_1), b(1-p\alpha_1), 0, 0\} \quad [10]$$

$$S_s^{LN} = \{m_1^{LNa}, m_1^{LN}, m_2^{LNa}, m_2^{LN}\} = \{b(1-p\alpha_1), b, 0, b\} \quad [11]$$

A separating equilibrium arises if and only if, given the *LD* policymaker's equilibrium strategy and expectation formation, *LN* is better off choosing b rather than mimicking *LD* and creating money at rate $b(1-p\alpha_1)$ in the first period. Hence, if that equilibrium emerges it must provide a two-period utility greater than the utility provided by a mimicking strategy. Such a mimicking strategy is

$$S_m^{LN} \equiv S^{LN}\big|_{\text{mimicking}} = \{b(1-p\alpha_1), b(1-p\alpha_1), 0, b\}. \quad [12]$$

Note that mimicking creates zero money growth expectations for period 2. The reason being that if *LN* mimics *LD* in the first period, the public will believe that the policymaker in office is dependable. This is so because a *LN* policymaker will always make the same monetary announcement as the *LD* one. Since being dependable allows to lower money growth expectations, and since one always wants lower expectations, and since there is no cost to the *LN* policymaker of deviating from his announcements, then it must be true that for any equilibrium announcement by the *LD* policymaker, the *LN* will mimic it.

The present value of his utility under this mimicking strategy is

$$UL(S_m^{LN}) = \frac{1}{2} b^2 [1 + \delta + (p\alpha_1)^2] - b(1-p)\, m_1^{Re}.$$

If, on the other hand, LN adheres to the separating equilibrium in [11], the present value of his utility is

$$UL(S_s^{LN}) = \frac{1}{2} b^2 [1 - \delta + 2(p\alpha_1)^2 - 2p] - b(1-p)\, m_1^{Re}.$$

Consequently, a separating equilibrium emerges if and only if $UL(S_s^{LN})$ exceeds $UL(S_m^{LN})$. This is equivalent to the condition

$$\frac{1}{2}(p\alpha_1)^2 > \delta \quad [13]$$

Note that, given the parameter values b, p, α_1 and δ, the separating equilibrium in [10] and [11] is the only separating Perfect Bayesian equilibrium. The reason is that in the second period, once their types have been fully revealed, both policymakers always follow their most preferred strategies which are 0 and b for *LD* and *LN*, respectively.

Since the equilibrium is separating, the best actual monetary stance for *LN* in period 1 is b. And given separation, m_1^{LDa} is the only equilibrium strategy for *LD* in period 1. As *LN* is always better off announcing the monetary program (m_1^{LDa}, m_2^{LDa}) than doing anything else, both types always announce (m_1^{LDa}, m_2^{LDa}) within the electoral program.

Hence, there exists a sole equilibrium electoral program for party *D* when the equilibrium is separating. Such a program is given by [10] and [11].

3.2 *Pooling equilibrium*

In a pooling equilibrium there is no separation until the last move of the game which involves the choice of actual money growth in period 2. Hence, in all previous moves *LN* must mimic *LD*. That is

$$m_t^{LDa} = m_t^{LNa}, \; t = 1,2, \qquad [14]$$

$$m_1^{LDa} = m_1^{LN} \equiv m_1^{LDa}. \qquad [15]$$

Since the *LN* policymaker cannot commit to stick to the announcement, and since the second period is the last one, the *LN* policymaker always chooses the discretionary rate, b, in that period. Let m_1^{LDa} be the rate of money growth chosen and announced by type *LD* for period 1. The public knows the parameters of the model and therefore the fact that equilibrium is pooling. Hence, expectations are

$$m_1^{Le} = m_1^{LDa}, \qquad [16]$$

$$m_1^e = pm_1^{Le} + (1-p)\, m_1^{Re} = pm_1^{LDa} + (1-p)\, m_1^{Re}, \qquad [17]$$

$$m_2^{Le} = \alpha_2 m_2^{LDa} + (1-\alpha_2)\, b = \alpha_1\, m_2^{LDa} + (1-\alpha_1)\, b, \text{ if party } L \text{ is elected} \qquad [18]$$

The second equality in [18] is a consequence of the fact that (excluding period 2 money growth) the strategies of both policymakers are identical, as shown by [14] and [15]. As a result, there is no change in the probability distribution of policymaker's types held by the public although both the electoral outcome and the first-period money stance are known.

The *LD* policymaker knows that the public is aware of the fact that the *LN* policymaker will mimic his announcement and his monetary stance for period 1. Hence, he knows that any announcement will be fully believed as specified in [16] and [17]. Since both types adhere to their electoral program for period 1, there is no unexpected money growth if party *L* is elected. The money growth rate that maximizes *LD's* utility in the first period is obtained by using [17].

$$max \left\{ -\frac{1}{2}\, (m_1^{LDa})^2 + b\, [m_1^{LDa} - pm_1^{LDa} - (1-p)\, m_1^{Re}] \right\} \qquad [19]$$

The solution is

$$m_1^{LDa} = b\ (1-p) = m_1^{LNa} = m_1^{LN}. \qquad [20]$$

The optimal announcement elaborated by *LD* for the second period under a pooling strategy is obtained by using [18]:

$$max \left\{-\frac{1}{2}\ (m_2^{LDa})^2 + b\ [m_2^{LDa} - \alpha_1 m_2^{LDa} - (1-\alpha_1)\ b]\right\} \qquad [21]$$

The solution es $m_2^{LDa} = b(1-\alpha_1)$. To sum up, the strategies of the two policymakers under pooling are

$$S_p^{LD} = \{b\ (1-p),\ b(1-p),\ b\ (1-\alpha_1),\ b\ (1-\alpha_1)\} \qquad [22]$$

$$S_p^{LN} = \{b\ (1-p),\ b(1-p),\ b\ (1-\alpha_1),\ b\} \qquad [23]$$

and the corresponding expectations are

$$m_1^e = bp\ (1-p) + (1-p)\ m_1^{Re}, \qquad m_2^e = b(1-\alpha_1^2). \qquad [24]$$

A pooling equilibrium arises if and only if, given *LD's* equilibrium strategy and expectation formation, *LN* is better off following the strategy S_p^{LN} than deviating from it. If he follows the strategy S_p^{LN}, the present value of his utility is

$$UL\ (S_p^{LN}) = \frac{1}{2}\ b^2\ [(1-p)^2 + \delta\ (2\alpha_1^2-1)] - b\ (1-p)\ m_1^{Re}$$

If the *LN* policymaker decides to deviate from S_p^{LN}, then he chooses b rather than $b\ (1-p)$ n period 1. However, since he is better off not being revealed prior to the formation of first-period expectations, he still announces a money growth rate equal to $b\ (1-p)$, thus maintaining first-period expectations at that rate. Since he deviates from the pooling equilibrium strategy, the non-dependable policymaker's type is common knowledge at the start of period 2. Hence, the public expects a monetary stance at rate b for period 2 if party L wins the election and, after that, *LN* deviates in period 1. Summing up, the entire strategy of the *LN* policymaker when he deviates from S_p^{LN} is

$$S_{nm}^{LN} \equiv S^{LN}\big|_{\text{no mimicking}} = \{b(1-p),\ b,\ b(1-\alpha_1),\ b\}$$

and the corresponding expectations are

$$m_1^e = bp\ (1-p) + (1-p)\ m_1^{Re}, \quad m_2^e = b. \qquad [25]$$

Therefore, if the *LD* policymaker does not mimic, the present value of his utility is

$$UL\ (S_{nm}^{LN}) = \frac{1}{2}\ b^2\ [1 - \delta - 2p\ (1-p)] - b(1-p)\ m_1^{Re}$$

Hence, a pooling equilibrium emerges, if and only if $UL\ (S_p^{LN}) > UL\ (S_{nm}^{LN})$, which is equivalent to the condition

$$\delta > p^2/2\alpha_1^2 \qquad [26]$$

Observe that, given parameter values b, α_1, p and δ, the pooling equilibrium in [22] and [23] is the only pooling Perfect Bayesian equilibrium.

3.3 Mixed-strategies equilibrium

Instead of choosing m_1^{LDa} or b in the first period, the *LN* policymaker may randomize between them. Let H and $1-H$ be the probabilities assigned to m_1^{LDa} and b, respectively. Since this strategy (although not its realization) is common knowledge, the money growth rate expected by the public for period 1 is

$$m_1^e = p\ \{\alpha_1 m_1^{LDa} + (1-\alpha_1)\ [Hm_1^{LDa} + (1\text{-}H)b]\} + (1-p)\ m_1^{Re} \qquad [27]$$

Whatever the outcome of the randomization, the *LN* policymaker always chooses the discretionary rate b in period 2. If the realization of his period 1 randomization is also b, he is revealed as non-dependable and he loses the ability to get a monetary surprise in period 2 since the public, by updating its belief to $\alpha_2 = 0$, expects a money growth rate b. If the realization of period 1 randomization is m_1^{LDa}, the public remains unsure about the identity of the policymaker into the second period. It then pays the *LN* policymaker to announce the same rate of money growth as a *LD* policymaker would have done. The reason for this is that he thereby retains some ability to surprise the public in period 2. Thus,

$$\dot{m}_1^{LDa} = m_2^{LNa}. \qquad [28]$$

Although it remains unsure about the policymaker's type at the start of period 2, the public updates its probability of the event that the policymaker is dependable (α_2) by means of Bayes's rule:

$$\alpha_2 = Pr\left[D \mid m_1^{LDa}, m_2^{LDa}\right] = Pr\left[D \mid m_1^{LDa}\right] =$$

$$= \frac{Pr\left[m_1^{LDa} \mid D\right] Pr\ [D]}{Pr\left[m_1^{LDa} \mid D\right] Pr\ [D] + Pr\left[m_1^{LDa} \mid N\right] Pr\ [N]} = \frac{\alpha_1}{\alpha_1 + H(1-\alpha_1)} \qquad [29]$$

Given α_2, the expected money growth rate for period 2 is

$$m_2^e = \alpha_2 m_2^{LDa} + (1-\alpha_2)\, b, \qquad [30]$$

where m_2^{LDa} is the money growth rate chosen by the *LD* policymaker in period 2. In view of [30], the second-period problem of a *LD* policymaker is

$$max\ \delta\ \{-\frac{1}{2}\ (m_2^{LDa})^2 + b\ [m_2^{LDa} - \alpha_2 m_2^{LDa} - (1-\alpha_2)\ b]\}, \qquad [31]$$

whose solution is

$$m_2^{LDa} = b(1-\alpha_2). \qquad [32]$$

In the first period a *LD* policymaker chooses m_1^{LDa} so as to maximize the present value of his utility, taking into account the way the public forms period 1 expectations, as given by [27]. Since the maximized value of period 2 objetive function is $-1/2\ \delta\,(1-\alpha_2^2)\,b^2$ and it does not depend on m_1^{LDa}, the problem reduces to

$$max\left\{-\frac{1}{2}\,(m_1^{LDa})^2+\left[m_1^{LDa}-p\,\{\alpha_1 m_1^{LDa}+(1-\alpha_1)\,[Hm_1^{LDa}+(1-H)b]\}\right.\right.$$
$$\left.\left.-(1-p)\,m_1^{Re}\right]\right\} \qquad [33]$$

whose solution is

$$m_1^{LDa}=bx, \qquad [34]$$

where $x\equiv 1-p\alpha_1-p\,(1-\alpha_1)\,H$.

Summing up, when the *LN* policymaker randomizes between m_1^{LDa} and b in the first period, the strategies of the two types of policymaker from party *L* are

$$S_M^{LD}=\{bx,\ bx,\ b(1-\alpha_2),\ b\,(1-\alpha_2)\} \qquad [35]$$

$$S_M^{LD}=\{bx;\ bx\ \textit{with prob. } H \textit{ or } b \textit{ with prob. } 1\text{-}H;\ b(1-\alpha_2);\ b\} \qquad [36]$$

The value of the mixing probability, *H*, is determined by the condition that the *LN* policymaker is indifferent between mimicking the dependable one (picking $m_1^{LDa}=bx$) and choosing b and being revealed already at the start of period 2.

The present values of *LN's* objetives when he mimics *LD* and when he does not are, respectively

$$UL\,(S^{LN}\mid m_1^{LDa})=-\frac{1}{2}\,(m_1^{LDa})^2+b\,(m_1^{LDa}-m_1^e)+\delta\left[-\frac{1}{2}\,b^2+b\,(b-m_2^e)\right]$$
$$UL\,(S^{LN}\mid b)=-\frac{1}{2}\,b^2+b\,(b-m_1^e)+\delta\,b^2/2,$$

where

$$S^{LN}\mid m_1^{LDa}\equiv\{m_1^{LDa},\ m_1^{LDa},\ m_2^{LDa},\ b\}, \qquad [37]$$

$$S^{LN}\mid b\equiv\{m_1^{LDa},\ b,\ m_2^{LDa},\ b\}. \qquad [38]$$

The probability *H* is determined by the indifference condition

$$UL\,(S^{LN}\mid m_1^{LDa})=UL\,(S^{LN}\mid b). \qquad [39]$$

Using [27], [30] and [32], substituting the resulting expression in [39] and rearranging, one obtains

$$UL(S^{LN}\mid m_1^{LDa})=\frac{1}{2}\,b^2x^2-b^2p\,(1-\alpha_1)\,(1-H)+\delta b^2\,(2\alpha_2^2-1)/2$$
$$-\,b(1-p)\,m_1^{Re},$$
$$UL(S^{LN}\mid b)=-\frac{1}{2}\,b^2+b^2\,[1-p\alpha_1x-p\,(1-\alpha_1)\,Hx]-b^2p(1-\alpha_1)\,(1-H)\,b$$
$$-\,\delta b^2/2-b(1-p)\,m_1^{Re}.$$

Equating these expressions, one obtains the following second degree equation

$$x^2 - 2x + 1 - 2\delta\alpha_2^{\,2} = 0, \tag{40}$$

whose solution is

$$x = 1 - \alpha_2 \sqrt{2\delta}. \tag{41}$$

Since p, α_1, and H are bounded between 0 and 1, $0 \leqslant x \leqslant 1$. Hence, the positive root can be ruled out. Equation [42] is obtained by substituting α_2 from [29] into [41]:

$$x = 1 - \frac{\alpha_2 \sqrt{2\delta}}{\alpha_2 + H(1-\alpha_1)}. \tag{42}$$

Equation [42] can be rearranged to provide an explicit solution for H.

$$H = \frac{-2p\alpha_1 (1-\alpha_1) \pm \sqrt{4p\,(1-\alpha_1)^2\alpha_1\sqrt{2\delta}}}{2p(1-\alpha_1)^2} \tag{43}$$

We can observe that [43] is another second degree equation. This means that it also has two solutions to H. It can be seen that there is always a negative root. Therefore, there is always at most one solution between 0 and 1. Ruling out the negative root and rearranging [43] we obtain

$$H = \frac{1}{p(1-\alpha_1)}\left[-p\alpha_1 + \sqrt{p\alpha_1\sqrt{2\delta}}\right]. \tag{44}$$

The equilibrium strategy of the LN policymaker is truly mixed if and only if this solution occurs in the open range (0,1). [44] shows that

$$\begin{aligned} &H > 0 \text{ if and only if } \delta > p^2\alpha_1^2/2, \\ &H = 0 \text{ if and only if } \delta = p^2\alpha_1^2/2, \\ &H < 1 \text{ if and only if } \delta < p^2/2\alpha_1^2, \\ &H = 1 \text{ if and only if } \delta = p^2/2\alpha_1^2, \end{aligned} \tag{45}$$

4. Time and partisan paths for money growth

Expression [45] in conjuntion with [13] and [26] allows us to completely characterize the condition leading to alternative types of equilibria. Thus, equilibrium is

separating if and only if $\delta \leqslant p^2\alpha_1^2/2$ [46]
mixed if and only if $p^2\alpha_1^2/2 < \delta < p^2/2\alpha_1^2$ [47]
pooling if and only if $p^2/2\alpha_1^2 \leqslant \delta$ [48]

Observe that, given the parameter values b, α_1, p, and δ, the mixed equilibrium in [35] and [36] is the only mixed Perfect Bayesian Equilibrium. As a result, depending upon those parameter values, our game may have either a single separating PBE, or a single pooling PBE, or a single mixed PBE. Therefore, in our model there does not exist the striking multiplicity of equilibria usually observed in most dynamic games with imperfect information and, in turn, we do not need to resort to equilibrium refinements such as Cho and Kreps' (1987) intuitive criterion.

Expression [46] shows that the smaller both α_1 and p the smaller the range of δ's for which separating equilibria emerge. Moreover [48] shows that the smaller α_1 and the higher p the smaller the range of δ's for which pooling equilibria arise. The intuition underlying these results is as follows: the smaller both the reputation α_1 and the electoral probability p the larger the money growth rate chosen by *LD* in period 1 when separation is expected (see [8]). However, the larger this rate, the stronger the incentive of the *LN* policymaker to postpone separation to the last period. Hence, the range of δ's for which equilibrium is separating shrinks.

In addition, as can be seen from the expression for $UL\,(S_p^{LN})$, the benefit to the *LN* policymaker of fully mimicking the *LD* one decreases as reputation declines and p rises. As a consequence, the range of δ's for which equilibrium is pooling also shrinks. The intuition is clear: despite following a pooling strategy, a *LN* policymaker still can surprise the public in period 1 if p is distinct from one. The surprise will be higher the smaller p. At the same time $m_2^e = b\,(1-\alpha_1^2)$, as [24] shows. Thus, the surprise *LN* can obtain in period 2 is lower the smaller α_1.

If we assume that on average the electoral probabilities of left-wing and right-wing parties are somewhat similar ($p \simeq 0.5$) it can be fully characterized the type of equilibria that –on average– arise for alternative combinations of α_1 and δ. If we put a diffuse prior on the pair for parameters α_1 and δ, mixed and pooling equilibria are likely to emerge but it will be difficult to see separating equlibria. In fact, the condition for a separating equilibrium is virtually unachievable unless policymakers discount the second period almost entirely, since it requires that δ be at most $p^2\alpha_1^2/2 = (0.5^2 \cdot 1^2)/2 = 0.125$. (See Figure 1).

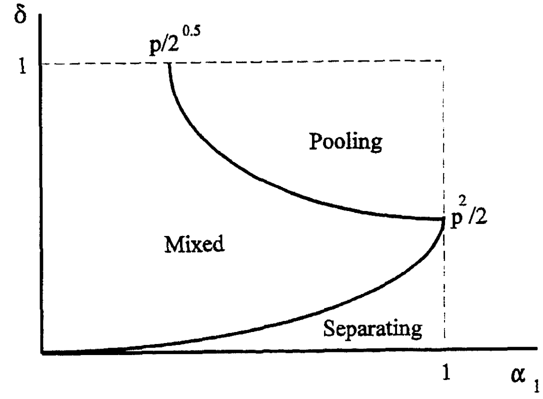

Figure 1
Types of equilibrium according to α_1 and δ

Separating, pooling and mixed equilibria for party R are derived similarly to party L's case. In particular, if the common objective of right-wing policymakers is to maximize [4], then the results obtained above can be directly extended to party R's case by substituting R for L, λ for δ, $(1-p)$ for p, and z for b.

If equilibrium is separating and the left-wing policymaker is dependable money growth will be lower in period 2, since in this equilibrium $m_1^{LD} = b(1-p\alpha_1) > 0$ and $m_2^{LD} = 0$, so that $m_1^{LD} > m_2^{LD}$. If the left-wing policymaker is non-dependable, money growth does not change across periods, since $m_1^{LN} = b$, $m_2^{LN} = b$, and $m_1^{LN} = m_2^{LN}$. Therefore, provided there exist dependable left-wing policymakers, if equilibrium is separating we will tend to observe —on average— decreasing money growth in pre-election periods (period 2). However, as stressed above, the likelihood of observing separating equilibria is very small.

If equilibrium is pooling and the left-wing policymaker is dependable, the money growth rates are $m_1^{LD} = b(1-p)$ and $m_2^{LD} = b(1-\alpha_1)$. Therefore, money growth will be higher in period 2 if $m_2^{LD} = b(1-\alpha_1) > m_1^{LD} = b(1-p)$, that is, if the condition $p > \alpha_1$ is fulfilled. If the left-wing policymaker is non-dependable, money growth is always higher in period 2 because, in such a case, $m_2^{LN} = b > m_1^{LN} = b(1-p)$. Since there is always a higher pre-electoral money growth under non-dependable policymakers and there is a positive chance for the condition $p > \alpha_1$ to be fulfilled under dependable policymakers, we can conclude that, if equilibrium is pooling, we will tend to observe —on avergage— higher money growth in pre-election periods.

If equilibrium is mixed and the left-wing policymaker is dependable, the money growth rates are $m_1^{LN} = bx$ and $m_2^{LD} = b(1-\alpha_2)$. Accordingly, money growth in period 2 is higher if the condition $(1-\alpha_2) > x$ is fulfilled. This condition can be rewritten as $\delta > 1/2$ (which seems to be a very reasonable condition to be met). If the left-wing policymaker is non-dependable, the money growth rates are $m_1^{LN} = bx$ with probability H or $m_1^{LN} = b$ with probability $1-H$, and $m_2^{LN} = b$. Therefore, money growth does not change across periods with probability $1-H$ $(m_1^{LN} = m_2^{LN} = b)$ and is higher in period 2 with probability H $(m_1^{LN} = bx < m_2^{LN} = b)$. Accordingly, on average, if equilibrium is mixed we will tend to observe higher money growth in pre-electoral periods.

Overall, since we have shown that in our model separating equilibria are scant and mixed and pooling equilibria provide *on average* higher pre-electoral money growth, our model generates the prediction that money growth will tend to be higher before elections and lower after elections, irrespective of the party in power.[5]

[5] The time paths for money growth under right-wing governments can be derived from a similar reasoning by substituting λ for δ and (1-p) for p. The conclusion about the existence, on average, of higher pre-electoral money growth rates also applies under right-wing policymakers.

In general, if we assume that the left-wing and right-wing rates of time preference and electoral probabilities are somewhat similar ($\delta \cong \lambda$, and $p \cong 0.5$), then the differences that could exist between left- and right-wing money growth rates will depend upon the difference $(b\text{-}z)$. Since by assumption this difference is positive, our model predicts that *on average* money growth rates will be higher under left-wing administrations. As an example, consider the period 1 money growth rate created under pooling by left- and right-wing policymakers: $m_1^L = b(1-p)$, $m_1^R = zp$. Since the partisan theory assumes that $b > z$, if $1-p \cong p$, then $m_1^L > m_1^R$. This argument is clearer when comparing the discretionary money growth rates delivered by non-dependable policymakers: $b > z$.

5. Conclusions

This paper develops a political monetary model based on partisanship and commitment arguments that replicates the existence of expansionary monetary policy in pre-election periods irrespective of the incumbent party and of permanent partisan differences in money growth. The approach taken is the incorporation of electoral economic programs into a rational partisan model. The key feature in this work is the imperfect information the public has about a policymaker's ability to stand behind his announcement when in office. This contrasts with Alesina (1988) who emphasizes the difference between previous announcements and actually implemented policies in the framework of an electoral game with rational, forward-looking and fully informed voters. In that paper voters are fully informed about the parties' objective functions and thus will not believe any preelectoral announcements other than the ones which exactly match those genuine preferences. In our framework, on the contrary, the existence of uncertainty about policymakers' type can induce the announcement of only partially credible electoral programs.

The theoretical results obtained from our non-opportunistic rational partisan model are broadly consistent with the empirical findings of Alesina, Cohen, and Roubini for a sample that includes three decades in 18 OECD countries. Therefore, it is not obvious that preelectoral expansionary monetary policy should rest on the opportunistic behavior on the part of office motivated policymakers.

However, we do not claim that our model does explain why expansionary policies are pursued prior to elections and why systematic partisan differences arise in monetary policy. As a matter of fact, our model contains several assumptions that restrain its ability to explain monetary policy. First, the probability of political parties winning an election does not depend on previous policies and electoral programs. If monetary policy is an important part of total policy and if voters' utilities are affected by monetary policy, then the probability p would become endogenous. Second, the probability held by the public before an election of a monetary policymaker being dependable is exogenous. Previous policies could affect such a probability if the time horizon would consist of more than just two periods. Third, a policymaker's own party does not know for sure which type he is until he is in office. This may not be true. Fourth, the independence of the events «party X is elected» and «party Y's policymakers are dependable» is restrictive if it is considered that voters view policymaker's dependability as a desirable attribute. Hence, dependability would be one of the electoral assets that improve the likelihood of election. Fifth, and related to some of the above assumptions, our two-period framework may be very restrictive because monetary policy in the second period has no impact on future reputation, lilelihood of reelection and so on.

Despite all these drawbacks, our argument remains. On the one hand, at present there is no sound office-motivated model of monetary policy that might account for the existence of political monetary cycles. On the other hand, this paper shows that non-opportunistic models of monetary policy can provide predictions that resemble money growth patterns in OECD countries. As a consequence, it is by no means clear that governmental opportunistic behavior to enhance the prospects of re-election lies behind the political monetary cycles actually observed in western economies.

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Resumen

Este artículo desarrolla un modelo de corte político para la política monetaria que incorpora programas económicos electorales dentro de un marco no oportunista, partidista y racional. El modelo predice la probable existencia de una política monetaria expansiva en períodos preelectorales, así como de diferencias partidistas permenentes en política monetaria. Estos resultados son consistentes con los obtenidos empíricamente por Alesina, Cohen y Roubini (1992, 1993) en una muestra que cubre 18 países de la OCDE durante tres décadas.

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