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Economic Policies and Elections
A principal-agent point of view

António Caleiro *
Universidade de Évora, Departamento de Economia

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UNIVERSIDADE DE ÉVORA
DEPARTAMENTO DE ECONOMIA
Largo dos Colegiais, 2 – 7000-803 Évora – Portugal
Tel.: +351 266 740 894 Fax: +351 266 742 494
www.decon.uevora.pt wp.economia@uevora.pt

Abstract:

One of the most crucial lessons to be taken from the literature on electoral business cycles is that the short-run electorally-induced fluctuations prejudice the long-run welfare. Since the very first studies on the matter, some authors offered suggestions as to what should be done against this electorally-induced instability. The problem assumes an interesting form, given that we can presume that if electoral business cycles do exist it is because voters, being ignorant, allow them to exist or, indeed, because the government, in the case of implementing policies that are optimal in the long-run for society, may be electorally punished by voters. As the government's optimal policies depend crucially on the behaviour of voters, the paper analyses the circumstances under which a *non-representative* behaviour of voters may induce the government to behave as representative of the society's interests (without punishing it).
As is well-known, governments may have the temptation to exploit the Phillips curve. This discretionary way of making economic policy generates an inflation bias. The literature has then evolved to analyse possible punishment strategies in order to avoid that discretionary behaviour. Traditionally it is considered that the punishment takes the form of people considering announced policies as non-credible. This introduces the problem of arranging the right mechanism or moment in time to implement these punishment strategies. It turns out that elections are indeed the appropriate mechanism to *punish* or to *reward* the past behaviour of the incumbent. In fact, elections can be used to turn voters, i.e. the public into the principal who has all the incentives to motivate the government, as the *agent*, to use the appropriate policies.
The paper analyses the circumstances under which an optimal contract can be established between the electorate and the government in order to guarantee that the government behaves in accordance with the true interests of the society.

Palavras-chave/Keywords: Economic Policies, Elections, Optimal Contracts, Principal-Agent

Classificação JEL/JEL Classification: D72, E32, E61

1 Introduction and Motivation

The existence of democratic elections is often associated with the question of an electoral cycle created by governments. From the literature on this kind of business cycles, one of the most crucial lessons to be taken is that the short-run electorally-induced fluctuations prejudice the long-run welfare.[1] Since the very first studies on the matter, some authors offered suggestions as to what should be done against this electorally-induced instability. For some authors, ever since Nordhaus (1975), a good alternative to the obvious proposal to increase the electoral period length is to consider that voters abandon a passive and naive behaviour and, instead, are willing to learn about government's intentions.[2] In fact, because the electoral results depend on voters' evaluation, we can presume that if electoral business cycles do exist it is because voters, through ignorance or for some other reason, allow them to exist or, indeed, because a benevolent government, *i.e.* the one implementing policies that are optimal from the society's point of view, may be electorally punished by voters. This being said, the introductory objective of the paper is to show that it is *the lack of foresight* of voters that may allow or, indeed, provoke the existence of electorally-induced policies.

Being apparent that the government's optimal policies depend crucially on the behaviour of voters on the election day, one should then study the circumstances under which voters oblige the government to choose policies that are optimal from the society's point of view (without punishing it). *Strategic voting* may, in fact, make the electorally-motivated government choose socially-optimal economic policies. This can be done by strategically changing the relative importance of objectives on the election day in order to motivate the government to behave as a benevolent social planner. For that to happen, it is enough that voting decisions *do not* reflect (in the correct way) the social importance of the economic variables. In other words, voters can make the government obtain the long-run first best social optimum if the strategy of voting results in isovote curves with different shapes of the social indifference curves. The main objective of the paper is then to show how, from the society's point of view, a *non-representative* behaviour of voters may induce the government to behave as a *representative* agent of the society's interests.

As is well-known, governments may have the temptation, not necessarily as the result of trying to obtain votes, to exploit the Phillips curve. This discretionary way of making economic policy generates an inflation bias. The literature has then evolved to analyse possible punishment strategies in order to avoid that wrong consequence of discretionary behaviour. Traditionally it is considered that the punishment takes the form of people withdrawing belief in the announced policies, *i.e.* considering these as non-credible. Yet

[1] It is often claimed that electorally-induced fluctuations are indeed harmful for the society. Sørensen (1991) shows that this conjecture is not necessarily correct.

[2] It is curious to note that even before the seminal paper of Nordhaus (1975), Barro (1973) already used a principal-agent approach to analyse how re-election motives can be used to *control politicians*, therefore avoiding over-spending.

this requires that individuals coordinate their actions but, as pointed out by Minford (1995), a mechanism allowing for that coordination of actions seems, at the first sight, to be inexistent. This introduces the problem of arranging the right mechanism or moment in time to implement these punishment strategies. It turns out that elections are indeed the appropriate mechanism to *punish* the past behaviour of the incumbent. But this, in turn, rises the question: which kind of discretionary *electoral punishment* makes sense? A subsidiary objective of the paper is to shed some light on the answer to this question.

Closely related with the previous question (and its answer) is the fact that elections can be used to turn voters, *i.e.* the public into the *principal* who *should* have all the incentives to motivate the government, as the *agent*, to use the appropriate policies. As it is apparent that voters *should* have good reasons for motivating the government to act as a benevolent social-planner, one should then study the circumstances under which an *optimal contract* can be established between the public and the government in order to guarantee enough motivation for the agent/government, to behave in accordance with the true interests of the principal/public. The main objective of the paper is then concretised with the analysis of when and how an optimal contract can be established between the government and the electorate in order to induce the socially-optimal economic policies to be chosen by the government.

The remainder of the paper is structured as follows. Section 2 analyses the importance of voters' foresight in the inevitability of an opportunistic behaviour by the government. Moreover, it shows how a non-representative electorate may induce an opportunistic government to behave as benevolent. This links to section 3, where an electoral punishment is questioned. Section 4 then analyses the type of 'contract' that can be made in order to make it possible that the government receives the more votes the more it behaves as benevolent. Section 5 concludes and offers some possible avenues for further research.

2 The Importance of Voters' Foresight

Elections can be seen as one of the – if not *the* – oldest ways of delegating decision power. Voters, through an electoral process, elect an agent who is supposed to take decisions, for instance implementing economic policies, that are the best for society. These decisions are supposed to be even better than those that would be taken by voters themselves. This traditional vision derives from the consideration that the government should essentially be an agent that can and should have a more distant *time horizon* than voters do. This means that, when the electorate votes on a government which has implemented policies that have generated pleasurable outcomes and this is viewed as a bad phenomenon, it is because voters possess a shorter-sight view of the economy. In the limiting case, if voters are viewed as agents with the same time horizon as the government, then a positive election result should be viewed as *exactly* what the society wants, *if* we consider the electorate as representative of society. In any case, the voters' objective should be to make the government choose policies that are optimal from the society's point of view.

Strategic voting, ever since studied by MacRae (1977), may, in fact, make the electorally-motivated government to choose socially-optimal economic policies. This can be done by

strategically changing the relative importance of objectives *on the election day.* A somehow different kind of strategic voting can also be applied to avoid bad consequences, in the long-run, from the short-run behaviour of a government just wanting to win the forthcoming election. To illustrate the analysis let us consider the following figure, as in Nordhaus (1975):[3]

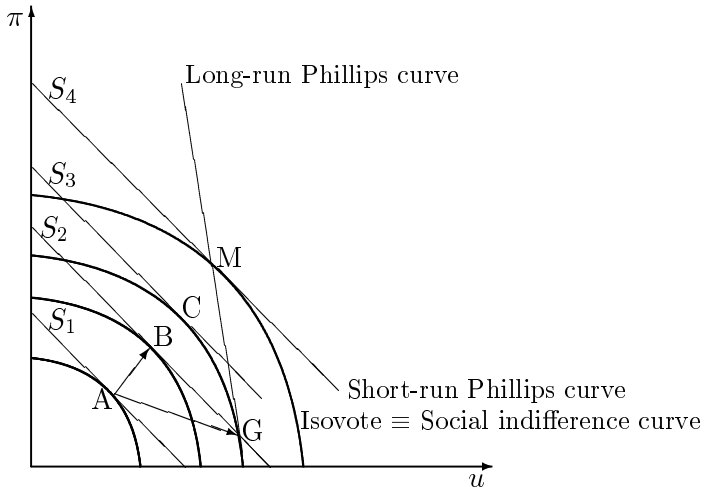

Figure 1: The long-run equilibria

Clearly, from the long-run point of view, the best situation is attained at point G. Nevertheless, the repetition of short-run behaviour by the government leads the economy, in the long-run, to point M which is obviously Pareto-inferior to point G.[4] What can then be done to lead the economy to point G instead of point M? In other words, how can voters motivate the government immediately to choose point G instead of point B (after a starting position given by point A)? The answer is conceptually easy to give (and may be generalised to other models unlike the Nordhaus (1975) one). For that to happen, it is enough that voting decisions *do not* reflect (in the correct way) the social importance of the economic variables.[5]

This very simple case show that voters can indeed make the government obtain the long-run first best social optimum if they incentive/motivate the government to do so by voting in a strategic way. The strategy of voting should then result in isovote curves with different shapes of the social indifference curves. In the particular case that we are using as illustration, it is clear that voters should consider, for their voting decisions, unemployment

[3] Note that as Nordhaus (1975) considers the "*observed aggregate voting function* (...) *as the appropriate social welfare function*" the isovote curves coincide with the social indifference curves. In fact, the assumption that the objective function reflects both the government's and the society's preferences has been present in most of the relevant literature. See, for instance, Walsh (1995) or Svensson (1997). Clearly, we will *not* adopt this point of view.

[4] As a consequence, Nordhaus (1975) concludes that "*democratic systems will choose a policy on the long-run trade-off that has lower unemployment and higher inflation than is optimal.*"

[5] This fact makes it interesting to note how, in a dynamic sense, we are close enough to the remark provided in Minford (1995), which says: "*The ironic implication (...) is that the government should be deterred from trying to maximise social welfare in order to succeed in maximising it*".

relatively more important than inflation, then society does. Figure 1 would then assume the following aspect.

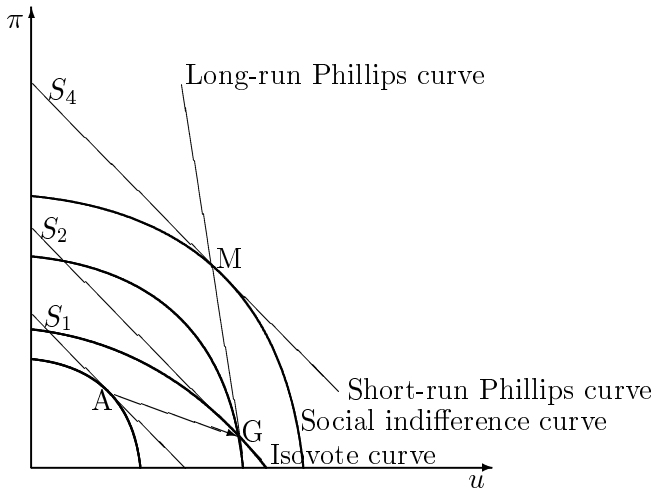

Figure 2: A strategic change

3 Does Electoral Punishment Make Sense?

In the situation where there is absolutely no uncertainty then, in some sense, the strategic voting as described above can be more safely or more fairly performed. To be clearer, this is to say that, because there are no stochastic elements 'contaminating' the effects of economic policies on economic outcomes, punishing 'wrong' outcomes should be as easy or as fair as punishing 'wrong' policies. Alternatively, the motivation needed to obtain 'good' outcomes may be as well be done at the economic policy level. Obviously, when the results of the economic policies also depend upon the realisation of, say, stochastic shocks, a sophisticated electorate may want to consider it safer or fairer to punish or monitor policies rather than outcomes.

The existence of stochastic shocks also has another kind of important consequence on the punishment strategies. As is well-known, governments may have the temptation, not necessarily as the result of trying to obtain votes, to exploit the Phillips curve. This discretionary way of making economic policy generates an (unnecessary) inflation bias but it also reflects the optimal response to shocks. The literature has then evolved to analyse possible punishment strategies in order to avoid that malefic part of discretionary behaviour. Traditionally it is considered that the punishment takes the form of people considering announced policies as non-credible. But this requires that individuals coordinate their actions. As Minford (1995) clearly points out:

> "*It is only rational for people to follow these strategies if they know everyone else will follow them; yet there is no mechanism to initiate common action in following the strategies.*"

This leaves us, then, with the problem of arranging the right mechanism or moment in time to implement these punishment strategies. It turns out that elections are indeed

the appropriate mechanism to punish or to reward the past behaviour of the incumbent government. In other words, elections can in fact turn voters into the principal who has all the incentives to motivate the government, as the agent, to use the appropriate policies.

Naturally, one has then to determine the appropriate policies. In a situation where there are some stochastic shocks, it is optimal to let the government react to those shocks. But the allowance to use some discretion may not be used to try to exploit the Phillips curve, as (even the government should know) this attempt only results in unnecessary inflation. As Minford (1995) shows, there is the possibility of considering a discretionary electoral punishment large enough (that is an electoral defeat) to deter any attempt to exploit the Phillips curve, but no punishment at all for the correct response to shocks. But this means that when monitoring the government's performance, voters should be able to observe (at least the sum of) the individual shocks by the time of the election. Let us then proceed by showing how to overcome this difficulty. We start by presenting the model used in Minford (1995).

3.1 The model

Concerning the supply side of the model, we admit that the output level, y_t, deviates from the natural level, $\bar{y}_t$, if there is an inflation surprise and some supply shock. This means that we assume a Lucas supply curve as follows:

$$y_t = \bar{y}_t + \alpha\left(\pi_t - \pi_t^e\right) + u_t, \tag{1}$$

where u_t is a i.i.d. supply shock observed by the policy maker but not by the wage-setters, with expected value $\mathsf{E}[u_t] = 0$ and variance $\mathsf{V}[u_t] = \sigma_u^2$. Due to this specification, there are reasons justifying stabilisation policies, as the government may react to shocks whereas the same does not happen with wage-setters. Following Minford (1995), we also assume that the natural level follows a random walk:

$$\bar{y}_t = \bar{y}_{t-1} + v_t, \tag{2}$$

where v_t is a i.i.d. shock, independent of u_t, with expected value $\mathsf{E}[v_t] = 0$ and variance $\mathsf{V}[v_t] = \sigma_v^2$.

Let us also assume that disutility in each period is a quadratic function of the deviations of output levels, y_t, and inflation, π_t, from their desired values, $\tilde{y}$ and 0, respectively, where $\tilde{y} > \bar{y}_t$.[6] Assuming β to be the (relative) degree of inflation aversion, the vote function is given by:

$$V = -\frac{1}{2}\beta\pi_t^2 - \frac{1}{2}\left(y_t - \tilde{y}\right)^2. \tag{3}$$

[6] Note that it is considered a full-quadratic objective function, where the objective, in what concerns output, is to stabilise it in turn of a given level, $\tilde{y}$, that exceeds the natural level $\bar{y}$. This is justified by the existence of market imperfections such as distorting taxes that make the natural level of output inefficiently low. An alternative explanation is that labour market 'insiders' set wages too high for full employment. See, for instance, Lockwood (1997), Persson and Tabellini (1999) or Svensson (1997).

As the model is stochastic, we consider that the government follows a *policy rule* (a state-contingent strategy), which is assumed to be linear in the realisation of the shocks:[7]

$$\pi_t = a_t + b_t u_t + c_t v_t. \tag{4}$$

The optimal values of the coefficients a_t, b_t and c_t differ according to the policy environment. If the government commits itself to a choice of a_t, b_t and c_t in advance, that is *before* the private sector sets wages (or expected inflation) that corresponds to the so-called commitment solution. The so-called discretionary solution corresponds to the case where those parameters are determined *after* the setting of wages (or expected inflation). As is well-known, in general, these two solutions differ because, under discretion, the policy-maker fails to internalise the mapping from actual policy (inflation) to expected policy (inflation), which does not happen under commitment.

We first determine the discretionary solution. As is well-known, in this case it is assumed that for certain reason(s), including credibility ones, the government cannot commit itself to a policy rule but chooses its policy under discretion. In this case, the optimal inflation rate will be chosen only *after* inflation expectations are formed (and the supply shock is observed).

The equilibrium policy rule is determined as follows. We first substitute (1), (2) and (4) into (3) and get

$$V^D = -\frac{1}{2}\beta\left(a_t + b_t u_t + c_t v_t\right)^2 - \frac{1}{2}\left(\bar{y}_{t-1} + v_t + \alpha\left(a_t + b_t u_t + c_t v_t - \pi_t^e\right) + u_t - \tilde{y}\right)^2,$$

whose expected value is maximised at

$$a_t = \alpha\frac{\alpha\pi_t^e + \tilde{y} - \bar{y}_{t-1}}{\beta + \alpha^2} \tag{5}$$

and

$$b_t = c_t = -\frac{\alpha}{\beta + \alpha^2}. \tag{6}$$

Imposing rational expectations, *i.e.* $\pi_t^e = \mathsf{E}\left[\pi_t | u_t, v_t\right] = a_t$, the solution of (5) will be:

$$a_t = \alpha\frac{\tilde{y} - \bar{y}_{t-1}}{\beta},$$

which means that the optimal policy under discretion is:

$$\pi_t = \alpha\frac{\tilde{y} - \bar{y}_{t-1}}{\beta} - \frac{\alpha}{\beta + \alpha^2}u_t - \frac{\alpha}{\beta + \alpha^2}v_t. \tag{7}$$

A few results are already noticeable. Plainly, inflation is used to cushion supply shocks in order to stabilise the effects of these shocks on output. Negative supply shocks are

[7] We assume that the government retains control of the monetary policy. See, for instance, Muscatelli (1998). Alternatively, this may be seen as assuming that the government delegates the monetary policy in a central banker but, from what follows, it will be clear that this does not correspond to a mere re-location of the time-inconsistency problem. In fact, the way voters reward or punish the government may constitute *the* (sufficiently) high cost for changing the arrangement/contract (or simply to change the central banker) allowing delegation to solve (and not simply re-locate) the time-inconsistency problem. See Driffill and Rotondi (2003).

counteracted with positive inflation surprises. Moreover, the higher the concern about inflation relative to output stabilisation, that is β, the smaller is the degree to which inflation is used to stabilise the effects of supply shocks on output.[8] This optimal response to shocks is, nevertheless, accompanied by an inflation bias as

$$\pi_t^e = \mathsf{E}\left[\pi_t | u_t, v_t\right] = \alpha \frac{\tilde{y} - \bar{y}_{t-1}}{\beta}.$$

The output level will be given by:

$$y_t = \bar{y}_{t-1} + \frac{\beta}{\beta + \alpha^2}\left(u_t + v_t\right). \tag{8}$$

This policy (and the corresponding output) leads to

$$\mathsf{E}\left[V^D\right] = -\frac{1}{2}\left[\frac{\beta}{\beta+\alpha^2}\sigma^2 + \frac{\beta+\alpha^2}{\beta}\left(\bar{y}_{t-1} - \tilde{y}\right)^2\right],$$

where $\sigma^2 \equiv \sigma_u^2 + \sigma_v^2$.

We now proceed by determining the commitment solution. As the private sector does not observe u_t and v_t then, if the policy rule (4) is considered credible, expected inflation should be set equal to:

$$\pi_t^e = \mathsf{E}\left[\pi_t | u_t, v_t\right] = a_t. \tag{9}$$

If expectations are made according to (9), then

$$V^C = -\frac{1}{2}\beta\left(a_t + b_t u_t + c_t v_t\right)^2 - \frac{1}{2}\left(\bar{y}_{t-1} + v_t + \alpha\left(b_t u_t + c_t v_t\right) + u_t - \tilde{y}\right)^2,$$

whose expected value is maximised at:

$$a_t = 0 \tag{10}$$

and

$$b_t = c_t = -\frac{\alpha}{\beta + \alpha^2}. \tag{11}$$

Plainly, any inflation that occurs is fully unexpected and does not violate rationality, as it happens only as the result of the fact that government knows the value of the shocks, whereas private sector does not.[9] In fact, $\pi_t^e = 0$.

A simple comparison between the discretionary and commitment solutions for inflation – see (6) and (11) – shows that the optimal response to shocks is the same in both (discretionary/commitment) situations. This fact is naturally important to explain the equality registered by the level of output in both situations. See (8).

This policy (and the corresponding output) leads to

[8] Plainly, this is accordance with the result that an augmented output variability, given by $\sigma_y^2 = \frac{\beta^2}{\left(\beta+\alpha^2\right)^2}\left(\sigma_u^2 + \sigma_v^2\right)$ is the price to pay when delegating the economic policy to a more conservative agent.

[9] Note that a possible contradiction is to be present by assuming that voters are able to observe these shocks.

$$\mathsf{E}\left[V^C\right] = -\frac{1}{2}\left[\frac{\beta}{\beta+\alpha^2}\sigma^2 + (\bar{y}_{t-1} - \tilde{y})^2\right],$$

where $\sigma^2 \equiv \sigma_u^2 + \sigma_v^2$.

Clearly, on average, the commitment solution gives rise to better results than the discretionary solution. In fact:

$$\mathsf{E}\left[V^C\right] - \mathsf{E}\left[V^D\right] = \frac{1}{2}\left[\frac{\alpha^2}{\beta}(\bar{y}_{t-1} - \tilde{y})^2\right] > 0.$$

Obviously, one should be able to make the government to choose the commitment solution by imposing a punishment high enough to make the government to react only to shocks, which can be done at the election day. This absolute need to react only to shocks constitutes then a constraint in the government's optimisation programme. This is so because it is in the government's own interest that the pre-commitment policy is shown to be computed in that way. Only in that circumstances the pre-commitment policies will be expected and effectively chosen because they are optimal. In this way, the government, by truly punishing itself if required to do so, will achieve a better outcome. See also Minford (1990).

In the case of a discretionary electoral punishment, as it is considered in Minford (1995), the government uses as a constraint:

$$\pi_t = b_t u_t + c_t v_t$$

and, in this case, the expected value $\mathsf{E}\left[V^M\right]$ will be maximised at

$$b_t = c_t = -\frac{\alpha}{\beta+\alpha^2}.$$

Clearly, if the self-imposed punishment is considered credible, $\pi_t^e = 0$. All this results in:

$$\mathsf{E}\left[V^M\right] = -\frac{1}{2}\left[\frac{\beta}{\beta+\alpha^2}\sigma^2 + (\bar{y}_{t-1} - \tilde{y})^2\right].$$

Given that voters have good reasons for motivating the incumbent government, is it plausible to accept that, despite the initial problems of making the punishment promises acquire credibility, these punishment strategies make sense? The infinite repetition of the gains from those strategies will plausibly overcome the costs but this is no less demanding than making it credible the commitment solutions. It is apparent that the self-punishment as above described suffers from a credibility problem which is aggravated by the fact that, in order to be implementable, requires that voters observe the shocks u_t, v_t , or at least $u_t + v_t$.

It turns out that the intrinsic difference on the information set between voters and the government can be handled through the consideration of an optimal contract that, in this case, assumes that voters reward (or punish) the performance of the government, in marginal terms, by a linear term in inflation. This, as it will be shown below, will make it possible to motivate or indeed oblige an opportunistic government to behave as benevolent.

4 The Optimal Contracts

4.1 A one-period case

In the tradition of Walsh (1995) or Svensson (1997) we study a particular kind of contract, *i.e.* a linear inflation contract, established between the government and the electorate, whose objective is to make an electorally-motivated government to choose policies that are socially-optimal. The objective of the contract is to eliminate the inflation bias. This is so because the optimal response to shocks is the same whether policy is determined in a discretionary way or using a commitment rule.[10]

We consider that the electorate votes according to

$$V = -\frac{1}{2}\beta\pi_t^2 - \frac{1}{2}\left(y_t - \tilde{y}\right)^2 + \lambda\pi_t. \tag{12}$$

If this is the case, the optimal discretionary policy will be given by

$$\pi_t = \frac{\alpha^2\pi_t^e - \alpha\bar{y}_{t-1} - \alpha v_t - \alpha u_t + \alpha\tilde{y} + \lambda}{\beta + \alpha^2}.$$

The imposition of rational expectations leads to:

$$\pi_t^e = \frac{\alpha\left(\tilde{y} - \bar{y}_{t-1}\right) + \lambda}{\beta}, \tag{13}$$

which means

$$\pi_t = \frac{\alpha\left(\tilde{y} - \bar{y}_{t-1}\right) + \lambda}{\beta} - \frac{\alpha}{\beta + \alpha^2}\left(u_t + v_t\right). \tag{14}$$

This, in turn, leads to:

$$y_t = \left(\bar{y}_{t-1} - \tilde{y}\right) + \frac{\alpha}{\beta + \alpha^2}\left(u_t + v_t\right).$$

The optimal contract should now be established by the determination of the optimal value for the parameter λ. Naturally, from the voters' viewpoint, λ should be the one maximising the expected value of (12). From the first-order conditions:

$$\frac{\partial \mathsf{E}\left[V\right]}{\partial\lambda} = \frac{\alpha\left(\tilde{y} - \bar{y}_{t-1}\right) + \lambda}{\beta} \stackrel{!}{=} 0,$$

one immediately obtains that $\lambda = \alpha\left(\bar{y}_{t-1} - \tilde{y}\right)$. Clearly, the optimal value of λ is the one making the expected value of inflation being zero; see (13). This naturally is compatible with an optimal policy, determined in a full discretionary way, that reacts only to shocks; see (14).

An optimal contract can, in fact, be determined as λ depends only on observables by the voters. Given that the optimal contract is based solely on elements that voters know, the fact that the government possesses private information about the values of the shocks does not invalidate the contract. This is so because the penalty/reward being linear in

[10] Given the close relation with this question, one should refer that indeed, in presence of preferences uncertainty, in general there is no contract leading to the same welfare as the one associated with a commitment rule. See Beetsma and Jensen (1998).

inflation it (only) increases/decreases the marginal popularity cost of inflation by the same amount for all states of nature, *i.e.* for all values of the shocks. Therefore the optimal response to shocks is unaffected by the particular value of the shock that, indeed, only the government observes.

The model considered so far is a one-period (time-less) model. In fact, it does not need to be a multi-period model as, clearly, the government reacts exactly in the same way, in any period. Given that the government reacts only to shocks, the optimal response (to shocks) does not change over time. Hence, we cannot, with this model, study another case of interest to us, where a different weighting of time periods leads to economic policies that do not maximise social welfare. We then move to consider another case where this situation can be studied.

4.2 A two-period case

In order to study the case where society weights time in a different way that the way voters forget, we start by assuming that the government's mandate can be divided in a non-election period, where $t = 1 \equiv \mathcal{N}$ and in an election period, where $t = 2 \equiv \mathcal{E}$, such that society's welfare during the mandate is given by:

$$W = W_{\mathcal{N}} + \rho W_{\mathcal{E}}, \tag{15}$$

where ρ is the social rate of discount, whereas the vote function is

$$V = \mu V_{\mathcal{N}} + V_{\mathcal{E}}, \tag{16}$$

where μ is the degree of memory of the electorate. At this stage we also admit that

$$W_t = V_t = -\frac{1}{2}\beta\pi_t^2 - \frac{1}{2}\left(y_t - \tilde{y}\right)^2. \tag{17}$$

In these circumstances it is worth immediately noticing that, in general, excepting if $\mu\rho = 1$, the policies that maximise social welfare (15) are not the ones that maximise popularity (16) . As it plausible to assume that both ρ and μ do not exceed 1, it is immediately clear that only in the case of perfect memory, *i.e.* $\mu = 1$, and both periods being equally important for society, *i.e.* $\rho = 1$, an opportunistic behaviour of the government is the best one for society. In all the other cases, society suffers a loss in welfare due to the way government explore the degree of memory loss by the electorate.

As above was pointed out, the model corresponding to the natural rate case, as the one considered so far, does not imply a time-varying optimal response to shocks. If, indeed, for some reason, the government reacts differently to shocks in different moments of time then a different weighting of time may, as well, be a source of sub-optimal economic policies. It turns out that, if output presents some degree of persistence over time, a time-varying optimal response to shocks is obtained. Hence, we will consider next a version of the model embodying *output* persistence; see Gärtner (1999) for an *output* persistence case and/or Jonsson (1997) for an *unemployment* persistence case.[11]

[11] As acknowledged in Gärtner (1999), only quite recently authors have started to pay due attention to

Let us start to re-write the supply side of the model as follows:

$$y_t = \bar{y} + \alpha\left(\pi_t - \pi_t^e\right) + \varepsilon_t, \tag{18}$$

where ε_t is a i.i.d. supply shock observed by the policy maker but not by the wage-setters, with expected value $\mathsf{E}[\varepsilon_t] = 0$ and variance $\mathsf{V}[\varepsilon_t] = \sigma_\varepsilon^2$.

As is clear, (18) does not allow for output persistence. Therefore, in order to introduce this phenomenon, it will be replaced by

$$y_t = \alpha\left(\pi_t - \pi_t^e\right) + (1-\phi)\,\bar{y} + \phi y_{t-1} + \varepsilon_t, \tag{19}$$

where $\bar{y}_t \equiv (1-\phi)\,\bar{y} + \phi y_{t-1}$ is the 'equilibrium level of output' in period t and $0 \leq \phi \leq 1$ measures the degree of output persistence.[12] To sum up, (19) shows that the output level is affected by an inflation surprise, by an inherited level of output and/or by some supply shock.[13]

We first determine the commitment solution. The one-period objective function is (17) such that

$$\mathcal{W} = \mathsf{E}\left[W_t + \rho W_{t+1}\right], \tag{20}$$

is the criterion to be optimised.

As before we consider a state-contingent rule for economic policy:

$$\pi_t = a_t + b_t \varepsilon_t. \tag{21}$$

If the policy rule (21) is considered credible, expected inflation should be set equal to

$$\pi_t^e = \mathsf{E}\left[\pi_t | \varepsilon_t\right] = a_t. \tag{22}$$

If expectations are made according to (22), and inflation follows (21), output will be given by:

$$y_t = (1-\phi)\,\bar{y} + \phi y_{t-1} + (\alpha b_t + 1)\,\varepsilon_t. \tag{23}$$

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the consequences of considering that relevant macroeconomic variables, *in reality*, show some degree of persistence over time. A casual observation on reality imediatly confirms this fact.

On the theoretical ground, this phenomenon has been explained: (*i*) on the supply side of the labour market, by (voluntary/involuntary) limited search for jobs activity; and (*ii*) on the demand side of the labour market, as the result of a prolonged period of restrictive anti-inflationary policies that have been followed by the generality of the European countries. Independently of the validity of these theoretical explanations, the fact is that reality evidences this phenomenon and that, for our purposes, is sufficient to justify the consideration that there is some degree of *output persistence*.

[12] Obviously, to $\phi = 0$ corresponds the natural-rate case that we have analysed so far. Clearly, a major consequence of introducing persistence in output is that the optimisation problem becomes intrinsically dynamic/intertemporal given that, when $\phi \neq 0$, past inflationary surprises influence current output levels.

[13] This way of introducing persistence, which results in expression (19) is the most common in the literature; see Gärtner (1999), Jonsson (1997) or Lockwood (1997). It is interesting to note that Svensson (1997) justifies the existence of an autoregressive term on the Phillips curve when wage setters set nominal wages one period in advance, disregarding non-union workers' preferences for real wages and employment, and where union membership depends on previous unemployment. This explanation should therefore be viewed as alternative to the one already given in Lucas (1973) for output persistence.

Plugging (21) and (23) into the loss function (17) we get

$$W_t^C = -\frac{1}{2}\beta\left(a_t + b_t\varepsilon_t\right)^2 - \frac{1}{2}\left(\left(1-\phi\right)\bar{y} + \phi y_{t-1} + \left(\alpha b_t + 1\right)\varepsilon_t - \tilde{y}\right)^2.$$

The optimal policy rule will be determined by solving

$$\max_{\{a_t, b_t\}} \mathcal{W} = \mathsf{E}\left[W_1 + \rho W_2\right]. \tag{24}$$

A backward-induction solution of (24) shows that:[14]

$$a_2^C = 0 \qquad \text{and} \qquad b_2^C = -\frac{\alpha}{\beta + \alpha^2}.$$

This means that

$$\pi_2^C = -\frac{\alpha}{\alpha^2 + \beta}\varepsilon_2 \tag{25}$$

which differs from

$$\begin{aligned} \pi_2^e &\equiv a_2 \\ &= 0 \end{aligned}$$

due to some random supply shock occurred on the second period.

Output will be

$$y_2^C = \left(1-\phi\right)\bar{y} + \phi y_1 + \frac{\beta}{\alpha^2 + \beta}\varepsilon_2.$$

Given these results, one obtains next:

$$a_1^C = 0$$

and

$$b_1^C = -\frac{\alpha\left(1 + \rho\phi^2\right)}{\beta + \alpha^2 + \rho\phi^2\alpha^2}, \tag{26}$$

which means that

$$\pi_1^C = -\frac{\alpha\left(1 + \rho\phi^2\right)}{\beta + \alpha^2 + \rho\phi^2\alpha^2}\varepsilon_1 \tag{27}$$

and that

$$y_1^C = \left(1-\phi\right)\bar{y} + \phi y_0 + \frac{\beta}{\beta + \alpha^2 + \rho\phi^2\alpha^2}\varepsilon_1. \tag{28}$$

Through the comparison between the optimal inflation rates, it is apparent that, as a shock occurring at the first period carries over some effect to the next period, it is optimal to stabilise more at $t = 1$ than at $t = 2$.[15] This extra stabilisation 'effort' is an increasing

[14] The algebra is tedious but straightforward.

[15] In fact,

$$\left|b_1^C\right| - \left|b_2^C\right| = \frac{\alpha\beta\rho\phi^2}{\left(\beta + \alpha^2 + \rho\phi^2\alpha^2\right)\left(\beta + \alpha^2\right)} > 0.$$

function of the discount rate ρ, as well of the degree of output persistence ϕ; see (25) *versus* (27).[16]

We proceed by determining the discretionary solution which, immediately considers the establishment of a contract that besides being linear in inflation it also will allow for a difference between the degree of aversion of voters and than that of society.

As noted above, the timing of events suffers a change as, in this case, the optimal inflation rate will be chosen only *after* inflation expectations are formed (and the supply shock is observed). Hence, the equilibrium policy rule is determined as follows. We first substitute (21) into (19) and get

$$y_t = \alpha\left(a_t + b_t\varepsilon_t - \pi_t^e\right) + (1-\phi)\,\bar{y} + \phi y_{t-1} + \varepsilon_t. \tag{29}$$

Plugging (21) and (29) into the loss function (17) we get

$$V_t^D = -\frac{1}{2}\beta_t\left(a_t + b_t\varepsilon_t\right)^2 - \frac{1}{2}\left(\alpha\left(a_t + b_t\varepsilon_t - \pi_t^e\right) + (1-\phi)\,\bar{y} + \phi y_{t-1} + \varepsilon_t - \tilde{y}\right)^2 + \lambda_t\pi_t.$$

Using a backward-induction method to:[17]

$$\max_{\{a_t,b_t\}} \mathcal{V} = \mathsf{E}\left[\mu V_1 + V_2\right]$$

we first obtain

$$b_2 = -\frac{\alpha}{\beta_2 + \alpha^2}$$

and

$$a_2 = \frac{\alpha^2\pi_2^e + \alpha\left(\tilde{y} - \bar{y}\right) + \alpha\phi\left(\bar{y} - y_1\right) + \lambda_2}{\beta_2 + \alpha^2},$$

whose rational expectations solution is:

$$a_2 = \frac{\alpha\left(\tilde{y} - \bar{y}\right) + \alpha\phi\left(\bar{y} - y_1\right) + \lambda_2}{\beta_2}.$$

Plainly

$$\pi_2^D = \frac{\alpha\left(\tilde{y} - \bar{y}\right) + \alpha\phi\left(\bar{y} - y_1\right) + \lambda_2}{\beta_2} - \frac{\alpha}{\beta_2 + \alpha^2}\varepsilon_2. \tag{30}$$

To the optimal inflation rate π_2^D will then correspond

$$y_2^D = (1-\phi)\,\bar{y} + \phi y_1 + \frac{\beta_2}{\beta_2 + \alpha^2}\varepsilon_2. \tag{31}$$

[16] In fact,

$$\frac{\partial}{\partial\rho}\left(\frac{\alpha\rho\phi^2\beta}{\left(\beta + \alpha^2 + \rho\phi^2\alpha^2\right)\left(\beta + \alpha^2\right)}\right) = \frac{\alpha\phi^2\beta}{\left(\beta + \alpha^2 + \rho\phi^2\alpha^2\right)^2} > 0,$$

and

$$\frac{\partial}{\partial\phi}\left(\frac{\alpha\rho\phi^2\beta}{\left(\beta + \alpha^2 + \rho\phi^2\alpha^2\right)\left(\beta + \alpha^2\right)}\right) = \frac{2\alpha\rho\phi\beta}{\left(\beta + \alpha^2 + \rho\phi^2\alpha^2\right)^2} > 0.$$

[17] The algebra is tremendously tedious but still straightforward.

Naturally, the objective of the contract is to make the electorate to vote in order to make an opportunistic government to choose policies that are the ones that society would consider the best ones. In other words, the objective is to determine the values of λ_1 and λ_2 such that the inflation bias is eliminated while guaranteeing the optimal reaction to shocks from the society's point of view. For the last period of the mandate, this means:

$$\lambda_2 = \alpha\left(\bar{y} - \tilde{y}\right) + \alpha\phi\left(y_1 - \bar{y}\right)$$

and

$$\beta_2 = \beta.$$

This last equality shows that, being the last period of the mandate, the electorate should be as conservative as society.

Concerning the first period of the mandate, it is possible to verify that

$$a_1 = \frac{\alpha^2\left(\mu + \phi^2\right)\pi_1^e + \alpha\left(\phi - 1\right)\left(\phi^2 + \phi + \mu\right)\bar{y} + \alpha\left(\mu + \phi\right)\tilde{y} - \alpha\phi\left(\mu + \phi^2\right)y_0 + \mu\lambda_1}{\mu\alpha^2 + \phi^2\alpha^2 + \mu\beta_1},$$

whose rational expectations solution is:

$$a_1 = \frac{\alpha\left(\phi - 1\right)\left(\phi^2 + \phi + \mu\right)\bar{y} + \alpha\left(\mu + \phi\right)\tilde{y} - \alpha\phi\left(\mu + \phi^2\right)y_0 + \mu\lambda_1}{\mu\beta_1}.$$

Given the objectives of the contract, the parameter λ_1 will be determined in order to make expected inflation, $\pi_1^e = a_1$ being zero, which means:

$$\lambda_1 = \alpha\frac{\left(\mu + \phi\right)\left(\bar{y} - \tilde{y}\right) + \phi\left(\mu + \phi^2\right)\left(y_0 - \bar{y}\right)}{\mu}.$$

Concerning the parameter b_1 in the policy rule it is possible to show that:

$$b_1 = -\frac{\alpha\left(\phi^2 + \mu\right)}{\mu\alpha^2 + \phi^2\alpha^2 + \mu\beta_1}. \tag{32}$$

In order to guarantee the same response to shocks as in the benevolent government case, the degree of inflation aversion by the electorate for the first period, β_1, must satisfy the following equation that results from (32) being equalised to (26):

$$-\frac{\alpha\left(\phi^2 + \mu\right)}{\mu\alpha^2 + \phi^2\alpha^2 + \mu\beta_1} = -\frac{\alpha\left(1 + \rho\phi^2\right)}{\beta + \alpha^2 + \rho\phi^2\alpha^2}.$$

The result is:

$$\beta_1 = \beta\frac{\mu + \phi^2}{\mu + \mu\rho\phi^2},$$

which shows that in the first period of the mandate the electorate should be more conservative than society itself. This is so in order to soften more the effect of the shock occurring at the first period which is propagated to the second period given that output shows some persistence.

5 Conclusion and Discussion

The social perception that an electoral cycle is a costly phenomenon anticipates a possible *remedy*. A naive approach would consider the only way of turning a self-interested vote-maximising government into an 'altruistic' government which optimises a social welfare function – *the benevolent dictator fiction* – is by imposing an infinite electoral period. Nevertheless, this trivial solution can be disputed even in economic terms. Even if non-economic aspects are ignored, that is if we abstract from valid objectives inherent in the democratic process such as political freedom, the consideration of an entirely *economic* objective function still does not lead to an obvious answer to the question: *is democracy bad for the economy*?

On the one hand, there are at least three reasons why elections may also have economic benefits – the non-economic benefits are obvious. The first reason is based on an argument for efficiency arising from the nature of elections as devices for distinguishing between competent and incompetent policy-makers. In a sense related with that reason, in the second place, elections can also be the appropriate mechanism to punish (or to reward) the incumbent government if it tried (or not) to exploit the Phillips curve throughout the mandate. In the third place, elections can serve the purpose of signalling social preferences which naturally evolve over time. In other words, the existence of elections is obviously crucial for taking into consideration the preferences of new generations.

On the other hand, the instability created by electorally-motivated governments is, indeed, accepted to be long term welfare-decreasing. There are, at least, three reasons why the electorally-induced economic policies may be prejudicial to social welfare:

1. The opportunistic government uses a finite time horizon, usually the election day, whereas society should consider an infinite time horizon;

2. The discounting of time periods is different: whereas, for society, future periods should be less important than present ones, this is not the case with an opportunistic government, as future moments, *i.e.* those closer to the election day, are more vital than present ones, in order to explore the decay in the memory of voters;

3. The vote function may not reflect exactly the (relative) social preferences.

The paper has shown that, in fact, when the vote function does not reflect, in the correct way, the social preferences it is possible to eliminate (besides, obviously, this third reason) also the problem of a different valuation of time as indicated in the second reason.[18] Moreover, it has also shown how this non-representative behaviour of voters, which is established at an optimal 'contract' level, may eliminate the inflation bias arising from a discretionary behaviour of the government without the need of an electoral punishment *à la* Minford. In what concerns the first reason, we would like to leave it as an opportunity for future research.

[18] As an evidence of how this problem has been ignored by the literature, consider, for example, Fratianni *et al.* (1997) where discounting is ignored for parsimony and Lohmann (1998) where it is assumed that second-period utilities (in a two-period model) are not discounted.

From what we have just discussed, it is apparent that the government's optimal strategy depends crucially on the (possibility) of punishment imposed by voters on the election day. The punishment imposed by voters can, in fact, assume different forms and may as well be transformed in reward, *i.e* on motivation such that the government, as an *agent*, puts all *effort*, during the mandate in order to obtain the best result from the society's, as the *principal*, point of view. In the paper we followed a traditional approach, as in most of the literature, that is an optimal contract that does nor explicitly contemplates the effort made by the agent which, by the optimal nature of the contract, is also the best one from the principal's point of view. This was, indeed, the initial framework of the principal-agent models. See, for instance, Frey (1983), Sutter (1998) and/or Walsh (1995). The application of this approach seems to be an avenue for further research that we would like to carry out in the field of the relations between economic policies and elections.

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