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To Be or Not To Be in Office Again, That is the Question:
Political Business Cycles with Local Governments

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ABSTRACT

Most opportunistic-type models of political business cycles tend to posit a given objective for incumbents: maximisation of re-election chances. Though taking an opportunistic view too, we suggest a new explanation for a fiscal policy cycle: the incumbent's concern with her own welfare in cases of victory and defeat. This rationale addresses local policy-making in particular. An equilibrium perfect-foresight model is designed which totally dispenses with any form of irrationality (namely, on the part of voters) or the common objective functions (re-election chances). Being well grounded in basic microeconomic theory (welfare maximisation by the individual agent), our model provides another foundation for the emergence of political business cycles at the local level.

The empirical plausibility of theoretical predictions is then tested on Portuguese municipal data. The estimation of an error-components econometric framework finds evidence in favour of the proposed explanation during the period 1986 to 1993, and enlightens the role played by several politico-economic determinants of local governments' investment outlays, such as electoral calendar, re-candidacy decisions, political cohesion and intergovernmental capital transfers.

Keywords: local public finance; public choice; political business cycles; elections; Portugal.
JEL's classification: C23; D72; H41; H72; R51.

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1 Introduction

In very broad terms, political business cycle (PBC) analysis concerns short-run government behaviour within election dates. It is believed that authorities run economic policy in typical intertemporal patterns each office term.[1] Theoretical approaches have searched for justifications of such patterns while empirical inquiries have tested their reliability with actual data.

1.1 PBCs with local governments

By far, economists have focused on central government behaviour and macroeconomic data—Frey (1997). This is not surprising since the possibilities of influencing the economy increase with the level of aggregation. In general, central and even regional governments enjoy discretionary power over many more policy instruments than do local governments. Monetary

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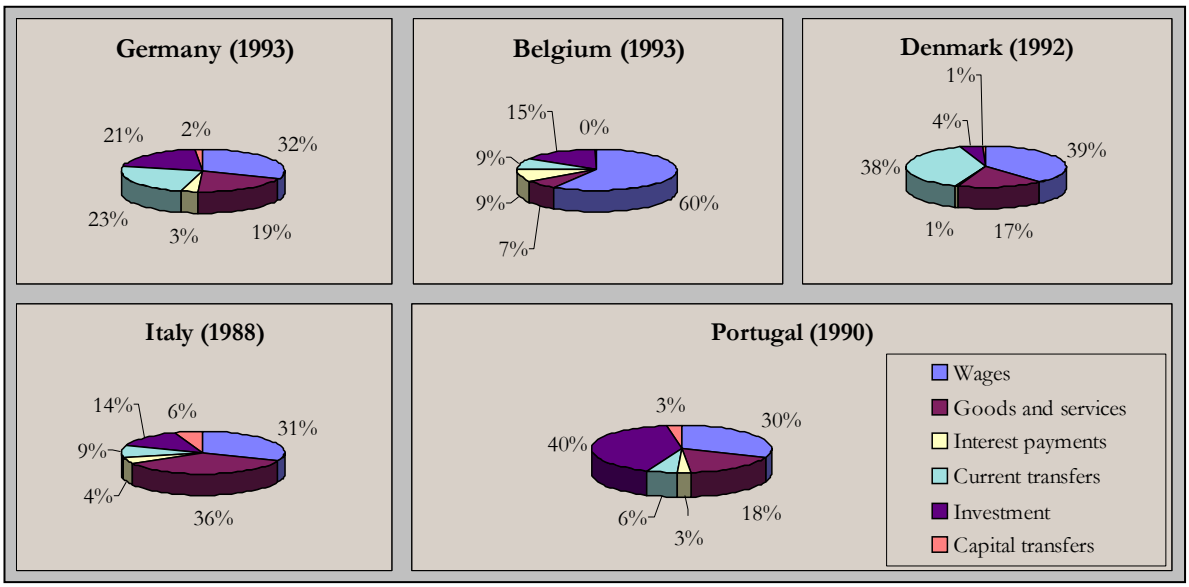
[1] A different, historically oriented strand of literature has focused on the long-run interaction cycles between economic performance and political systems, seeking ties with the well-known economic history concepts of *Kuznets and Kondratieff fluctuations*. A flavour of this avenue can be found in Soldatos (1994).

policy is not a local business and, with respect to fiscal policy, spatial mobility constrains considerably the local autonomy over stabilisation, redistribution and own revenue collection.[2]

Yet, it is stimulating to think about the prospects of PBC at the local government level. All over the world, the last two decades have witnessed an unprecedented trend toward fiscal decentralisation—Yilmaz (2001), Inter-American Development Bank (1997), and Ter-Minassian (1997)—which has raised the political and economic visibility of local decision-making. Local authorities are playing an increasing role in the allocation function of fiscal policy. The provision of local public goods is their core economic case. However, cross-country differences abound when it comes to the economic breakdown of expenditure. Chart 1 below takes a selection of EU Member States just as an illustration of different specialisations. Whilst somewhat balanced distributions exist, such as in Germany, it is easy to find many cases of local expenditure concentration. In Belgium, for instance, the allocation seems to rely mainly on civil servant expenditure—which accounts for 60% of total local expenditure. In Denmark, current transfers show a remarkable share of 38%, possibly reflecting the typical involvement that Scandinavian local authorities have in welfare programmes. In Italy, the largest share (36%) corresponds to public procurement for non-durable goods. Investment expenditure plays a chief role in Portugal (40%).



Source: IMF (1995).

Chart 1—Economic breakdown of local public expenditure, selected EU countries

PBCs on the expenditure side of the budget require the strategic variable to have some particular features. It should be an expenditure item having local accountability and political visibility. In other words, such an item ought to be an expenditure category subject to discretionary change by the local authority and whose manipulation from one period to another is not constrained by serious rigidities; additionally, people's awareness about these outlays is crucial if one expects governments to use them to enhance their idiosyncratic goals. Investment seems to

[2] Other factors constrain autonomous local fiscal decision-making, notably scale economies in administration and tax compliance costs.

meet these requirements quite well in the Portuguese local case. Most local investment is made on highly visible infrastructures (1990 shares for illustrative purpose only): roads (30%), sewerage and piped water (13%), social housing (11%), schools and sports (11%). The executive branch is fully autonomous to set the contents and the timing of the municipal investment plan—details in Section 2—and this *inter-year* flexibility is almost impossible with major current expenditure categories. In fact, the latter are rigid and exogenous with respect to local decision-making: there are no welfare outlays, public jobs are highly protected by national law and wages are set by the central government.

En passant, we should note that *ideologically*-motivated PBCs are far less likely at the local level than at the central or even the regional government level. When discretion exists only over one or two expenditure categories, there is no scope for the typical right-left wing preference biases between current and capital expenditure or between social expenditure and taxes.

1.2 Vote-maximising models and our contribution

The analysis in this paper pivots around the foundations of *opportunistic* PBC modelling. It combines a new explanation with an empirical test at the local government level. In the political economy literature at large, it is commonly argued that incumbents seek re-election and challengers strive to reach office. For instance, Kraan (1996, p. 62) has written: "According to the dominant view in the public choice literature, the objective function of politicians is the maximisation of electoral votes (…)." A similar remark is made by McNutt (1996, p. 9). This belief has indeed spread to the PBC literature. Earlier seminal opportunistic models were recently reprinted in Frey (1997) under the suggestive heading of "vote maximising models".[3] Modern examples of PBC models where incumbents aim at maximising their re-election chances are Nordhaus (1989), Shachar (1993), Gärtner (1994) and Persson and Tabellini (2000, Ch. 16; 1990, Ch. 5).

We depart from this view to consider explicitly the two states of nature associated with electoral uncertainty: to win and to lose. The motivation springs from the fact that political activity is fraught with risk. Electorally appointed jobs are scarce when compared to the number of potential candidates. Under democratic rules, administration positions are subject to turnover rates much higher than elsewhere in the economy. Incumbents who fail to be re-elected in general have no certain employment prospects in other public sector offices. These women and men must find an alternative job in case they fail re-election. It therefore seems quite reasonable to expect rational incumbents to bear in mind outside income (that is, income earned outside the public sector) when making their fiscal policy decisions.[4] This behaviour looks even more plausible at the local rather than the central government tier since the uncertainty on future political

[3] See Drazen (2000) for a fresh survey of the PBC literature.

[4] Pure vote-maximising models have also been questioned from the point of view of office holders' career concerns—see Le Borgne and Lockwood (2000) and the references therein. Voters follow a cut-off rule according to which they re-elect the incumbent if she performs above a threshold level that does not maximise their assessment. Contrary to our approach, the focus is not on the trade off between (local) public office and private appointment, but rather on the interaction between effort and ability to meet the voters' cut-off level.

appointments is greater for local than for higher-rank politicians.[5] The maximisation of re-election chances alone impairs the incumbent's expected utility upon uncertain events because one of the feasible alternatives, electoral defeat, is ignored beforehand.

Our paper hopes, therefore, to work out the implications of a simultaneous consideration of the two feasible electoral outcomes: to be or not to be in office in the following term. Though proceeding from an opportunistic view too, we are able to suggest a different explanation for a fiscal policy cycle: the incumbent's concern with her own welfare in case of no re-election. We borrow a simple framework presented in Baleiras (1997a) to accommodate the possibility of exogenous probability shocks and to open the ground for empirical testing. An equilibrium perfect-foresight model is designed which totally dispenses with any form of irrationality (namely, on the part of voters) or the common objective functions (re-election chances). Being well grounded in basic microeconomic theory (own-welfare maximisation by the individual agent), our analysis provides another foundation for the emergence of PBCs.

The outlined model is then applied to a panel data sample of Portuguese local governments. This application serves a twofold purpose. Firstly, it provides a test on the empirical plausibility of theoretical predictions. The methodology is quite general and can easily be customised to other national contexts. Secondly, it creates the opportunity to try to improve the understanding of the Portuguese local finance system.

The paper is organised as follows. Section 3 sets the theoretical model. Major features of the empirical application, such as sample nature, variable definitions and econometric framework, are explained in Section 4. The main empirical results follow in Section 5. Section 6 concludes.

2 An Institutional Digest of Investment-decision-making in Portugal

Before moving into economic analysis, it seems helpful to describe briefly the institutional set-up behind the model. The local government unit we will address here is the municipality. In mainland Portugal, the public sector comprises the central government and 278 (275 until 1997) municipalities—there are no intermediate-level governments. Each year, the municipality's executive branch proposes to the legislative branch the local budget and the activities plan. The legislative branch votes on both documents but cannot impose any amendment to them. In-

[5] The difficulty local incumbents face in finding a future political appointment in case of no re-election has been documented for the case of Portugal. Mozzicafreddo *et al*. (1991, p. 45) found that "(…) very curiously, the political career of mayors (*Presidentes de Câmara*) initiates and ends at the local level, rarely holding positions in the cabinet, the central administration or in the national bodies of political parties. The only link, with some significance, between central and local tiers is the seating at the national parliament before municipal activity—this has been the case of 27.3 per cent of surveyed mayors." These conclusions follow from a survey analysis involving 55 mayors in 1986 and a case-study approach focusing on five municipalities from 1976 to 1987. Moreover, central-government politicians enjoy a lifetime compensation upon exit of (at least an eight-year long) political activity on top of any retirement allowance they may be entitled to (the minimum eligible period has changed to twelve years from 1996 onwards); local-government politicians are not entitled to such compensation.

vestment expenditures can only be authorised whenever they are budgeted and framed in the activities plan.

A wide public investment spectrum is legally foreseen for local governments' intervention. Municipalities hold exclusive responsibility for promoting investment on particular items in the following areas: urban and rural facilities, sewerage and environment, energy, transports and communications, education, culture-leisure-sports and housing. Through case-by-case partnership contracts with the central government, the municipality may also invest in other areas along regulated sharing procedures.

The chairperson of the executive branch (*presidente*) plays a prominent role in local politics. Moreover, she is legally assigned protagonist functions as far as investment actions are concerned. Among her exclusive capacities, she is entitled to the right to personally authorise the payment of budgeted outlays and the execution of public works framed in the activities plan. In other words, she alone holds the power to decide on the timing of local investment actions and on the choice of capital goods suppliers.

3 Electoral Defeats: the Rationale for a PBC

This section presents the model under which the PBC is driven by the incumbent's concern with her own welfare in case of electoral defeat or, more generally, no re-election. Following the motivation in Subsection 1.1, the model aims to explain the intertemporal manipulation of one expenditure category. As this paper tests the rationale with Portuguese local governments, the target category is investment. However, the model is fully applicable to other countries under appropriate relabelling of the target variable.

The PBC is the optimal solution to the fiscal policy problem faced by the incumbent politician. We firstly describe the underlying assumptions and, secondly, present three theoretical outcomes, one by one: intertemporal consistency of the policy-maker's problem, PBC on local public expenditure and a comparative static experiment over the PBC width.

3.1 Assumptions

Consider two time periods, with an election taking place in-between.[6] The model addresses institutional set-ups where the government does not have the option of calling for an early contest. The local government has a multiperiod investment programme whose present value is exogenously defined. However, it can set the expenditure timing. Naturally, this choice must meet the budget constraint

$$g_1 + g_2 = 1 \quad , \tag{1}$$

[6] This two-period time segmentation is usual in related literature. See, for instance, Lohmann (1998), Dur *et al*. (1998), Tabellini and Alesina (1990), Persson and Tabellini (1990) and Alesina and Rosenthal (1988).

where $g_i > 0$ stands for the programme fraction accomplished in period i ($i = 1,2$). In other words, the g_is denote the (normalised) investment expenditure in periods 1 and 2. For simplicity, there is no intertemporal discount rate.[7]

An elected politician (the incumbent) runs the government and each office term lasts two time periods. The incumbent decides expenditure levels at the beginning of each period. She derives personal satisfaction from her political activity during each period, $v(g_i)$, and this function is twice continuously-differentiable with $v' > 0, v'' < 0$ for $i = 1,2$. The justification for a utility term associated with holding office can be traced back to the ego-rent label introduced by Rogoff (1990). Explanations for preferring large budgets to small ones, other things being equal, are common in the public choice literature—recall, for instance, the *leviathan* description of government as made by Brennan and Buchanan (1980, Chs. 2 and 7) or Findlay and Wilson (1984).[8]

The politician enjoys $v(g_2)$ only if re-elected, which is an uncertain event. We believe the incumbent does care as well about the prospects of losing her office in the following contest. Hence, this model innovates by looking also at the welfare associated with this latter event. As mentioned above, there is an opportunity cost to holding a public office. Instead of being incumbent, the politician could be active elsewhere in the economy, either in the private sector or in a non-local public sector, and earn income y per period. Let $x(y)$ denote the twice continuously-differentiable utility derived from the outside income, with $x' > 0$. At the beginning of period 1, the incumbent faces the intertemporal utility function

$$u = v(g_1) + \pi v(g_2) + (1-\pi)x(y) \quad , \tag{2}$$

where π indicates the re-election probability.[9] This probability is endogenously determined by the electorate's *ex ante* assessment of the incumbent's future performance while in office, which we denote by s. So,

$$\pi \equiv \pi(s) = \overline{\pi} + \gamma(s) \tag{3}$$

where $\overline{\pi}$ represents an exogenous probability component and $\gamma(\cdot)$ is twice continuously-differentiable, with $\gamma' > 0$. We further assume $\pi(s) < 1$, *i.e.*, the incumbent never runs unop-

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[7] The opportunity cost of capital—interest rate—and the concomitant financial discount factor were essential to allow for a PBC in many backward-looking models popular in the 1970s. As we are dealing with forward-looking expectations, we can set it aside and still explain a cycle. Of course, the interest rate could be introduced in our model without changing results qualitatively. Thus, we opted for its exclusion in order to stress what is essential.

[8] Moreover, politicians' preferences over public outlays underpin the money-metric utility concept of *total evaluation function* recently introduced by Kraan (1996, Ch. 3) to model the demand for public goods by political authorities.

[9] In many countries, the incumbent accumulates other earnings with the office wage, such as conference and copyright fees or returns from financial assets. These earnings are not what we mean by *outside* income y. This latter variable is a labour return in a *fulltime* activity outside the local government, and so is not cumulative with the office wage.

posed, and $\pi(s) \geq 0$, where the equality allows for the possibility of no re-candidacy; therefore, $-\gamma(s) \leq \overline{\pi} < 1-\gamma(s)$. The modelling of π thus reflects a democratic political system.

The outside income *y* is endogenous. The incumbent's fiscal policy decisions are a signal of her competence to prospective employers. The income they are ready to offer her naturally rests on the evaluation they make about her political activity performance, *s*, which is thus shared by the electorate at large and prospective employers in particular.[10] So

$$y = y(s) \quad , \tag{4}$$

which is assumed to be twice continuously-differentiable, with $y' > 0$.

Finally, we must define the way voters and prospective employers assess governmental choices. Taking *g* as expenditure on capital public goods, they are naturally pleased whenever their provision is increased. Therefore,

$$s = w(g_1) + w(g_2), \tag{5}$$

where $w(\cdot)$ is twice continuously-differentiable, with $w' > 0, w'' < 0$. This evaluation function is forward-looking since people at time zero judge the current incumbent according to what they expect her to do in the future. Why would a rational individual ever assign any weight in his voting decision to what a government has done in the past when what matters to him is what the government will do in the future?[11] Note that prospective employers take into account the incumbent's choice of g_2 in their assessment, a choice the politician will have to make in the post-election period only if re-elected, even though outside employment takes place in the opposite state of nature (non-re-election). We are thus assuming rational players and perfect foresight. This, in turn, implies that voters' interests do influence the incumbent's choices since the latter incorporates the electorate's evaluation in her decision problem—directly through $\pi(s)$ and indirectly through $y(s)$.[12] There are empirical tests asserting the wisdom of this procedure—see Levernier (1992) for an application to US state government elections.

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[10] We may take the latter as a random sample of the former, a reasonable and mild assumption.

[11] Naturally, this attitude does not exclude data on the government's past behaviour from the voter's relevant information set. Further justification for this line of reasoning can be found in Keech (1995, pp. 141-143) and Alesina and Rosenthal (1995, p. 3).

[12] A curious interpretation of voters' rational behaviour is summed-up in three characteristics by Suzuki (1994, pp. 241-242), regarding the design of macroeconomic political business cycle models: "*(the) electorate possesses a well-defined utility function in accordance with the structure of the macroeconomic system in which they operate; voters have good ideas about the strategic environment of the system and are aware of the possibility that the incumbent government will pursue its own political goals at the expense of public economic well-being; understanding that the way they evaluate the government profoundly influences the formation of macroeconomic policy, voters rely on a sophisticated heuristic for their electoral judgements in an attempt to hold the government accountable for economic performance.*"

An appropriate incentive-compatibility constraint is required to make the incumbent politician interested in a re-election run. Condition

$$\phi \equiv v(g_2) - x(y) > 0 \tag{6}$$

plays this role. It says the utility from being re-elected, $v(\cdot)$, exceeds the satisfaction derived from the alternative occupation, $x(\cdot)$. This expression thus states the expected incentive for the incumbent to seek re-election; it can be understood as a necessary (though not sufficient) condition for a re-election run. It would be unrealistic to suppose the sign of ϕ otherwise as the vast majority of incumbents seek re-election if permitted to do so. Technically, a negative ϕ would alter the players' incentives implicit in our model, thus rendering its solution meaningless—see Proposition 2 below. It also seems natural to assume $\partial\phi/\partial g_1 \leq 0$; in words, the lower the pre-electoral public expenditure, the higher is the post-electoral (feasible) expenditure and the more willing to accept a second term in office will the current incumbent be. Thus, by taking the intertemporal budget constraint (1) into account when differentiating condition (6), we derive the assumption

$$v'(1-g_1) + x'y'\left[w'(g_1) - w'(1-g_1)\right] \geq 0 \quad . \tag{7}$$

To conclude, two further technical assumptions are required if one wants the optimal solution to be meaningful. Basically, we require the incumbent's utility function $u(\cdot)$ to be strictly quasi-concave in g_1 and g_2,[13] and will exclude non-interior solutions in the sequel.

3.2 The optimal fiscal policy problem

Under the hypotheses presented in Subsection 3.1, how is local fiscal policy designed? The incumbent's choice of g_2 is trivial. She maximises her own welfare $v(\cdot)$ by exhausting the programme's budget (normalised to unity), net of the previous period expenditure g_1, since $v' > 0$. Thus,

$$g_2 = 1 - g_1 \quad .$$

The selection of g_1 is not trivial. The politician maximises her intertemporal utility (2) subject to the constraints resulting from the definitions of re-election probability (3), outside income (4), voters' and prospective employers' assessment of her performance (5), as well as from her own (trivial) strategy for choosing g_2. Formally, the fiscal problem faced in the pre-electoral period is

[13] Quasi-concavity defined for $u(\cdot)$ with π, y and s replaced by their definitions so as to have the politician's objective function defined only over the fiscal instruments she controls.

$$\max_{g_1,g_2} v(g_1)+\pi v(g_2)+(1-\pi)x(y)$$

$$\text{s.t.} \begin{cases} \pi=\pi(s) \\ y=y(s) \\ s=w(g_1)+w(g_2) \\ g_2=1-g_1 \end{cases},^{14}$$

which simplifies to

$$\max_{g_1} \quad v(g_1)+\pi\left[w(g_1)+w(1-g_1)\right]v(1-g_1)+ \\ +\left\{1-\pi\left[w(g_1)+w(1-g_1)\right]\right\}x\left\{y\left[w(g_1)+w(1-g_1)\right]\right\} \qquad (8)$$

In the pre-electoral period, the incumbent picks g_1 taking into account how her decision shapes her subsequent policy option, if re-elected. This is clear if we note that the solution to problem (8) is recursively derived and thus constitutes a *sub-game perfect Nash equilibrium* of the game. We state this first result as Proposition 1.

Proposition 1—optimum and Nash equilibrium: *the optimal solution to the local incumbent's problem before elections is a pure strategy sub-game perfect Nash equilibrium of a game played by successive policy-makers*.

Proof: see Appendix.

Proposition 1 assures us that the backward induction procedure used to solve the dynamic fiscal policy game generates a time-consistent expenditure profile no matter who wins the up-coming elections. In case of the incumbent's defeat or no candidacy to a new term, the choice rule of the subsequent administration regarding g_2 is also to exhaust the budget, exactly the same strategy for setting g_2 as the current incumbent's.[15]

The problem above can also be looked upon as a stage of a multi-stage game where one of the players is a composite of successive administrations, the other two being voters and prospective employers. However, stationarity of the stage game, resulting from the assumptions on the budget as well as on voters' and employers' horizons (two consecutive periods with elections in-between), simplifies the analysis considerably by eliminating the need to study the overall game. Note also that the incumbent has a pre-commitment mechanism since her pre-electoral choice renders her post-electoral policy option credibly known to both voters and prospective employers.

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[14] The re-election probability is still ruled by function (3). The parameter $\overline{\pi}$ is omitted here just to economise on notation. It will play a relevant role in Proposition 3 below.

3.3 The political expenditure cycle

In this subsection, we want to show how a specific intertemporal expenditure asymmetry is generated in an institutional environment as described above. To do that, we must first characterise the optimal solution to problem (8). This characterisation is conveyed by the *first-order condition*[16]

$$v'(g_1) - \pi(s)v'(1-g_1) = \Omega\left[w'(g_1) - w'(1-g_1)\right] \tag{9}$$

with

$$\Omega \equiv \left\{x\left[y(s)\right] - v(1-g_1)\right\}\gamma'(s) - \left[1-\pi(s)\right]x'(y)y'(s) < 0 \quad .$$

The sign of Ω springs from the incentive condition (6) and the derivative signs assumed over the primitive functions. The following proposition states the political business cycle in our model.

Proposition 2—the political expenditure cycle: *the incumbent's optimising behaviour captured by the first-order condition* (9) *implies a politico-budgetary cycle such that pre-electoral expenditure exceeds post-electoral expenditure* $(g_1 > 0.5)$.

Proof: see Appendix.

So, the incumbent engenders a cycle: at the optimum, $g_1 > g_2$. Why? By taking into consideration the chance of losing the upcoming contest and thus earning the outside income, the incumbent is led to discount future utility from being in office according to her re-election prospects, whereas her pre-electoral utility is not discounted. Hence, pre-electoral outlays bear full marginal utility, whereas, in contrast, post-electoral expenses convey only a probabilistically discounted marginal utility. As a consequence, she is led to set pre-electoral investment expenditure above post-electoral investment expenditure. Summing-up, the concern with her own post-electoral welfare, by leading to a probabilistic assessment of post-election outcomes, generates a cycle.

One could note that a pure re-election seeker would induce no cycle at all in this model, which contrasts sharply with the conventional wisdom in the opportunistic PBC literature—see

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Footnotes, continued from previous page

[15] Though in a different policy context, Tabellini and Alesina (1990, p. 40) have pointed out that the time-consistent solutions to dynamic optimisation problems similar to ours is indeed the non-co-operative equilibrium of a game played by consecutive decision-makers.

[16] Its necessity to describe optimal behaviour is established by the proof to Proposition 2, below.

Baleiras (1997a) for details. The cycle is clearly ascribed to the contingent nature of the incumbent's post-election utility that results from her concern with the electoral outcome.[17]

The two-period structure of the model is not restrictive as far as the incentives to create the expenditure cycle are concerned. As pointed out by an anonymous referee, this is not obvious. After all, in order to solve the incumbent's problem, i.e., setting $g_i, i = 1,2$, we would need to take future periods (beyond period 2) into account because the politician is not indifferent between starting the next budgetary period in office and in opposition. Insofar as the former is preferred to the latter, restricting focus to the budgetary period is inconsequential for our outcomes. The Appendix shows the details.

3.4 Re-election probability and the cycle width

In typical opportunistic political business cycle models, we would anticipate an inverse relationship between the probability of electoral success and the (investment) expenditure cycle width. When that probability drops unexpectedly, the re-election-seeker reacts by spending more before elections in order to recover popularity, thus widening the cycle.[18]

In our model, the incumbent is not a pure re-election runner and yet the above relationship still holds. The current subsection aims precisely at showing this outcome. To consider this issue, we have to look for the total derivative of g_1 with respect to the exogenous probability component $\overline{\pi}$. As will be shown below, a clear conclusion is achieved. We state it as Proposition 3.

Proposition 3—re-election probability and the political expenditure cycle: *the political expenditure cycle does not narrow with declining exogenous re-election probability ($d\, g_1 / d\, \overline{\pi} \leq 0$).*

Proof: see Appendix.

Under an exogenously given intertemporal budget, an increase in pre-electoral expenditure decreases post-electoral expenditure and thus widens the cycle. Proposition 3 tells us that an exogenous probability fall does not shrink the electoral expenditure deviation.

This outcome would be the natural response of a re-election seeker, pure opportunistic politician. However, our model does not comprehend such a player. Intuitively, note that a fall in the exogenous probability of success decreases the weight assigned by the incumbent to post-electoral public expenditure. In fact, recall the objective function (2). Both g_1 and g_2 enter the

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[17] Baleiras and Santos (2000, 2001) extend this model in a number of ways. In particular, they allow voters and the business community to have independent preferences. Interestingly, even when both groups exhibit an exogenous bias towards "reverse" cycles (i.e., fiscal policies where $g_1 < 0.5$), the latter paper shows that a cycle such as that which Proposition 2 predicts is statistically more likely.

[18] As Frey and Schneider (1978) put it: "When (governments) are afraid of losing the election, they make an effort to influence the economy in order to increase their popularity and hence their chances of re-election."

outside income definition with the same weight. However, a given level of g_1 pays off a higher ego-rent than an equal level of g_2 because $v(g_2)$ is *discounted* by the success probability. Hence, a lower probability renders the pre-electoral utility even more important than the post-electoral one. Therefore, the rational incumbent reacts to the probability shock by widening (or, at least, by not narrowing) the expenditure cycle.

The predictions in Propositions 2 and 3 may not differ from others in vote-maximising models. After all, even within this literature the *same* cycle has been predicted in different papers. The underlying reason for the cycle is what distinguishes between them.[19] The same happens with this paper. We depart from maximisation of vote share to explore the simple idea, so far ignored in the PBC literature, that there is life to care about in the event of an electoral defeat. Propositions 2 and 3 are indeed ascribed to this idea.

4 Application to Portuguese Municipalities

As an application of the previous theoretical work, we now wish to investigate whether the proposed structural model helps to understand the actual behaviour of local governments in Portugal. Through this application, we also hope to shed light on other potentially interesting facts concerning the political economy of Portuguese local public finance. Propositions 2 and 3 contain empirical implications that make up the basic ingredients to test. The former implies that pre-election investment expenditure exceeds post-election investment expenditure. The latter entails a cycle to a departing incumbent that is at least as large as the one induced by a re-election seeker politician. This implication perhaps needs a clarification. Consider two alternative incumbents, one seeking re-election and the other not. Clearly, the re-election probability is positive in the former case[20] and nil in the latter. With the specific probability function we used in the theoretical model, it seems natural to differentiate between the two alternative cases according to the value of the exogenous component $\overline{\pi}$. Hence, an incumbent not seeking re-election has a lower $\overline{\pi}$ than an incumbent standing for the next elections.[21] Note also that the implication from Proposition 3 discriminates on empirical grounds our rationale from a conventional opportunistic model because, in such a model, the incumbent cannot aim at anything other than winning the forthcoming electoral contest. We firstly describe the data set and, secondly, explain the econometric framework designed to serve the double purpose above.

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[19] For example, the following macroeconomic PBC has been predicted in several vote-maximising contributions: output expansions in electoral periods and output contractions in non-electoral periods. However, this very cycle is driven by information asymmetry in Persson and Tabellini (2000, Ch. 16; 1990, Ch. 5), retrospective voting in Nordhaus (1989), and monopoly power of trade unions in Gärtner (1994, Sc. 4.1).

[20] We naturally discard the possibility of an absolute incompetent politician for whom the chances of being re-elected are simply non-existent.

[21] More precisely, the no re-candidacy case implies $\overline{\pi} = -\gamma(s)$ in equation (3), exactly the lower bound for parameter $\overline{\pi}$. The re-candidacy case implies $\overline{\pi} > -\gamma(s)$.

4.1 The sample

We have constructed an annual panel data sample of thirty Portuguese (mainland) municipalities comprising five full electoral terms, from 1977 to 1993.[22] In our application, the dependent variable (denoted by *y*) is total real *per capita* investment expenditure: if any political influence of the kind discussed in Section 3 exists, investment is the expenditure item over which that influence is likely to extend with greater significance.

The empirical test of Propositions 2 and 3 requires the use of qualitative explanatory variables. Given the two-period nature of the incumbent's model discussed in Section 3, it seems natural to define the two following dummy regressors:

$$x_2 = \begin{cases} 1 & \text{if local elections are held at the end of the current period} \\ 0 & \text{otherwise} \end{cases}$$

$$x_3 = \begin{cases} 1 & \text{if the current incumbent seeks re-election and} \\ & \text{the current period is pre-electoral} \\ 0 & \text{otherwise} \end{cases}.$$[23]

Consider a fit involving x_2 only. Our prior, based on Proposition 2, is to find a positive estimate of β_2.[24] The electoral schedule introduces an expansionary deviation on investment outlays at pre-electoral periods. If x_2 and x_3 enter the same fit, Proposition 2 calls for positive estimates of β_2 and $\beta_2 + \beta_3$ because a PBC is expected without regard to the outcome of the re-candidacy decision. However, this decision is expected to make a difference on the cycle width; in fact, Proposition 3 implies $\beta_3 \leq 0$, thus ascribing a narrower cycle to a re-election seeker.

Due to a legislative change, the first three sample terms (1977 to 1985) are three years long and the last two (1986 to 1993) are four years long. The pre-electoral period of these latter terms was defined as the election year and the year before; the pre-electoral period of the former was defined as the election year only.

We have defined an additional political regressor to take into account the degree of political cohesion within the local government. Although the theoretical model of Section 3 does not require this variable, we believe it plays an interesting role in actual policy-making; hence,

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[22] The universe contains 275 municipalities during the sample period. Missing data precluded a larger set. However, the sample covers a wide diversity in terms of population, density, partisan dominance, constituency, and revenue. In 1993, the sampled municipalities account for 31 per cent of total (nominal) municipal investment and 26 per cent of total resident population. Further data details appear in Baleiras (1997b, pp. 234–237 and 311–333) and are available from the author upon request. The use of a random-effects panel data model minimises the inconveniences from any bias eventually remaining in the sample—see why in Subsection 4.2, below.

[23] Variable x_1 has unit value if the regression equation contains an intercept term. More will be said about the intercept presence below when presenting the estimation method.

[24] Hereinafter, we will denote the parameter associated with the independent variable x_k as β_k.

we decided to include it in the current application.[25] In Portugal, as in many other countries, the budgetary function is shared between both branches of government but naturally, the intertemporal profile of fiscal policy is a prerogative of the branch empowered with the initiative competence.[26] Thus, municipal parliaments are not so bothered with intra-tenure investment management as are executive branches and their leaders. They do, however, believe in the political value of investment outlays. Hence, the members of a local parliament belonging to the president's party naturally tend to favour expansionary plans while their opponents wish to restrain investment initiatives. To make it clearer: *ceteris paribus*, we expect municipal investment in any year to be higher if the president's party enjoys an absolute seat majority at the legislative branch than when that is not the case. We can test for this hypothesis by defining a new political dummy variable,

$$x_4 = \begin{cases} 1 & \text{if the incumbent's party holds more than 50\% of total seats at the legislative branch} \\ 0 & \text{otherwise} \end{cases} .$$

Our expectation is therefore to find a positive estimate of β_4.[27] We could alternatively conceive a continuous measurement of political cohesion, defined by the exact seat percentage. However, this seems a rather weaker way of capturing econometrically the likely influence of political cohesion. A score under 50 per cent would probably call for a compromise solution with other parties at the parliament, thus diluting the expansionary motivation of the ruling party.

There is one last explanatory variable we need to define. An economic variable is required to control the regressions. As the financial environment facing local governments is not stabilised along the sample period, we must distinguish between expenditure changes genuinely induced by local political considerations and expenditure changes due simply to varying funding. Therefore, we should add a funding indicator to the empirical model in an attempt to control for political effects. Given their relative size, received capital transfers are a natural candidate—these grants represent over 60 per cent of capital expenditure during the sample period. We label this new variable as x_5. It is obviously defined in real *per capita* units, just like the dependent variable. Naturally, we expect a positive estimate for β_5.[28]

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[25] Actually, the fits do improve with the presence of this variable.

[26] This prerogative is indeed legally binding in Portugal. According to the Local Authorities Act, the municipal parliament cannot introduce a single amendment to the budget or the activities plan proposed by the executive branch; it can only approve or reject the executive's proposal (no. 4 of article 39).

[27] We have also considered the possibility of interaction between political cohesion and the other dummies. Variable x_2x_4 (x_3x_4) captures the impact of an absolute majority on the cycle width (on the differential width induced by a re-election seeker). Yet, we found no empirical support for these interactions. By entering alone in regression lines, variable x_4 tests for the above time-independent effect of partisan composition on investment expenditure.

[28] As the number of sampled individuals grows to infinity, lagged values of the dependent variable are increasingly more appealing as control variables—see Arellano and Bond (1991). Reliance on their use is particularly tempting when no sound, natural exogenous variable exists in the application context. In our case, neither of these conditions is met, which explains our preference to control the regressions via received capital grants.

To conclude, we should remark on a potential structural break in 1986. Portugal joined the European Community as of the 1st of January, 1986. Its participation in the community regional policy gave the central as well as local governments new resources, the structural funds—and later, from 1993 onwards, the cohesion fund. These proceedings are *matching grants* conditional upon the rules of eligibility and additionality that restrict their use to investment finance. A large fraction is actually translated into public capital accumulation. Rules of access to these new income streams, however, differ quite substantially from those applying to traditional central government transfers. In particular, their disposal by municipal budgets is less predictable than older transfers (those from the central government) since these newer transfers are conditional on the pre-existence of investment programs and, to a large extent, must be bargained with central government agencies. The whole transfer procedure is thus longer and contains several critical deadlines sharing nothing with local electoral schedules. Therefore, we should suspect that the increasing reliance of local governments on structural funds makes the political business cycle harder to implement. Nevertheless, the increasing availability of this new revenue, which does not crowd out any previous income source, is expected to enhance the power of capital transfers to explain municipal investment. Hence, we will divide the sample into two sub-periods, 1977 to 1985 and 1986 to 1993, so as to formally test the statistical significance of this potential 1986 break.

4.2 The econometric framework

As is evident from the sample nature discussed above, each variable observation contains both an individual and a time dimension. With N individuals and T time periods, the empirical model becomes

$$y_{it} = \sum_{k=1}^{K} \beta_k x_{kit} + v_{it} \qquad i = 1,\ldots,N; t = 1,\ldots,T \quad , \tag{10}$$

where k accounts for the number of regressors and v_{it} is the usual stochastic residual. The economic variables (y and x_5) are measured in logarithmic units.[29] Sample municipalities are likely very different from one another. Population size is not the same across them, their geographic location varies, they are ruled by distinct political parties, the personal motivation of incumbent leaders is inherently idiosyncratic, incumbents' competence is unalike and all this diversity leads local governments to differ in the way they adjust investment expenditure to common stimuli. Clearly, the assumption of equal regression coefficients implicit in (10) does not seem realistic. But the problem of finding a better specification is that we do not know for sure what it exactly is. Moreover, the wish to add realism must be traded off against the degrees of freedom loss when we think about estimation procedures.

[29] As there is no theoretical recommendation, our empirical implementation has actually measured real *per capita* investment and real *per capita* transfers both in natural units and in logarithmic terms. However, for the sake of space, we report only the logarithmic case in Section 5 Empirical Results, as its fits are better.

In our quest for a parsimonious specification allowing for individual heterogeneity, we decided to reflect inter-municipal differences solely in intercept terms. To be more precise, all slope coefficients are assumed to be equal across individuals and the parameter associated with $k = 1$ is expressed as

$$\beta_{1it} = \beta_1 + \mu_i \qquad \forall i,t \quad ,$$

where β_1 is constant and μ_i is the individual-specific component. Although unknown, one must also assume from the outset whether these individual components are *fixed* or *random*.

The choice between fixed and random effect specifications has been thoroughly analysed in the econometrics literature. Following several criteria suggested by Balestra (1992), Hsiao (1986, Chs. 3 and 6; 1992) and Greene (1993, Sc. 16.4), we opt for the stochastic version of individual parameters. Firstly, municipal heterogeneity relies upon a number of non-observable random causes, such as access to capital transfers,[30] incumbent's re-candidacy decision[31] or re-election probability.[32] Secondly, given that *T* is relatively small (when compared to *N*) in our sample, parameter estimates in fixed-effect models are less reliable than in random-effect models because the ratio of estimable coefficients to available observations is larger. Thirdly, the sample is open in the sense that the *N* collected municipalities are only a subset of the whole statistical population of Portuguese local governments. Therefore, individual differences are not a main research concern—the focus is clearly on slope parameters. Individual asymmetry analysis would become a natural priority if the sample were closed in the sense of covering all individuals of the statistical population; in this case, then, a fixed-effects model would be most welcome.[33] Finally, we would like to use regression results to draw conclusions bearing some significance to Portuguese local public finance in general and not only applicable to sampled municipalities. In other words, we prefer to make statistical inference with respect to population features rather than inference conditional on the effects present in the sample. According to Hsiao (1986, Chs. 3 and 6) in particular, a random-effects model is the most suitable specification when this kind of inference is wished.

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[30] Access to national transfers relies very much on the central government's discretion and very little on the local governments' behaviour. The same applies to European capital grants, whose eligibility is contingent upon administrative contests empowered by the central government and European agencies. *Ex ante*, these variables are unknown to the individual municipality, whose bargaining power is typically too small to exert any noticeable influence upon their realisation. Only a collective lobbying organisation encompassing a large enough number of local governments may have such power. The reader interested in a political economy approach to municipal lobbying for transfers may wish to consult Pereira (1996).

[31] The re-candidacy decision, whose foundations lie beyond this essay's scope, depends on the incumbent's personal trade-off between the local public and non-local public job offers and we can think of politicians as being sorted out from a random distribution of these trade-offs. The concerned reader can refer to Reed (1994) for a cost-benefit analysis of re-election runs.

[32] We have not explored in Section 3 the randomness of the re-election probability but we do not ignore its role in the real world. See Tabellini and Alesina (1990) for an example of random probability modelling.

[33] The individual-specific terms μ_i should be treated as constants if the performance of the individual units in the database were of paramount interest, but that is not our case. The size and magnitude of slope coefficients matter more for us than eventual individual differences between them.

It is fair to say the empirical PBC literature has proceeded otherwise. In papers such as Roubini and Sachs (1989a,b), Alesina and Roubini (1992), Alesina *et al*. (1993), and Schuknecht (1999, 2000), on the central government tier, and Blais and Nadeau (1992), at the subnational tier, the individual idiosyncrasies are modelled as deterministic effects from the outset and are not open to discussion. Contrary to this trend, and following the arguments above, we believe there are reasons in our statistical population to expect randomness on inter-municipal structural differences; therefore, we opt for a stochastic specification of individual effects and will subject our choice to the data scrutiny—indeed, a formal test (the *Hausman*'s test below) will endorse, in our case, the superiority of the random-effects approach.

Having decided to use a stochastic specification of individual effects on intercepts, the appropriate econometric specification is the so-called *error-components* model. It will be estimated according to the *feasible generalised least-squares* method. Technical details on both the model and the estimator can be found, for example, in Greene (1993, Ch. 16), Mátyás (1992) and Hsiao (1986, Ch. 3).

5 Empirical Results

The main outcomes of our empirical research are shown in Table 1. We ran the logarithm of real *per capita* investment expenditure (*y*) against the logarithm of real *per capita* received capital transfers (x_5) and the political dummies—the electoral variable x_2, the re-candidacy differential variable x_3 and the political cohesion variable x_4. Column 1[34] refers to the total sample period, 1977–93, whereas columns 2 and 3 refer to the sub-periods 1977–85 and 1986–93, respectively. Firstly, we shall comment upon the overall results in these columns; secondly, we shall address the empirical backup of the PBC rationale.

5.1 Basic findings

The evidence in favour of the structural break is indeed quite strong. There is a clear regression improvement from 1986 onwards. This is perceived by the individual explanatory power of each independent variable and, most noticeably, is reflected in both overall *goodness-of-fit* statistics displayed: the absolute error measure given by the residual's standard deviation falls from 0.40 to 0.24 and its relative error counterpart, the coefficient of determination, rises almost twenty percentage points. The implicit *Chow*'s test confirms the significance of the differences. The residual sum of squares attached to the post-1986 regression is 3.356 while the homologous figure relating to the whole sample period is 16.046; hence, the relevant *F*-statistic is 3.292, comfortably above the 1 per cent significance threshold. Consequently, we should reject the explicit null hypothesis, that is, we find evidence in favour of a structural break in 1986. The sub-samples are drawn from different populations and should not be merged. At the end of this

[34] Columns are numbered from left to right.

subsection, we shall comment on the weaker performance of the empirical model in the first sub-period.

Table 1—Main regressions

Independent variables	Dependent variable: ln *y*				
	1977–93	**1977–85**	**1986–93**	**Constr. model 1977–85**	**Constr. model 1986–93**
ln x_5	0.677 (10.667)*	0.607 (6.168)*	0.671 (25.529)*	0.630 (6.322)*	0.695 (8.663)*
x_2	0.223 (2.142)***	0.266 (2.143)***	0.090 (4.954)*	—	—
x_3	-0.099 (-0.877)	-0.157 (-0.994)	-0.056 (-2.993)*	—	—
x_4	0.265 (3.643)*	-0.108 (-0.694)	0.321 (9.902)*	-0.149 (-0.972)	0.292 (2.945)*
Constant	0.975 (5.135)**	1.187 (5.201)**	1.019 (2.993)**	1.211 (5.250)**	1.025 (3.845)**
St. error of regression	0.339	0.396	0.238	0.404	0.258
R^2	0.513	0.379	0.563	0.338	0.513
Hausman	5.315	1.244	0.907	0.865	3.039

t-Ratios in parentheses.
* Significant at 99 % (one-tailed test).
** Significant at 99 % (two-tailed test).
*** Significant at 97.5 % (one-tailed test).

The first three specifications pass the overall significance *F*-test, even in the case of column 2 whose coefficient of determination is only about 38 per cent.[35] Interestingly, in all cases the *Hausman*'s statistic is comfortably located in the acceptance region of the relevant χ^2-distribution (the critical value for a 99 per cent confidence level is 13.3); thus, the empirical evidence does not contradict our priors in favour of the random composition of individual effects.

Note the strong explanatory power of the control variable. The elasticity of investment with respect to capital transfers increases from less than 61 per cent in the first period to over 67 per cent afterwards, and this point estimate change is combined with a clear significance improvement. This result confirms our expectation about the role of structural funds after 1986. Curiously, the political cohesion variable displays the expected sign and is statistically significant in columns 1 and 3 but fails these features in column 2.

So the empirical model shows a weaker performance in the 1977–85 sub-period. The problems seem to lie with two political regressors, x_3 and x_4. Like x_2, these variables assume a democratic background where the people elect incumbents at regular time intervals. However, Portugal was ruled by a dictatorship for 48 years, until 1974. Moreover, between 1911 and 1976 local incumbents have always been appointed by the central government and were accountable before the central government only. The first local elections since 1911 were held precisely in

[35] Typically, panel data models of government finance exhibit relatively low values for R^2 and display significance problems with dummy variables at high levels of breakdown.

December 1976. This means the political background of the PBC model in Section 3 above was lacking in Portugal during the first democratic years. It takes time to learn democracy and to discover the kind of politico-economic incentives that drive our theoretical model. We thus believe that this learning process can be a valid explanation for the somewhat weaker empirical results found in the first sub-period.

5.2 Test of the PBC rationale

We can now address the empirical implications of our main theoretical results. Recall that Proposition 2 entails $\beta_2 > 0$ and $\beta_2 + \beta_3 > 0$ while Proposition 3 implies $\beta_3 \leq 0$. The estimates in all columns 1–3 do comply with these theoretical restrictions—their statistical significance is analysed below. During the first sub-period (column 2), leaving incumbents are associated with a 31 per cent[36] investment jump in pre-electoral years while re-election runners also display an intertemporal asymmetry but of a lesser magnitude, recording only a 12 per cent PBC. Cycles in the second sub-period (column 3) are smaller: 9 per cent upward jumps for departing incumbents and just 4 per cent upward deviations for re-election seekers. Hence, access to EC's structural grants seems to have reduced the PBC potential and reinforced the role of capital transfers, just as expected.

Chart 2 offers a graphical illustration of the PBC taking the municipality of Viana do Alentejo as an example.[37] We opted to represent the sub-sample models only—regression 2 for the years 1977 to 1985 and regression 3 for the years 1986 to 1993. The solid line plots the *no-cycle* prediction for this municipality, i.e. the fits in columns 2 and 3 without the cycle dummies x_2 and x_3. Adding up these variables, we derive the expenditure prediction in line with the proposed regressions—the dashed line gives its plot. Please note that local elections were held in mid-December of the following years: 1979, 1982, 1985, 1989, and 1993. The vertical solid line segments between those two lines stress the estimated pre-electoral upward jumps in investment. The jumps are higher when the incumbent did not run for re-election, which (in Viana do Alentejo) happened in 1979 and 1993.[38] The structural break is visible in two ways: lower jumps in the last two tenures and the marked 1986 rise in the dependent variable.

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[36] The predicted proportional change in *y* is not exactly equal to $\hat{\beta}_2$ because x_2 is a discrete variable. The same applies to the other political dummies. We are grateful to an anonymous referee for calling our attention to this point.

[37] The choice of municipality is immaterial. Viana do Alentejo is located in the Alentejo province—southern Portugal.

[38] Contrast the 31 per cent jump of 1979 with the 12 per cent deviations in 1982 and 1985, and the 9 per cent jump of 1993 with the 4 per cent deviation in 1989.

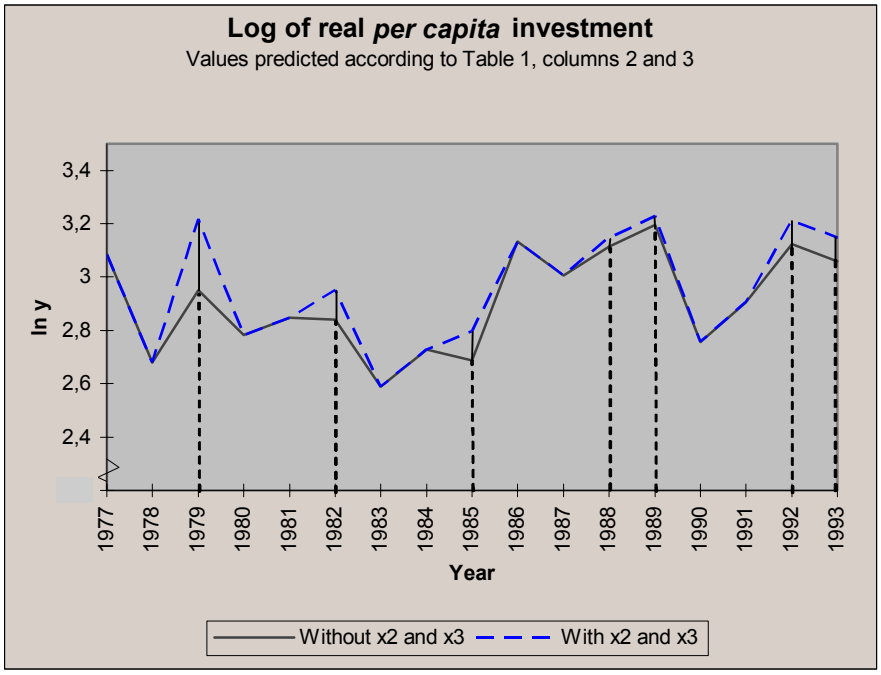

Chart 2—The political expenditure cycle in the municipality of Viana do Alentejo

The statistical significance of the PBCs was also investigated. Firstly, we tested for the joint significance of both propositions. This requires the estimation of a constrained model, derived from the original by imposing the nulls. Columns 4 and 5 in Table 1 present its estimates for the first and the second sub-samples, respectively. For each one, the statistical significance of the difference between the unrestricted and the constrained models is judged upon the value of the relevant *F*-statistic, which equals 8.799 in 1977–85 and 13.531 in 1986–93. In both cases, the data do not reject the overall explanation of investment cycles put forward in Section 3.

Secondly, we have also looked for the individual significance of each proposition. As there are two empirical implications springing from Proposition 2, its test requires i) a simple *t*-ratio analysis of $\hat{\beta}_2$ in columns 2 and 3 above, and ii) a comparison between the unrestricted model (in those columns) and a constrained model embodying the null $H_0: \beta_2 + \beta_3 = 0$. Note therefore that β_2 in columns 2 and 3 is significantly non-zero. The coefficient of determination of the constrained model (not shown) is 0.371 for the 1977–85 sub-period and 0.513 for the 1986–93 sub-period; they entail *F*-statistics of 3.275 and 27.099, respectively, thus allowing us to reject the null in both cases—with a 90 per cent confidence level in the first case and 99 per cent in the second. So the two empirical implications of Proposition 2 pass the data test in both sample periods. To test for Proposition 3's empirical implication alone, it suffices to look for the individual significance of β_3 in columns 2 and 3. Although portraying an economically sound estimate in both sub-periods, this proposition finds statistical support in 1986–93 only. As suggested above, the weaker performance in the earlier sub-period is probably due to the democracy-learning process.

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The empirical findings in this section associate economic plausibility with statistical significance, and two conclusions clearly emerge. On the one hand, Propositions 2 and 3 are fully supported by the results in column 3 of Table 1, thus revealing an actual case where the political business cycle rationale put forward in Section 3 is empirically relevant. On the other, the available data point out a diachronic structural break: participation in the common regional policy from 1986 onwards may have led to a mitigation of the PBC and a reinforcement of the explanatory power of capital transfers.

6 Concluding Remarks

Conventional views about opportunistic PBCs often ascribe their origin to the electorate's shortsightedness or the incumbent's desire for being re-elected. In this paper, we suggest a quite different interpretation. PBCs can indeed be the optimal outcome of an *ultrarational* set-up where information is full and symmetrically distributed, all players optimise, voters are forward-lookers and the current incumbent explicitly allows for her satisfaction in the two possible future states of nature: electoral victory and electoral defeat. To the extent that the analysis addresses how the voting institution aligns people's preferences with the incentives of self-interested politicians, the paper is very much in the spirit of the on-going literature on the micropolitical foundations of public finance analysis—see Persson *et al*. (1998).

The theoretical framework points out three predictions. First, the expenditure profile is time-consistent regardless of who wins the following elections; indeed, the optimal solution corresponds to the (unique) sub-game perfect Nash equilibrium of a game played by successive administrations. Secondly, the optimal policy is a PBC where public outlays before elections exceed those after elections. The incumbent's pre-electoral utility is totally derived from being in office whereas her post-electoral utility is contingent upon the electoral score; hence, consideration for the possibility of defeat (or no re-candidacy) and the concomitant alternative employment introduces an asymmetry in the way pre- and post-electoral expenditure levels are set and engenders the cycle. Thirdly, a decrease in the (exogenous) re-election probability does not narrow the expenditure cycle. This is so because the incumbent's pre-electoral utility becomes relatively more important following the probability shock.

We believe the theoretical framework is particularly suited for explaining PBCs at the local government tier. Thus, the paper has also provided an empirical test to the proposed rationale, based on a panel data sample of Portuguese municipalities. Municipal investment expenditure was the endogenous variable over which political cycles were expected to materialise. The empirical evidence in the period 1986–1993 seems to support the theoretical model, as its predictions were not contradicted by the data.

So, public expenditure fluctuations can be interpreted as the outcome of rational behaviour by fully informed agents. Inasmuch as these fluctuations are regarded as detrimental to society, our research motivates a future study on incentive design to minimise their occurrence.

Appendix

Proof of Proposition 1: Problem (8) is the recursive solution to the successive static optimisation problems stated in Subsection 3.2. Each static problem can be viewed as a sub-game of a game played by two consecutive administrations. Note that only one action is possible at each moment and that the optimal solution to each static problem is unique; hence, the game at issue belongs to the class of finite games of perfect information. By *Zermelo's theorem*, we are told that: i) there is a unique Nash equilibrium for the intertemporal fiscal policy game; ii) this equilibrium outcome can be derived through backward induction. Moreover, as with every game in that class, ours has a unique pure strategy sub-game perfect Nash equilibrium—according to proposition 9.B.2. in Mas-Collel *et al*. (1995, p. 276). Consequently, the strategy profile derived by backward induction in Subsection 3.2 identifies the Nash equilibrium for both the whole game and each associated sub-game.

Proof of Proposition 2: A three-step approach is used to establish the thesis. First, the very existence of an optimal solution is ensured; secondly, the necessity of the first-order condition to describe optimising behaviour is asserted; finally, the specific cycle $g_1 > 0.5$ will be derived as an implication of the first-order condition.

(i) Optimum existence: the incumbent's problem (8) can be rewritten as

$$\begin{aligned} \max_{g_1,g_2} \quad & u \equiv v(g_1) + \pi\left[w(g_1) + w(g_2)\right]v(g_2) + \\ & + \left\{1 - \pi\left[w(g_1) + w(g_2)\right]\right\}x\left\{y\left[w(g_1) + w(g_2)\right]\right\} \\ \text{s.t.} \quad & (g_1, g_2) \in E \end{aligned} \tag{11}$$

where

$$E = \left\{(g_1, g_2) : (g_1, g_2) \in \Re_+^2 \wedge g_1 + g_2 \leq 1\right\}$$

is the opportunity set. Clearly, E is a non-empty and compact set in $\Re^2$. The objective function is continuous in this set as it is arithmetically built from the continuous function defined therein. Hence, the *Weiertrass's theorem* applies. Moreover, the optimal solution is unique because the objective function is assumed to be strictly quasi-concave in that domain.

(ii) Necessity of the first-order condition: condition (9) is necessary to characterise local extrema because both the objective and the constraint are C^2-functions and the relevant rank condition is obviously met.

(iii) Expenditure cycle: from (i) and (ii) above, we know that a utility maximising basket exists, is unique and verifies (9). We will show now that the optimal solution implies $g_1 > 0.5$ by contradiction. Suppose $g_1 \leq 0.5$. Then,

$$v'(g_1) \geq v'(1 - g_1) > \pi(s)v'(1 - g_1)$$

because $v' > 0$, $v'' < 0$ and $\pi(s) < 1$. Hence,

$$v'(g_1) - \pi(s)v'(1-g_1) > 0,$$

i.e., the left-hand side of (9) is strictly positive. By the same token, $w' > 0$ and $w'' < 0$ imply $w'(g_1) - w'(1-g_1) \geq 0$. Since $\Omega < 0$, the right-hand side of (9) is non-positive—hence a contradiction is generated when $g_1 \leq 0.5$. Therefore, $g_1 > 0.5$ in the maximising basket.

Generalization to multiple periods: The incumbent's utility function (2) can be understood as a reduced version of the multi-period utility function governing the incumbent's behaviour. The reduced version gains in simplicity at the cost of omitting terms that do not qualitatively affect the results. To see this, consider the utility function at the beginning of a budget cycle,

$$u = v(g_1) + \pi v(g_2) + (1-\pi)x(y) + \pi\bar{u} + (1-\pi)\underline{u} \quad ,$$

where $\bar{u}$ and $\underline{u}$ represent the utility of starting the new budget cycle (after period 2) in office and in opposition, respectively. Similar to the hypothesis $v(g_2) > x(y)$, let $\bar{u} > \underline{u}$—we thereby reiterate the assumption that the politician prefers to start the new budget cycle as the incumbent. Rewriting the above equation as

$$u = v(g_1) + \pi\left[v(g_2) - x(y)\right] + x(y) + \pi(\bar{u} - \underline{u}) + \underline{u}$$

allows for a simplification. The term $\pi\left[v(g_2) - x(y)\right]$ is qualitatively analogous to $\pi(\bar{u} - \underline{u})$ as far as the incentives for setting g_1 and g_2 are concerned. To see this, note that winning the election is then desirable not only because being in office yields more utility during period 2—which is captured by the term $\pi\left[v(g_2) - x(y)\right]$—but also because the politician prefers to start the new budget cycle as the incumbent—as captured by the term $\pi(\bar{u} - \underline{u})$. Thus, ignoring the terms associated with the distant (post-period 2) future does not qualitatively affect the incentives driving the results. In the main text, we ignore these terms without loss of generality—for the purpose of studying cycles' amplitude as a function of behavioural parameters—and make considerable gains in simplicity.

Proof of Proposition 3: Firstly, we will derive the bordered hessian determinant associated with the incumbent's problem. Secondly, the expression for $d\,g_1/d\,\bar{\pi}$ will be obtained out of the total differentiation of the first-order condition. The sign of this expression follows from that determinant.

(i) The bordered hessian determinant inherent to the incumbent's problem (11) is (interior solutions only)

$$\left|\overline{\mathbf{H}}\right| = \begin{vmatrix} \ell_{11} & \ell_{12} & 1 \\ \ell_{21} & \ell_{22} & 1 \\ 1 & 1 & 0 \end{vmatrix} \quad ,$$

where ℓ_{ij} $(i, j = 1,2)$ denotes the second-order partial derivatives of the auxiliary lagrangean function:

$$\ell_{11} = v''(g_1) + \left[v(g_2)\gamma' + (1-\pi)x'y' - x\gamma'\right]w''(g_1) + \\ + \left\{v(g_2)\gamma'' + (1-\pi)\left[x'y'' + x''(y')^2\right] - 2x'y'\gamma' - x\gamma''\right\}\left[w'(g_1)\right]^2$$

$$\ell_{12} = \ell_{21} = v'(g_2)w'(g_1)\gamma' + \\ + \left\{v(g_2)\gamma'' + (1-\pi)\left[x'y'' + x''(y')^2\right] - 2x'y'\gamma' - x\gamma''\right\}w'(g_2)w'(g_1)$$

$$\ell_{22} = \pi v''(g_2) + 2v'(g_2)w'(g_2)\gamma' + \left[v(g_2)\gamma' + (1-\pi)x'y' - x\gamma'\right]w''(g_2) + \\ + \left\{v(g_2)\gamma'' + (1-\pi)\left[x'y'' + x''(y')^2\right] - 2x'y'\gamma' - x\gamma''\right\}\left[w'(g_2)\right]^2 \quad .$$

We are interested in evaluating $\left|\overline{\mathbf{H}}\right|$ at the stationary point, which naturally complies with the budget constraint $g_2 = 1 - g_1$. After some rearrangements, the expression of the determinant becomes

$$\left|\overline{\mathbf{H}}\right| = -v''(g_1) - \pi v''(1-g_1) + \Omega\left[w''(g_1) + w''(1-g_1)\right] - \\ - \left\{\left[v(1-g_1) - x\right]\gamma'' + (1-\pi)\left[x'y'' + x''(y')^2\right]\right\}\left[w'(g_1) - w'(1-g_1)\right]^2 + \quad , \\ + 2\gamma'\left\{v'(1-g_1) + x'y'\left[w'(g_1) - w'(1-g_1)\right]\right\}\left[w'(g_1) - w'(1-g_1)\right] > 0$$

where the strict positiveness follows from the strict quasi-concavity of the objective function in problem (8).

(ii) We now derive $d\,g_1 / d\,\overline{\pi}$. Total differentiation of the first-order condition (9), p. 10, with respect to g_1 and $\overline{\pi}$ leads to

$$\left\{v''(g_1) + \pi v''(1-g_1) - \Omega\left[w''(g_1) + w''(1-g_1)\right]\right\}dg_1 - \\ - \left\{v'(1-g_1)\gamma'\frac{ds}{dg_1} + \left[w'(g_1) - w'(1-g_1)\right]\frac{\partial\Omega}{\partial g_1}\right\}dg_1 = \quad . \qquad (12) \\ = \left\{v'(1-g_1) + \left[w'(g_1) - w'(1-g_1)\right]\frac{\partial\Omega}{\partial\overline{\pi}}\right\}d\overline{\pi}$$

Proceeding to a separate evaluation of the derivatives in (12), we get:

$$\frac{\partial \Omega}{\partial g_1} = v'(1-g_1)\gamma' + \\ +\left\{\left[x - v(1-g_1)\right]\gamma'' + 2x'y'\gamma' - (1-\pi)\left[x''(y')^2 + x'y''\right]\right\}\frac{ds}{dg_1}$$

$$\frac{\partial \Omega}{\partial \pi} = x'y'$$

$$\frac{ds}{dg_1} = w'(g_1) - w'(1-g_1) \quad ,$$

by definition of s and the budget constraint. Inserting these individual derivatives into the total differential (12) and rearranging, we arrive at

$$\frac{dg_1}{d\pi} = \frac{A}{B + CA} \quad ,$$

where

$$A \equiv v'(1-g_1) + x'y'\left[w'(g_1) - w'(1-g_1)\right]$$

$$B \equiv v''(g_1) + \pi v''(1-g_1) - \Omega\left[w''(g_1) + w''(1-g_1)\right] + \\ +\left\{\left[v(1-g_1) - x\right]\gamma'' + (1-\pi)\left[x'y'' + x''(y')^2\right]\right\}\left[w'(g_1) - w'(1-g_1)\right]^2$$

$$C \equiv -2\gamma'\left[w'(g_1) - w'(1-g_1)\right] \quad .$$

Now note that $B + CA = -\left|\overline{\mathbf{H}}\right|$. Therefore, $B + CA < 0$. Moreover, A is simply the left-hand side of assumption (7), presented on p. 8; hence, $A \geq 0$. So,

$$\frac{dg_1}{d\pi} \leq 0 \quad ,$$

which concludes the proof.

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