Making Rules Credible: Divided Government and Political Budget Cycles*

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Abstract

Political budget cycles (PBCs) result from the credibility problems that office-motivated incumbents face under asymmetric information, due to their temptation to manipulate fiscal policy to increase their electoral chances. We analyze the role of rules that limit debt, crucial for aggregate PBCs to take place. Since the budget process under separation of powers typically requires that the legislature authorize new debt, divided government can make these fiscal rules credible. Commitment is undermined either by unified government or by imperfect compliance with the budget law. When divided government affects efficiency, voters must trade off electoral distortions and government competence.

Keywords: political budget cycles, unified government, rules, credibility, separation of powers, divided government

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1 Introduction

In the rational choice approach to electoral cycles, asymmetric information allows the incumbent to exploit its discretionary power for electoral purposes. In the case of monetary policy, Lohmann (1998a) points out that the incumbent is tempted towards a stimulative stance if it cannot credibly commit to optimal policy. This electoral bias carries over to fiscal policy: Shi and Svensson (2006) and Alt and Lassen (2006a) show how the inability of the executive incumbent to credibly commit not to use debt for electoral purposes causes aggregate political budget cycles (PBCs).

The solution to the credibility problems caused by time consistency has often been cast in terms of the "rules versus discretion" debate (Kydland and Prescott 1977). von Hagen (2006) characterizes ex ante fiscal rules as numerical constraints on certain budgetary aggregates, like numerical debt ceilings, and summarizes the empirical evidence for US states on the effectiveness of ex ante rules on debt and deficits as limited, because they can be circumvented. Besides requiring rules to be clear-cut and comprehensive, Strauch and von Hagen (2001) stress that enforcement of rules should rely on independent agents and restraints should be hard to amend. This paper focuses on institutional arrangements that limit the discretion to change rules, and in particular on how a power that checks power can turn the budget rule into a credible commitment.

In constitutional democracies the budget process requires the participation of the legislature. We specifically consider a budget rule that prohibits the executive from issuing new debt, unless authorized by the legislature. Once the assumption of a single fiscal authority is dropped, the possibility of PBCs will depend on the leeway that the legislature allows the executive in pursuing electoral destabilization (Streb 2005,

Saporiti and Streb 2008).

We draw on the insight of Alesina and Rosenthal (1995), with partisan political parties, about the moderating influence of an opposition legislature. Through the metric of veto players (Tsebelis 2002), this insight applies not only to divided government in presidential systems, but also to coalition governments in parliamentary systems. Relying on the Romer and Rosenthal (1978, 1979) model to formalize divided government as the presence of a veto player, our contribution is to show that this moderating influence carries over to an opportunistic framework with office-motivated parties, where divided government can solve the credibility problems behind electoral cycles in fiscal policy. While our focus is on the credibility of rules, Lohmann (1998b) and Keefer and Stasavage (2003) make a related point on the credibility of delegation. They show that an independent central bank, the Rogoff (1985) solution to the time consistency problem of monetary policy, is not credible unless there are political veto players that can block the executive incumbent.

Divided government can also reduce government efficiency, so voters face a trade-off between the "control" and "selection" motives (Umeno and Bugarin 2008): voters can control the moral hazard problem that leads to PBCs, at the cost of introducing an adverse selection effect under divided government, namely, forcing the most competent party to share power with less competent ones. Section 2 describes the setup, Section 3, the equilibria, Section 4, the empirical implications, and Section 5 concludes.

2 Setup

To focus on the credibility problems of economic policy in electoral periods, we assume the executive does not know its current competence shock (Lohmann 1998a).[1] The interpretation of this timing is that policy is decided under uncertainty. Voters have to decide without observing the choice of fiscal policy instruments, but after observing fiscal policy outcomes.

The Romer and Rosenthal (1978) and (1979) agenda setter model is used to depict how the process of drafting, revising, approving, implementing and controlling the budget in constitutional democracies requires the participation of the legislature.[2] Following Shi and Svensson (2006) and Alt and Lassen (2006a,b), we additionally assume that debt financing is distortionary, so fiscal policies are reversed after elections.

2.1 Citizens

Consider an infinite-horizon society. Let t denote time, where odd positive integers are electoral periods and even positive integers are non-electoral periods. The society is composed by a large but finite number of identical individuals, labeled $i = 1, 2, \ldots, n$, that play roles both as consumers and as citizens. Following Alt and Lassen (2006a), we could alternatively assume there is heterogeneity among voters, and that the median

[1] Persson and Tabellini (2000, pp. 420-5) characterize models such as Lohmann (1998a) as moral hazard models of electoral cycles, in contrast to the adverse selection models developed by Rogoff and Sibert (1988), Rogoff (1990), and Persson and Tabellini (1990) where electoral cycles are a signal of the competence of the incumbent. If the incumbent does not have private information about its competence, but asymmetric information on the choice of policy instruments remains, the moral hazard problem discussed in the text comes to the forefront.

[2] Persson, Roland and Tabellini (1997) apply this model to analyze how separation of powers allows to control the rents of politicians. Saporiti and Streb (2008) apply it to PBCs, but since the legislature acts benevolently as a representative of the interests of the people, it is never aligned with the executive.

voter is just indifferent between the incumbent and the opposition in terms of ideology, so its vote is determined by the expected competence of each.

The representative consumer derives utility from a public good g_t and a private good c_t, with a quasi-linear per-period payoff

$$u(c_t,\, g_t) = c_t + \alpha \ln(g_t), \tag{1}$$

where $0 < \alpha < 1$. The intertemporal utility function U is given by

$$U = \sum_{t=0}^{\infty} \beta^t u(c_t,\, g_t), \quad 0 < \beta < 1. \tag{2}$$

Output y_t is exogenous, with $y_t = y$. By the consumer's budget constraint, consumption c_t equals disposable income, namely, y net of the tax burden p_t:

$$c_t = y - p_t. \tag{3}$$

2.2 Government

Unlike Rogoff (1990) and the subsequent literature, we distinguish between budget items and production technology.[3] Each period t, the government is subject to the budget constraint

$$\gamma_t = \pi_t + d_t - (1 + r)d_{t-1}, \tag{4}$$

[3]In Rogoff (1990), the production of public goods is determined by tax revenues and government competence. Though public expenditure equals tax revenues, at times it is confused with the production of public goods. Unlike voters, an econometrician does not observe public goods, but rather budget expenditures.

where γ_t denotes budget expenditures on public goods, π_t are tax revenues or receipts, d_t is public debt and r is the interest rate on debt, that is constant.[4]

Public resources γ_t are transformed into the public good g_t according to the competence θ_t of the government. Similarly, the competence of the government affects how the tax burden p_t turns into government tax receipts π_t, reflecting, among other things, the use of more or less distortionary taxes:

$$g_t = \theta_t \gamma_t. \tag{5}$$

$$p_t = \frac{\pi_t}{\theta_t}. \tag{6}$$

By (5), to provide a given level of public goods, expenditure must be higher with less competent governments. By (6), to generate a given level of tax receipts, the tax burden must be higher with less competent governments. Our technological assumptions lead tax revenues and expenditures to fluctuate with the competence of the government.

The standard assumption is that government competence is that of the party in control of the executive. For party i, competence follows a first-order moving average process, as in Rogoff and Sibert (1988), making retrospective voting rational (the superscript i is omitted here):

$$\theta_t = \bar{\theta} + \varepsilon_{t-1} + \varepsilon_t. \tag{7}$$

The incumbent does not know its current competence shock when it takes bud-

[4]Positive public debt implies the government incurs in external debt.

get decisions. Each competence shock ε is uniformly distributed over the interval $\left[-\frac{1}{2\xi}, \frac{1}{2\xi}\right]$, with expected value $\mathbf{E}(\varepsilon) = 0$ and density function $\xi > 0$. A higher value of ε corresponds to a more competent politician. The probability distribution of competence θ_t conditional on ε_{t-1}, $\mathbf{F}(\theta_t|\varepsilon_{t-1})$, is also uniform, with support $\left[\bar{\theta} + \varepsilon_{t-1} - \frac{1}{2\xi}, \bar{\theta} + \varepsilon_{t-1} + \frac{1}{2\xi}\right]$, and $\mathbf{E}(\theta_t|\varepsilon_{t-1}) = \bar{\theta} + \varepsilon_{t-1}$.Henceforth, $\bar{\theta} > 1/\xi$, so $\theta_t > 0$ and (5) and (6) are well-defined.

The quasilinear preferences in (1), jointly with an assumption about the value of the discount factor β and the interest rates, drastically simplify the optimal policy problem. Whereas in Shi and Svensson (2006) the interest rate is increasing in the level of debt, here the rate r at which the government can borrow is constant but larger than the rate r' at which it can lend, and $r > r' > 0$. Absent electoral concerns, the following condition assures that neither debt nor holding financial assets will be optimal:

$$\frac{1}{(1+r)} \frac{\mathbf{E}_t\left(\frac{1}{\theta_t}\right)}{\mathbf{E}_t\left(\frac{1}{\theta_{t+1}}\right)} < \beta < \frac{1}{(1+r')} \frac{\mathbf{E}_t\left(\frac{1}{\theta_t}\right)}{\mathbf{E}_t\left(\frac{1}{\theta_{t+1}}\right)}. \tag{8}$$

To avoid corner solutions, and to reflect the empirical evidence since Frey and Schneider (1978) and Tufte (1978) on how governments lower taxes and increase expenditure in electoral years, we later introduce a restriction by which debt has to be distributed between taxes and expenditures in specified proportions.

2.3 Separation of powers

The agenda setter model of Romer and Rosenthal (1978, 1979) allows to reduce the budget process to the interaction of the two branches of government, the executive E

and the legislature L. Both must reach an agreement for there to be a change in the status quo. The executive is the agenda setter: E makes a budget allocation proposal, which must be accepted by L to become law; no amendment rights exist, so L faces a take-it-or-leave-it proposal where the reversion outcome (the status quo) in case of rejection is specified below. This perspective is applied more often to European, Asian and Latin American democracies, where the executive can unilaterally issue decrees, than to the United States (McNollgast 2007, p. 1680). We later review the case where L can amend E's proposal, so L has the agenda setting power.

What matters for PBCs is not a nominal veto player, but rather an effective veto player. Since all legislatures do not have the same capability to monitor and control the budget, we distinguish between two polar cases, perfect compliance with the budget law and null compliance with the budget law.

The terms in office in the executive and legislative branches last two periods. Every other period, the electorate removes or confirms the executive and legislative leaders in an explicit electoral contest. If the incumbent is confirmed, it controls this branch for another term. Otherwise, the opposition takes office.

There are two parties, A and B. Each party has a leader, that changes before each election.[5] Besides the utility from the consumption of private and public goods, when a party wins executive elections, the party leader becomes the E incumbent and receives an exogenous rent $\chi^E > 0$ at the beginning of the term. The leader of the party that wins legislative elections and controls L receives a rent $\chi^L \geq 0$, where $\chi^L < \chi^E$. These

[5]This assumption rules out end-period problems, since parties will always be interested in winning the upcoming election. This is consistent with Aldrich (1995) and the literature on how parties solve collective action problems.

rents reflect the strength of the electoral goal (Lohmann 1998a) and are the source of conflict between political parties and the electorate.

Through the idea of veto players, the model also reflects the workings of parliamentary systems (Tsebelis 2002). In a parliamentary system, E represents the leader of the majority coalition party and L the leader of the minority coalition party. If E and L are controlled by the same party, there is no veto player: in a presidential system, this is referred to as unified government; in a parliamentary system, as single-party rule. There are veto players in a presidential system with divided government, when the legislature is controlled by an opposition party; in a parliamentary system, something similar happens when the party that leads government is forced to form a coalition to reach a majority of seats in parliament; we refer to this case as divided government too.

What does not translate so easily to a parliamentary system is the voting decision. In a presidential system, each voter has separate votes for the executive and legislative branches. In a parliamentary system, there is no separate vote for the executive. However, the representative voter has a preference for whether it wants a single-party government or a coalition government. Allowing for fictitious vote splitting, so the voter can distribute its vote in a given proportion between parties A and B, can artificially recreate what the electorate at large can do. Our specific purpose at hand is to see the consequences for PBCs of whether one or more parties run the government.

2.4 Shared government

We introduce a stylized model of government performance. Our hypothesis is that the competence of the government θ_t is a weighted average of the competence of the

executive and legislative branches, θ_t^E and θ_t^L, with weights ρ and $(1-\rho)$ and $\rho \in (1/2, 1]$:

$$\theta_t = \rho\theta_t^E + (1-\rho)\theta_t^L. \tag{9}$$

The competence of each branch depends on the parties that are in office, so voters will want to have the most competent party in the executive office. In even (non-electoral) periods, the competence of the executive branch equals the competence of the party $i \in \{A, B\}$ that leads E, and the competence of the legislative branch equals the competence of the party $j \in \{A, B\}$ that leads L.

$$\text{For } t \text{ even, } \begin{cases} \theta_t^E = \theta_t^i \ , \\ \theta_t^L = \theta_t^j \ . \end{cases} \tag{10}$$

In odd (electoral) periods, while the competence of the executive branch equals the competence of the party $i \in \{A, B\}$ that leads E, the competence of the legislative branch either equals the competence of the party that leads L, when $i = j$ (unified government), or zero, when $i \neq j$ (divided government):

$$\text{For } t \text{ odd, } \begin{cases} \theta_t^E = \theta_t^i \ , \\ \theta_t^L = \theta_t^j \text{ if } i = j, \ \theta_t^L = 0 \text{ otherwise.} \end{cases} \tag{11}$$

That is to say, by (9-11) divided government affects efficiency, particularly in electoral periods. Specification (11) is used for tractability, so in electoral years fiscal outcomes under divided government only reflect the competence of the party that leads the executive, simplifying the voter's inference problem. This inference problem has been used by Powell and Whitten (1993) to explain why economic voting is less impor-

tant when responsibility is less clear, most of which reflects divided government, e.g., a bicameral opposition, minority governments, or coalition governments. However, there is also political rationale for assumption (11), because political parties find it particularly hard to work together when the members of the coalition start campaigning and competing for votes. Hence, voters might discount worse performance close to elections, because it does not reflect low competence of the party that leads the government, but rather the breakdown of cooperation among parties in power.

2.5 Timing of the budget process

The budget proposals are in terms of budget revenue and debt, because the budget restriction determines budget expenditure (only two of these three variables can be chosen freely). The timing of the budget process in period t is as follows:

1. E proposes $\tilde{\pi}_t^E$, $\tilde{d}_t^E$ to L.
2. Since L has no amendment rights, L chooses whether to accept the proposal or not. If the proposal is not accepted, the budget is given by status quo $\bar{\pi}_t$, $\bar{d}_t$. This will determine the approved budget $\tilde{\pi}_t$, $\tilde{d}_t$.
3. E implements π_t, d_t, which equals the approved budget under perfect compliance.
4. ε_t is realized and g_t and p_t are determined according to (5) and (6).
5. Voters observe g_t and p_t, but not ε_t nor (γ_t, π_t, d_t), forming a belief $\hat{\theta}_t$ about the incumbent's competency.

6. Without loss of generality, we assume party A controls E. If t is an odd positive integer, i.e., an electoral period, voters decide whether to reelect party A in E, and whether to vote incumbent party A or opposition party B for L.

7. Individuals observe ε_t and $(\gamma_t,\, \pi_t, d_t)$ and period t ends.

If the executive's budget proposal is rejected, the status quo for taxation is given by an arbitrary reversion point $\overline{\pi}_t$. McNollgast (2007) describe how the main alternatives in the US Federal Government budget are either a zero budget rule or reverting to the past budget. A zero budget rule leads to no expenditure unless Congress approves new appropriations, where the exogenous reversion point $\overline{\pi} = 0$. Reverting to the past budget implies an endogenous status quo, where $\overline{\pi}_t = \pi_{t-1}$. This is typical of entitlements like Social Security, but not of most discretionary spending. Though expenditure must be authorized by the legislature, since the executive cannot spend more than tax receipts plus new debt, and it has no incentive to spend less, no additional restriction on this front is required.

As to the status quo for debt, in the United States the amount of money the federal government is allowed to borrow is subject by the Constitution to a statutory limit that can be raised by Congress (Heniff 2004). This status quo, an outstanding amount of debt that cannot be increased unless authorized by the legislature, is typical of budget processes:

$$\overline{d}_t \leq d_{t-1}. \tag{12}$$

Incumbents do not observe ε_t before making budget decisions, operating under uncertainty about the effect of policy actions. The representative voter knows the structure of the budget process, and observes the amount of public good g_t provided and the tax payments p_t it makes, but not the executive party's competence shock, ε_t, nor the budget decisions (γ_t, π_t, d_t). Thus, incumbents have a temporary information advantage over the actual budget allocation. Past competence shocks are common knowledge.

3 Equilibrium

Our solution concept is perfect Bayesian equilibrium. We first describe the equilibrium without elections, as well as the standard setup of concentration of powers where the incumbent has full discretion. We then turn to separation of powers, and to the effect of power-sharing on government performance.

3.1 No elections

A randomly selected candidate in period $t = 0$ remains in office forever. By quasilinear preferences, the marginal utility of consumption is equal to one. If, in expected value, the marginal utility of the public good is equal to the marginal utility of consumption, any extra resources will be optimally used to reduce taxes.

Suppose the government resorts to an extra dollar of debt in period t to reduce taxes. From expressions (1), (2), (3), (4), and (6), expected utility increases $\mathbf{E}_t\left(\frac{1}{\theta_t}\right)$ in period t. If the extra dollar of debt is repaid next period, utility falls by $(1+r)\mathbf{E}_t\left(\frac{1}{\theta_{t+1}}\right)$

in period $t+1$. Since the future is discounted at the rate β, it will never be optimal to borrow an extra dollar and repay it in the next period, because by (8):

$$\beta(1+r)\mathbf{E}_t\left(\frac{1}{\theta_{t+1}}\right) > \mathbf{E}_t\left(\frac{1}{\theta_t}\right).$$

Here $\mathbf{E}_t\left(\frac{1}{\theta_{t+1}}\right)$ equals unconditional expectation, since there is no information on current shock when decision is taken. Following an analogous argument, condition (8) also rules out the possibility that the government may become a net lender. This leads to a corner solution with no debt nor financial assets.

The assumptions about β, r and r' in (8) assure that $d_t = 0$ for $t = 0, 1, ...$, allowing to break down the intertemporal problem into a sequence of simpler optimization problems:

$$\max_{\{\gamma_t, \pi_t\}} \mathbf{E}_t[c_t + \alpha \ln(g_t)], s.t.\ (3),\ (4),\ (5) \text{ and } (6).$$

The solution, using the properties of the uniform distribution and integrating, is:

Proposition 1 *Benevolent ruler. Suppose there are no elections. The ruler will choose optimal expenditure and tax collection each period:*

$$\gamma_t^* = \pi_t^* = \frac{\alpha}{\mathbf{E}_t\left(\frac{1}{\theta_t}\right)} = \frac{\alpha}{\xi \ln\left(\frac{\bar{\theta}+\varepsilon_{t-1}+\frac{1}{2\xi}}{\bar{\theta}+\varepsilon_{t-1}-\frac{1}{2\xi}}\right)},\ t = 0, 1, \ldots \tag{13}$$

Since the budget is decided ex-ante, it cannot be conditioned on the current competence shock ε_t. However, fiscal policy γ_t^* and π_t^* does depend on expected competence, since higher competence lowers the relative cost of public versus private goods. By dif-

ferentiation of (13), public expenditure is increasing in the past competence shock ε_{t-1}. The expected provision of the public good is also increasing in ε_{t-1} for two reasons, higher expected competence and a larger budget for the public good. Though taxes are increasing in ε_{t-1}, expected consumption of the private good is constant, since the increase in legislated taxes is exactly compensated by larger efficiency in tax collection.

As to the ex-post outcomes, a more competent incumbent generates a greater provision of the public good and imposes a lower burden on tax payers, so disposable income increases and there is a consumption boom.

3.2 Concentration of powers

Consider next regular elections every other period. There is only one policy-maker, the executive. The players are the incumbent party A, the opposition party B, the representative voter V, and Nature. From the viewpoint of the representative voter V, the two parties only differ in competence. Because the competence shocks are transitory, each election can be treated separately, so the infinite-horizon model can be broken down into a series of separate problems. Using backwards induction, the solution can be found in a sequence of steps.

The incumbent's decision in a non-electoral period

In period $t+1$, a non-electoral period, the incumbent has no incentive to manipulate the voters' perception of its competence. Since the optimal strategies of all incumbents in the post-electoral period are the same, the distinction between the original and the potential incumbents is omitted, and the superscript u refers to an unchecked executive:

$$\gamma_{t+1}^u = \gamma_{t+1}^* = \frac{\alpha}{\mathbf{E}_{t+1}\left(\frac{1}{\theta_{t+1}}\right)}, \pi_{t+1}^u = \gamma_{t+1}^* + (1+r)d_t. \tag{14}$$

The inference problem of voters

At election time t, voters observe g_t and p_t, but not d_t, γ_t and π_t. Their problem is to estimate the competence shock ε_t. Let the actual budget choices γ_t and π_t be determined by scale factors a_t, b_t that multiply π_t^* and γ_t^*, that is:

$$\gamma_t = a_t\gamma_t^*, \quad \pi_t = \frac{\pi_t^*}{b_t}. \tag{15}$$

Moreover, from (5) and (6) we have that:

$$\theta_t a_t = \frac{g_t}{\gamma_t^*}, \quad \theta_t b_t = \frac{\pi_t^*}{p_t}. \tag{16}$$

Since voters observe g_t and p_t and they can compute π_t^* and γ_t^*, they can estimate ε_t. Though voters know the exact linear relation between a_t and $b_t$is $\frac{a_t}{b_t} = \frac{g_t p_t}{\gamma_t^* \pi_t^*}$, they cannot determine a_t and b_t individually. Voters face a problem of inference under perfect multicollinearity. We hereafter impose the restriction that debt must be split between more expenditure and less taxes in the same proportion, i.e., $\omega_t = a_t = b_t$. Voters also know that $\pi_t^* = \gamma_t^*$ when there is no previous debt. This implies that, beyond identity (4), debt must satisfy:

$$d_t = \gamma_t - \pi_t = \left(\omega_t - \frac{1}{\omega_t}\right)\pi_t^*. \tag{17}$$

Restriction (17) avoids corner solutions.[6] It also forces the incumbent to use debt in a way that preserves the characteristics of the original distribution of competence shocks, with the expected value of the distribution shifted to the right by $\omega_t \geq 1$.

Call $\hat{\omega}_t$ voters's estimate of ω_t[7]. Voters's estimate of θ_t is given by the ratio of both fiscal outcomes (either one could also be used to make the inference, see 16):

$$\hat{\theta}_t = \frac{\sqrt{g_t/p_t}}{\widehat{\omega}_t}. \tag{18}$$

Using (18), voters can estimate the incumbent's current competence shock ε_t:

$$\hat{\varepsilon}_t = \hat{\theta}_t - \bar{\theta} - \varepsilon_{t-1} = \frac{\sqrt{g_t/p_t}}{\hat{\omega}_t} - \bar{\theta} - \varepsilon_{t-1}. \tag{19}$$

The citizen's vote

Voters compare the expected utility next period with either the incumbent or the challenger. In regard to the opposition, voters only know the distribution of ε_t and hence that $\mathbf{E}_t[\varepsilon_t] = 0$. Hence, expected utility from a vote for the opposition is not conditional on the current competence shock:

$$\mathbf{E}_t \left[c_{t+1} + \alpha \ln(g_{t+1})\right] = \mathbf{E}_t \left[y - \frac{\pi^u_{t+1}}{\theta_{t+1}} + \alpha \ln(\theta_{t+1}\gamma^u_{t+1})\right]. \tag{20}$$

[6]Since utility is linear in consumption and the incumbent's utility is linear in the probability of reelection, the model has an extreme behavior in electoral years: either there is no distortion of taxes (when political rents are low), or no taxes are levied at all (when political rents are high). Restricion (17) allows an interior solution to emerge. Shi and Svensson (2006) achieve an interior solution by assuming that the interest rate increases with debt, but PBCs are exclusively through expenditures.

[7]A more precise, but tedious, notation would define a probability measure over ω that represents voter's beliefs, and then apply Bayes'rule to update them. However, in equilibrium this probability measure will be degenerate, with all the mass in the true ω, which justifies the notation in the text. The same applies to $\hat{\theta}$ and $\hat{\varepsilon}$.

On the other hand, expected utility from a vote for the incumbent can be conditioned on the current competence shock, which can be estimated from policy outcomes:

$$\mathbf{E}_t\left[c_{t+1}+\alpha\ln(g_{t+1})\mid\hat{\varepsilon}_t\right]=\mathbf{E}_t\left[y-\frac{\pi^u_{t+1}}{\theta_{t+1}}+\alpha\ln(\theta_{t+1}\gamma^u_{t+1})\mid\hat{\varepsilon}_t\right]. \tag{21}$$

The expression $c_{t+1}+\alpha\ln(g_{t+1})$ is a function of the two independent stochastic variables ε_t and ε_{t+1}. In the Appendix, Lemma 1 proves that when the conditional expected value of a function of two independent stochastic variables is increasing and concave, it is greater or equal to its unconditional expected value if and only if the conditioning variable is greater or equal to its expected value; Lemma 2 establishes that $\mathbf{E}_t\left[c_{t+1}+\alpha\ln(g_{t+1})\mid\varepsilon_t\right]$ is increasing and concave. Hence,

Corollary 1 $\mathbf{E}_t\left[c_{t+1}+\alpha\ln(g_{t+1})\mid\hat{\varepsilon}_t\right]\geq\mathbf{E}_t\left[c_{t+1}+\alpha\ln(g_{t+1})\right]$ *if and only if* $\hat{\varepsilon}_t\geq 0$.

Corollary 2 *Voters vote for the incumbent if and only if* $\hat{\varepsilon}_t\geq 0$.

Proof: The proof of Corollary 1 follows from Lemma 2 and the application of Lemma 1, where the vector of information variables to estimate $\hat{\varepsilon}_t$ is integrated by g_t, p_t, ε_{t-1}, and $\hat{\omega}_t$. Given that voters maximize expected utility, Corollary 2 is immediate from Corollary 1. If indiffert (a zero probability event), voters reelect the incumbent.■

Corollary 2 can be used to compute the probability $\mu_t=\Pr(\hat{\varepsilon}_t\geq 0)$ that the incumbent wins the election. First, replace $\hat{\varepsilon}_t$ by $\frac{\sqrt{g_t/p_t}}{\widehat{\omega}_t}-\bar{\theta}-\varepsilon_{t-1}$. Since ε_t equals $\frac{\sqrt{g_t/p_t}}{\omega_t}-\bar{\theta}-\varepsilon_{t-1}$, adding these terms to each side and simplifying, $\mu_t=\Pr\left[\varepsilon_t\geq\frac{\sqrt{g_t/p_t}}{\omega_t}\left(1-\frac{\omega_t}{\widehat{\omega}_t}\right)\right]$. Given that ε_t follows a uniform distribution and $\theta_t=\frac{\sqrt{g_t/p_t}}{\omega_t}$,

$$\mu_t=\frac{1}{2}+\xi\theta_t\left(\frac{\omega_t}{\widehat{\omega}_t}-1\right). \tag{22}$$

If voters are surprised ($\omega_t > \widehat{\omega}_t$), the incumbent increases its probability of winning.

The incumbent's decision in an electoral period

Given our timing, the electoral outcome is uncertain from the incumbent's viewpoint. Taking into account μ_t, the endogenous probability that the incumbent is re-elected, the incumbent's objective function is:

$$\max_{\{\gamma_t,\pi_t,d_t\}} \mathbf{E}_t \left\{ c_t + \alpha \ln(g_t) + \beta \left[c_{t+1} + \alpha \ln(g_{t+1}) \right] + \beta \mu_t \chi^E \right\}, \; s.t. (3)\text{-}(6), \; (17) \text{ and } (22).$$

Incorporating these restrictions, the government's problem in the electoral period can be reframed in terms of the choice of ω_t. The first order condition can be further simplified using the definition of π_t^*:

$$\frac{d\mathbf{E}_t\left[\cdot\right]}{d\omega_t} = \alpha\left(\frac{1}{\omega_t} + \frac{1}{\omega_t^2}\right) - \alpha\beta(1+r)\frac{\mathbf{E}_t\left(\frac{1}{\theta_{t+1}}\right)}{\mathbf{E}_t\left(\frac{1}{\theta_t}\right)}\left(1 + \frac{1}{\omega_t^2}\right) + \beta\xi\frac{\bar{\theta} + \varepsilon_{t-1}}{\hat{\omega}_t}\chi^E \leq 0,$$

$$\text{with strict equality if } \omega_t > 1. \tag{23}$$

As to $\frac{d_t^2 \mathbf{E}[.]}{d\omega_t^2}$, it is strictly negative for $\omega_t \geq 1$ if the following condition holds:

$$\beta(1+r)\frac{\mathbf{E}_t\left(\frac{1}{\theta_{t+1}}\right)}{\mathbf{E}_t\left(\frac{1}{\theta_t}\right)} \leq \frac{3}{2}. \tag{24}$$

Proposition 2 *Concentration of powers. Suppose there are elections in odd periods and the incumbent faces no checks and balances. Let conditions (8) and (24) hold, i.e.,*

$1 < \beta(1+r)\frac{\mathbf{E}_t\left(\frac{1}{\theta_{t+1}}\right)}{\mathbf{E}_t\left(\frac{1}{\theta_t}\right)} \leq \frac{3}{2}$, *and let* $\bar{\chi}_t = \frac{2\alpha\left[\beta(1+r)\frac{\mathbf{E}_t\left(\frac{1}{\theta_{t+1}}\right)}{\mathbf{E}_t\left(\frac{1}{\theta_t}\right)}-1\right]}{\beta\xi(\bar{\theta}+\varepsilon_{t-1})}$.

In a non-electoral period $t+1$*, the incumbent chooses optimal expenditure and tax collection, namely,*

$$\gamma_{t+1}^u = \gamma_{t+1}^* = \frac{\alpha}{\mathbf{E}_{t+1}\left(\frac{1}{\theta_{t+1}}\right)}, \pi_{t+1}^u = \gamma_{t+1}^u + (1+r)d_t.$$

In an electoral period t*:*

1. *If* $\chi^E \leq \bar{\chi}_t$*, the incumbent does not generate PBCs* ($\omega_t^u = 1$)*, so* $\gamma_t^u = \gamma_t^*$ *and* $\pi_t^u = \pi_t^*$.

2. *If* $\chi^E > \bar{\chi}_t$*, the incumbent generates PBCs* ($\omega_t^u > 1$)*, hence* $\gamma_t^u = \omega_t^u \gamma_t^*$ *and* $\pi_t^u = \frac{\pi_t^*}{\omega_t^u}$.

Proof: In a perfect Bayesian equilibrium, beliefs on the equilibrium path are determined by equilibrium strategies (i.e., expectations are rational), so $\hat{\omega}_t = \omega_t^u$ and

$$\frac{d\mathbf{E}_t[\cdot]}{d\omega_t} = \alpha\left(\frac{1}{\omega_t^u} + \frac{1}{(\omega_t^u)^2}\right) - \alpha\beta(1+r)\frac{\mathbf{E}_t\left(\frac{1}{\theta_{t+1}}\right)}{\mathbf{E}_t\left(\frac{1}{\theta_t}\right)}\left(1 + \frac{1}{(\omega_t^u)^2}\right) + \beta\xi\frac{\bar{\theta}+\varepsilon_{t-1}}{\omega_t^u}\chi^E \leq 0$$

$$\text{with strict equality if } \omega_t^u > 1. \tag{25}$$

If $\chi^E < \bar{\chi}_t$, expression (25) is negative at $\omega_t^u = 1$, so incumbents will not want to go further.[8] If $\chi^E = \bar{\chi}_t$, expression (25) is zero at $\omega_t^u = 1$. For for $\chi^E > \bar{\chi}_t$, it becomes

[8]Given assumption (8) that rules out asset accumulation, $\omega_t^u < 1$ will not be optimal either.

positive at that point, which implies that the incumbent prefers $\omega_t^u > 1$ in equilibrium. In an opportunistic framework the overriding concern of politicians is to be reelected, so the natural scenario is $\chi^E > \bar{\chi}_t$ where the executive is indeed willing to distort fiscal outcomes to be reelected.■

Time consistency and budget rules

Suppose an unconstrained executive E formulates plans in non-electoral period $t-1$. Viewed at $t-1$, when the incumbent sets policy in advance, the probabilities of reelection μ_t are exogenous and equal to $1/2$ in expected value. Therefore, the incumbent's best policy is to plan to pick γ_t^* and π_t^*, which are socially optimal. The problem with this optimal plan is that it is not time-consistent: when an electoral period arrives, the incumbent has an incentive to increase expenditure and reduce taxes. This credibility problem underlies Proposition 2 under an unchecked executive.

What happens if the status quo is set according to rule (12)? Well, if the rule were binding, this would effectively curb the credibility problem: in an electoral period the executive would prefer to use debt to increase expenditures and reduce taxes in order to look more competent, but the status quo rules out more public indebtedness. However, it does not make sense to assume that the executive is constrained to follow any rule unless it has to share the power to change rules with another body. If the executive is vested with legislative power, it can do and undo any rule it likes. The natural environment where the executive shares rule-making power is when there is separation of powers, and an agreement has to be reached with the legislative veto player on changes in the budget.

3.3 Separation of powers

For both presidential and parliamentary systems, divided government is described in terms of E being in the hands of one party and L in the hands of the other. In what follows, $1 < \beta(1+r)\frac{\mathbf{E}_t\left(\frac{1}{\theta_{t+1}}\right)}{\mathbf{E}_t\left(\frac{1}{\theta_t}\right)} \leq \frac{3}{2}$ and $\chi^E > \bar{\chi}_t$, so the executive has an incentive to distort fiscal outcomes due to electoral reasons. Still governement competence only depends on the executive ($\theta_t = \theta_t^E$).

We first consider the case of perfect compliance with the budget law. At election time t, voters will want the party with the highest expected competence in the executive. At the same time, they will want divided government, since an opposition legislature can block the executive's attempts to distort the budget in period $t+2$, without affecting government performance.

Does what actually happens under divided government, in periods $t+1$ and $t+2$, conform to voter's expectations? Let A control the executive and B the legislature. In electoral period $t+2$, the executive would like to increase its electoral chances by using debt to select π_{t+2}^u and γ_{t+2}^u. However, party B can veto any attempt of A to employ debt to increase expenditures and reduce taxes, since the status quo debt restriction given by (12), i.e., $\overline{d}_{t+2} \leq d_{t+1}$, introduces a binding constraint on the executive. Party B has the motivation and the power to veto any attempt of party A to use debt: if this authorization of new debt were unexpected by voters, this would increase the electoral chances of party A at the expense of B; if expected, it would reduce the welfare of party B because of the electoral distortion of fiscal variables. On the other hand, the legislature does not have an incentive to veto the optimal level of taxes and expenditures, because this would not affect the voters' perception of party A's competence. What

voters use in their inference problem is the no new debt restriction, which implies that $\gamma_{t+2} = \pi_{t+2}$, so $\omega_{t+2} = 1$. Hence, the ratio g_{t+2}/p_{t+2} can be used to infer competence, whatever the level of taxation. Given that it cannot affect its perceived competence, the best party A can do is to select the optimal level of taxes and expenditures.

As to non-electoral period $t+1$, the executive chooses an optimal expenditure and repays past debt, if any. The legislature does not veto this proposal, because it does not affect future reelection prospects of either party, and it leads to optimal outcome in the non-electoral period.

The degree of compliance with the authorized budget describes the effective limits L imposes on the executive office. Under null compliance with the balanced budget rule (the extreme case of imperfect compliance), L is not capable of effectively monitoring fiscal policy. The environment then reverts to an unchecked executive. Hence,

Proposition 3 *Separation of powers. Suppose there are elections in odd periods, and the legislature must authorize new debt. Assume that* $1 < \beta(1+r)\frac{\mathbf{E}_t\left(\frac{1}{\theta_{t+1}}\right)}{\mathbf{E}_t\left(\frac{1}{\theta_t}\right)} \leq \frac{3}{2}$ *and* $\chi^E > \bar{\chi}_t$.

In a non-electoral period the executive, with the agreement of the legislature, will set taxes and expenditures at the optimal level.

In an electoral period:

1. *Under perfect compliance with the budget law, divided government will set taxes and expenditures at the optimal level, while unified government will generate PBCs. Voters strictly prefer divided government.*

2. *Under null compliance with the budget law, the executive will generate PBCs. Voters will be indifferent between divided and unified government.*

The results in Proposition 3 assume that E is the agenda setter. What happens when the legislature has amendment powers? The results are unchanged. Since L can prevent new indebtedness, an unaligned legislature would not be willing to authorize the use of debt for electoral purposes, so $\overline{d}_t = d_{t-1}$. At the same time, L would be willing to authorize the optimal level of expenditure $\gamma_t^* = \pi_t^*$, because a lower level of expenditures and taxes does not reduce E's reelection chances, given that voters can use the g_t/p_t ratio to infer competence.

3.4 Shared government

Shared government competence provides a more balanced view of the costs and benefits of divided government. Competence depends on the parties in charge of each government branch ($\theta_t = \rho\theta_t^E + (1-\rho)\theta_t^L$) and on whether or not it is an electoral period.

In a non-electoral period $t+1$, the arguments of Propositions 2 and 3 apply, with competence now a weighted average of the competence of the executive and the legislative branches, so optimal expenditure is:

$$\gamma_{t+1}^* = \frac{\alpha}{\mathbf{E}_{t+1}\left(\frac{1}{\theta_{t+1}}\right)} = \frac{\alpha}{\mathbf{E}_t\left(\frac{1}{\rho\theta_{t+1}^E + (1-\rho)\theta_{t+1}^L}\right)}.$$

In electoral periods, the argument behind Proposition 3 also applies, so an opposition legislature will not approve new debt, nor will it object the optimal level of taxes and

expenditures. Though divided government eliminates budget cycles, it does so at a cost, due to the efficiency losses generated by power-sharing, plus the breakdown of cooperation between the executive and the legislature in electoral periods. This is the fundamental trade-off that the representative voter faces.

The voter estimates the competence shocks of the candidates as follows (call these beliefs $\hat{\varepsilon}_t^A$ and $\hat{\varepsilon}_t^B$). With unified government, estimated government competence is formed as in equation (19), with an estimated distortion $\hat{\omega}_t = \omega_t^u$. With divided government, estimated government competence is a proportion ρ of the competence of the party in charge of the executive, and estimated distortion is $\hat{\omega}_t = 1$.

The voter's decision is a dynamic programming problem. Let $V(i,j)$ be the value for the voter in the electoral period t given that currently (that is, before elections) party i leads E, and party j, L. Since the voter's problem has a recursive structure, we have the following Bellman equation, where $\hat{\varepsilon}_t^i$ is estimated using information set $\Im_t = \left(g_t, p_t, \varepsilon_{t-1}^E, \varepsilon_{t-1}^L, \hat{\omega}_t\right)$ and $i', j' \in \{A, B\}$ are the control variables:

$$V(i,j \mid \hat{\varepsilon}_t) = \max_{i',\, j' \in \{A,B\}} \left\{ \beta_t \mathbf{E}_t \left[c_{t+1}(i,j,i\prime,j\prime) + \alpha \ln g_{t+1}(i,j,i\prime,j\prime) \mid \hat{\varepsilon}_t^i \right] \right.$$
$$\left. + \beta_t^2 \mathbf{E}_t \left[c_{t+2}(i\prime,j\prime) + \alpha \ln g_{t+2}(i\prime,j\prime) + V(i',j') \right] \right\},$$

$$\text{where } c_{t+1}(i,j,i\prime,j\prime) = y - \frac{\frac{\alpha}{\mathbf{E}_{t+1}\left(\frac{1}{\rho\theta_{t+1}^{i'} + (1-\rho)\theta_{t+1}^{j'}}\right)} + (1+r)\left(\hat{\omega}_t(i,j) - \frac{1}{\hat{\omega}_t(i,j)}\right)\frac{\alpha}{\mathbf{E}_t\left(\frac{1}{\theta_t^i}\right)}}{\rho\theta_{t+1}^{i'} + (1-\rho)\theta_{t+1}^{j'}},$$

$$\ln g_{t+1}(i,j,i\prime,j\prime) = \ln\left(\frac{\rho\theta_{t+1}^{i'}+(1-\rho)\theta_{t+1}^{j'}}{\mathbf{E}_{t+1}\left(\frac{1}{\rho\theta_{t+1}^{i'}+(1-\rho)\theta_{t+1}^{j'}}\right)}\right)+\ln\alpha,$$

$$c_{t+2}(i\prime,j\prime) = y-\frac{\alpha}{\hat{\omega}_{t+2}\left(i',j'\right)\theta_{t+2}^{i'}\mathbf{E}_{t+2}\left(\frac{1}{\theta_{t+2}^{i'}}\right)},$$

$$\ln g_{t+2}(i\prime,j\prime) = \ln\left(\frac{\hat{\omega}_{t+2}\left(i',j'\right)\theta_{t+2}^{i'}\alpha}{\mathbf{E}_{t+2}\left(\frac{1}{\theta_{t+2}^{i'}}\right)}\right)+\varphi\left(i',j'\right)\alpha\ln\rho^2,$$

$$\hat{\omega}_t\left(i,j\right) = \begin{cases} 1 & \text{if } i\neq j \\ \omega_t^u & \text{otherwise} \end{cases}, \quad \varphi\left(i',j'\right) = \begin{cases} 1 & \text{if } i'\neq j' \\ 0 & \text{otherwise} \end{cases}.$$

Let $\Phi\left(i,j,\hat{\varepsilon}_t^i\right)$ denote the policy function that solves the voter's decision problem. We make the following conjecture, where i is the party currently in charge of E, and j is in charge of L:

$$\Phi\left(i,j,\hat{\varepsilon}_t^i\right) = \begin{cases} (i,i) & \text{if } \frac{1}{2\xi}\geq\hat{\varepsilon}_t^i\geq\varepsilon_H^{i,j}, \\ (i,\sim i) & \text{if } 0\leq\hat{\varepsilon}_t^i<\varepsilon_H^{i,j}, \\ (\sim i,i) & \text{if } -\varepsilon_L^{i,j}<\hat{\varepsilon}_t^i<0, \\ (\sim i,\sim i) & \text{if } -\frac{1}{2\xi}\leq\hat{\varepsilon}_t^i\leq-\varepsilon_L^{i,j}. \end{cases} \tag{26}$$

The symbol $\sim i$ indicates the opposition (thre are only two parties). The higher and lower limits are not symmetrical. The limits also depend on whether the starting point is unified government ($i=j$) or divided government ($i\neq j$).[9] We now verify this cut

[9]The difference of starting with either unified or divided government is the burden of the debt in $t+1$. Divided government imposes a loss in expected competence, but also reduces its variance. These two effects have opposite effect in the expected burden of the debt. When the loss in expected competence prevails, unified government becomes more attractive.

point strategy.

The vote for the executive

First, as in Corollary 2, the representative voter prefers to reelect the party in charge of the executive $i \in \{A, B\}$ if and only if $\hat{\varepsilon}_t^i \geq 0$, since the voter never receives information about the current shock of the opposition party, whether it is completely out of office or leads the legislature.

Vote splitting?

Let party A control E in period t. If $\hat{\varepsilon}_t^A \geq 0$, voters pick $i' = A$, and in the Bellman equation we must only consider the controls $j' = A, B$ (if $\hat{\varepsilon}_t^A < 0$, the representative voter favors party B instead and similar arguments apply). If the representative voter chooses divided government in period t, the effect on the Bellman equation can be broken down into three welfare effects.

The first welfare effect is $\mathbf{E}_t \left[c_{t+1}(A, j, A, A) + \alpha \ln g_{t+1}(A, j, A, A) \mid \hat{\varepsilon}_t^A \right] - \mathbf{E}_t \left[c_{t+1}(A, j, A, B) + \alpha \ln g_{t+1}(A, j, A, B) \mid \hat{\varepsilon}_t^A \right]$. For $\hat{\varepsilon}_t^A = 0$, the difference is second order and has to do with the effects on variance. With unified government, shock $\hat{\varepsilon}_t^A$ is known in equilibrium, whereas with divided government $\rho\hat{\varepsilon}_t^A + (1-\rho)\varepsilon_t^B$ has a expected value of zero but a positive variance; on the other hand, in the next period, expected competence is the same, but variance is lower with divided government, since $\rho\varepsilon_{t+1}^A + (1-\rho)\varepsilon_{t+1}^B$ has the same expected value (zero) but less dispersion than ε_{t+1}^A. These two risk effects have opposite signs. However, as $\hat{\varepsilon}_t^A$ increases, there is a competence effect that clearly favors unified government: by Lemma 3 in the Appendix, for $\rho < 1$, $\mathbf{E}_t \left[c_{t+1}(A, j, A, A) + \alpha \ln g_{t+1}(A, j, A, A) \mid \hat{\varepsilon}_t^A \right] - \mathbf{E}_t \left[c_{t+1}(A, j, A, B) + \alpha \ln g_{t+1}(A, j, A, B) \mid \hat{\varepsilon}_t^A \right]$ is increasing in $\hat{\varepsilon}_t^A$.

As to the second welfare effect, expectations about period $t+2$ are not conditional on the current competence shock, so $\mathbf{E}_t\left[c_{t+2}(A,A)+\alpha\ln g_{t+2}(A,A)\right]-\mathbf{E}_t\left[c_{t+2}(A,B)+\alpha\ln g_{t+2}(A,B)\right]=\mathbf{E}_t\left[\frac{\alpha\left(1-\frac{1}{\omega^u_{t+2}}\right)}{\theta^{i'}_{t+2}\mathbf{E}_{t+2}\left(\frac{1}{\theta^{i'}_{t+2}}\right)}+\alpha\ln\left(\frac{\omega^u_{t+2}}{\rho^2}\right)\right]$,which is nonnegative because $\omega^u_{t+2}\geq 1$ and $\rho\leq 1$. In period $t+2$ there will be an efficiency loss with divided government due to the break down in cooperation between the executive and legislative branches. Furthermore, there will be no cycle under divided government. Both effects tends to reduce utility in period $t+2$ compared to a situation with unified government (no PBCs imply more taxes and less public goods in period $t+2$).

The third welfare effect is $\mathbf{E}_t\left[V\left(A,A\right)\right]-\mathbf{E}_t\left[V\left(A,B\right)\right]<0$. Voter prefers to begin with divided government because there is no debt to repay in the future. Formally, the result follows from a direct inspection of the Bellman equation.

While the second and third welfare effects are fixed costs and benefits, by Lemma 3 the first welfare effect is increasing in $\hat{\varepsilon}^A_t$. Hence, if for some $\hat{\varepsilon}^A_t\geq 0$ the representative voter prefers unified government (A,A) to divided government (A,B), then for $\hat{\varepsilon}^{A\prime}_t>\hat{\varepsilon}^A_t$ the voter will also prefer (A,A) to divided government (A,B); and if for $\hat{\varepsilon}^A_t\geq 0$ the representative voter prefers (A,B) to (A,A), then for $0\leq\left(\hat{\varepsilon}^A_t\right)'<\hat{\varepsilon}^A_t$ the voter will also prefer (A,B) to (A,A). This shows that the policy function must be a cut point strategy as conjectured in (26).

Influence of parameter ρ on choice

The standard assumption is that opportunism is high, so $\chi^E>\bar{\chi}_t$ and politicians are willing to engineer a cycle. By Proposition 3, for $\rho=1$ and $\chi^E>\bar{\chi}_t$ the representative voter strictly prefers divided government, since there is no efficiency cost and electoral cycles are avoided. Since the efficiency cost of divided government increases as ρ falls,

given the magnitude of electoral cycles there will be a $\rho < 1$ for which there are values $\varepsilon_H, \varepsilon_L$ such that if $\hat{\varepsilon}_t^A > \varepsilon_H$ or $\hat{\varepsilon}_t^A < -\varepsilon_L$, then the representative voter prefers (A, A) to (A, B) when the starting point is a unified government with party A in the executive position (a similar argument applies when the starting point is divided government). Moreover, as ρ keeps falling, the efficiency costs of divided government will eventually outweigh its moderating effects, so the representative voter always prefers unified government. Hence,

Proposition 4 *Separation of powers and shared government competence. Suppose there are elections in odd periods, and the legislature must authorize new debt. Furthermore, government competence is a weighted average of the competence of the parties that share government. Assume that* $1 < \beta(1+r)\frac{\mathbf{E}_t\left(\frac{1}{\theta_{t+1}}\right)}{\mathbf{E}_t\left(\frac{1}{\theta_t}\right)} \leq \frac{3}{2}$ *and* $\chi^E > \bar{\chi}_t$.

In a non-electoral period the executive, with the agreement of the legislature, will set taxes and expenditures at the optimal level.

In an electoral period:

1. *Under perfect compliance with the budget law, divided government will set taxes and expenditures at the optimal level, while unified government will generate PBCs. Voters are more likely to pick unified government either when the current government is very competent (and hence reelected) or very incompetent (and hence replaced by the opposition).*

2. *Under null compliance with the budget law, the executive will generate PBCs. Voters favor unified government.*

4 Empirical implications

Alesina, Roubini, and Cohen (1997, chaps. 4 and 6) link the lack of recent evidence on opportunistic cycles for the United States to the fact that after 1980 many federal transfer programs became mandatory by acts of Congress, so they cannot be easily manipulated for short run purposes by the President. According to the logic of our model, these developments may be due in turn to the fact that in the postwar period US voters have favored divided government (cf. Alesina and Rosenthal 1995), because Propositions 3 and 4 imply that divided government can prevent PBCs.

The moderating influence of divided government in Propositions 3 and 4 assumes there is perfect compliance with the budget law, but not all legislatures actually have the capability to assure such compliance. If not, by Propositions 3 and 4 the budget rule is not credible. The US Congress has an uncommon capability of monitoring and enforcing the budget. Nordhaus (1989) traces the roots of this back to the Nixon administration, whose lies prompted the US Congress to establish in 1974 the Congressional Budget Office to have an independent control of the budget.

One can derive a sharp empirical implication from these two propositions, namely, that aggregate PBCs should be larger either in countries with low legislative checks and balances, or with low observance of the rule of law. Authors (2009) empirically study this implication, constructing a proxy for effective checks and balances that combines the presence of a legislative veto player (using the Henisz political constraints index) with the degree of compliance with the law (using the ICRG law and order index). With a panel of democracies over the 1960-2001 period, they find that legislative checks and balances indeed moderate cycles in countries with high observance of the rule of

law. These results confirm the Schuknecht (1996) conjecture that stronger PBCs in developing countries are due to weaker checks and balances.

Another implication of Propositions 3 and 4 is that the choice of unified or divided government is endogenous. Proposition 3 has a counterfactual implication, that voters will always choose divided government. Instead, Proposition 4 implies that divided government is more likely when the differences in expected competence between both parties are not too large. On the other hand, if a legislature does not have the capability to assure compliance with the budget law, then divided government is useless to moderate the executive and only the efficiency costs are left.

5 Conclusions

The inability of the executive incumbent to credibly commit not to use debt for electoral purposes has been pointed out as being at the heart of aggregate PBCs (Shi and Svensson 2006, Alt and Lassen 2006a,b). Since this credibility problem is generated by the discretionary power of the executive, this paper models the role of legislative veto players as a possible solution to PBCs.

When there is separation of powers, appropriate checks and balances may work as a commitment device, making all players better off (including the executive incumbent). When the legislature is aligned with the executive, it will not curb aggregate cycles in spending, taxes and debt because it shares the same electoral objectives. When the legislature is not aligned with the executive, it will veto these electoral changes in the budget. For this veto power to be effective in avoiding PBCs, the legislature needs

the oversight and enforcement capacity to insure that the executive complies with the approved budget law.

In relation to the debate on rules versus discretion, our discussion of PBCs shows that a way to solve the credibility problem, making the budget rule a credible commitment, is to introduce an institutional arrangement that limits the discretion to change rules. Separation of powers and compliance with the budget law provide an institutional technology that gives voters the opportunity to turn the budget law into a credible commitment if they pick divided government. Voters may find this commitment device useful or not depending on its benefits (eliminating PBCs) and costs (lower competence). The actual checks and balances under separation of powers are endogenous and depend on whether voters pick unified or divided government.

6 Appendix

Lemma 1 *Let $Z = h(X, Y)$ be a function of two independent stochastic variables X and Y, with marginal densities $f_x(x)$ and $f_y(y)$. Let $g(x) = \mathbf{E}[Z \mid x]$ be the expected value of Z conditional on x. Suppose that $g(x)$ is an increasing and concave function of x. Consider a known vector of information variables W that allows to estimate X and call $\hat{x}(w)$ the estimated value of X when W adopts the value w. Then*

$$\mathbf{E}[Z \mid \hat{x}(w)] \geq \mathbf{E}[Z] \text{ if and only if } \hat{x}(w) \geq \mathbf{E}[X].$$

Proof: First, since X and Y are independent stochastic variables, $g(x) = \mathbf{E}[Z \mid x] = \int h(x, y)\ f_y(y)\ dy$. Since $g(x)$ is concave, by Jensen's inequality it fol-

lows that $g[\mathbf{E}(X)] \geq \mathbf{E}[g(x)]$. Employing the definition of g, the left hand side of the inequality is $\mathbf{E}\left[Z \mid E\left[X\right]\right]$, while the right hand side is $\mathbf{E}_X\left[\mathbf{E}\left[Z \mid X\right]\right]$. Therefore, $\mathbf{E}\left[Z \mid \mathbf{E}\left[X\right]\right] \geq \mathbf{E}_X\left[\mathbf{E}\left[Z \mid X\right]\right]$. By the law of iterated expectations, $\mathbf{E}\left[Z\right] = \mathbf{E}_X[\mathbf{E}\left[Z \mid X\right]]$. Hence,

$$\mathbf{E}\left[Z \mid \mathbf{E}\left[X\right]\right] \geq \mathbf{E}\left[Z\right]. \tag{27}$$

Now, consider the vector of information variables W, whose realization w is known. From inspection of (27), if $g(x) = \mathbf{E}\left[Z \mid x\right]$ is an increasing function of x, then $\mathbf{E}\left[Z \mid \hat{x}(w)\right] \geq \mathbf{E}\left[Z \mid \mathbf{E}\left[X\right]\right]$ if and only if $\hat{x}(w) \geq \mathbf{E}\left[X\right]$.■

Lemma 2 $\mathbf{E}_t[c_{t+1} + \alpha \ln(g_{t+1}) \mid \varepsilon_t]$ *is an increasing and concave function of* ε_t.

Proof: Replace c_{t+1} and g_{t+1}, then replace γ_{t+1}^u and π_{t+1}^u, apply the conditional expected value operator, and use $\mathbf{E}_t\left(\frac{1}{\theta_{t+1}} \mid \varepsilon_t\right) = \mathbf{E}_{t+1}\left(\frac{1}{\theta_{t+1}}\right)$:

$$\mathbf{E}_t\left[c_{t+1} + \alpha \ln(g_{t+1}) \mid \varepsilon_t\right] = y - \alpha - (1+r)d_t\mathbf{E}_t\left(\frac{1}{\theta_{t+1}} \mid \varepsilon_t\right) + \alpha\mathbf{E}_t\left[\ln\left(\frac{\theta_{t+1}\alpha}{E_{t+1}[\frac{1}{\theta_{t+1}}]}\right) \mid \varepsilon_t\right]$$

Expected utility in $t+1$ is increasing in ε_t because of a lower expected burden of outstanding debt, a higher expected competence in the provision of the public good, and a higher expenditure on the public good:

$$\frac{\partial \mathbf{E}_t\left[c_{t+1} + \alpha \ln(g_{t+1}) \mid \varepsilon_t\right]}{\partial \varepsilon_t} = (1+r)d_t\mathbf{E}_t\left(\frac{1}{\theta_{t+1}^2} \mid \varepsilon_t\right) + \alpha\left[\mathbf{E}_t\left(\frac{1}{\theta_{t+1}} \mid \varepsilon_t\right) + \frac{\mathbf{E}_{t+1}\left(\frac{1}{\theta_{t+1}^2}\right)}{\mathbf{E}_{t+1}\left(\frac{1}{\theta_{t+1}}\right)}\right] > 0$$

As to the second derivative of $\mathbf{E}_t[c_{t+1} + \alpha \ln(g_{t+1}) \mid \varepsilon_t]$, first

$$\frac{\partial^2 \mathbf{E}_t \left(c_{t+1} \mid \varepsilon_t\right)}{\partial \varepsilon_t^2} = -2(1+r) d_t \mathbf{E}_t \left(\frac{1}{\theta_{t+1}^3} \mid \varepsilon_t\right) = \frac{(-2)\,(1+r) d_t (\bar{\theta} + \varepsilon_t)}{\left[(\bar{\theta} + \varepsilon_t)^2 - (\frac{1}{2\xi})^2\right]^2} < 0.$$

Since debt may be zero, for expected utility to be concave in ε_t, the second derivative of the public good must be negative. Using $\mathbf{E}_t \left(\frac{1}{\theta_{t+1}^2} \mid \varepsilon_t\right) = \mathbf{E}_{t+1} \left(\frac{1}{\theta_{t+1}^2}\right)$,

$$\frac{\partial^2 E_t[\ln(g_{t+1}) \mid \varepsilon_t]}{\partial \varepsilon_t^2} = \frac{\mathbf{E}_{t+1} \left(\frac{1}{\theta_{t+1}^2}\right) \left\{\mathbf{E}_{t+1} \left(\frac{1}{\theta_{t+1}^2}\right) - \left[\mathbf{E}_{t+1} \left(\frac{1}{\theta_{t+1}}\right)\right]^2\right\} - 2\mathbf{E}_{t+1} \left(\frac{1}{\theta_{t+1}^3}\right) \mathbf{E}_{t+1} \left(\frac{1}{\theta_{t+1}}\right)}{\left[\mathbf{E}_{t+1} \left(\frac{1}{\theta_{t+1}}\right)\right]^2}.$$

Since $\left\{\mathbf{E}_{t+1} \left(\frac{1}{\theta_{t+1}^2}\right) - \left[\mathbf{E}_{t+1} \left(\frac{1}{\theta_{t+1}}\right)\right]^2\right\}$ is second order in relation to the following term, this derivative is negative.■

Lemma 3 *Suppose that party A controls the executive in period t, then the difference* $D\,(A,B) = \mathbf{E}_t \left[c_{t+1}(A,j,A,A) + \alpha \ln g_{t+1}(A,j,A,A) \mid \hat{\varepsilon}_t^A\right] - \mathbf{E}_t \left[c_{t+1}(A,j,A,B) + \alpha \ln g_{t+1}(A,j,A,B) \mid \hat{\varepsilon}_t^A\right]$ *is increasing in* $\hat{\varepsilon}_t^A$.

Proof: Applying the properties of operator $\mathbf{E}$ and the definitions of c_{t+1} and g_{t+1},

$$D\,(A,B) = \frac{(1+r)\left[\hat{\omega}_t\,(A,j) - \frac{1}{\hat{\omega}_t(A,j)}\right]}{\mathbf{E}_t \left(\frac{1}{\theta_t^A}\right)} \mathbf{E}_t \left[\frac{1}{\rho\theta_{t+1}^A + (1-\rho)\theta_{t+1}^B} - \frac{1}{\theta_{t+1}^A} \mid \hat{\varepsilon}_t^A\right] +$$

$$+ \alpha \mathbf{E}_t \left[\ln \left(\frac{\theta_{t+1}^A}{\rho\theta_{t+1}^A + (1-\rho)\theta_{t+1}^B}\right) \mid \hat{\varepsilon}_t^A\right] + \alpha \mathbf{E}_t \left[\ln \left(\frac{\mathbf{E}_{t+1} \left(\frac{1}{\rho\theta_{t+1}^A + (1-\rho)\theta_{t+1}^B}\right)}{\mathbf{E}_{t+1} \left(\frac{1}{\theta_{t+1}^A}\right)}\right) \mid \hat{\varepsilon}_t^A\right].$$

Diferentianting $D(A,B)$:

$$\frac{\partial D(A,B)}{\partial \hat{\varepsilon}_t^A} = \frac{(1+r)\left[\hat{\omega}_t(A,j) - \frac{1}{\hat{\omega}_t(A,j)}\right]}{\mathbf{E}_t\left(\frac{1}{\theta_t^A}\right)} \frac{\partial \mathbf{E}_t\left[\frac{1}{\rho\theta_{t+1}^A + (1-\rho)\theta_{t+1}^B} - \frac{1}{\theta_{t+1}^A} \mid \hat{\varepsilon}_t^A\right]}{\partial \hat{\varepsilon}_t^A} +$$
$$+ \alpha \frac{\partial \mathbf{E}_t\left[\ln\left(\frac{\theta_{t+1}^A}{\rho\theta_{t+1}^A + (1-\rho)\theta_{t+1}^B}\right) \mid \hat{\varepsilon}_t^A\right]}{\partial \hat{\varepsilon}_t^A} + \alpha \frac{\partial \mathbf{E}_t\left[\ln\left(\frac{\mathbf{E}_{t+1}\left(\frac{1}{\rho\theta_{t+1}^A + (1-\rho)\theta_{t+1}^B}\right)}{\mathbf{E}_{t+1}\left(\frac{1}{\theta_{t+1}^A}\right)}\right) \mid \hat{\varepsilon}_t^A\right]}{\partial \hat{\varepsilon}_t^A}.$$

$\hat{\omega}_t(A,j) \geq 1$, because either $\hat{\omega}_t(A,j) > 1$ with PBCs, or $\hat{\omega}_t(A,j) = 1$. As to the first derivative,

$$\frac{\partial \mathbf{E}_t\left[\frac{1}{\rho\theta_{t+1}^A + (1-\rho)\theta_{t+1}^B} - \frac{1}{\theta_{t+1}^A} \mid \hat{\varepsilon}_t^A\right]}{\partial \hat{\varepsilon}_t^A} = (1-\rho)\mathbf{E}_t\left[\frac{\left(\theta_{t+1}^B\right)^2 - \rho\left(\theta_{t+1}^A - \theta_{t+1}^B\right)^2}{\left(\rho\theta_{t+1}^A + (1-\rho)\theta_{t+1}^B\right)^2\left(\theta_{t+1}^A\right)^2} \mid \hat{\varepsilon}_t^A\right]$$

For $\rho = 1$, this is zero, and for $\rho = 0$, this is positive. When $\rho < 1$, this is also positive, because the second term of the numerator is second order with respect to the first term. Therefore:

$$\frac{\partial \mathbf{E}_t\left[\frac{1}{\rho\theta_{t+1}^A + (1-\rho)\theta_{t+1}^B} - \frac{1}{\theta_{t+1}^A} \mid \hat{\varepsilon}_t^A\right]}{\partial \hat{\varepsilon}_t^A} \begin{array}{l} = 0 \text{ if } \rho = 1, \\ > 0 \text{ if } \rho < 1. \end{array} \tag{28}$$

As to the second derivative,

$$\frac{\partial \mathbf{E}_t\left[\ln\left(\frac{\theta_{t+1}^A}{\rho\theta_{t+1}^A + (1-\rho)\theta_{t+1}^B}\right) \mid \hat{\varepsilon}_t^A\right]}{\partial \hat{\varepsilon}_t^A} = \mathbf{E}_t\left[\frac{(1-\rho)\theta_{t+1}^B}{\theta_{t+1}^A\left(\rho\theta_{t+1}^A + (1-\rho)\theta_{t+1}^B\right)} \mid \hat{\varepsilon}_t^A\right] \begin{array}{l} = 0 \text{ if } \rho = 1, \\ > 0 \text{ if } \rho < 1. \end{array} \tag{29}$$

As to the third derivative,

$$\frac{\partial \mathbf{E}_t\left[\ln\left(\frac{\mathbf{E}_{t+1}\left(\frac{1}{\rho\theta^A_{t+1}+(1-\rho)\theta^B_{t+1}}\right)}{\mathbf{E}_{t+1}\left(\frac{1}{\theta^A_{t+1}}\right)}\right)\mid \hat{\varepsilon}^A_t\right]}{\partial\hat{\varepsilon}^A_t}=\mathbf{E}_t\left\{\frac{(1-\rho)\mathbf{E}_{t+1}\left(\frac{1}{\left(\theta^A_{t+1}\right)^2}\right)\mathbf{E}_{t+1}\left(\frac{1}{\rho\theta^A_{t+1}+(1-\rho)\theta^B_{t+1}}\right)}{\mathbf{E}_{t+1}\left(\frac{1}{\rho\theta^A_{t+1}+(1-\rho)\theta^B_{t+1}}\right)\mathbf{E}_{t+1}\left(\frac{1}{\theta^A_{t+1}}\right)}+\right.$$

$$\left.-\rho\frac{\left[\mathbf{E}_{t+1}\left(\frac{1}{\left(\rho\theta^A_{t+1}+(1-\rho)\theta^B_{t+1}\right)^2}\right)\mathbf{E}_{t+1}\left(\frac{1}{\theta^A_{t+1}}\right)-\mathbf{E}_{t+1}\left(\frac{1}{\left(\theta^A_{t+1}\right)^2}\right)\mathbf{E}_{t+1}\left(\frac{1}{\rho\theta^A_{t+1}+(1-\rho)\theta^B_{t+1}}\right)\right]}{\mathbf{E}_{t+1}\left(\frac{1}{\rho\theta^A_{t+1}+(1-\rho)\theta^B_{t+1}}\right)\mathbf{E}_{t+1}\left(\frac{1}{\theta^A_{t+1}}\right)}\mid\hat{\varepsilon}^A_t\right\},$$

where the first term in the numerator is positive, and the second term of the numerator is second order (since it is the difference of two products of similar magnitude). Hence,

$$\frac{\partial \mathbf{E}_t\left[\ln\left(\frac{\mathbf{E}_{t+1}\left(\frac{1}{\rho\theta^A_{t+1}+(1-\rho)\theta^B_{t+1}}\right)}{\mathbf{E}_{t+1}\left(\frac{1}{\theta^A_{t+1}}\right)}\right)\mid \hat{\varepsilon}^A_t\right]}{\partial\hat{\varepsilon}^A_t}\begin{array}{l}=0 \text{ if } \rho=1,\\ >0 \text{ if } \rho<1.\end{array} \tag{30}$$

Summing up, (28)-(30) imply that the second part of Lemma 3 is satisfied.■

References

[1] Aldrich, John H. (1995). *Why parties? The origin and transformation of political parties in America*. Chicago, University of Chicago Press.

[2] Alesina, Alberto, and Howard Rosenthal. (1995). *Partisan politics, divided government and the economy*. Cambridge, Cambridge University Press.

[3] Alt, James E., and David D. Lassen. (2006a). Fiscal transparency, political parties and debt in OECD countries. *European Economic Review* 50: 1403-1439.

[4] Alt, James E., and David D. Lassen (2006b). Transparency, political polarization, and political budget cycles in OECD countries. *American Journal of Political Science* 50: 530-550.

[5] Authors (2009). Checks and balances on political budget cycles: Cross-country evidence, *Kyklos*, forthcoming.

[6] Frey, Bruno S., and Friedrich Schneider (1978). A politico-economic model of the United Kingdom, *Economic Journal* 88: 243-253.

[7] Heniff, Bill (2004). Debt-limit legislation in the congressional budget process. CRS Report for Congress 98-453 GOV, Congressional Research Service, Library of Congress.

[8] Keefer, Philip, and David Stasavage (2003). The limits of delegation: Veto players, central bank independence, and the credibility of monetary policy. *American Political Science Review* 97: 407-23.

[9] Kydland, Finn E., and Edward C. Prescott (1977). Rules rather than discretion: The inconsistency of optimal plans. *Journal of Political Economy* 83: 1009-21.

[10] Lohmann, Susanne (1998a). Rationalizing the political business cycle: A workhorse model. *Economics and Politics* 10: 1-17.

[11] Lohmann, Susanne (1998b). Federalism and central bank independence: The politics of German monetary policy, 1957-1992. *World Politics* 50, 401-446.

[12] McNollgast –McCubbins, Matthew, Roger Noll, and Barry Weingast– (2007). The political economy of the law, in A. M. Polinsky and S. Shavel (eds.), *Handbook of law and economics*, volume 2, chapter 22. Amsterdam, Elsevier Science Publishing.

[13] Persson, Torsten, Gerard Roland, and Guido Tabellini. (1997). Separation of powers and political accountability. *Quarterly Journal of Economics* 112: 1163-1202.

[14] Persson, Torsten, and Guido Tabellini (1990). *Macroeconomic policy, credibility and politics.* London, Harwood Academic Publishers.

[15] Persson, Torsten, and Guido Tabellini (2000). *Political economics.* Cambridge, MA, MIT Press.

[16] Powell, G. Bingham, Jr., and Guy D. Whitten. (1993). A cross-national analysis of economic voting taking account of the political context, *American Journal of Political Science* 37: 391-414.

[17] Rogoff, Kenneth (1985). The optimal degree of commitment to an intermediate monetary target. *Quarterly Journal of Economics* 100: 1169-1190.

[18] Rogoff, Kenneth (1990). Equilibrium political budget cycles. *American Economic Review* 80: 21-36.

[19] Rogoff, Kenneth, and Anne Sibert. (1988). Elections and macroeconomic policy cycles. *Review of Economic Studies* 55: 1-16.

[20] Romer, Thomas, and Howard Rosenthal. (1978). Political resource allocation, controlled agendas, and the status quo. *Public Choice* 33: 27-44.

[21] Romer, Thomas, and Howard Rosenthal. (1979). Bureaucrats vs. voters: On the political economy of resource allocation by direct democracy. *Quarterly Journal of Economics* 93: 563-588.

[22] Saporiti, Alejandro D., and Jorge M. Streb (2008). Separation of powers and political budget cycles. *Public Choice* 137: 329-345.

[23] Schuknecht, Ludger (1996). Political business cycles in developing countries. *Kyklos* 49: 155-70.

[24] Shi, Min, and Jakob Svensson (2006). Political budget cycles: Do they differ across countries and why? *Journal of Public Economics* 90: 1367-89.

[25] Strauch, Rolf R., and Jürgen von Hagen (2001). Formal fiscal restraints and budget processes as solutions to a deficit and spending bias in public finances - U.S. experience and possible lessons for EMU, Working Paper B14, ZEI, Rheinische Friedrich-Wilhelms-Universität Bonn.

[26] Streb, Jorge M. (2005). Signaling in political budget cycles. How far are you willing to go? *Journal of Public Economic Theory* 7: 229-52.

[27] Tsebelis, George (2002). *Veto players. How political institutions work.* New York, NY, Russell Sage Foundation.

[28] Tufte, Edward R. (1978). *Political control of the economy.* Princeton, NJ, Princeton University Press.

[29] Umeno, Luis G., and Maurício S. Bugarin (2008). Electoral control in the presence of moral hazard and adverse selection. *Brazilian Review of Econometrics* 28: 17-50.

[30] von Hagen, Jürgen (2006). Political economy of fiscal institutions, in B. Weingast and D. Wittman (eds.), *The Oxford handbook of political economy*, chapter 26. New York, Oxford University Press.