SPENDING-BIASED LEGISLATORS: DISCIPLINE THROUGH DISAGREEMENT*

Facundo Piguillem and Alessandro Riboni

We study legislators who have a present bias for spending: they want to increase current spending and procrastinate spending cuts. We show that disagreement in legislatures can lead to policy persistence that attenuates the temptation to overspend. Depending on the environment, legislators' decisions to be fiscally responsible may either complement or substitute other legislators' decisions. When legislators have low discount factors, their actions are strategic complements. Thus, changes of the political environment that induce fiscal responsibility are desirable as they generate a positive responsibility multiplier and reduce spending. However, when the discount factor is high, the same changes induce some legislators to free ride on others' responsibility which may lead to higher spending. *JEL* Codes: D72-H00.

I. Introduction

Political disagreement is ubiquitous and usually regarded as harmful. In particular, the literature in political economy emphasizes that disagreement is associated with inefficient outcomes: it makes governments myopic, leading to low public investment and excessive debt.[1]

We show instead that when politicians have a present-bias temptation to overspend, disagreement in legislatures might be welfare improving. Our result follows from the key role played by the status quo in negotiations as the outside option in case of disagreement. If legislators know that current decisions could persist due to political gridlock, the threat that high spending could continue helps impose discipline and makes them less myopic.

*We thank the editors and anonymous referees for constructive comments and suggestions. We are grateful to Raphael Godefroy, Marie-Aude Laguna, Olivier Loisel, Nicola Persico, Giacomo Ponzetto, Andy Skrzypacz, Francesco Squintani, Daniele Terlizzese, Pierre Yared, Huseyin Yildirim, Lin Zhang, and seminar participants at several universities and conferences for valuable feedback. The authors are thankful to Anna Hovde for outstanding editing work. Alessandro Riboni acknowledges the financial support of Investissements d'Avenir (ANR-11-IDEX-0003/Labex Ecodec/ANR-11-LABX-0047).

1. See Persson and Svensson (1989), Alesina and Tabellini (1990), and Azzimonti (2011). In Alesina and Drazen (1991) political conflict leads to delay of efficient reforms. See also Besley and Coate (1998).

The Quarterly Journal of Economics (2015), 901–949. doi:10.1093/qje/qjv011.
Advance Access publication on February 5, 2015.

We analyze a model in which all politicians have time-inconsistent preferences: they want high current spending and low spending in the future, but when the future comes they are tempted to postpone spending cuts. There is a continuum of politicians who differ with respect to the strength of their spending bias. Some gain more than others when spending increases. However, if there were a commitment technology, all legislators would agree on lower future spending.

The spending bias is akin to the present bias temptation in the hyperbolic discounting literature. In political settings present-bias temptation typically arises when heterogeneous preferences are aggregated, as in Jackson and Yariv (2012), or when there is political turnover and politicians value spending more when they are in office.[2] Alternatively, legislators' spending bias could reflect a similar bias in their constituents.

Institutions are key to dealing with politicians' self-control problems. To this end, we consider a model where legislators negotiate policies under two widespread institutional features. First, spending is decided through legislative bargaining between an agenda setter (e.g., the executive or committee chairs) and the legislature. Second, the status quo is the default option in case of disagreement. This assumption is appropriate for many budget categories. For instance, mandatory spending, such as Social Security, is determined by provisions enacted by law and spending continues unless a new law is approved.

Disagreement is endogenous in that whether it arises depends on expectations. When disagreement is anticipated, the least present-biased legislators have an incentive to favor low spending to preserve it in case of future gridlock, while legislators with higher temptation would vote for higher spending. The expectation itself creates disagreement, which sustains a low-spending equilibrium.

When, instead, unanimity is anticipated, legislators give in to the temptation to overspend. On the one hand, if unanimous support for high spending is expected, legislators know that low spending today cannot stop policy makers from raising spending in the future: high spending is thus a self-fulfilling equilibrium. On the other hand, if unanimous support for low spending is expected, low spending will be chosen in the future regardless of the

2. For instance, see Alesina and Tabellini (1990) and Amador (2003).

status quo, so legislators can spend today and free-ride on future responsibility.

Our first contribution is a precise characterization of how legislative bargaining enhances efficiency. We show that when the default option in the bargaining process is exogenously fixed, legislators cannot affect future outcomes through the status quo, and thus they have no incentive to refrain from high spending. Similarly, when a single decision maker chooses the policy, the only equilibrium is one in which high spending is always chosen. Intuitively, when power is concentrated in a single individual, there is no gridlock to create policy persistence, which makes the policy dictator short-sighted. Thus, in our setting collective decision making is welfare improving because it mitigates the time inconsistency problem faced by individuals.

The endogenous status quo leads to dynamic strategic interactions. The current level of fiscal responsibility depends on expected future responsibility. The two can either be complements or substitutes depending on the discount factor.

Our second contribution is a clear description of these strategic interactions. This allows us to determine under which conditions changes in the environment are welfare improving. For instance, when we exogenously add more fiscally responsible (less tempted) legislators, we show that the other legislators could become either more or less responsible. This indirect equilibrium effect can then reinforce or attenuate the direct effect due to the introduction of responsible legislators. In economies where politicians have a relatively high discount factor, such a change triggers irresponsibility in other legislators. When the discount factor is high enough, the majority is far-sighted and favors low spending, so a further increase in fiscal responsibility would reinforce the majority view and thus reduces disagreement, which leads to weaker incentives to maintain fiscal discipline. Politicians are tempted to free-ride by indulging in current spending if they expect others to be responsible.

Conversely we find a strategic complementarity when politicians' discount factor is low. When some legislators exogenously become more fiscally responsible, other legislators also become more disciplined: there is a "responsibility multiplier." When the discount factor is low, the majority of legislators support high spending. An increase in fiscal responsibility leads to a legislature more evenly divided between fiscally responsible and irresponsible, which raises the probability of political deadlock and thus strengthens the incentive to keep spending low. This complementarity can explain why economies may find themselves trapped in a high-spending equilibrium.

Since economies where legislators have different discount factors are characterized by different types of strategic interactions, similar institutional changes can have very different effects. A general lesson that we can draw from these results is that there are no institutional changes that work well in all environments. Institutions that increase inefficient spending in some economies may reduce it in others.

The remainder of this article proceeds as follows. In Section II we review the literature, and in Section III present our basic model. In Section IV, we analyze the importance of the endogenous status quo assumption and weaken the legislature's ability to veto policy changes. In Section V, we modify the spending-bias distribution in the legislature. We analyze legislative bargaining under simple majority rule in Section VI, and in Section VII we analyze an environment where the agenda setter's power is persistent. We conclude in Section VIII. For ease of exposition, all proofs are in the Appendix.

II. Literature Review

This article is related to the literature on self-control problems and commitment started by Strotz (1955) and Phelps and Pollak (1968) and further developed by Laibson (1997). The literature was motivated by laboratory experiments suggesting that individuals' long-run preferences often conflict with their short-run behavior.

Commitment problems have been studied to explain phenomena such as procrastination, drug addiction, and undersaving (e.g., Akerlof 1991; Barro 1999). For instance, O'Donoghue and Rabin (1999b, 2001) find that when agents must perform an activity that has immediate costs and delayed rewards, self-control problems lead to procrastination. They show that being overconfident about the possibility of overcoming the self-control problem makes procrastination worse. O'Donoghue and Rabin (1999a, 2003) analyze the problem of addiction as a game between current and future "selves," with strategic interactions similar to those in our article. They show that the expectation of addictive behavior leads to a pessimism effect, which exacerbates drug consumption, and an incentive effect, which leads individuals to avoid consumption of addictive products to induce good behavior in their future selves. Likewise, Gul and Pesendorfer (2007) show that a prohibitive policy, by providing future commitment opportunities, may make it less costly to get addicted. Krusell and Smith (2003) analyze a consumption-savings model and find that when preferences are time-inconsistent, different expectations about future behavior lead to multiple equilibria.

Recent papers introduce self-control problems into political economy models. In Bisin, Lizzeri, and Yariv (2011) and Lizzeri and Yariv (2012), voters are time inconsistent and politicians may exploit their biases to win the election. In some cases, governments completely undermine individuals' ability to commit. They compare the outcome under government intervention with the laissez-faire equilibrium, where consumption and savings decisions are decentralized.

Our work is also related to the recent literature on dynamic models of legislative bargaining, which builds on the seminal paper by Baron and Ferejohn (1989). Battaglini and Coate (2007, 2008) analyze how policies respond to shocks in spending needs in a model where debt is the only state variable. In Battaglini, Nunnari, and Palfrey (2012) the dynamic linkage across periods is given by the public good, which can be accumulated over time. As in our model, various papers analyze legislative bargaining with an endogenous default option. Starting from the contribution of Baron (1996), this literature has been growing rapidly.[3] These papers focus on standard time consistent preferences and consider bargaining protocols where the outcome is deterministic. From this point of view, our article contributes methodologically to the dynamic bargaining literature.

A common result in the endogenous status quo literature is that when legislators have concave preferences, the endogenous status quo improves welfare by reducing policy variability. For instance, Bowen, Chen, and Eraslan (2014) consider a model where two parties must determine the allocation to a public good and private transfers. They find that when the status quo level of the public good is endogenous, parties can ensure against power fluctuations. In this paper, decision makers have linear utility and

3. Recent contributions include Kalandrakis (2004), Riboni and Ruge-Murcia (2008), Diermeier and Fong (2010), Duggan and Kalandrakis (2011), Zapal (2011), Nunnari (2014), Bowen and Zahran (2012), Anesi and Seidmann (2012), and Baron and Bowen (2013).

the endogenous status quo is beneficial because it serves a disciplinary role. Riboni (2010) and Piguillem and Riboni (2013) also argue that the endogenous status quo has a disciplinary role in the context of a Barro-Gordon economy and a capital taxation model, respectively. The bargaining protocol in Piguillem and Riboni (2013) is similar to the one used here, but it is embedded in a dynamic general equilibrium growth model and consequently cannot be solved in closed form. In contrast, we provide a tractable model that allows for a clear understanding of how public policies vary with changes to the political and institutional environment. Riboni and Ruge-Murcia (2008) and Dziuda and Loeper (2012) assume that players' preferences change over time stochastically. In contrast to this article, they find that having an endogenous status quo may be welfare decreasing as players sometimes fail to reach an agreement when the status quo is Pareto dominated.

Halac and Yared (2014) study a benevolent government's optimal debt policy when the government is present-biased toward spending. The optimal fiscal rule solves the trade-off between the value of commitment and the need to respond to spending shocks. The mechanism behind their optimal contract is similar to ours. If a government claims to have high spending needs, it is "punished" by relaxing the borrowing limit of future governments, leading to more irresponsibility in the future. This suggests that the welfare-enhancing mechanism that we describe may extend to other settings.

III. The Model

Time is discrete, infinite, and indexed by t. Let s_t denote the spending level approved by the legislature in period t. Let $s_t \in \{\underline{s}, \overline{s}\}$, with $0 \leq \underline{s} < \overline{s}$.[4]

For simplicity, we assume that the government's budget is balanced. This implies that there is a simple mapping between taxation and spending: low spending translates into low taxes and high spending translates into high taxes. We abstract from debt to isolate the direct effect of the endogenous status quo. Our model could be interpreted as the problem faced by legislators in

4. The assumption that the policy space includes only two alternatives is without loss of generality. Results would not change if the policy space were the interval because equilibrium indirect utilities will be linear in the current policy (see Appendix A.2). As a result, policy makers' choices will be at the corners.

U.S. states where balanced budget requirements force governments to finance current spending with tax revenue.[5]

III.A. Preferences

There is a continuum of legislators, indexed by $a_i \in [0, 1]$, with cumulative distribution function $F(a_i)$. Throughout this article, legislators have dynamically inconsistent preferences on spending.[6] Lifetime utility of legislator a_i at time t is

$$U_{i,t} = a_i s_t - \sum\nolimits_{j=1}^{\infty} \beta^j s_{t+j}, \tag{1}$$

where $\beta \in (0, 1)$ is the discount factor. At time $t+1$ lifetime utility becomes:

$$U_{i,t+1} = a_i s_{t+1} - \sum\nolimits_{j=1}^{\infty} \beta^j s_{t+1+j}. \tag{2}$$

Current spending enters positively in equations (1) and (2), while spending from the next period onward enters negatively. In particular, the coefficient on s_{t+1} is equal to $-\beta$ when utility is evaluated at t, but becomes a_i when utility is evaluated at $t+1$.

Assuming that politicians like (dislike) current (future) spending is a tractable way to induce the following preference reversal. Under commitment, all legislators unanimously agree on the path of spending $(\overline{s}, \underline{s}, \underline{s}, \underline{s}, ...)$. In the absence of commitment, policy makers would subsequently have an incentive to revise the spending plan by selecting $\overline{s}$ and delaying spending cuts. Higher a_i implies a higher marginal benefit of deviating ex post by selecting $\overline{s}$. The parameter a_i measures the severity of the time inconsistency problem of legislator i. In Appendix A.1 we provide a rationalization of the preferences (1).

III.B. Legislative Bargaining

Spending is decided sequentially through legislative bargaining. Let q_t denote the default option in case of disagreement. The timing is:

(i) At each t an agenda setter is chosen randomly from the legislature.

5. Adding debt would introduce an additional linkage across periods. See Persson and Svensson (1989), Alesina and Tabellini (1990), and Battaglini and Coate (2008) for interesting implications.

6. Halac and Yared (2014) also assume that politicians have a bias for current spending.

(ii) The agenda setter makes a take-it-or-leave-it proposal and all legislators simultaneously cast a vote to either "accept" or "reject" the proposal.
(iii) The proposal passes with probability equal to the measure of legislators who accept it.
(iv) If the proposal is rejected, the default option q_t is the status quo policy s_{t-1}. If the proposal is accepted, it becomes the spending level for the current period and the default option for the next period: $q_{t+1} = s_t$.
(v) At time $t+1$, a new agenda setter is randomly drawn and the bargaining unfolds as at time t, and so on, for all subsequent periods.

In practice, the identity of the agenda setter varies depending on the institutional context (see Tsebelis 2002). In parliamentary systems the government usually sets the agenda, whereas in presidential systems the Congress sets the agenda (e.g., the Speaker of the House, or the chairs of committees, such as the Rules Committee in the U.S. House of Representatives).

Probabilistic acceptance captures the inherent uncertainty in the actual legislative bargaining process. In point (iii) above, the probability of acceptance increases linearly in the number of legislators who favor the proposal. If we denote the measure of legislators who accept the proposal by $x \in [0, 1]$, the proposal passes with probability x. The proposal is accepted with certainty only when all legislators prefer the proposal to the status quo, and rejected with certainty when all legislators prefer the status quo. Thus rejection may occur even if the majority of legislators favor the proposal. In a typical legislature, this may happen when a minority of legislators have the ability to delay or veto a bill. Likewise, (iii) also implies that a proposal may pass (although with smaller probability) when it is approved by a minority. In practice this might result from vote trading or party discipline.[7] Note, however, that this assumption is not essential for the results; see Section VI, where we assume that policy changes pass by a simple majority rule.

In point (iv), the status quo, which coincides with the previous period's spending level, is the default option in case of

7. For example, suppose that the policy stance of the majority party is decided by the median legislator within the party. A policy change may then pass with the support of 25% of the legislature.

disagreement. As described by Tsebelis (2002, p. 8), this is a realistic institutional feature in actual budget negotiations.[8] Bowen, Chen, and Eraslan (2014) note that for "mandatory" spending programs (including Social Security) the default option is the status quo: such programs, in fact, continue unless Congress passes legislation to change them. In Section IV.A, we compare the equilibrium outcomes with an endogenous and fixed status quo.

We emphasize that the thrust of our results remains when we modify some features of the bargaining protocol. However, as shown in Section IV, it is important to preserve two features: the default option must be endogenous, and power cannot be concentrated into a legislator. In our model, the agenda setter has the exclusive right to propose changes to the status quo but needs the approval of the legislature to pass the proposal. Separation of power creates the possibility of a status quo bias, which is key to our equilibrium.[9]

III.C. *Markov-Perfect Equilibrium*

We focus on pure-strategy Markov-perfect equilibria (MPE) and rule out strategies contingent on payoff-irrelevant histories. This approach, which is used by much of the applied literature on dynamic games, has important advantages, including the simplicity of Markov strategies and the possibility of obtaining sharper predictions (see Maskin and Tirole 2001). The status quo is the only payoff-relevant state variable. We also focus on equilibria in stage-undominated strategies (Baron and Kalai 1993) where legislators vote "yes" to a proposal if their expected utility from the status quo is not larger than their expected utility from the proposal. This assumption, which is standard in the voting literature, rules out uninteresting equilibria in which all players

8. For instance, the Treaty on the Functioning of the European Union states: "Where no Council regulation determining a new financial framework has been adopted by the end of the previous financial framework, the ceilings and other provisions corresponding to the last year of that framework shall be extended until such time as that act is adopted" (Para 4, Art 312, European Union 2010).

9. Having an agenda setter is not necessary to generate persistence. In the Online Appendix we consider the case where no legislator has agenda-setting power and decisions are passed by a supermajority rule. We show that in some cases there are equilibria with low spending. We thank an anonymous referee for suggesting this.

accept a proposal they dislike because a single rejection would not change the outcome.

In Sections III and IV, we assume that the spending bias is uniformly distributed in the legislature:

ASSUMPTION 1. $F(a_i) = a_i$ for all $a_i \in [0, 1]$.

We also assume that the agenda setter is drawn from the distribution of legislators:

ASSUMPTION 2. The agenda setter's identity is an i.i.d. random variable with distribution function $F(a_i)$.

In Section V we relax both assumptions by allowing more general distributions of legislators and different recognition probabilities. In Section VII we study the consequences of persistent agenda-setting power.

An MPE of the game is (i) a proposal rule specifying the proposal made by an agenda setter of type a_i for all status quo policies and (ii) a voting rule specifying the vote of legislator a_i after any proposal and for all status quo policies. Each legislator at any point in time is modeled as a "separate" agent who chooses her strategy to maximize her utility given the strategies of all other players (including her future selves). All politicians can forecast their own future time-inconsistent behavior. Moreover, legislators know that the current policy becomes the status quo in the next legislative session. Since strategies are stationary, we remove the time index from the notation.

1. Voting Strategy. As discussed already, we restrict legislators to use stage-undominated voting strategies. Then, legislator a_i votes "yes" to proposal s if and only if:

$$a_i s + \beta \mathrm{E}V(s) \geq a_i q + \beta \mathrm{E}V(q). \tag{3}$$

The left-hand side of equation (3) is the utility of implementing the proposal plus the expected continuation utility of going to the next period with s as the new status quo. The right-hand side is the utility of maintaining the status quo policy q plus the continuation utility of going to the next period with the status quo.

2. Proposal Strategy. Since the policy space includes only two alternatives, the agenda setter's problem amounts to a simple comparison between the utilities of proposing a policy change or not. Agenda setter a_i prefers proposing s rather than keeping the status quo when

$$\begin{aligned}&[1-\mathbf{Pr}(s\,\text{passes})]\,[a_i q+\beta \mathrm{E}V(q)]\\ &\quad+\mathbf{Pr}(s\,\text{passes})\,[a_i s+\beta \mathrm{E}V(s)]\geq a_i q\,+\beta\,\mathrm{E}V(q).\end{aligned} \tag{4}$$

The left-hand side of equation (4) is the payoff of proposing a policy change; the right-hand side is the utility of proposing the status quo, which is accepted by all legislators and thus passes for sure. Notice that inequality (4) is satisfied when condition (3) holds. Thus, the considerations affecting voting and proposal decisions are identical. This greatly simplifies the analysis.

3. Equilibrium Characterization. In any MPE legislators follow cutoff strategies. Notice, in fact, that for a given MPE, the continuation payoffs are identical for all legislators and the spending bias is increasing in a_i. Under the assumption that legislators use stage-undominated strategies, from inequality (3) it follows that there exists a unique threshold that separates the legislators who favor high spending from those who favor low spending. Namely, there exists a voting cutoff $\hat{l}\in[0,1]$ and a proposal cutoff $\hat{e}\in[0,1]$ with the following properties. Legislators of type $a_i>\hat{l}$ accept spending increases (and refuse spending cuts), whereas those with $a_i\leq\hat{l}$ accept spending cuts (and refuse spending increases). Similarly, agenda setters of type $a_i\leq\hat{e}$ propose low spending and those of type $a_i>\hat{e}$ propose high spending. By Assumptions 1 and 2, the shares of fiscally responsible voting legislators and agenda setters are $F(\hat{l})=\hat{l}$ and $F(\hat{e})=\hat{e}$, respectively.

One important feature of the equilibrium is that cutoffs do not depend on the status quo. To see this, note from equation (3) that legislators who accept a spending increase when the status quo is $\underline{s}$ also reject a spending cut when the status quo is $\overline{s}$. Since voting strategies do not depend on q, the executive does not condition her proposal on q. It is important to stress that while equilibrium cutoffs do not depend on q, the possibility of gridlock makes the value functions depend on the status quo.

The probability that the legislature approves spending j given an initial status quo i is denoted by p_{ij}. In any cutoff

MPE, equilibrium spending levels follow a Markov chain with transition probability matrix

$$\mathbf{P} = \begin{bmatrix} p_{\underline{s}\underline{s}} & p_{\underline{s}\overline{s}} \\ p_{\overline{s}\underline{s}} & p_{\overline{s}\overline{s}} \end{bmatrix} = \begin{bmatrix} \hat{e} + (1-\hat{e})\hat{l} & (1-\hat{e})(1-\hat{l}) \\ \hat{l}\,\hat{e} & \hat{e}(1-\hat{l}) + 1 - \hat{e} \end{bmatrix}. \tag{5}$$

It is instructive to compute, for instance, the probability that a low status quo is maintained. The first term of $p_{\underline{s}\underline{s}}$ is the probability that a fiscally responsible agenda setter is recognized and proposes $\underline{s}$. Since the status quo is also $\underline{s}$, low spending is maintained for sure. The second term of $p_{\underline{s}\underline{s}}$ is the probability that a fiscally irresponsible legislator becomes agenda setter multiplied by the probability that her proposal to increase spending is rejected. A spending cut, which happens with probability $p_{\overline{s}\underline{s}}$, requires instead that low spending is proposed (an event occurring with probability $\hat{e}$) and that the proposal is accepted (an independent event occurring with probability $\hat{l}$).

Notice that the bargaining procedure introduces a status quo bias. In particular, $p_{\underline{s}\underline{s}} \geq p_{\overline{s}\underline{s}}$ and $p_{\overline{s}\overline{s}} \geq p_{\underline{s}\overline{s}}$: going to the next period with a low (high) status quo raises the probability that $\underline{s}$ ($\overline{s}$) will be implemented. The increase in policy persistence gives legislators the incentive to keep current spending low in spite of their temptation.

Using equation (3), we obtain that legislator of type a_i accepts a spending cut (and rejects a spending increase) if the current gain from spending is smaller than the net gain of going to the next period with a low status quo spending level:

$$a_i\,(\overline{s} - \underline{s}) \leq \beta[\mathrm{E}V(\underline{s}) - \mathrm{E}V(\overline{s})]. \tag{6}$$

Expected continuation utilities satisfy:

$$\mathrm{E}V(\underline{s}) = p_{\underline{s}\underline{s}}[-\underline{s} + \beta \mathrm{E}V(\underline{s})] + (1 - p_{\underline{s}\underline{s}})[-\overline{s} + \beta \mathrm{E}V(\overline{s})]. \tag{7}$$

$$\mathrm{E}V(\overline{s}) = p_{\overline{s}\underline{s}}[-\underline{s} + \beta \mathrm{E}V(\underline{s})] + (1 - p_{\overline{s}\underline{s}})[-\overline{s} + \beta \mathrm{E}V(\overline{s})]. \tag{8}$$

Using equations (7) and (8), condition (6) can be rewritten as

$$a_i\,(\overline{s} - \underline{s}) \leq \beta(p_{\underline{s}\underline{s}} - p_{\overline{s}\underline{s}})(\overline{s} - \underline{s}) + \beta^2(p_{\underline{s}\underline{s}} - p_{\overline{s}\underline{s}})[\mathrm{E}V(\underline{s}) - \mathrm{E}V(\overline{s})]. \tag{9}$$

After repeatedly substituting equations (7) and (8) into the above trade-off condition, we obtain

$$a_i\,(\bar{s}-\underline{s}) \leq (\bar{s}-\underline{s})\beta(p_{\underline{s}\underline{s}}-p_{\bar{s}\underline{s}})\sum\nolimits_{t=0}^{\infty}\beta^t(p_{\underline{s}\underline{s}}-p_{\bar{s}\underline{s}})^t. \tag{10}$$

From equation (5) we see that

$$p_{\underline{s}\underline{s}}-p_{\bar{s}\underline{s}}=p_{\bar{s}\bar{s}}-p_{\underline{s}\bar{s}}=(1-\hat{l})\hat{e}+\hat{l}(1-\hat{e}). \tag{11}$$

Expression (11) is the probability of legislative gridlock due to disagreement between the legislature and the agenda setter. In fact, $(1-\hat{l})\hat{e}$ is the probability that a spending cut is proposed and rejected, and $\hat{l}(1-\hat{e})$ is the probability that a spending increase is proposed and rejected.

Using equation (11), condition (10) can be rewritten as:

$$a_i \leq \beta\frac{(1-\hat{l})\hat{e}+\hat{l}(1-\hat{e})}{1-\beta[(1-\hat{l})\hat{e}+\hat{l}(1-\hat{e})]}. \tag{12}$$

Equation (12) shows the key mechanism generating and shaping equilibria in this setting: every legislator compares her temptation with the long-run cost induced by disagreement.

Since agenda setters and voting legislators face the same trade-off, in equilibrium we have $\hat{e}=\hat{l}$. Therefore, the equilibrium cutoff solves:

$$\hat{l}=\beta\frac{2(1-\hat{l})\hat{l}}{1-\beta 2(1-\hat{l})\hat{l}}. \tag{13}$$

In Figures I and II we represent the current cutoff rule used by policy makers on the vertical axis, and the expected cutoff used in the future on the horizontal axis. The equilibrium cutoff corresponds to the intersection of the right-hand side of equation (13) with the 45-degree line. Figures I and II analyze the case of $\beta \leq \frac{1}{2}$ and $\beta > \frac{1}{2}$, respectively.

Notice that the right-hand side of equation (13) is zero when the expected share of fiscally responsible legislators is either 0 or 1, that is, when there is full agreement for either high or low spending.

The right-hand side of equation (13) is strictly positive only when future disagreement is expected and reaches its maximum value at $\frac{1}{2}$. This is because when $\hat{l}=\frac{1}{2}$ the legislature is equally split in two groups with opposite views, the disagreement is

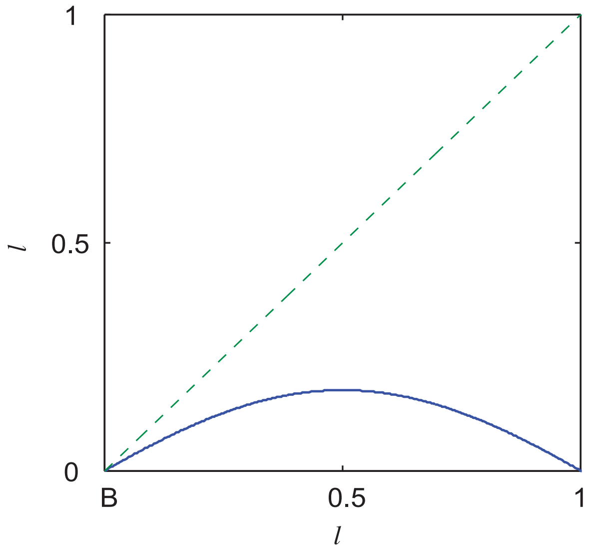

FIGURE I
Equilibrium Cutoffs; $\beta \leq \frac{1}{2}$

maximum, and consequently, current spending is more likely to persist.

PROPOSITION 1. Suppose that Assumptions 1 and 2 hold.
For any $\beta \in (0, 1)$ there exists a MPE where all players use the cutoffs $\hat{e} = \hat{l} = 0$ and where $\overline{s}$ is implemented with probability one at all times.
For any $\beta \in (\frac{1}{2}, 1)$ there also exists an interior equilibrium, with cutoff

$$\hat{e} = \hat{l} = \frac{\sqrt{2\beta - 1}}{\sqrt{2\beta}}, \tag{14}$$

where $\underline{s}$ is implemented with strictly positive probability.

Proposition 1 states that for any $\beta \in (0, 1)$ there exists an equilibrium in which high spending is unanimously chosen (point B in Figures I and II). If unanimity favoring high spending is expected, a low status quo cannot prevent future legislators from choosing high spending. As a result, there are no incentives

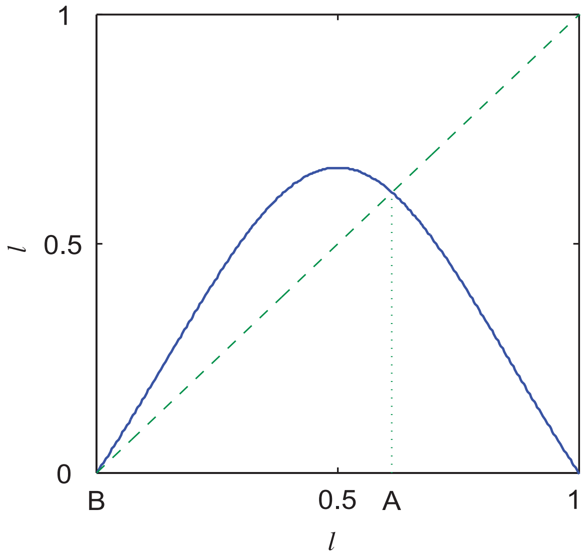

FIGURE II
Equilibria Cutoffs; $\beta > \frac{1}{2}$

to choose current low spending. Being irresponsible is a self-fulfilling equilibrium: all legislators, even those with an infinitesimal bias, find it profitable to propose and accept $\overline{s}$.

However, when $\beta > \frac{1}{2}$ there is another equilibrium (point A in Figure II) where low spending is proposed and accepted with a strictly positive probability. The second equilibrium is driven by the anticipation of future disagreement. When disagreement is expected, the least present-biased legislators have an incentive to favor low spending to secure it as a future policy in case of disagreement. Legislators with high bias instead favor high spending, which creates disagreement and sustains the equilibrium.[10]

Note that equation (14) is strictly lower than 1. If there were unanimity for low spending, it would not be costly to go to the

10. Our equilibrium construction requires an infinite horizon. If there were a termination date, in the final period there would be unanimity for high spending and consequently no incentive to keep spending low in the penultimate period. Proceeding backward, high spending would be chosen at all t.

next period with a high status quo policy, so current legislators would have an incentive to free-ride on future responsibility.

Given the multiplicity of equilibria, one may wonder whether all legislators who find themselves in equilibrium B would benefit from moving to equilibrium A. We compare the payoff associated to B with the (interim) utility of switching to A, and show that the two equilibria can be Pareto ranked.

PROPOSITION 2. (Welfare) Suppose that $\beta \in (\frac{1}{2}, 1)$ so that multiple equilibria exist. For all legislators $a_i \in [0, 1]$ the high spending equilibrium is Pareto dominated.

Not surprisingly, the legislator's welfare gain from moving to equilibrium A is decreasing in her bias. We show in the Appendix that if the legislature included politicians with very high bias (larger than 1), the welfare gain could be negative for those legislators.

Next, we derive the stationary distribution π_i, $i \in \{\underline{s}, \overline{s}\}$, such that $\Sigma_{i\in\{\underline{s},\overline{s}\}} \pi_i p_{ij} = \pi_j$ for all $j \in \{\underline{s}, \overline{s}\}$. The unconditional probability of observing high spending is

$$\pi_{\overline{s}} = \frac{p_{\underline{s}\overline{s}}}{p_{\overline{s}\underline{s}} + p_{\underline{s}\overline{s}}}. \tag{15}$$

Using equations (5) and (15) and the results of Proposition 1, in Figure III we show how $\pi_{\overline{s}}$ varies with β. In case of multiple equilibria, we pick the best-case scenario (the lowest probability corresponding to each β).[11] Thus,

$$\pi_{\overline{s}} = \begin{cases} \dfrac{\left(1-\dfrac{\sqrt{2\beta-1}}{\sqrt{2\beta}}\right)^2}{\left(1-\dfrac{\sqrt{2\beta-1}}{\sqrt{2\beta}}\right)^2+\dfrac{2\beta-1}{2\beta}} & \beta>\dfrac{1}{2} \\ 1 & \beta \le \dfrac{1}{2} \end{cases}. \tag{16}$$

Figure III shows that when β is smaller than $\frac{1}{2}$, an increase of β does not have an effect on spending. The discount factor starts reducing spending when β crosses the $\frac{1}{2}$ threshold. Moreover, the model exhibits a "diminishing returns" property: the marginal effect of higher β decreases in absolute value as β increases. The intuition for this property is discussed next.

11. Analyzing the worst-case scenario (i.e., the equilibrium where all legislators are irresponsible) would not be interesting since equilibrium B is not affected by changes of parameters and/or institutions.

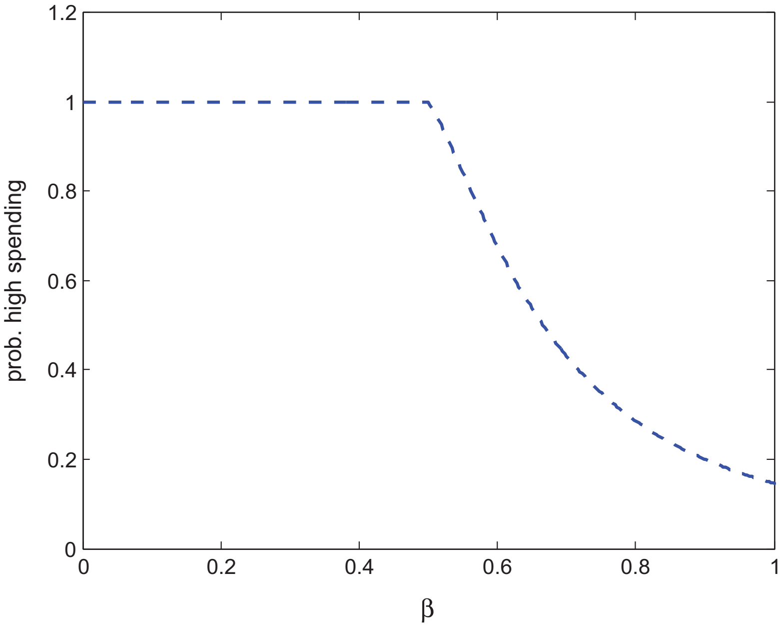

FIGURE III
Unconditional probability of $\bar{s}$

III.D. Complementarity and Substitutability

In this section, we analyze how the discount factor affects equilibrium spending. We rewrite the equilibrium condition (13) as

$$\hat{l} = \mathcal{T}(\hat{l}, \beta). \tag{17}$$

Suppose that $\beta \in [\frac{1}{2}, 1)$ and consider a variation of β in the neighborhood of the interior equilibrium. Knowing from equation (14) that $\hat{l}$ is a function of β, differentiating equation (17) we obtain

$$\frac{d\hat{l}}{d\beta} = \mathcal{T}_{\beta} \frac{1}{1 - \mathcal{T}_{l}}. \tag{18}$$

Since $\mathcal{T}_{\beta} > 0$ and $\mathcal{T}_{l} < 1$ (see Appendix A.4), an increase in the discount factor has a positive effect on the equilibrium cutoff. As shown in Figure III, the magnitude of this effect depends on β.

Proposition 3 states that for values of β between $\frac{1}{2}$ and $\frac{2}{3}$, complementarities are at work. In this case, one can show that $0 < \mathcal{T}_l < 1$ and the total effect is higher than the partial effect: $\frac{d\hat{l}}{d\beta} > \mathcal{T}_\beta$. The quantity $\frac{1}{1-\mathcal{T}_l}$ represents a (local) multiplier effect. For values of the discount factor higher than $\frac{2}{3}$, we have instead that $\mathcal{T}_l < 0$. In this case, the total effect is lower than the partial effect: $\frac{d\hat{l}}{d\beta} < \mathcal{T}_\beta$.

PROPOSITION 3. The interior cutoff is increasing in β. For all $\beta \in [\frac{1}{2}, \frac{2}{3})$ the game exhibits strategic complementarities and a multiplier effect. For all $\beta \in (\frac{2}{3}, 1)$ the game exhibits strategic substitutabilities.

Suppose first that $\beta \in [\frac{1}{2}, \frac{2}{3})$ and consider a small increase in the discount factor (see Figure IV). When taking legislators' future actions as given, the cutoff moves from C to C'. However, the equilibrium response exceeds the partial response, as C'' is greater than C'. To understand this, note that at the interior cutoff C, the large majority of legislators are in favor of high spending, making disagreement in the legislature relatively unlikely. Increasing β induces more fiscal responsibility and makes the legislature more equally divided, leading to more status quo bias and, consequently, to stronger incentives to keep spending low. Current and future fiscal responsibility are complements; there is a "responsibility multiplier."

Suppose instead that $\beta > \frac{2}{3}$. When the discount factor increases, the partial response taking the action of others as given (from D to D') exceeds the equilibrium response (see Figure V). When $\beta \in [\frac{2}{3}, 1)$ the majority of legislators favor low spending. When β increases, even more politicians become fiscal responsible and disagreement among legislators is reduced. This leads to lower policy persistence, which weakens the incentive to keep spending low. At high levels of β, current and future fiscal responsibility are then strategic substitutes.

IV. BREAKING THE DYNAMIC LINKAGE

In this section, we analyze two modifications of the bargaining protocol that weaken the dynamic linkage across periods.

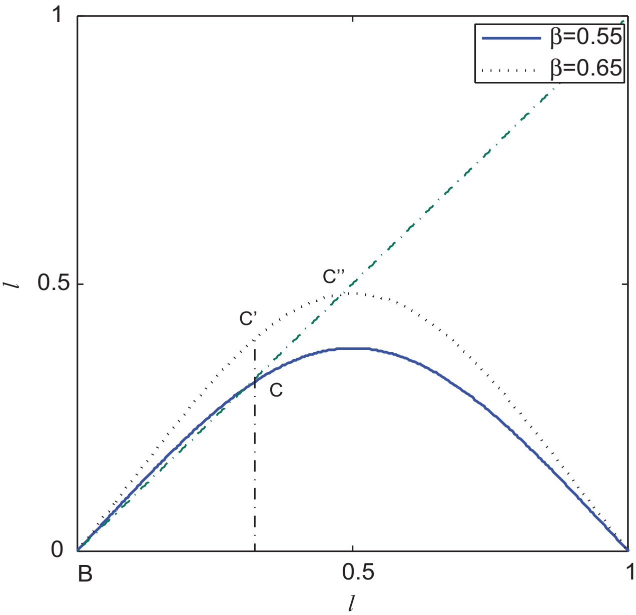

FIGURE IV
Strategic Complementarity

These modifications will reduce the legislators' incentives to choose low spending.

IV.A. *Exogenous versus Endogenous Status Quo*

A key element of the bargaining protocol discussed in Section III.B is the endogeneity of the default option. As discussed in Bowen, Chen, and Eraslan (2014), this assumption is appropriate for many spending categories. For instance, mandatory spending, which includes Social Security programs, is defined by provisions enacted by law and spending continues in the future unless a new law is approved.

To appreciate the role of the "endogenous status quo" assumption, suppose that when a proposal is rejected, with probability $\theta \in [0, 1]$ the outside option is endogenous, $q_t = s_{t-1}$, and with probability $1-\theta$ the default option is exogenously given, $q_t = s_d$. We denote the fixed default option by $s_d \in \{\underline{s}, \overline{s}\}$. The setting analyzed in Section III is a special case of the one analyzed here when $\theta = 1$.

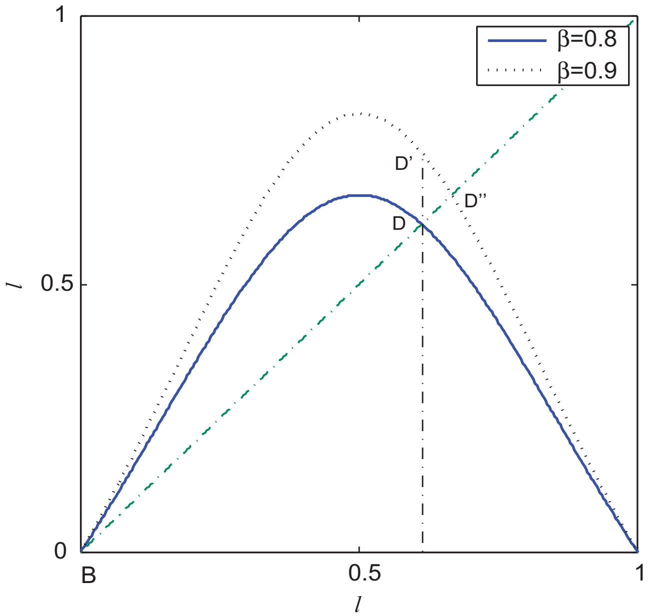

FIGURE V
Strategic Substitutability

Following the same steps as in Section III.C (see Appendix A.5) we obtain that the equilibrium cutoff(s) are given by the root(s) of the following equation:

$$\hat{l} = \theta\beta \frac{2\hat{l}(1-\hat{l})}{1-\theta\beta 2(1-\hat{l})\hat{l}}. \tag{19}$$

Condition (19) is identical to condition (13) after interpreting $\beta\theta$ as "modified" discount factor. In other words, a fixed status quo is equivalent to a reduction of the discount factor. The following proposition follows from equation (19).

PROPOSITION 4. Spending is higher with a fixed status quo than with an endogenous status quo. For any exogenous default option s_d, when $\theta < \frac{1}{2}$ high spending is always chosen for all $\beta \in (0, 1)$.

A fixed default option breaks the dynamic linkage across periods. As a result, legislators cannot influence future policy outcomes, so there are weaker gains of choosing low spending. Interestingly, the result of Proposition 4 holds regardless of which spending level is selected as fixed default option. This implies that choosing low spending as the fixed default option would not increase the probability that low spending is selected.

IV.B. Policy Dictator

So far we have assumed that the agenda setter's proposal needs to be approved by the legislature. In practice, however, the legislature sometimes "rubber-stamps" the bills proposed by the executive. Let us suppose that with probability $1-\zeta$ the proposal is automatically implemented; $\zeta = 1$ is the case in Section III.B, while $\zeta = 0$ means that the agenda setter's proposal is automatically accepted.

Note that a low ζ may capture the fact that the agenda setter and the decisive voter in the legislature belong to the same party. One could argue that to some extent in parliamentary democracies (where the executive is an expression of the majority) ζ is lower than in presidential democracies (where divided governments often occur).

PROPOSITION 5. Automatic acceptance of proposals increases spending. When $\zeta < \frac{1}{2}$, high spending is chosen at all times for all $\beta \in (0, 1)$.

When ζ is low, agenda setters are not much constrained, so that legislative gridlock rarely occurs. Low ζ is equivalent to breaking the dynamic link between current and future decisions. The next corollary follows directly from Proposition 5.

COROLLARY 1. When the agenda setter is a policy dictator ($\zeta = 0$) high spending is always chosen for all $\beta \in (0, 1)$.

A legislator who is fully in control of policy decisions would face severe self-control problems and choose high spending in all periods. When instead decisions are negotiated in a legislature, there exists an equilibrium where low spending is chosen with strictly positive probability. Recalling the welfare result of Proposition 2, this suggests that policy makers might prefer to delegate policy making to a legislature.

V. Distributional Changes

In this section, we consider a more general distribution of the spending bias in the legislature and allow for different recognition probabilities. These distributional changes could reflect a change of preferences or be the result of institutional reforms that modify the way legislators and agenda setters are elected.

V.A. *Changing the Median*

This section relaxes Assumption 1 but maintains Assumption 2. To keep the analysis tractable, we choose the following specification:

Assumption 3. Let $\varepsilon \in (-1, 1)$. Suppose the spending-bias in the legislature is distributed according to the following c.d.f.:

$$F(a_i) = \begin{cases} 0 & \text{for } a_i < 0 \\ \dfrac{(1-\varepsilon)a_i}{1-\varepsilon a_i} & \text{for } 0 \le a_i < 1 \\ 1 & \text{for } a_i \ge 1 \end{cases}. \tag{20}$$

Notice from equation (20) that $F(0) = 0$, $F(1) = 1$ for all $\varepsilon \in (-1, 1)$, and $F'(x) > 0$ for all x. Moreover, F is strictly convex when $0 < \varepsilon < 1$ and strictly concave when $\varepsilon < 0$. When $\varepsilon = 0$ we obtain the uniform cumulative distribution analyzed in Section III. The median a_m of distribution (20) is

$$a_m = F^{-1}\left(\frac{1}{2}\right) = \frac{1}{2-\varepsilon}. \tag{21}$$

Increasing ε raises the median spending bias and amounts to a shift of the distribution in the sense of first-order stochastic dominance.

We show that when we increase ε equilibrium spending is affected in two ways. First, there is a direct effect: keeping legislators' strategies fixed, since more legislators have a higher spending bias when ε increases, spending tends to increase. Second, the parameter ε affects legislators' incentives and thus changes the equilibrium cutoff.

Under Assumptions 2 and 3, the voting and proposal cutoffs still coincide, $\hat{l} = \hat{e}$. Moreover, the probability of legislative gridlock is $2F(\hat{l})[1 - F(\hat{l})]$, which is lower than $\frac{1}{2}$ for all $\hat{l}$.

When the discount factor is sufficiently high there exists an interior MPE with cutoff:

$$\hat{e} = \hat{l} = \frac{\varepsilon + \sqrt{\frac{2\beta-1-\varepsilon}{2\beta}}}{1+\varepsilon\sqrt{\frac{2\beta-1-\varepsilon}{2\beta}}}. \tag{22}$$

Given $\hat{l}$, we let v denote the share of fiscally responsible legislators: $v \equiv F(\hat{l})$. Using equations (20) and (22), we obtain

$$v = \frac{1}{(1+\varepsilon)}\left(\varepsilon + \sqrt{\frac{2\beta - 1 - \varepsilon}{2\beta}}\right). \tag{23}$$

It can be shown that $\hat{l}$ is decreasing in ε when β is relatively low and increasing in ε when β is relatively high. The intuition for this result is similar to the intuition in Section III.D. When β is small, there are strategic complementarities. Since the majority of legislators are in favor of high spending, an exogenous increase of fiscal irresponsibility (higher ε) decreases the equilibrium level of disagreement and gives weaker incentives to be fiscally responsible. As a result, $\hat{l}$ decreases with ε, implying that some of the legislators who were fiscally responsible with lower ε now favor high spending. In this case, the equilibrium effect reinforces the direct effect and expected spending necessarily increases.

Instead, when β is large, strategic substitutabilities are in play. Since the majority of legislators are in favor of low spending, raising ε increases the disagreement and thus provides more incentive for some legislators to behave responsibly. For high values of the discount factor, $\hat{l}$ increases with ε and, consequently, the equilibrium effect attenuates the direct effect. Proposition 6 summarizes how equations (22) and (23) are affected by ε:[12]

PROPOSITION 6. Suppose that Assumptions 2 and 3 hold. Consider the MPE characterized by equations (22) and (23). The equilibrium cutoff $\hat{l}$ is decreasing in ε when β is low and increasing in ε when β is high. Finally, the measure of fiscally responsible legislators v is decreasing in ε.

12. Proposition 6 focuses attention on the "best" equilibrium. In Appendix VII we show that under Assumption 3, we may have two interior equilibria.

Proposition 6 shows that the equilibrium effect cannot completely offset the direct effect: $\frac{\partial v}{\partial \varepsilon} < 0$, implying that spending is increasing in ε.

V.B. Different Distributions for Agenda Setters and Legislators

In this section we relax Assumption 2, allowing for the possibility that the identity of the agenda setter is drawn from a different distribution than the legislators' distribution. This is realistic in many instances. In practice, agenda setters (e.g., executives and committee chairs) are selected according to procedures that differ from those to elect the legislature.

When Assumption 2 is relaxed, increasing the median spending bias in the legislature might have a strong disciplinary effect. In contrast to Section V.A, expected spending may go down as a result. For tractability, we assume what follows:

ASSUMPTION 4. The identity of the agenda setter is uniformly distributed over [0,1]. The spending bias in the legislature is distributed according to equation (20).

Suppose that ε is initially 0 and consider an increase in ε. Under Assumption 4, the change implies that the spending bias of the median legislator increases, but recognition probabilities are unaffected. As a result, the distance in preference terms between the median legislator and the expected agenda setter increases. Therefore, a higher ε raises the extent of disagreement in the political system and makes legislative gridlock more likely. In contrast to the previous sections, the probability of political gridlock is not bounded above by $\frac{1}{2}$.

As in Section V.A, raising ε has a direct effect on spending. Keeping legislators' strategies fixed, when ε increases, more voting legislators favor high spending. Therefore, spending cuts are more likely to be rejected and spending increases are more likely to be accepted. The direct effect unambiguously increases the probability of observing high spending. There is also an effect on equilibrium strategies. Since status quo bias is more likely, some of the agenda setters who were fiscally irresponsible when $\varepsilon = 0$ now favor low spending. This disciplinary effect arises when β is sufficiently high and strategic substitutability is at work.

We compute the stationary probability of observing high spending and analyze how it varies with ε. The total effect on $\pi_{\overline{s}}$ is given by the sum of the direct and equilibrium channels.

When β is small both channels predict that a higher ε increases spending. As shown in Figure VI, in economies where β is small, it is not desirable to add legislators with a strong spending bias since this aggravates self-control problems and considerably increases spending. However, when β is high, the two channels have opposite effects on spending. Remarkably, in economies with high β, a significant increase of ε has little effect on $\pi_{\bar{s}}$. When β is close to 1, it may actually reduce spending. We obtain this result because there is a sizeable disciplinary effect, which overcomes the direct effect.

In this section, we have shown that institutions which give considerable veto power to legislators with a strong temptation to spend may lead to more discipline in the remaining legislators. This result goes against the common wisdom from models without bargaining (e.g., Rogoff 1985) that giving more power to individuals with less severe self-control problems is always preferable.[13]

V.C. Homogeneous Legislature

Suppose that legislators have a common spending bias a. As before, there exists an equilibrium in which all legislators choose high spending. However, under some conditions it is possible to construct an equilibrium where identical legislators follow different strategies: some favor high spending, whereas others favor low spending. This separation generates the necessary disagreement that sustains the equilibrium. The measure of legislators that favor low spending, denoted by v, solves:

$$a = \frac{\beta 2v(1-v)}{1-\beta 2v(1-v)}. \tag{24}$$

In the posited equilibrium, all legislators are indifferent between high and low spending.

To solve for v, we analyze two cases. First, suppose that the common bias is sufficiently small: $a < \frac{\beta}{2-\beta}$. In this case, equation (24) has two solutions

$$v = \frac{1}{2} \pm \frac{\sqrt{(\beta(1+a)-2a)}}{2\sqrt{\beta(1+a)}}. \tag{25}$$

13. If it were possible to delegate full decision-making power to legislators without self-control problems, this would be optimal. This option, however, is not always viable.

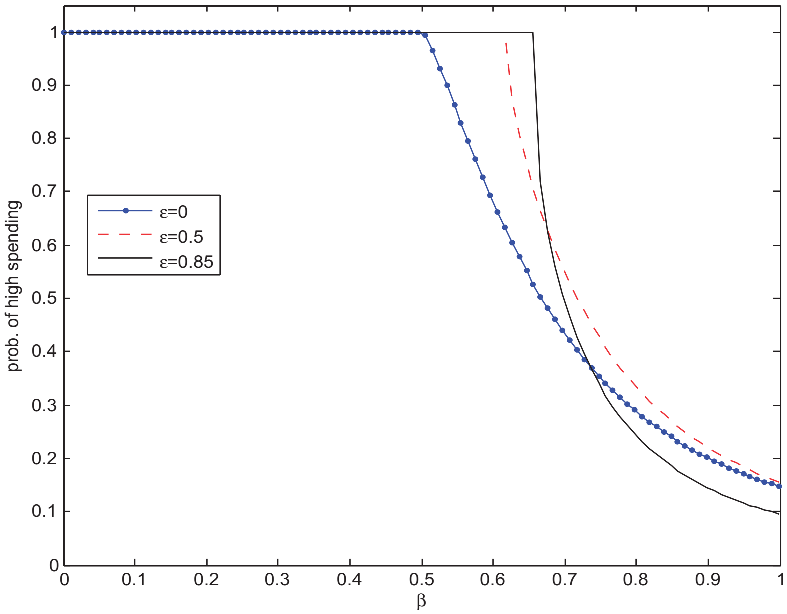

FIGURE VI

Unconditional probability of $\bar{s}$

Second, suppose $a > \frac{\beta}{2-\beta}$. In this case, equation (24) has no solution and the only equilibrium is the one with high spending. For instance, when the common bias is $\frac{1}{2}$ a discount factor of at least $\frac{2}{3}$ is needed to observe low spending with positive probability.[14]

This section illustrates that disagreement (and not preference heterogeneity per se) is necessary to sustain an equilibrium with low spending. Disagreement is self-fulfilling and can be obtained, at least theoretically, in a model with homogeneous legislators. In practice, however, the described equilibrium construction could be difficult to achieve for at least two reasons. First, it requires identical legislators to coordinate on different strategies. Second, in such an equilibrium all legislators are indifferent between high spending and low spending. Instead,

14. Note that with a heterogenous legislature, as in Section III.C, with a mean spending bias equal to $\frac{1}{2}$, low spending is sometimes implemented for $\beta < \frac{2}{3}$.

in the MPE of Proposition 1, legislators have a strict incentive to follow the equilibrium.

VI. Simple Majority

In this section, we show that the thrust of our results would not change in a model with a simple majority voting rule. Under majority rule, the legislator with the median bias is decisive in the sense that a policy change passes if and only if the median accepts it. In each legislative session, there are therefore two pivotal legislators: the random agenda setter and the median. In Proposition 7, we show that disagreement between these two players might create political gridlock which sustains an equilibrium with low spending. This is the same intuition driving the results in the benchmark model, with the only difference being that under probabilistic acceptance the decisive legislator is also random.

Proposition 7. Suppose that policy changes pass by simple-majority rule. Assumptions 1 and 2 hold: the median a_m is located at $\frac{1}{2}$.

(i) If $\beta \geq \frac{2}{3}$ there exists a MPE in which the median always rejects spending increases and accepts spending cuts. In this equilibrium, regardless of the initial status quo the economy reaches an absorbing state of low spending.

(ii) If $\beta < \frac{2}{3}$ in all MPE the median always accepts spending increases and rejects spending cuts. Regardless of the initial status quo the economy reaches an absorbing state of high spending.

Proposition 7 states that under simple majority rule spending eventually settles at the spending level favored by the median. In a sense, the median-voter theorem holds in the long run. The steady-state spending level depends on the discount factor. When $\beta < \frac{2}{3}$ most legislators (including the median) support high spending and the economy eventually settles into a high spending equilibrium. In this case, neither the median nor most agenda setters are sufficiently forward-looking to internalize the long-run cost of persistent high spending. When $\beta \geq \frac{2}{3}$, there exists an equilibrium in which the median is fiscally responsible. As soon as low spending is proposed, it is accepted by the median and becomes an absorbing state. The median is responsible because she realizes that favoring high spending could make it persist in case an agenda setter with severe spending bias is selected in the next period.

VII. Persistent Agenda Setting Power

We now assume that agenda-setting power is persistent over time. Suppose that with probability ρ the agenda setter at t is also recognized at $t+1$. With probability $1-\rho$ a new agenda setter is selected. The case analyzed before corresponds to $\rho=0$; $\rho=1$ is equivalent to a fixed agenda setter. A positive ρ captures the observed incumbency advantage of executive and legislative agenda setters. In practice, ρ depends on various constitutional provisions (e.g., term length and limits) and other factors (such as fund-raising advantages and franking privilege) affecting the strength of the incumbency advantage.[15]

When $\rho>0$ the analysis is considerably more complex because the agenda setter's type is an additional state variable: strategies potentially depend on the identity of the agenda setter. For instance, a legislator may vote for a spending increase proposed by an agenda setter with a low spending bias, but not when the same increase is proposed by an agenda setter with a high bias. Throughout this section, we keep the assumption that legislators' bias and recognition probabilities are uniformly distributed over the unit interval. Let $V(s, a)$ denote the continuation value function when the status quo is s and next period's agenda setter is of type a. Agenda setter a_i favors $\overline{s}$ over $\underline{s}$ if and only if

$$a_i\,\overline{s}+\beta[\rho V(\overline{s},a_i)+(1-\rho)E_jV(\overline{s},a_j)]\geq a_i\underline{s}$$
$$+\beta[\rho V(\underline{s},a_i)+(1-\rho)E_jV(\underline{s},a_j)]. \tag{26}$$

Expression (26) makes clear that ρ affects equilibrium behavior by changing expectations about the next agenda setter's bias. When $\rho=0$, next period's proposer will have an expected bias

15. Clearly, ρ also depends on voters' electoral decisions, which are not modeled here. In future research, it would be desirable (but difficult) to model the electoral stage. Turnover is treated as endogenous in political agency models (see Barro 1973; Ferejohn 1986; and more recently, Acemoglu, Golosov, and Tsyvinski 2008; Yared 2010; Ales, Maziero, and Yared 2014).

equal to the average bias in the legislature. Conversely, when there is persistence, the next agenda setter is expected to have a spending bias that is close to the one of the current proposer. Due to strategic interdependence, different expectations alter current incentives.

In Appendix A.9 we show that there exists a cutoff, $\hat{e}$, that separates fiscally responsible and fiscally irresponsible agenda setters. Moreover, there are two cutoffs $\hat{l}_L$ and $\hat{l}_H$ which denote the measure of fiscally responsible voting legislators when the current agenda setter is below and above $\hat{e}$, respectively.

Cutoffs $\hat{e}$, $\hat{l}_H$, and $\hat{l}_L$ satisfy the following three conditions. First, given $\hat{l}_H$ and $\hat{l}_L$, for all agenda setters $a \leq \hat{e}$ it must be true that

$$(27) \quad f_L(a;\hat{l}_L) \equiv \frac{a}{\beta\rho} + (1-\hat{l}_L)\frac{[-1+\beta(1-\rho)\mathcal{A}]}{1-\beta\rho(1-\hat{l}_L)} + \frac{(1-\rho)}{\rho}\mathcal{A} \leq 0,$$

where $\mathcal{A} \equiv \frac{E_j V(\underline{s},a_j) - E_j V(\overline{s},a_j)}{\underline{s}-\overline{s}}$. For all agenda setters $a \geq \hat{e}$ it must be that

$$(28) \qquad f_H(a;\hat{l}_H) \equiv \frac{a}{\beta\rho} + \hat{l}_H\frac{[-1+\beta(1-\rho)\mathcal{A}]}{1-\beta\rho\hat{l}_H} + \frac{(1-\rho)}{\rho}\mathcal{A} \geq 0.$$

Second, given $\hat{e}$ and $\hat{l}_H$, the probability that a spending cut is accepted when the current agenda setter is below $\hat{e}$ is equal to $\hat{l}_L$ and solves $f_L(\hat{l}_L;\hat{l}_L) = 0$. Finally, given $\hat{e}$ and $\hat{l}_L$, the probability that a spending increase is accepted when the current agenda setter is above $\hat{e}$ is equal to $1-\hat{l}_H$, where $\hat{l}_H$ solves $f_H(\hat{l}_H;\hat{l}_H) = 0$.

As we show in detail in Appendix A.9, there are multiple configurations of cutoffs that satisfy the foregoing conditions, and most of them cannot be found in closed form. For this reason, this section focuses on the case of a fixed agenda setter.[16] When $\rho = 1$ the analysis is particularly tractable because the term $\mathcal{A}$ drops from equations (27) and (28), which allows for explicit solutions. Proposition 8 states that spending in the long run depends on whether the fixed agenda setter is below or above a given cutoff.

16. In related work, Diermeier and Fong (2011) also focus on this specific case.

PROPOSITION 8. Let $\rho = 1$. Assumptions 1 holds and recognition probabilities are uniformly distributed. Let a_s denote the type of the fixed agenda setter.

(i) If $a_s > \alpha$, where

$$\alpha \equiv \frac{1}{2\beta}\left(\sqrt{4\beta^2+1}-1\right), \tag{29}$$

in all MPE we have that a_s proposes $\overline{s}$ in all periods. Regardless of the initial status quo, the economy reaches an absorbing state of high spending.

(ii) If $a_s \leq \alpha$, there exists a MPE in which a_s proposes $\underline{s}$ in all periods. In this equilibrium, regardless of the initial status quo, the economy reaches an absorbing state of low spending.

When $\rho = 1$, we compute the unconditional probability of high spending, $\pi_{\overline{s}}$, as follows. In case of multiple equilibria, as before we pick the lowest equilibrium probability corresponding to each β. It is immediate that when there is full persistence, $\pi_{\overline{s}}$ is simply the probability that the fixed executive has a bias above the cutoff α. Since the fixed agenda setter is drawn from a uniform distribution over the unit interval, $\pi_{\overline{s}}$ is equal to $1-\alpha$.

Figure VII illustrates that spending is lower when $\rho = 0$ and β is sufficiently large, while if β is sufficiently small full persistence is preferable. To understand this result, suppose that $\beta < \frac{1}{2}$ and consider an agenda setter with a small preference parameter (below cutoff α). With fully persistent agenda-setting power we know from Proposition 8 that there exists a MPE in which the fixed agenda setter makes fiscally responsible decisions. Conversely, given that $\beta < \frac{1}{2}$, Proposition 1 establishes that in all MPE the same agenda setter would choose high spending when she expects to be replaced.

The intuition behind this result is that when recognition probabilities are i.i.d., the current agenda setter expects to be followed by an agenda setter who is randomly drawn from the legislators' distribution. If β is low, this implies that future agenda setters are expected to have a strong incentive to propose high spending. The current agenda setter foresees future agreement in favor of high spending and, recalling that strategic complementarities operate when β is low, she is discouraged from

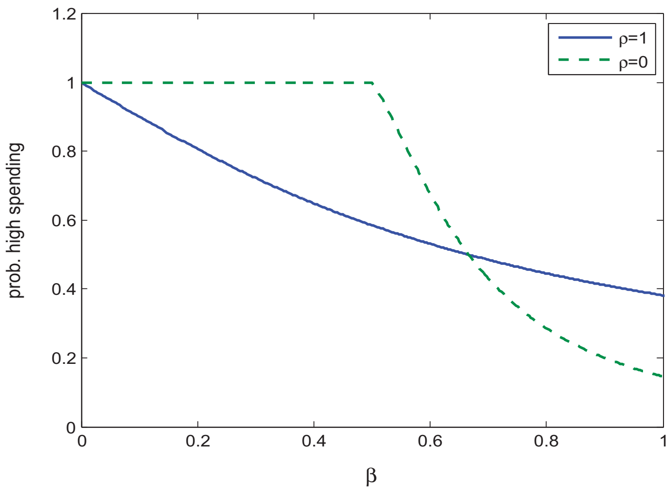

FIGURE VII

Persistent Agenda Setting and Spending

being responsible. This occurs even if the current proposer has an infinitesimally small spending bias. When instead $\rho = 1$, an agenda setter with a small spending bias expects to be "replaced" by an agenda setter with an equally low bias. This expectation, coupled with the threat of an irresponsible legislature, raises the extent of future disagreement and thus gives a stronger incentive to keep spending low. Since α is strictly positive for any β, this explains why no agenda-setting turnover is ex ante more desirable than maximum turnover for sufficiently small β.

When β is larger than $\frac{1}{2}$, spending without persistence drops rapidly due to the responsibility multiplier discussed in the previous sections. With a fixed agenda setter such strategic complementarities do not arise and the probability of high spending decreases more slowly. After the discount factor crosses the $\frac{2}{3}$ threshold, we have that spending with $\rho = 0$ falls below that obtained when $\rho = 1$.

As mentioned before, the intermediate case $\rho \in (0, 1)$ is considerably more difficult to analyze. In the Online Appendix, we characterize an equilibrium that converges to the one analyzed in Section III.C when $\rho \to 0$ and to the equilibrium characterized in Proposition 8 when $\rho \to 1$. We show that results are quantitatively similar: the equilibrium unconditional probability of high spending lies between the dashed and continuous line in Figure VII.

VIII. Conclusions

Politicians often have the incentive to shift spending toward the current period rather than taking a comprehensive intertemporal view. To capture this, we consider a legislature where politicians have self-control problems: they are tempted to increase spending and procrastinate spending cuts. We find that when policies are decided through legislative bargaining, disagreement among legislators induces policy persistence that reduces the temptation to raise current spending.

A general lesson of this article is that institutions matter, but that their effects are heterogeneous and depend crucially on the strategic interactions in the system. We find that economies where politicians have a low discount factor may be trapped in an equilibrium with high spending. To improve outcomes, it would be desirable to introduce institutional changes that exogenously induce some degree of fiscal responsibility. Due to strategic complementarity, such changes can trigger even more responsibility in other legislators and generate a virtuous circle, leading to lower inefficient spending. Conversely, when the politicians' discount factor is sufficiently high, strategic substitutability is at work: institutional changes that induce some legislators to be fiscally responsible would trigger irresponsibility in others. In such economies, we find that institutions that give considerable power to legislators with a strong temptation to spend lead to more discipline in the remaining legislators and may reduce inefficient spending.

Appendix

A.1. A Rationalization of the Preferences

Consider an economy populated by a continuum of consumers and politicians, both of measure 1. Consumers do not make any decision: their income is exogenous and equal to 1 at all t. Consumption at time t is equal to disposable income, $1-s_t$. We let $U_{c,t}$ denote the consumers' intertemporal utility at t:

$$U_{c,t} = \sum_{j=0}^{\infty} F_c(j)(1 - s_{t+j}), \tag{30}$$

where $0 \leq F_c(j) \leq 1$ is the consumers' discount function, with $F_c(0) = 1$ and F_c decreasing in j. Note from equation (30) that for consumers public spending is wasteful.

Instead, we assume that politicians derive positive utility from spending. This may occur because they capture part of the spending revenue or because they are able to use it for pet projects. Although to different degrees, politicians also care about consumers' well-being. The idiosyncratic parameter $\alpha_i \in [1, \overline{\alpha}]$ measures politicians' selfishness. We assume that politicians' intertemporal preferences at time t can be represented by the following utility function:

$$U'_{i,t} = U_{c,t} + \alpha_i \sum_{j=0}^{\infty} F_l(j) s_{t+j}, \tag{31}$$

where $0 \leq F_l(j) \leq 1$ is the discount function used to evaluate future spending. The second term of equation (31) is the utility that politicians derive from current and future spending. Politicians face a simple trade-off: increasing spending raises the second term of equation (31), but reduces consumers welfare.

We assume that

$$\overline{\alpha} F_l(j) < F_c(j) \tag{32}$$

for $j > 1$. That is, legislators are sufficiently more impatient than consumers. A possible reason for this is that politicians internalize the possibility of exiting the legislature.

After substituting equation (30) into equation (31) it is immediate to see that politicians' utility is linear in spending. Therefore, to find the spending sequence that maximizes equation (31), we need to determine the sign of the coefficients multiplying s_{t+j}, for all $j \geq 0$. Since α_i is assumed to be higher than 1, the coefficient attached to s_t is positive. Inequality (32) implies that the coefficient attached to future spending is negative. As a result, politicians would find it optimal to choose high spending in the current period, but low spending from tomorrow onward. We obtain this result because consumers' welfare matters relatively more when choosing future spending, while the second term of equation (31) matters relatively more when choosing current spending.

After recomputing the utility at time $t+1$, note that if legislators had the possibility to reoptimize, they would choose high spending also at $t+1$.

We now show that for specific values of $F_l(j)$ and $F_c(j)$ we obtain the preferences equation (1). Choose $F_l(j) = \delta\beta^j$ and $F_c(j) = \beta^j$. When $0 \leq \delta < \frac{1}{2}$ and $\overline{\alpha} = 2$, inequality (32) holds. If we divide equation (31) by the positive term $(1-\alpha_i\delta)$, equation (31) can be rewritten as equation (1), where

$$a_i \equiv \frac{(\alpha_i - 1)}{(1-\alpha_i\delta)} \geq 0. \tag{33}$$

After evaluating equation (31) at $t+1$ and performing similar transformations, we obtain equation (2). Similarly to Jackson and Yariv (2012), with heterogeneity in discounting utilitarian aggregation generically results in time-inconsistent preferences. This result occurs even if we assume that $F_l(j)$ and $F_c(j)$ are given by standard exponential discount functions.

A.2. *Proof of Proposition 1*

Proposition 1 follows from equations (6)–(13). To further help intuition, we provide a different proof. We use the index L (resp. H) to denote that the recognized agenda setter is below (resp. above) the cutoff $\hat{e}$. Further, we let $V^j(s)$ denote the continuation value function when tomorrow's state is $j = L, H$ and the next period's status quo is s. In computing $\mathrm{E}V(s)$ we assume that legislators are expected to use the cutoff voting strategies $\hat{l}$ and $\hat{e}$. Then,

$$\mathrm{E}V(\overline{s}) = \hat{e}\,V^L(\overline{s}) + (1-\hat{e})V^H(\overline{s}), \tag{34}$$

$$\mathrm{E}V(\underline{s}) = \hat{e}\,V^L(\underline{s}) + (1-\hat{e})V^H(\underline{s}), \tag{35}$$

where

$$\begin{aligned} V^L(\overline{s}) = {} & \hat{l}\left\{-\underline{s} + \beta\left[\hat{e}\,V^L(\underline{s}) + (1-\hat{e})V^H(\underline{s})\right]\right\} \\ & + \left(1-\hat{l}\right)\left\{-\overline{s} + \beta\left[\hat{e}\,V^L(\overline{s}) + (1-\hat{e})V^H(\overline{s})\right]\right\}, \end{aligned} \tag{36}$$

$$V^H(\overline{s}) = -\overline{s} + \beta\left[\hat{e}V^L(\overline{s}) + (1-\hat{e})V^H(\overline{s})\right], \tag{37}$$

$$V^L(\underline{s}) = -\underline{s} + \beta\left[\hat{e}V^L(\underline{s}) + (1-\hat{e})V^H(\underline{s})\right], \tag{38}$$

$$\begin{aligned} V^H(\underline{s}) = {} & \hat{l}\left\{-\underline{s} + \beta\left[\hat{e}\,V^L(\underline{s}) + (1-\hat{e})V^H(\underline{s})\right]\right\} \\ & + \left(1-\hat{l}\right)\left\{-\overline{s} + \beta\left[\hat{e}\,V^L(\overline{s}) + (1-\hat{e})V^H(\overline{s})\right]\right\}. \end{aligned} \tag{39}$$

Plugging $\hat{e} = \hat{l}$ into expressions (34) to (39), one obtains

$$EV(\overline{s}) = -\frac{\overline{s}}{1-\beta} + \frac{\hat{l}^2(\overline{s}-\underline{s})}{(1-\beta)\left[1-\beta 2\left(1-\hat{l}\right)\hat{l}\right]} \tag{40}$$

$$EV\left(\underline{s}\right) = -\frac{\underline{s}}{1-\beta} - \frac{\left(\hat{l}-1\right)^2(\overline{s}-\underline{s})}{(1-\beta)\left[1-\beta 2\left(1-\hat{l}\right)\hat{l}\right]}. \tag{41}$$

Using the expressions above, it is easy to show that

$$\hat{l}\left(\overline{s}-\underline{s}\right) = \beta\left[\mathrm{E}V\left(\underline{s}\right) - \mathrm{E}V(\overline{s})\right] = \beta\frac{2\left(1-\hat{l}\right)\hat{l}}{1-\beta 2\left(1-\hat{l}\right)\hat{l}}\left(\overline{s}-\underline{s}\right). \tag{42}$$

It is immediate that the roots of equation (42) are given by $\hat{l} = 0$ and, provided that $\beta \geq \frac{1}{2}$, by expression (14), as stated by Proposition 1. ■

A.3. *Proof of Proposition 2*

Switching from the high-spending equilibrium to equilibrium A is profitable if and only if

$$(1-p_{\overline{s}\underline{s}})[a_i\overline{s} + \beta EV(\overline{s})] + p_{\overline{s}\underline{s}}[a_i\underline{s} + \beta EV(\underline{s})] \geq a_i\overline{s} - \frac{\beta}{1-\beta}\overline{s}, \tag{43}$$

where the left-hand side is the interim utility of moving from equilibrium *B* to equilibrium *A*. Knowing that in the interior equilibrium one must have

$$\beta\left[EV(\underline{s}) - EV(\overline{s})\right] = \frac{\sqrt{2\beta-1}}{\sqrt{2\beta}}(\overline{s}-\underline{s}), \tag{44}$$

we write equation (43) as

$$p_{\overline{s}\underline{s}}\left\{-(\overline{s}-\underline{s})a_i + \frac{\sqrt{2\beta-1}}{\sqrt{2\beta}}(\overline{s}-\underline{s})\right\} + \beta EV(\overline{s}) \geq -\frac{\beta}{1-\beta}\overline{s}. \tag{45}$$

Using equations (40), (5), (13) and the equilibrium values from Proposition 1, equation (45) can be written as

$$\text{(46)}\quad \frac{2\beta-1}{2\beta}(\overline{s}-\underline{s})\left[\frac{\sqrt{2\beta-1}}{\sqrt{2\beta}}-a_i+\frac{1}{(1-\beta)2\left(1-\frac{\sqrt{2\beta-1}}{\sqrt{2\beta}}\right)}\right]\geq 0.$$

It can be shown that the term in square brackets is positive for all $a_i \in [0,1]$ and $\beta > \frac{1}{2}$, proving Proposition 2. ■

A.4. *Proof of Proposition 3*

The first statement of Proposition 3 follows directly from equation (14). Write equation (13) as $\mathcal{T}(\hat{l},\beta)$. First, it is easy to see that $\mathcal{T}_\beta(\hat{l},\beta) > 0$. Moreover,

$$\text{(47)}\quad \mathcal{T}_l(\hat{l},\beta)=\frac{\beta 2(1-2\hat{l})}{\left[1-\beta 2(1-\hat{l})\hat{l}\right]^2}.$$

We compute the value of $\mathcal{T}_l(\hat{l},\beta)$ at an interior cutoff:

$$\text{(48)}\quad \mathcal{T}_l\left(\frac{\sqrt{2\beta-1}}{\sqrt{2\beta}},\beta\right)=\frac{1}{2\beta}\left[1-\frac{2\beta-1}{4\beta-1-2\sqrt{2\beta(2\beta-1)}}\right].$$

One can show that for all $\beta > \frac{1}{2}$, expression (48) is less than 1, it is decreasing in β and equal to 0 when $\beta = \frac{2}{3}$. The multiplier $\frac{1}{1-\mathcal{T}_l}$ is thus less than 1 when $\beta > \frac{2}{3}$ and larger than 1 when $\beta \in (\frac{1}{2},\frac{2}{3})$, thus proving Proposition 3. ■

A.5. *Proof of Proposition 4*

We denote by $\mathrm{E}V(q; s_d)$ the continuation value function when the current status quo is q and the fixed default is s_d. Legislator a_i votes for a policy change from q to s if and only if:

$$\text{(49)}\quad \begin{aligned} a_i s+\beta \mathrm{E}V(s;s_d) \geq\ & (1-\theta)\left[a_i s_d+\beta \mathrm{E}V(s_d;s_d)\right] \\ & +\theta\left[a_i q+\beta \mathrm{E}V(q;s_d)\right]. \end{aligned}$$

The right-hand side of equation (49) is the expected payoff in case of rejection. Similarly, agenda setter a_i prefers proposing s rather than keeping the status quo when

$$[1-\mathbf{Pr}(s\,\text{passes})]\,\{\theta[a_i q+\beta\mathrm{E}V(q;s_d)]+(1-\theta)[a_i s_d+\beta\mathrm{E}V(s_d;s_d)\}$$
$$+\mathbf{Pr}(s\,\text{passes})\,[a_i s+\beta\mathrm{E}V(s;s_d)]\geq a_i q\;+\beta\mathrm{E}V(q;s_d). \tag{50}$$

It is simple to show that equations (49) and (50) coincide with

$$a_i\,(\overline{s}-\underline{s})\geq\beta[\mathrm{E}V(\underline{s};s_d)-\ \mathrm{E}V(\overline{s};s_d)]. \tag{51}$$

To solve for the equilibrium, compute the right-hand side of (51). Without loss of generality, assume that $s_d=\underline{s}$. For ease of exposition, we remove s_d from the notation. Following the terminology introduced in the proof of Proposition 1, we rewrite the continuation value functions as follows:

$$\begin{aligned}V^L(\overline{s})=(1-\theta)\big\{-\underline{s}+\beta\big[\hat{e}\,V^L(\underline{s})+(1-\hat{e})V^H(\underline{s})\big]\big\}\\ +\theta\hat{l}\Big\{-\underline{s}+\beta\Big[\hat{e}\,\hat{V}^L(\underline{s})+(1-\hat{e})V^H(\underline{s})\Big]\Big\}\\ +\theta(1-\hat{l})\big\{-\overline{s}+\beta\big[\hat{e}\,V^L(\overline{s})+(1-\hat{e})V^H(\overline{s})\big]\big\}\end{aligned} \tag{52}$$

$$\begin{aligned}V^H(\overline{s})=\theta\big\{-\overline{s}+\beta\big[\hat{e}\,V^L(\overline{s})+(1-\hat{e})V^H(\overline{s})\big]\big\}\\ +(1-\theta)\hat{l}\big\{-\underline{s}+\beta\big[\hat{e}\,V^L(\underline{s})+(1-\hat{e})V^H(\underline{s})\big]\big\}\\ +(1-\theta)(1-\hat{l})\big\{-\overline{s}+\beta\big[\hat{e}\,V^L(\overline{s})+(1-\hat{e})V^H(\overline{s})\big]\big\}\end{aligned} \tag{53}$$

$$V^L(\underline{s})=-\underline{s}+\beta\big[\hat{e}\,V^L(\underline{s})+(1-\hat{e})V^H(\underline{s})\big] \tag{54}$$

$$\begin{aligned}V^H(\underline{s})=\hat{l}\big\{-\underline{s}+\beta\big[\hat{e}\,V^L(\underline{s})+(1-\hat{e})V^H(\underline{s})\big]\big\}\\ +(1-\hat{l})\Big\{-\overline{s}+\beta\Big[\hat{e}\,\hat{V}^L(\overline{s})+(1-\hat{e})V^H(\overline{s})\Big]\Big\}\end{aligned}. \tag{55}$$

After some algebra, and setting $\hat{e}=\hat{l}$, the equilibrium cutoff solves

$$\hat{l}=\theta\beta\frac{2\hat{l}(1-\hat{l})}{1-\theta\beta2(1-\hat{l})\hat{l}}, \tag{56}$$

which has two (weakly) positive roots:

$$\hat{e} = \hat{l} = \frac{\sqrt{2\theta\beta - 1}}{\sqrt{2\theta\beta}} \; and \; \hat{e} = \hat{l} = 0. \tag{57}$$

The first root is real only when $\beta\theta > \frac{1}{2}$. Since $\beta < 1$, this proves Proposition 4. ■

A.6. *Proof of Proposition 5*

Legislator a_i votes for a policy change from q to s if and only if:

$$a_i s + \beta \mathrm{E}V(s) \geq (1-\zeta)\,[a_i s + \beta \mathrm{E}V(s)] + \zeta\,[a_i q + \beta \mathrm{E}V(q)]. \tag{58}$$

The right-hand side of equation (58) is the legislator's utility in case of rejection. Agenda setter a_i prefers proposing s rather than keeping the status quo when

$$\begin{aligned} &\zeta[1 - \mathbf{Pr}(s\,\text{passes})]\,[a_i q + \beta \mathrm{E}V(q)] \\ &\quad + [1 - \zeta + \zeta \mathbf{Pr}(s\,\text{passes})]\,[a_i s + \beta \mathrm{E}V(s)] \geq a_i q + \beta \mathrm{E}V(q). \end{aligned} \tag{59}$$

It is simple to show that equations (58) and (59) coincide with

$$a_i\,(\overline{s} - \underline{s}) \geq \beta[\mathrm{E}V(\underline{s}) - \mathrm{E}V(\overline{s})]. \tag{60}$$

To solve for the equilibrium, compute the right-hand side of equation (60). We find the continuation value functions:

$$\begin{aligned} V^L(\underline{s}) = &\left[\zeta\hat{l} + (1-\zeta)\right]\left\{-\underline{s} + \beta\left[\hat{e}\,V^L(\underline{s}) + (1-\hat{e})V^H(\underline{s})\right]\right\} \\ &+ \zeta(1-\hat{l})\left\{-\overline{s} + \beta\left[\hat{e}\,V^L(\overline{s}) + (1-\hat{e})V^H(\overline{s})\right]\right\}. \end{aligned} \tag{61}$$

$$V^H(\overline{s}) = -\overline{s} + \beta\left[\hat{e}V^L(\overline{s}) + (1-\hat{e})V^H(\overline{s})\right]. \tag{62}$$

$$V^L(\underline{s}) = -\underline{s} + \beta\left[\hat{e}V^L(\underline{s}) + (1-\hat{e})V^H(\underline{s})\right]. \tag{63}$$

$$\begin{aligned} V^H(\underline{s}) = &\,\zeta\hat{l}\left\{-\underline{s} + \beta\left[\hat{e}\,V^L(\underline{s}) + (1-\hat{e})V^H(\underline{s})\right]\right\} \\ &+ \left[\zeta\hat{l} + (1-\zeta)\right]\left\{-\overline{s} + \beta\left[\hat{e}\,V^L(\overline{s}) + (1-\hat{e})V^H(\overline{s})\right]\right\}. \end{aligned} \tag{64}$$

After some algebra, we find that the interior cutoff must solve

$$\hat{l}\,(\bar{s}-\underline{s}) = \beta\zeta\frac{(1-\hat{l})\hat{e}+\hat{l}(1-\hat{e})}{1-\beta\zeta\hat{l}-\beta\zeta\hat{e}(1-2\hat{l})}\,(\bar{s}-\underline{s}). \tag{65}$$

Solving this equation after setting $\hat{e}=\hat{l}$, we have two (weakly) positive roots:

$$\hat{e}=\hat{l}=\frac{\sqrt{2\zeta\beta-1}}{\sqrt{2\zeta\beta}} \text{ and } \hat{e}=\hat{l}=0. \tag{66}$$

The first root is real only when $\beta\zeta>\frac{1}{2}$. Since β is smaller than 1, this proves Proposition 5. ■

A.7. *Proof of Proposition 6*

Under Assumptions 2 and 3, write equilibrium condition (13) as

$$\hat{e}=\hat{l}=\frac{\beta 2F(\hat{l})[1-F(\hat{l})]}{1-\beta 2F(\hat{l})[1-F(\hat{l})]}. \tag{67}$$

For a given $\hat{l}$, the share of responsible legislators is $v=F(\hat{l})$. Low spending is proposed with probability v and spending cuts are also accepted with the same probability. Under Assumption 3, rewrite equation (67) as

$$\frac{v}{v\varepsilon+(1-\varepsilon)}=\frac{2\beta(1-v)v}{1-2\beta(1-v)v}. \tag{68}$$

This is a cubic equation and therefore has at most three solutions. One of the solutions is $v=0$. There are other two solutions:

$$v=\frac{1}{(1+\varepsilon)}\left(\varepsilon\pm\sqrt{\frac{2\beta-1-\varepsilon}{2\beta}}\right). \tag{69}$$

STEP 1. Let $\varepsilon\in(-1,0]$. For $\beta\geq\frac{1}{2(1-\varepsilon)}$ there exists a MPE in which the share of responsible legislators is:

$$v=\frac{1}{(1+\varepsilon)}\left(\varepsilon+\sqrt{\frac{2\beta-1-\varepsilon}{2\beta}}\right). \tag{70}$$

The equilibrium share (70) is increasing in β and decreasing in ε.

Proof of Step 1. For $\varepsilon \in (-1, 0]$ we consider only the solution equation (69) with the plus sign (the other solution always yields a negative v). Further, we need the following two conditions on β:

$$\beta \geq \frac{\varepsilon+1}{2} \text{ and } \beta \geq \frac{1}{2(1-\varepsilon)}. \tag{71}$$

The first inequality in equation (71) is needed for the solution to be real, while the second inequality guarantees that equation (70) is positive. It is immediate to show that when $\varepsilon \in (-1, 0]$, the first inequality in equation (71) is verified whenever the second holds. Finally, one can show that equation (70) is increasing in β and decreasing in ε.

STEP 2. Let $\varepsilon \in [0, 1)$. For

$$\beta \geq \frac{\varepsilon+1}{2} \tag{72}$$

there exists an interior equilibrium given by equation (70) which is increasing in β and decreasing in ε.
If

$$\frac{\varepsilon+1}{2} < \beta < \frac{1}{2(1-\varepsilon)} \tag{73}$$

there exists another MPE in which the share is given by

$$v = \frac{1}{(1+\varepsilon)}\left(\varepsilon - \sqrt{\frac{2\beta-1-\varepsilon}{2\beta}}\right). \tag{74}$$

Proof of Step 2. Condition (72) is required for equation (70) to be real. The first inequality in equation (73) guarantees that equation (74) is real. The second inequality guarantees that the equilibrium share equation (74) is positive. Expression (74) is decreasing in β and increasing in ε.

STEP 3. We prove that in the MPE with share (70) the equilibrium cutoff is

$$\hat{e} = \hat{l} = \frac{\varepsilon + \sqrt{\frac{2\beta-1-\varepsilon}{2\beta}}}{1+\varepsilon\sqrt{\frac{2\beta-1-\varepsilon}{2\beta}}}. \tag{75}$$

Cutoff (75) is decreasing in ε for low values of β and increasing in ε for high values of β.

Proof of Step 3. Under Assumption 3,

$$F(v)^{-1} = \frac{v}{v\varepsilon + (1-\varepsilon)}. \tag{76}$$

Using equation (76) it is immediate to obtain equation (75). Denoting $g(\varepsilon, \beta) \equiv \sqrt{\frac{2\beta-1-\varepsilon}{2\beta}}$, from equation (75) one obtains

$$\frac{\partial \hat{l}}{\partial \varepsilon} = \frac{1 + g_{\varepsilon}(\varepsilon, \beta)(1-\varepsilon^2) - [g(\varepsilon, \beta)]^2}{[1 + \varepsilon g(\varepsilon, \beta)]^2}. \tag{77}$$

First, we study the sign of equation (77) for low values of β. Two cases must be distinguished: $\varepsilon \in (-1, 0]$ and $\varepsilon \in (0, 1)$. Consider the first case. From Step 1, when $\varepsilon \in (-1, 0]$ consider $\beta \gtrsim \frac{1}{2(1-\varepsilon)}$. At such values of β we have $g(\varepsilon, \beta) \simeq -\varepsilon$ and obtain

$$\frac{\partial \hat{l}}{\partial \varepsilon} \simeq \frac{(1 + g_{\varepsilon}(\varepsilon, \beta))}{(1-\varepsilon^2)}. \tag{78}$$

When $\varepsilon \in (-1, 0]$ it can be verified from Step 1 that β is bounded below by $\frac{1}{4}$. If this is the case, it can be shown that (A.49) is negative. Next, we analyze the second case. When $\varepsilon \in (0, 1)$ consider $\beta \gtrsim \frac{\varepsilon+1}{2}$. Noting that $g_{\varepsilon}(\varepsilon, \beta)$ goes to minus infinity, the numerator of equation (77) is negative. Thus, for relatively low values of β the cutoff is decreasing in ε, as stated in Proposition 6.

Suppose now that β is close to 1:

$$\frac{\partial \hat{l}}{\partial \varepsilon} \simeq \frac{1 - \frac{1}{4\sqrt{\frac{1-\varepsilon}{2}}}(1-\varepsilon^2) - \frac{1-\varepsilon}{2}}{[1 + \varepsilon g(\varepsilon, \beta)]^2}, \tag{79}$$

which is positive. Thus for values of β close to 1, the cutoff is increasing in ε, as stated in Proposition 6. ■

A.8. *Proof of Proposition 7*

We reformulate Proposition 7 by listing all MPE of the dynamic game under simple-majority rule.

PROPOSITION A.1. Suppose that Assumptions 1–2 hold and that decisions pass by simple majority rule. We let $a_m = \frac{1}{2}$ denote the median in the legislature, while $\hat{e}$ denotes the measure of fiscally responsible agenda setters.

(i) For any $\beta \in (0,1)$ there exists a MPE in which a_m accepts $\bar{s}$ and rejects $\underline{s}$ at all t and $\hat{e} = 0$.

(ii) If $\beta \geq \frac{2}{3}$ there exists a MPE in which the median always rejects $\bar{s}$ and accepts $\underline{s}$, and $\hat{e} = \alpha$, where $\alpha \equiv \frac{1}{2\beta}(\sqrt{4\beta^2 + 1} - 1)$.

(iii) If $\beta \geq \frac{2}{3}$ there exists a MPE in which the median always accepts $\bar{s}$ and rejects $\underline{s}$, and $\hat{e} = \kappa$ where $\kappa \equiv \frac{1-\beta}{\beta}$.

Proof of Proposition A.1. To check that a strategy profile is a MPE, we verify that there are no profitable one-shot deviations for executives and the median.

Proof of part (i). Clearly, no legislator has the incentive to be responsible if all legislators are expected to be fiscally irresponsible in the future.

Proof of part (ii). Since the median is expected to be responsible at all t, we set $\hat{l} = 1$ in equation (12). Moreover, as stated in (ii) set $\hat{e} = \alpha$ in equation (12). If $\beta \geq \frac{2}{3}$ it can be shown that $a_m < \alpha$. In this case, it follows that inequality

$$\frac{1}{2\beta} < \frac{1-\alpha}{1-\beta(1-\alpha)} \tag{80}$$

is satisfied: the median has no incentive to deviate and be fiscally irresponsible.

It also follows that setters have no incentive to deviate. Agenda setters with $a_i > \alpha$ satisfy

$$\frac{a_i}{\beta} > \frac{1-\alpha}{1-\beta(1-\alpha)}, \tag{81}$$

while setters with $a_i \leq \alpha$ satisfy

$$\frac{a_i}{\beta} \leq \frac{1-\alpha}{1-\beta(1-\alpha)}. \tag{82}$$

Finally, it is easy to show that once $\underline{s}$ is proposed the economy settles in a low-spending absorbing state.

Proof of part (iii). First we show that there are no one-shot profitable deviations for the median. As posited, we set $\hat{l} = 0$ and $\hat{e} = \kappa$ in equation (12). Next, note that if $\beta \geq \frac{2}{3}$ the median is above κ. Inequality

$$\frac{0.5}{\beta} > \frac{\kappa}{1-\beta\kappa} \tag{83}$$

is satisfied. This proves that the median has no incentive to deviate. Second, it follows that agenda setters have no incentive to deviate. In fact, setters with $a_i > \kappa$ satisfy

$$\frac{a_i}{\beta} > \frac{\kappa}{1-\beta\kappa}, \tag{84}$$

while agenda setters with $a_i \leq \kappa$ satisfy

$$\frac{a_i}{\beta} \leq \frac{\kappa}{1-\beta\kappa}. \tag{85}$$

It is immediate that once $\bar{s}$ is proposed the economy settles in a high-spending absorbing state. ■

A.9. *Persistent Agenda Setting*

LEMMA A.1. Let $\rho \in [0, 1]$. Suppose that Assumption 1 holds and recognition probabilities are uniform. Denote

$$\mathcal{A} \equiv \frac{E_j V(\underline{s}, a_j) - E_j V(\bar{s}, a_j)}{\underline{s} - \bar{s}}. \tag{86}$$

Given $\hat{l}_H$ and $\hat{l}_L$, for all agenda setters $a \leq \hat{e}$ it must be true that

$$f_L(a; \hat{l}_L) \equiv \frac{a}{\beta\rho} + (1-\hat{l}_L)\frac{[-1+\beta(1-\rho)\mathcal{A}]}{1-\beta\rho(1-\hat{l}_L)} + \frac{(1-\rho)}{\rho}\mathcal{A} \leq 0. \tag{87}$$

For all agenda setters $a \geq \hat{e}$ it must be that

$$f_H(a; \hat{l}_H) \equiv \frac{a}{\beta\rho} + \hat{l}_H\frac{[-1+\beta(1-\rho)\mathcal{A}]}{1-\beta\rho\hat{l}_H} + \frac{(1-\rho)}{\rho}\mathcal{A} \geq 0. \tag{88}$$

Proof of Lemma A.1. From equation (26), we know that an agenda setter is fiscally irresponsible when

$$\frac{a}{\beta\sigma} + \left[\frac{V(\underline{s}, a) - V(\bar{s}, a)}{(\underline{s} - \bar{s})} + \frac{(1-\sigma)}{\sigma}\frac{E_j V(\underline{s}, a_j) - E_j V(\bar{s}, a_j)}{(\underline{s} - \bar{s})}\right] \leq 0, \tag{89}$$

and fiscally responsible when

$$\frac{a}{\beta\sigma} + \left[\frac{V(\underline{s}, a) - V(\bar{s}, a)}{(\underline{s} - \bar{s})} + \frac{(1-\sigma)}{\sigma}\frac{E_j V(\underline{s}, a_j) - E_j V(\bar{s}, a_j)}{(\underline{s} - \bar{s})}\right] \geq 0. \tag{90}$$

Let $V^L(q;\hat{l}_L)$ denote the continuation value function when the agenda setter is below the equilibrium cutoff $\hat{e}$ and when the probability that a spending cut is accepted is $\hat{l}_L$. One obtains

$$V^L(\underline{s};\hat{l}_L)=\frac{-\underline{s}+\beta(1-\rho)E_jV(\underline{s},a_j)}{1-\beta\rho} \tag{91}$$

and

$$V^L(\overline{s};\hat{l}_L)=\frac{-\left[\hat{l}_L\frac{\underline{s}}{1-\beta\sigma}+(1-\hat{l}_L)\overline{s}\right]+\beta(1-\rho)\left[(1-\hat{l}_L)E_jV(\overline{s},a_j)+\hat{l}_L\frac{E_jV(\underline{s},a_j)}{1-\beta\rho}\right]}{1-\beta\rho(1-\hat{l}_L)}. \tag{92}$$

The difference of value functions is:

$$V^L(\underline{s};\hat{l}_L)-V^L(\overline{s};\hat{l}_L)=(1-\hat{l}_L)\frac{-(\underline{s}-\overline{s})+\beta(1-\rho)[E_jV(\underline{s},a_j)-E_jV(\overline{s},a_j)]}{1-\beta\rho(1-\hat{l}_L)}. \tag{93}$$

Similarly, let $V^H(q;\hat{l}_H)$ be the continuation value function when the agenda setter a proposes $\overline{s}$ always and the probability that a spending hike is $1-\hat{l}_H$; note that $\hat{l}_H$ does not have to coincided with $\hat{l}_L$. One obtains

$$V^H(\overline{s};\hat{l}_H)=\frac{-\overline{s}+\beta(1-\rho)E_jV(\overline{s},a_j)}{1-\beta\rho} \tag{94}$$

and

$$V^H(\underline{s};\hat{l}_H)=\frac{-\left[\hat{l}_H\underline{s}+\frac{(1-\hat{l}_H)\overline{s}}{1-\beta\rho}\right]+\beta(1-\rho)\left[\hat{l}_HE_jV(\underline{s},a_j)+(1-\hat{l}_H)\frac{E_jV(\overline{s},a_j)}{1-\beta\rho}\right]}{1-\beta\rho\hat{l}_H} \tag{95}$$

Therefore we have

$$V^H(\underline{s};\hat{l}_H)-V^H(\overline{s};\hat{l}_H)=\hat{l}_H\frac{-(\underline{s}-\overline{s})+\beta(1-\rho)[E_jV(\underline{s},a_j)-E_jV(\overline{s},a_)]}{1-\beta\rho\hat{l}_H}. \tag{96}$$

Using equations (93), (96), and (86) in equations (89) and (90) we obtain inequalities (87) and (88). ■

It is straightforward to derive that the voting conditions are the same as equations (87) and (88). Thus, if the current agenda setter is below $\hat{e}$, a legislator votes for low spending if and only if equation (87) is satisfied. If instead, the current agenda setter is above $\hat{e}$, a legislator votes for high spending if and only if (88) is satisfied.

Proposition A.2 reformulates Proposition 8 by listing all MPE of the dynamic game with a fixed agenda setter.

PROPOSITION A.2. Let $\rho = 1$. Suppose Assumptions 1 holds and recognition probabilities are uniformly distributed over $[0, 1]$. We let a_s denote the type of the fixed agenda setter.

(i) For any β and $a_s \in [0, 1]$ there exists a MPE in which all setters propose $\bar{s}$ at all t and this proposal is accepted: $\hat{e} = \hat{l}_L = \hat{l}_H = 0$.

(ii) If $a_s \leq \alpha$, where

$$\alpha \equiv \frac{1}{2\beta}\left(\sqrt{4\beta^2 + 1} - 1\right), \tag{97}$$

there exists a MPE in which a_s proposes $\underline{s}$ at all t and $\hat{l}_L = \alpha$.

(iii) If $a_s > \alpha$ and $\beta \geq \frac{2}{3}$ there exists a MPE in which a_s proposes $\bar{s}$ at all t and $\hat{l}_H = \kappa$, where

$$\kappa \equiv \frac{1-\beta}{\beta}. \tag{98}$$

(iv) If $a_s > \kappa$ and $\frac{2}{3} \geq \beta \geq \frac{1}{2}$ there exists a MPE in which a_s proposes $\bar{s}$ at all t and $\hat{l}_H = \kappa$.

Proof of Proposition A.2. To check that a strategy profile is a MPE, we verify that there are no profitable one-shot deviations for executives and for voting legislators.

Proof of part (i). It is immediate that no legislator has the incentive to be responsible if all legislators are expected to be fiscally irresponsible in the future.

Proof of part (ii). First, we show that voting legislators have no profitable deviation. Since the agenda setter is expected to propose low spending at all t and $\hat{l}_L = \alpha$, we set $\rho = 1$ and $\hat{l}_L = \alpha$ in equation (87). Then, a legislator of type a_i strictly prefers voting for low spending if

$$\frac{a_i}{\beta} < \frac{1-\alpha}{1-\beta(1-\alpha)} \tag{99}$$

and strictly prefers high spending if

$$\frac{a_i}{\beta} > \frac{1-\alpha}{1-\beta(1-\alpha)}. \tag{100}$$

Note that α solves

$$\frac{x}{\beta} = \frac{1-x}{1-\beta(1-x)}. \tag{101}$$

After noticing that the right-hand side of equation (101) is decreasing in x, we conclude that voting legislators with $a_i \leq \alpha$ have no incentive to deviate and vote for high spending and those with $a_i > \alpha$ also have no incentive to deviate and vote for low spending.

Finally, we need to show that when future legislators are expected to vote using a cutoff rule given by α, the fixed agenda setter has no incentive to deviate in the current period and propose high spending. It is immediate that if the fixed agenda setter has $a_s \leq \alpha$, equation (99) holds. Then, a one-shot deviation consisting in proposing high spending is not profitable. Finally, given the strategy profile of point (ii), it is immediate that low spending, once approved, is an absorbing state.

Proof of part (iii). First, we show that an agenda setter with $a_s > \alpha$ has no incentive to propose low spending if the measure of fiscally responsible legislators is $\hat{l}_H = \frac{1-\beta}{\beta}$. That is, we need to check that condition (28) is verified. This is true when $\rho = 1$ and $\beta \geq \frac{2}{3}$. To conclude the proof of point (ii) we need to show that voting legislators have no incentives to deviate. After setting $\hat{e} = 0$ and $\hat{l} = \kappa$ in equation (12), first we need to check that a legislator of type $a_i \leq \kappa$ has no incentive to vote for high spending:

$$\frac{a_i}{\beta} < \frac{\kappa}{1-\beta\kappa}. \tag{102}$$

Second, we need to check that a legislator of type $a_i > \kappa$ has no incentive to vote for low spending: that is,

$$\frac{a_i}{\beta} > \frac{\kappa}{1-\beta\kappa}. \tag{103}$$

Equation

$$\frac{x}{\beta} = \frac{x}{1 - \beta x} \tag{104}$$

has two roots: a strictly positive root, $x_1 = \frac{1-\beta}{\beta}$ and $x_2 = 0$. After substituting x_1 into equations (103) and (104), it is immediate to verify our two claims. Given the strategy profile of point (iii), it is immediate that high spending, once approved, is an absorbing state.

Proof of part (iv). The condition on β is necessary so that equation (98) is less than 1. It is easy to verify that when $\hat{l}_H = \kappa$ condition (28) is satisfied: the agenda setter $a_s > \kappa$ has no incentive to propose low spending. It is also easy to show that no voting legislator has incentive to deviate. ■

EINAUDI INSTITUTE FOR ECONOMICS AND FINANCE
ECOLE POLYTECHNIQUE

SUPPLEMENTARY MATERIAL

An Online Appendix for this article can be found at QJE online (qje.oxfordjournal.org).

REFERENCES

Acemoglu, Daron, Mikhail Golosov, and Aleh Tsyvinski, "Political Economy of Mechanisms," *Econometrica*, 76 (2008), 619–641.
Akerlof, George A., "Procrastination and Obedience," *American Economic Review*, 81 (1991), 1–19.
Ales, Laurence, Pricila Maziero, and Pierre Yared, "A Theory of Political and Economic Cycles," *Journal of Economic Theory*, 153 (2014), 224–251.
Alesina, Alberto, and Allan Drazen, "Why Are Stabilizations Delayed?," *American Economic Review*, 81 (1991), 1170–1188.
Alesina, Alberto, and Guido Tabellini, "A Positive Theory of Fiscal Deficits and Government Debt," *Review of Economic Studies*, 57 (1990), 403–414.
Amador, Manuel, "A Political Economy Model of Sovereign Debt Repayment," Working Paper, 2003.
Anesi, Vincent, and Daniel J. Seidman, "Bargaining in Standing Committees with an Endogenous Default," University of Nottingham Working Paper, 2012.
Azzimonti, Marina, "Barriers to Investment in Polarized Societies," *American Economic Review*, 101 (2011), 2182–2204.
Baron, David, and Renee Bowen, "Dynamic Coalitions," Stanford University, Working Paper, 2013.
Baron, David P., "A Dynamic Theory of Collective Goods Programs," *American Political Science Review*, 90 (1996), 316–330.
Baron, David P., and Ehud Kalai, "The Simplest Equilibrium of a Majority-Rule Division Game," *Journal of Economic Theory*, 61 (1993), 290–301.
Baron, David P., and John A. Ferejohn, "Bargaining in Legislatures," *American Political Science Review*, 83 (1989), 1181–1206.

Barro, Robert J., “The Control of Politicians: An Economic Model,” *Public Choice*, 14 (1973), 19–42.
———, “Ramsey Meets Laibson in the Neoclassical Growth Model,” *Quarterly Journal of Economics*, 114 (1999), 1125–1152.
Battaglini, Marco, and Stephen Coate, “Inefficiency in Legislative Policy-Making: A Dynamic Analysis,” *American Economic Review*, 97 (2007), 118–149.
———, “A Dynamic Theory of Public Spending, Taxation and Debt,” *American Economic Review*, 98 (2008), 201–236.
Battaglini, Marco, Salvatore Nunnari, and Thomas Palfrey, “The Free Rider Problem: A Dynamic Analysis,” Princeton University Working Paper, 2012.
Besley, Timothy, and Stephen Coate, “Sources of Inefficiency in a Representative Democracy: A Dynamic Analysis,” *American Economic Review*, 88 (1998), 139–156.
Bisin, Alberto, Alessandro Lizzeri, and Leeat Yariv, “Government Policy with Time-Inconsistent Voters,” Working Paper, 2011.
Bowen, Renee, and Zaki Zahran, “On Dynamic Compromise,” *Games and Economic Behavior*, 76 (2012), 391–419.
Bowen, Renee, Ying Chen, and Hulya Eraslan, “Mandatory Versus Discretionary Spending: The Status Quo Effect,” *American Economic Review*, 104 (2014), 2941–2974.
Diermeier, Daniel, and Pohan Fong, “Legislative Bargaining with Reconsideration,” *Quarterly Journal of Economics*, 126 (2011), 947–985.
Duggan, John, and Tasos Kalandrakis, “A Newton Collocation Method for Solving Dynamic Bargaining Games,” *Social Choice and Welfare*, 36 (2011), 611–650.
Dziuda, Wioletta, and Antoine Loeper, “Dynamic Collective Choice with Endogenous Status Quo,” Working Paper, 2012.
Ferejohn, John, “Incumbent Performance and Electoral Control,” *Public Choice*, 50 (1986), 5–25.
Gul, Faruk, and Wolfgang Pesendorfer, “Harmful Addiction,” *Review of Economic Studies*, 74 (2007), 147–172.
Halac, Marina, and Pierre Yared, “Fiscal Rules and Discretion under Persistent Shocks,” *Econometrica*, 82 (2014), 1557–1614.
Jackson, Matthew O., and Leeat Yariv, “Collective Dynamic Choice: The Necessity of Time Inconsistency,” Working Paper, 2012.
Kalandrakis, Tasos, “A Three-Player Dynamic Majoritarian Bargaining Game,” *Journal of Economic Theory*, 116 (2004), 294–322.
Krusell, Per, and Anthony A. Smith, “Consumption-Savings Decisions with Quasi-Geometric Discounting,” *Econometrica*, 71 (2003), 365–375.
Laibson, David, “Golden Eggs and Hyperbolic Discounting,” *Quarterly Journal of Economics*, 112 (1997), 443–477.
Lizzeri, Alessandro, and Leeat Yariv, “Collective Self-Control,” available at http://ssrn.com/abstract=2120893 Social Science Research Network, 2012, available at http://ssrn.com/abstract=2120893.
Maskin, Eric, and Jean Tirole, “Markov Perfect Equilibrium: I. Observable Actions,” *Journal of Economic Theory*, 100 (2001), 191–219.
Nunnari, Salvatore, “Dynamic Legislative Bargaining with Veto Power,” Working Paper, 2014.
O’Donoghue, Ted, and Matthew Rabin, “Addiction and Self Control,” in *Addiction: Entries and Exits*, Jon Elster, ed. (New York: Russell Sage Foundation, 1999a).
———, “Doing It Now or Later,” *American Economic Review*, 89 (1999b), 103–124.
———, “Choice And Procrastination,” *Quarterly Journal of Economics*, 116 (2001), 121–160.
———, “Addiction and Present-Biased Preferences,” Game Theory and Information Series # 0303005, EconWPA, 2003.
Persson, Torsten, and Lars Svensson, “Why a Stubborn Conservative Would Run a Deficit: Policy with Time-Inconsistency Preferences,” *Quarterly Journal of Economics*, 104 (1989), 325–345.
Phelps, Edmund S., and Robert A. Pollak, “On Second-Best National Saving and Game-Equilibrium Growth,” *Review of Economic Studies*, 35 (1968), 185–199.

Piguillem, Facundo, and Alessandro Riboni, "Dynamic Bargaining over Redistribution in Legislatures," EIEF Working Papers Series # 1206, 2013.
Riboni, Alessandro, "Committees as Substitutes for Commitment," *International Economic Review*, 51 (2010), 213–236.
Riboni, Alessandro, and Francisco Ruge-Murcia, "The Dynamic (In)efficiency of Monetary Policy by Committee," *Journal of Money, Credit and Banking*, 40 (2008), 1001–1032.
Rogoff, Kenneth, "The Optimal Degree of Commitment to an Intermediate Monetary Target," *Quarterly Journal of Economics*, 100 (1985), 1169–1189.
Strotz, Robert H., "Myopia and Incosistency in Dynamic Utility Maximization," *The Review of Economic Studies*, 23 (1955), 165–180.
Tsebelis, George, *Veto Players: How Political Institutions Work* (Princeton: Princeton University Press, 2002).
Yared, Pierre, "Politicians, Taxes and Debt," *Review of Economic Studies*, 77 (2010), 806–840.
Zapal, Jan, "Explicit and Implicit Status-Quo Determination in Dynamic Bargaining: Theory and Application to FOMC Directive," Technical Report, LSE, 2011.

This page intentionally left blank