

# The Reverse Side of Fiscal Governance\*

Martin Gregor<sup>†</sup>  
Ph.D. Candidate  
Institute of Economic Studies  
Charles University, Prague

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## Abstract

Fiscal governance reduces excessive spending and deficit bias, but also protects executive budget proposals from concessions in legislative bargaining. This is a heretofore neglected cost of fiscal governance. In two specifications of political economy with heterogeneous legislators, we examine properties of three procedural fiscal rules: timing of a vote on the budget size, spending limit, and two types of deficit limit. We recognize three reverse sides of fiscal governance: nominal rules pronounce macroeconomic volatility, timing of vote on budget size may be irrelevant or leads to unpredictable changes, and the rules increase political polarization by inducing strategic delegation of voters.

**JEL Classification:** D78, H61, H62

**Keywords:** fiscal governance, fiscal rules, deficit bias

## 1 Introduction

One of the core topics of positive political economics as well as normative public finance is the budgetary process in democracies, featuring deficit bias and excessive spending (Persson & Tabellini 2000). Numerous nominal limits, procedural rules, and institutional arrangements on budgetary policy have been designed to accommodate the inefficiencies (Wyplosz 2002), and their richness gave rise to comprehensive indices of fiscal governance, serving since early 1990s as important policy devices.

The fiscal governance indices trace from von Hagen (1992), who revived interest in measurement of legislative oversight (see Oppenheimer 1983) and incorporated hierarchical procedures within the executive. Measures of fiscal

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<sup>†</sup>Corresponding address: Martin Gregor, IES FSV UK, Opletalova 26, Prague, CZ-110 00; E-mail: gregor@fsv.cuni.cz.

constraints later proliferated in Poterba & von Hagen (1999), Gleich (2003), Yläouinen (2004), and resulted in OECD/World Bank Budget Practices and Procedures Survey (OECD 2002, OECD/WB 2003), used, among others, by Filc & Scartascini (2004). In parallel, legislative studies has advanced the analysis of separation of the legislature from the executive, with recent papers by Krafchik & Wehner (1998), Schick (2002), Linert (2005) and Wehner (2005). Additional interest in fiscal governance indices can also be recognized in areas of public sector management, or generally in governance literature.

A very extensive set of rules has been typically included in the indices (see, e.g. Filc & Scartascini 2004), ranging from fiscal limits (nominal fiscal rules, targets or ceilings for expenditures, borrowing limits, permitted uses of the budget reserves), hierarchical procedures (power of the Finance Minister, amendments in the Legislature, cash management), and transparency (extra budgetary funds, independent forecasts). The abundance nevertheless brings about weaknesses and pitfalls. First of all, weights in composite indices are difficult to determine. Moreover, although the first-generation research by von Hagen (1992), replicated by Hallerberg (2004), demonstrated significant impact of fiscal procedures on deficit and public debt, later studies are far less conclusive. De Haan et al. (1999, p. 284) argue that "...budget institutions affect fiscal policy outcomes, but the effect is quite small." Filc & Scartascini (2004) in a sample of Latin American countries recognize that hierarchical procedures are much more significant than nominal rules and levels of transparency. Hallerberg and Meier (2004) found that only when personal vote is at stake, hierarchical procedures are relevant. This reveals some likely omissions and blind spots in the theory of fiscal governance.

The unifying approach toward fiscal rules, especially regarding procedural and nominal limits, largely refers to common-pool resource incentives, which arise when policy-makers bear only part of tax burden but full benefits of spending on their constituencies. Any coordination, remedying this competitive negative externality game, is thus considered socially optimal (Hallerberg 1999). However, as Persson & Tabellini (2000, p. 164) observe, "...one of the underlying problems that 'stricter' budgetary procedures are supposed to solve, namely the common-pool problem, also distorts the level of spending." Ehrhardt, K. *et al.* (2000) receive both theoretically and experimentally that top-down budgeting may result in excessive spending rather than bottom-up procedures. Diepolt (2006) discerns that balanced budget requirement not necessarily induces the government to spend less.

A related stream of literature investigates the role of the U.S. Congressional Budget Act 1974, which established a Budget Committee determining total spending before the composition is set in the Appropriations Committee. Ferejohn & Krehbiel (1987) and in a more general setup also Serritzew (2002) found that initial vote in spending often stimulates further spending. This is contested by Dharmapala (2003). The differences stems from defining key actors in the legislative bargaining; in the former, policy-seeking legislators sequentially vote on items, in the latter, interest groups lobby office-seeking legislators under resource constraints.

In this paper, we attempt to shed new light on fiscal governance, using the former approach of policy-seeking legislators. We analyze sequential budgeting featuring contest of legislators with different priorities on total budgets, when the tragedy of budgetary commons is put aside. Specifically, we study structure-induced equilibria under the assumption that parties in the executive coalition cannot commit their legislators.

The reason to follow the spatial approach with citizen-candidates is manifold. When conflicts on aggregate spending level and tax rate are investigated, group-specific spending is irrelevant, thus there is no element of common pool problem. Equally, there are no ‘special’ interests per se; the interests conflicting spread across all voters. In such setup, it is reasonable to assume that voters either bind elected legislators to announced policies, or that legislators are simply citizen-candidates with intrinsic preferences.<sup>1</sup> Another important feature is that details of electoral competition are omitted, and, unlike in Terai (2003), electoral alliances cannot emerge. Unconstrained voting in the Legislature thus produces the median voter outcome.

We distinguish between two models. In Quasi-Linear Model, we impose monotonicity on utility in spending level (at least on the set of feasible allocations), which allows us to introduce a few useful concepts and receive properties of fiscal rules. In Cobb-Douglas Model, utility is non-monotonic on the set of feasible allocations. We focus on volatility induced by fiscal rules, preciseness of fiscal governance indices, the role of broadness of coalitions (including the role of fragmentation) on the use of fiscal rules, and analyze the impact of fiscal rules on behavior of voters.

Having constructed budgeting setup in Section 2, we proceed to the Quasi-Linear Model in Section 3, and Cobb-Douglas Model in Section 4. The last and the least Section 5 concludes.

## 2 Assumptions

### 2.1 Citizens

Assume a population of citizens  $C$  of mass  $|C| \in \mathbb{N}$  in an economy without production. The population lives in two periods,  $t \in \{1, 2\}$ . Denote exogenous interest rate  $r$ . In both periods, individuals are endowed with incomes that are constant in monetary terms across both periods. Hence, denoting the income of the individual  $i \in C$  in period  $t$  as  $y_{i,t}$ , we assume that income in the second period writes as  $y_{i,1}(1+r)$ . Let  $\bar{y} := E(y_1)$  be the average income in the first period.

In each period, incomes are taxed by flat tax  $\tau \in [0, 1]$  and the citizens use the after-tax income for private consumption in that period. Tax revenues of both periods cover production of a single public good in both periods, where public expenses for the good write as  $g_t \geq 0$ .

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<sup>1</sup>Anyway, the model could be extended into a model where side-payments to legislators are organized.

We examine two alternative specifications of the utility function (Quasi-Linear Model and Cobb-Douglas Model). In each, citizens differ by propensity to consume private good  $\alpha_i$ , and income effects don't exist.

**Assumption 1 (Quasi-Linear Model)** *In Quasi-Linear Model, let the utility of each  $i \in C$  in period  $t \in \{1, 2\}$  write as:*

$$u_{i,t} = \alpha_i \ln(1 - \tau)y_{i,t} + g_t, \quad \alpha_i \in (0, 1) \quad (1)$$

**Assumption 2 (Cobb-Douglas Model)** *In Cobb-Douglas Model, let the utility of each  $i \in C$  in period  $t \in \{1, 2\}$  write as:*

$$v_{i,t} = [(1 - \tau)y_{i,t}]^{\alpha_i} g_t^{1 - \alpha_i}, \quad \alpha_i \in (0, 1) \quad (2)$$

Individuals are assumed to be of different age, which is reflected in variable  $p_i$ , defined as the probability of surviving the second period, where  $\frac{1}{2} < p_i \leq 1$ .<sup>2</sup> Assume a homogenous discount rate equal to banker's interest rate  $\frac{1}{1+r}$ . Now, we can write the lifetime utility as a present value of discounted utilities over two periods:

$$U_i \equiv \sum_t u_{i,t} \left( \frac{p_i}{1+r} \right)^{t-1} \quad V_i \equiv \sum_t v_{i,t} \left( \frac{p_i}{1+r} \right)^{t-1} \quad (3)$$

## 2.2 Public sector

The government has free access to financial markets, provided that the budget satisfies the transversality condition with interest rate  $r$ :

$$g_1 + \frac{g_2}{1+r} = \tau \bar{y} + \frac{\tau \bar{y}(1+r)}{1+r} = 2\tau \bar{y} \quad (4)$$

Unlike the government, we assume that citizens have no access to credit, so the present value of private good consumption equals in both periods. Individuals cannot make intertemporal optimization when the government induces intertemporal redistribution. This has been assumed only to avoid here unimportant effects of Ricardian equivalence.

In this framework, balanced-budget requirement in (4) allows to have public deficit in the first period as long as it is ultimately balanced. To capture how total tax revenues are distributed, we introduce *absolute deficit* as the proportion

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<sup>2</sup>Since individuals exit probabilistically (which can be interpreted as gradual exit), there is a legitimate question what happens to private assets left for private consumption but unconsumed. We assume that they entirely disappear from the economy. For instance, all bequests fall into an external pool such as foreign-aid charity. Or, without intention to create an overlapping generation model, the bequests are transferred to descendants who are not entitled to vote in our political economy. Otherwise we would have to specify how bequests are distributed, which arguably affects equilibrium tax and deficit levels. We put this effect aside for an extended version of the paper, although we expect that the optimal spending levels would only slightly increase in the anticipation of additional revenues.

of the first-period consumption to national income not covered by the first-period revenue:

$$\beta \equiv \frac{g_1 - \tau \bar{y}}{\bar{y}}, \quad b \in [-\tau, \tau] \quad (5)$$

In other words, zero absolute deficit implies no use of the financial market, minimal deficit  $\beta = -\tau$  (maximal surplus) occurs for zero consumption in the first period, and maximal deficit  $\beta = \tau$  is associated with zero consumption in the next period. By (4), we get the distribution of tax revenue across periods as the function of  $\beta$ :

$$g_1 = (\tau + \beta)\bar{y} \quad g_2 = (1+r)(\tau - \beta)\bar{y} \quad \frac{g_1}{g_2} = \frac{\tau + \beta}{(1+r)(\tau - \beta)} \quad (6)$$

Note also that the deficit can be re-interpreted as the proportion of the second-period tax revenues to national income, used for the first-period consumption:

$$\beta = \frac{\tau \bar{y}(1+r) - g_2}{\tau \bar{y}(1+r)} \quad (7)$$

Particularly for the purpose of Cobb-Douglas Model, introduce *relative deficit*  $b$  as the absolute deficit related to budget in the first period, so  $b \equiv \beta\tau$ .

Define *absolute spending* as the proportion of first period spending to national income as  $\gamma = \frac{g_1}{\bar{y}}$ , giving us  $\gamma = \beta + \tau$ . With this notation, we can express the public good consumption in both periods alternatively:

$$g_1 = \gamma\tau \quad g_2 = (1+r)(2\tau - \gamma)\bar{y} \quad \frac{g_1}{g_2} = \frac{\gamma}{(1+r)(2\tau - \gamma)} \quad (8)$$

This notation allows us to write allocations either as  $(\tau, \gamma)$ ,  $(\tau, \beta)$ , or  $(\tau, b)$ .

## 2.3 Legislature

Let  $L$  be a set of legislators, interpreted as successful citizen candidates,  $L \subset C$ . Suppose  $C$  is partitioned into subsets  $C_k$ , where  $k = 1, \dots, |L|$ , and each  $C_k$  (to be interpreted as district) elects one legislator. Within each district, Condorcet winner is elected. In the first part of paper, we treat  $L$  exogenous; extension follows in Section 3.7.

Let  $q$ , where  $q > \frac{|L|}{2}$ , be the majority quota for voting in the legislature. Any subset of legislators  $S \subseteq L$ , where  $|S| \geq q$ , we shall call a winning coalition. Assume all winning coalitions equally probable. Note that the winning coalitions not necessarily need to be minimum-winning, nor connected. (Bliss points of non-members may belong to a minimum convex set including all bliss points of coalition members.)

The coalition submits a budget proposal  $(\tau_S, \gamma_S)$ . Here, we use two types of coalitional bargaining. In Quasi-Linear Model, the coalition members maximize by utilitarian yardstick. This is driven by the idea that legislators enjoy private good with constant marginal utility, so mutual exchanges of private good

(compensations) allow the coalition to get to the optimal composition of public/private good consumption. Because of that, we safely assume transferrable utility, so the coalition can maximize the sum of utilities. In the Cobb-Douglas Model, we assume Nash-bargaining solution that is time separable (Osborne & Rubinstein 1990, p. 13). In this case, we use that for disagreement point  $(g_1, \tau) = (0, 0)$ , we have  $v_{j,1}(0, 0) = 0$ .

**Assumption 3 (Quasi-Linear Model)** *In Quasi-Linear Model, for any winning coalition  $S$ , let the outcome of bargaining maximize the sum of lifetime utilities:*

$$(\tau_S, \gamma_S) = \operatorname{argmax} \sum_{j \in S} U_j(\tau, \gamma) \quad (9)$$

**Assumption 4 (Cobb-Douglas Model)** *In Cobb-Douglas Model, for any winning coalition  $S$  and for disagreement point  $(\tau, \gamma) = (0, 0)$ , suppose the following bargaining outcome:*

$$(\tau_S, \gamma_S) = \operatorname{argmax} \sum_t \prod_{j \in S} v_{j,t}(\gamma, \tau) \quad (10)$$

## 2.4 Fiscal governance

Before outlining the budget process in detail, we describe budgetary rules. We draw on rules examined in a fiscal governance index by De Haan, Moessen and Volkerink (1999), who re-constructed a seminal index by von Hagen (1992). Of the index, we concentrate on two items, the timing of vote on budget size and the presence of explicit fiscal constraints (ceilings/limits), as investigated by De Haan et al. (1999, p. 286–7) in the two survey questions:

5.(e) Is there a global vote on total budget size?

Final only  
Initial

6. Could you please indicate whether the government is bound by some general constraint?

None  
...  
Government spending to GDP or Golden Rule  
Government spending to GDP & Deficit to GDP

Clearly, these two questions focus on three procedural rules: *Vote on budget size* (initial/final), *Spending constraint* (present/absent), and *Deficit constraint* (present/absent). The first rule is identical to the U.S. 1974 Congressional Budget Act, and the second is close to its supplement in the form of statutory spending limits in the Budget Enforcement Act of 1997. OECD/WB (2003) and Filc & Scartascini (2004) investigate equivalent rules in Questions 2.2.b.1 and 2.7.e.

## 2.5 Budget process

Members of the executive coalition  $S$  bargain over the budgetary proposal, with bargaining corresponding to Assumptions 3 and 4. We leave derivation of the budgetary proposal  $(\tau_S, \gamma_S)$  for the solution part, because solution is intimately related to the set of feasible outcomes, and they are endogenously determined by fiscal rules. In one extreme, when the proposal can't affect incentives of legislators, it is cheap talk, and the set of bargaining outcomes is only one point. In the other extreme, elements from a large set of proposals are enforceable in the legislature.

The budgetary process can be split into cabinet and legislative phase.

1. Fiscal targets. If *Spending constraint* applies, the coalition  $S$  imposes an enforceable constraint  $\gamma \leq \gamma_S$ . At the same time, if *Absolute deficit constraint* applies, it sets that  $\beta \leq \beta_S = \gamma_S - \tau_S$ . We will also study *Relative deficit constraint*, when the government sets  $b \leq b_S = (\gamma_S - \tau_S)\tau_S$ .

Then, the budget proposal proceeds to the Legislature.

1. Initial vote. If initial *Vote on budget size* applies, there is a simple-majority vote on the budget size  $g_1$  (or,  $\gamma$ ).
2. Revenue side. There is a simple-majority vote on tax rate  $\tau$ .
3. Final vote. If final *Vote on budget size* applies, there is a simple-majority vote on the budget size  $g_1$  (or,  $\gamma$ ).

Combining three binary variables (Vote on budget size, Absolute deficit limit, Spending limit) results in eight decision-making configurations. Although the Relative deficit limit has not been studied by de Haan et al. (1999), we also include two additional configurations with this constraint, in order to get a more complex idea of properties of constraints. Table 1 describes how spending and revenues are set in the presence of constraints present in each stage. (Basic constraints of  $\tau \in [0, 1]$  and  $\gamma \in [0, 2\tau]$  are not reported). Figure 1 depicts constraints in the space  $\tau \times \gamma$ .

Table 1: Institutional configurations (Initial vote)

Constraints		Stage 1	Stage 2
None		$\gamma$	$\tau \geq \frac{\gamma}{2}$
Spending	$\gamma_S$	$\gamma \leq \gamma_S$	$\tau \geq \frac{\gamma}{2}$
Absolute deficit	$\beta_S$	$\gamma \leq \tau_S + \beta_S$	$\tau \geq \max\{\frac{\gamma}{2}, \gamma - \beta_S\}$
Both	$\gamma_S, \beta_S$	$\gamma \leq \min\{\beta_S + \tau, \gamma_S\}$	$\tau \geq \max\{\frac{\gamma}{2}, \gamma - \beta_S\}$
Relative deficit	$b_S$	$\gamma \leq 1 + b_S$	$\tau \geq \frac{\gamma}{2} + \sqrt{\frac{\gamma}{4} - b}$

Table 2: Institutional configurations (Final vote)

Constraints		Stage 2	Stage 3
None		$\tau$	$\gamma \leq 2\tau$
Spending	$\gamma_S$	$\tau$	$\gamma \leq \min\{2\tau, \gamma_S\}$
Absolute deficit	$\beta_S$	$\tau$	$\gamma \leq \min\{\frac{\tau}{2}, \tau + \beta_S\}$
Both	$\gamma_S, \beta_S$	$\tau$	$\gamma \leq \min\{\frac{\tau}{2}, \beta_S, \gamma_S\}$
Relative deficit	$b_S$	$\tau$	$\gamma \leq \tau + \frac{b_S}{\tau}$

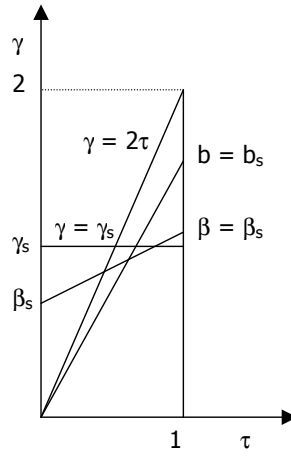


Figure 1: Constraints on budget proposals

### 3 Quasi-Linear Model

With quasi-linear utility function as in (1), the lifetime utility writes as follows:

$$U_i = y_{1,i}[\alpha_i(1 + p_i) \ln(1 - \tau) + (1 - p_i)\gamma + 2p_i\tau] \quad (11)$$

**Lemma 1** *Bliss points in Quasi-Linear Model write as follows:*

$$\tau_i^* = 1 - \frac{\alpha_i(p_i + 1)}{2} \quad \gamma_i^* = 2 - \alpha_i(p_i + 1) \quad (12)$$

*Optimal tax conditional on fixed spending, and optimal spending conditional on fixed tax, write as follows:*

$$\tau_i(\gamma_S) = 1 - \frac{\alpha_i(p_i + 1)}{2p_i} \quad \gamma_i(\tau_S) = 2\bar{\tau} \quad (13)$$

Optimal tax conditional on fixed absolute and fixed relative deficit are:

$$\tau_i(\beta_S) = 1 - \alpha_i \quad \tau_i(b_S) = 1 - \frac{\alpha_i(p_i + 1)}{1 + b_S + p_i(1 - b_S)} \quad (14)$$

Optimal spending conditional on fixed absolute and fixed relative deficit are:

$$\gamma_i(\beta_S) = 2 - 2\alpha_i \quad \gamma_i(b_S) = 2 - \frac{2\alpha_i(p_i + 1)}{1 + b_S + p_i(1 - b_S)} \quad (15)$$

First, notice that spending conditional on tax is maximal, which largely helps in analyzing solutions. The reason is that quasi-linear utility function induces maximal deficit when tax rate is fixed. Because future public consumption has always lower marginal utility than current public consumption,  $p < 1$ , individuals maximize deficits. And, for a fixed tax rate, maximal deficit is associated with maximum spending in the first period.

Interestingly, we also get that the conditional tax rate (conditional on fixed spending) is constant. Denote  $(\alpha_Q, p_Q)$  the parameters of the party Q which is associated with the median value of  $\alpha_i(p_i + 1)/2p_i$ . Then, by backward induction, we know that the Legislature would anticipate the following tax rate when setting any fixed  $\gamma$  in Initial vote, under condition that it is feasible:

$$\tau_Q \equiv 1 - \frac{\alpha_Q(p_Q + 1)}{2p_Q} \quad (16)$$

Similarly, denote  $(\alpha_R, p_R)$  parameters associated with the median value of  $\alpha_i(p_i + 1)$ . Also denote the median values of  $\alpha_i$  as  $\alpha_T$ . Define the corresponding tax rates:

$$\tau_R \equiv 1 - \frac{\alpha_R(p_R + 1)}{2} \quad \tau_T = 1 - \alpha_T \quad (17)$$

We also need to identify the median legislator when relative deficit is set, namely the median of  $\alpha_i(p_i + 1)/[b(1 - p_i) + 1 + p_i]$ . Unlike other medians, this doesn't have to be a single individual for all values of  $b$ . We denote them  $V(b)$  and the corresponding tax  $\tau_V(b)$ , and immediately get:

$$\tau_V(-1) = \tau_Q \quad \tau_V(0) = \tau_T \quad \tau_V(1) = \tau_R \quad (18)$$

All the medians turn indispensable in coming analysis.

**Lemma 2** For any distribution  $\mathbf{p}$ ,  $\alpha$ , and  $\mathbf{y}$ , where  $p_i \in (\frac{1}{2}, 1)$ ,  $\alpha_i \in (0, 1)$ ,  $y_i > 0$  for all  $i$ , we have  $\tau_Q < \tau_T < \tau_R$ . For  $b \in (-1, 1)$ , we have  $\tau_Q < \tau_V(b) < \tau_R$ .

Lemma 2 is helpful in analyzing the subgame-perfect Nash equilibria. We drive the solutions by backward induction, starting in the final stage when constraints are imposed, and getting optimum under these constraints. Regardless of institutional configuration, the optimum is aligned with either of median players Q, R, T, or  $V(b)$ . In the preceding step, the individuals are again sorted, but now by preferences over constraints. We again get that decisive player is either Q, R, T, or  $V(b)$ . Finally, coalitional decision-making about spending and/or deficit constraints is driven by maximization of transferrable utility.

**Proposition 1 (None constraint)** *In Quasi-Linear Model without nominal fiscal constraints, the Legislature adopts the budget  $(\tau_R, 2\tau_R)$ , regardless of initial/final Vote on budget size.*

Unconstrained voting leads to an identical outcome as if (median) player R had a veto over any budget proposal. The outcome is stable regardless of  $S$ . In the absence of constraints (lack of fiscal governance), executive coalitions in our model decide only on factors unrelated to fiscal variables, and neither coalitional instability nor majority quota affect fiscal policy, as long as the set  $L$  is exogenous.

### 3.1 Spending limit

When Spending constraint is present, the main difference is that  $\gamma_S$  may affect incentives in both subsequent changes. Therefore, we need to derive bargaining outcome.

**Lemma 3** *Denote  $\bar{p}$  the income-weighted average probability of survival of the members of coalition  $S$ , and  $\bar{\alpha}$  the income-weighted average propensity to consume private good:*

$$\bar{p} = \frac{1}{|S|} \sum_{j \in S} y_{j,1} p_j \qquad \bar{\alpha} = \frac{1}{|S|} \sum_{j \in S} y_{j,1} \alpha_j$$

*Then, the coalition  $S$  in Quasi-Linear Model prefers the following budget:*

$$\tau_S = 1 - \frac{\bar{\alpha}(\bar{p} + 1)}{2} \qquad \gamma_S = 2 - \bar{\alpha}(\bar{p} + 1) \qquad (19)$$

Obviously, if  $\gamma_S \geq 2\tau_R$ , the constraint becomes inactive, because only minority of public-good lovers with  $\tau_i^* \geq \tau_Q$  are restricted. It is relevant only for  $\gamma < 2\tau_S$ . At the same time, we can see that no coalition, including extremely conservative ones, has incentive to set too low spending constraint; for any  $\gamma_S < \tau_Q$ , the Legislature would adopt  $\tau_Q$ , but for this "minimal tax", everybody—including coalition members—would prefer maximal spending  $2\tau_Q > \gamma_S$ . This leads our intuition towards the finding that the coalitions apply the constraint to obtain conservative outcomes, but not excessively conservative ones.

**Proposition 2** *In Quasi-Linear Model, the existence of Spending constraint allows the coalition  $S$  secure any outcome  $(\tau^*, \gamma^*)$ , where  $\tau_Q \leq \tau^* \leq \tau_R$  and  $\gamma^* = 2\tau^*$ . The coalition opts for the following spending constraint irrespective of initial/final Vote on budget size:*

$$\gamma_S = \min \{ \max [2 - \alpha_Q(p_Q + 1), 2 - \bar{\alpha}(\bar{p} + 1)], 2 - \alpha_R(p_R + 1) \} \qquad (20)$$

If the coalition consists of public-good lovers,  $\tau_S \geq \tau_R$ , the solution is identical to the case with none constraint. In other words, public lovers cannot use the Spending constraint to promote their preferences in subsequent legislative votes.

Extreme conservatives can only shift the outcome towards its optimum, while minor conservatives are able to use the constraint to secure their own coalitional optimum. This may explain why constitutional preferences for spending rules stem from moderate right wing parties rather than extreme rightist parties, not to speak about left wing parties.

### 3.2 Absolute deficit limit

Interestingly, application of Absolute deficit constraint is but a subcase of the former constraint. Again, a too soft budget constraint,  $\beta_S = \gamma_S - \tau_S > \gamma_R - \tau_R$ , doesn't affect what the Legislature passes. And, again, a too hard constraint, here  $\gamma_S - \tau_S < \gamma_T - \tau_T$ , is counterproductive because the Legislature would adopt  $\tau_T$ , and each party would prefer maximal spending, namely  $2\tau_T$ . Like in Spending constraint, the coalition can secure some set of outcomes, but the interval is narrower, because by Lemma 2,  $\tau_Q < \tau_R$ .

**Proposition 3** *In Quasi-Linear Model, the existence of Absolute deficit constraint allows the coalition to secure any outcome  $(\tau^*, \gamma^*)$ , where  $\tau_T \leq \tau^* \leq \tau_R$  and  $\gamma^* = 2\tau^*$ . The coalition opts for the following spending constraint irrespective of the initial/final Vote on budget size:*

$$\gamma_S = \min \{ \max [2 - \alpha_T, 2 - \bar{\alpha}(\bar{p} + 1)], 2 - \alpha_R(p_R + 1) \} \quad (21)$$

### 3.3 Relative deficit limit

The relative deficit limit is a special constraint, because it prohibits maximal possible consumption in the first period. This can be deduced from constraints in Tables 1 and 2. In subsequent stages, the Legislature adopts optimum of the median  $V(b)$ , regardless of initial/final Vote on budget size, which allows coalitions to choose  $(\tau, \gamma)$  from the set of allocation  $(\tau_V(b), 1 + \tau_V(b))$ . This is an important manipulation device, which not only reduces tax rate from  $\tau_R$  down to  $\tau_Q$ , but can also reduce first period spending from  $2\tau_R$  down to zero.

**Proposition 4** *Suppose that the inverse function  $b^{-1}(\tau)$  to the function  $\tau_V(b)$  exists in  $\tau \in [\tau_Q, \tau_R]$ . Then, in Quasi-Linear Model, the existence of Relative deficit constraint allows the coalition to secure any outcome  $(\tau^*, \gamma^*)$ , where  $\tau_Q \leq \tau^* \leq \tau_R$  and  $\gamma^* = 1 + \tau_V(b^{-1}(\tau^*))$ . The outcome is identical both in the initial and final Vote on budget size.*

The interval from which the coalition can select are depicted on Figure 2, including also intervals for Spending limit and Absolute deficit limit.

### 3.4 Public sector size/fiscal volatility trade-off

The key finding of the model is that there is a trade-off between average tax level and volatility of taxes. The stricter institutional configuration, the lower tax and spending, but also higher volatility. This states Proposition 5 and illustrate Figures 3–4.

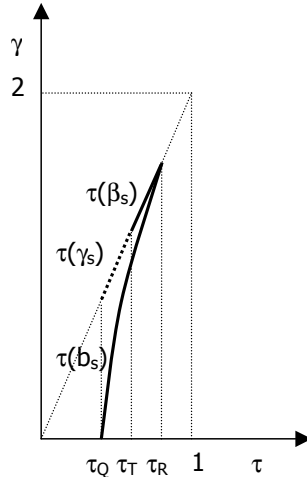


Figure 2: Feasible allocations (Quasi-Linear Model)

**Proposition 5** For any exogenous distribution of  $S$ , expected taxes are lowest with the Spending constraint and highest with None constraint, and volatility in taxes highest with the Spending constraint, and lowest with None constraint. Using corresponding superscripts, we have  $E^\gamma(\tau) \leq E^\beta(\tau) \leq E(\tau) = \tau_R$  and  $\sigma^\gamma(\tau) \leq \sigma^\beta(\tau) \leq \sigma(\tau) = 0$ .

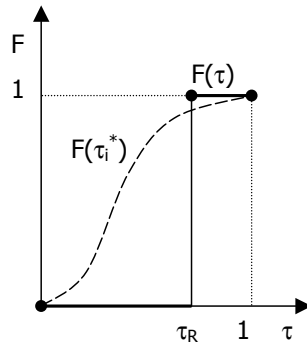


Figure 3: Distribution of taxes (None constraint)

In part, we have derived a standard result, that spending and deficit constraints reduce public spending. A less standard result is that timing of the Vote on budget size has no effect, which is however only a consequence of optimizing on corner solutions.

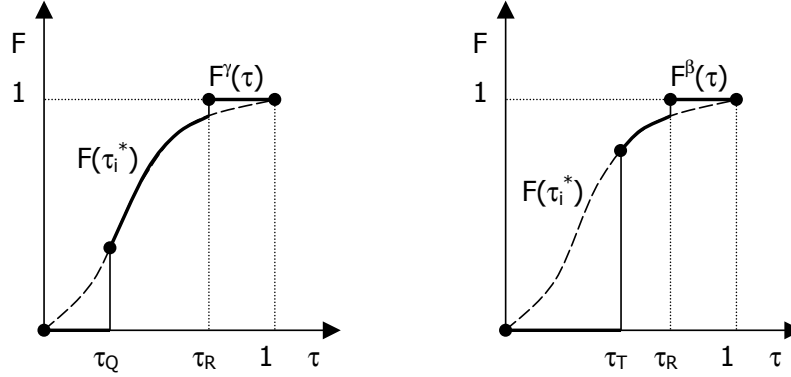


Figure 4: Distribution of taxes (Spending/Absolute deficit constraint)

Even less obvious result is that the (absolute) deficit limit is a generally weaker constraint than the spending limit. Again, this stems from the fact that bliss points are located on the boundary where spending level is maximal, so the present public good consumption is always preferred to public good consumption in the future.

A novelty of this approach is to point to volatility, induced by the procedural rules. The procedural fiscal rules protect budgetary proposals of moderate conservative coalitions, so if the distribution of coalitions is exogenous, we observe higher volatility of taxes and spending levels. Distribution of taxes, in comparison with distribution of individually optimal taxes, is more skewed in the presence of absolute deficit and especially spending constraint. The skewness is related to the fact that there are more public-loving coalitions that cannot protect their proposals than conservative coalitions.

### 3.5 Fiscal governance index

Fiscal governance indices may not appropriately reflect constraining limits of the procedural rules, as the political economy with quasi-linear utility shows. To demonstrate this property, we construct *apriori index* based on the presence of rules, and the *real index*, reflecting the extent to which the governance mode reduces spending. Obviously, using both indices is normatively useful only on presumption that the median behavior exhibits spending bias, which is however not modeled here.

Apriori index, normalized for minimum zero and maximum six points, is constructed such that two points are given for each procedural rule. Initial vote rule means two points (Final vote zero points), and presence of Spending constraint and Deficit constraint give two additional points each. Real index, normalized for minimum zero and maximum six points, counts results, not procedures. If the median outcome  $\tau_R$  is never reduced, we have to impose zero

points. If the executive coalition can select from a narrow interval  $[\tau_T, \tau_R]$ , we count three points. If the coalition optimizes on a larger interval,  $[\tau_Q, \tau_R]$ , we count six points. The following table reports comparison of the two indices:

Table 3: Normalized Apriori/Real index values

	None	Spending	Absolute deficit	Both
Initial	2/0	4/6	4/3	<b>6/3</b>
Final	0/0	<b>2/6</b>	2/3	4/3

Two largest deviations of Real index from Apriori index deserve special attention: on one hand, the Apriori index underestimates disciplining effect of the Spending constraint with Final vote, and on the other hand overestimates effect of both constraints in Initial mode. The reason is threefold here: First, Initial vote in fact brings no additional discipline in this model. Second, when Spending constraint is present, Absolute deficit constraint is redundant. And last, which is the reverse of the latter, Spending constraint is stronger than Absolute deficit constraint.

### 3.6 Majority quota

Decrease in majority quota  $q$  lowers the average number of coalition members and increases the total number of winning coalitions. New compromising budgetary proposals emerge, which make the distribution of proposals more concentrated. As a result, there are relative more budgetary proposals that can be protected by imposing a spending or deficit constraint.

**Proposition 6** *Consider quota  $q^2 > q^1$ . Let  $F_1^\beta(\tau)$  and  $F_2^\beta(\tau)$  be the distribution functions of tax proposals  $\tau_S$  for all winning coalitions  $S$  subject to quotas  $q^1, q^2$  respectively, in the presence of Deficit constraint. By analogy, denote  $F_1^\gamma(\tau)$  and  $F_2^\gamma(\tau)$  the distribution function of tax proposals  $\tau_S$  for all winning coalitions  $S$  subject to quotas  $q^1, q^2$  respectively, in the presence of Spending constraint. Then*

$$F_1^\beta(\tau_R) - F_1^\beta(\tau_T) \geq F_2^\beta(\tau_R) - F_2^\beta(\tau_T), \quad (22)$$

$$F_1^\gamma(\tau_R) - F_1^\gamma(\tau_Q) \geq F_2^\gamma(\tau_R) - F_2^\gamma(\tau_Q). \quad (23)$$

Procedural constraints become relatively more important with a larger number of coalitions. The more frequent use of constraints for lower quota however doesn't imply that the average budget will decline, or that the difference to the median  $\tau_R$  increases. In cases when individuals with extremely conservative preferences obtain very large incomes, the lower quota rather diminishes their bargaining power. The reason is that for lower  $q$ , relatively many new coalitions, where extreme individuals are not included, emerge. Their budget proposals can be protected, unlike budget proposals of coalitions with extreme

individuals. Lower quota hence works in the same way as extension of franchise to poor voters.

If the median budgetary proposal (i.e. median of weighted means) is sufficiently close to the median of individual bliss point, we won't observe this effect.<sup>3</sup> In fact, decrease in quota may be against the interests of big spenders, as the size of government becomes inverse to broadness of coalitions. Recall that we achieved that without any analysis of coordination of budgetary commons.

Generally, we can say that broader coalitions are associated also with lower fragmentation, so the existence of broader coalitions may be related to fragmentation, not to the high majority quota. Then, without incorporating fragmentation explicitly in our model, we might expect that higher fragmentation will induce more frequent use of the nominal fiscal rules.

### 3.7 Endogenous legislators

By Proposition 5, the distribution of taxes in the presence of Deficit and especially Spending constraint is more skewed in comparison with distribution of individually optimal taxes. We may expect that the skewness, namely the fact that a large number of coalitions cannot protect their proposals, affects selection of legislators. The voters may resort to strategic electoral behavior, known also as strategic delegation.

Extension towards endogenous coalitions can proceed in two ways—by making the set legislators  $L$  endogenous, and by abandoning the equiprobability assumption. We follow the first way as suggested in Section 2.3. In the analysis, we need not to derive all subgame-perfect Nash equilibria of the game. We only investigate the case of sincere delegation. By sincere delegation, denote a strategy profile when each district nominates a legislator on the basis of preferences of median voter within the district.

**Proposition 7** *In Quasi-Linear Model, sincere delegation is a subgame-perfect Nash equilibrium when nominal fiscal constraints are absent. With the Deficit and Spending constraint, sincere delegation is not a Nash equilibrium.*

Without nominal fiscal rules, an explanation is obvious. The median district preference is assured by Proposition 1, so whenever the median district votes sincerely and remaining districts by vote more extremely, thereby pronouncing the difference to median district, only  $\tau_R$  will be adopted.

With nominal constraints, sincere voting is suboptimal for extremely conservative districts (i.e. where median voter has preference below the interval in which proposals are secured). By voting more extremely, the district shifts all compromises in which his legislator takes part towards the optimum of the district median. This is costless, because compromises with even more extreme

<sup>3</sup>Consider legislature with  $\tau_1^* = (1, 2, 3, 4, 5)$ , quota  $q^1 = 3, q^2 = 4$ , spending constraint and  $\tau_Q = 2 < \tau_R = 3$ . When total income 60 is distributed by  $\mathbf{y} = (56, 1, 1, 1, 1)$ , we have  $E_1(\tau) \doteq 2.31 > 2.17 \doteq E_2(\tau)$ . When the income is more equally distributed, by  $\mathbf{y} = (9, 1, 40, 9, 1)$ , we get  $E_1(\tau) \doteq 2.75 < 2.79 \doteq E_2(\tau)$ .

legislators are not affected. Therefore, the best response is voting more extremely.

The presence of fiscal constraints in political markets with costless voting and rational voters thus distorts elections, and affects volatility of tax rates and spending levels.

## 4 Cobb-Douglas Model

In Cobb-Douglas economy, the lifetime utility function simplifies as follows:

$$V_i = (1 - \tau)^{\alpha_i} y_i [\gamma^{1-\alpha_i} + p_i(2\tau - \gamma)^{1-\alpha_i}] \quad (24)$$

Again, we first individually optimal tax and spending levels, in other words, individually-specific bliss points. We also find out conditional optima. The only difference is that we study, for algebraic simplicity, only relative deficit.

**Lemma 4** *In Cobb-Douglas Model, bliss points for each individual  $i \in C$  are:*

$$\tau_i^* = 1 - \alpha_i \quad \gamma_i^* = \frac{2(1 - \alpha_i)}{1 + p_i^{\frac{1}{\alpha_i}}} \quad (25)$$

*Optimal tax conditional on fixed spending and optimal spending conditional on fixed tax satisfy:*

$$\tau_i(\gamma_S) = 1 - \alpha_i + \frac{\alpha_i \gamma_S}{2p_i} \left[ p_i - \left( \frac{2\tau_i(\gamma_S) - \gamma_S}{\gamma_S} \right)^{\alpha_i} \right] \quad \gamma_i(\tau_S) = \frac{2\tau_S}{1 + p_i^{\frac{1}{\alpha_i}}} \quad (26)$$

*Optimal tax and optimal spending, conditional on fixed relative deficit, write as:*

$$\tau_i(b_S) = 1 - \alpha_i \quad \gamma_i(b_S) = (1 - \alpha_i)(1 + b_S) \quad (27)$$

Again, like in Quasi-Linear Model, we apply the concept of median parties. Recall that in the model, we had three invariant medians (Q, R and T) and one variant median,  $V(b)$ . In Cobb-Douglas Model, we have a different case. Q is defined implicitly by median of  $\tau_i(\gamma)$ , denoted as  $\tau_Q$ . As regards R, we use that we have closed-form solution of  $\gamma_i(\tau)$ . Let  $(\alpha_R, p_R)$  be the pair of parameters associated with the median  $1 + p_i^{\frac{1}{\alpha_i}}$ . Then, we get  $\gamma_R(\tau)$ , and can also introduce an inverse function  $\tau_R(\gamma) \equiv \gamma_R^{-1}(\tau)$ :

$$\tau_R = \frac{\gamma}{2} \left( 1 + p_R^{\frac{1}{\alpha_R}} \right)$$

We won't use T, since the absolute deficit constraint is not studied. Lastly, V becomes invariant, because  $\tau_i(b) = 1 - \alpha_i$  is constant. Denoting median  $\alpha_i$  as  $\alpha_V$ , we have  $\tau_V = 1 - \alpha_V$ .

**Proposition 8** *In Cobb-Douglas Model without nominal constraints and with the final Vote on budget size, the Legislature adopts the budget  $R \equiv (\tau_V, \gamma_R(\tau_V))$ . With initial Vote on budget size, it adopts the budget  $Q \equiv (\tau_Q(\gamma_Q), \gamma_Q)$ , where in general  $\gamma_Q \neq \gamma_R(\tau_V)$  and  $\tau_Q(\gamma_Q) \neq \tau_V$ .*

The presence of Initial vote changes equilibrium, but the direction depends on distribution of  $(\alpha, p)$ . This is closely related to finding that initial vote may lead to higher expenditures in Ferejohn & Krehbiel (1987). In addition, here it might also be that the level of taxes increase.

## 4.1 Spending limit

Like Quasi-Linear model, when Spending constraint is present,  $\gamma_S$  may affect incentives in both subsequent changes. Therefore, we need to derive bargaining outcome.

**Lemma 5** *Denote  $\hat{p}$  the product of probability of survival of the members of coalition  $S$ , i.e.  $\hat{p} = \prod_{j \in S} p_j$ . Then, the coalition  $S$  in Cobb-Douglas Model prefers the following budget:*

$$\tau_S = 1 - \bar{\alpha} \qquad \gamma_S = \frac{2(1 - \bar{\alpha})}{1 + \hat{p}^{\frac{1}{\alpha}}} \quad (28)$$

Obviously, when the spending limit set by the coalition is too high, it doesn't affect incentives of majority voters, including the respective median legislator. Therefore, either Q or R (depends on initial/final Vote on budget size) sustains as subgame-perfect Nash equilibria. The constraint becomes active only when the median legislator is affected, and has to comply with the restraint (i.e. either  $\gamma_S < \gamma_Q$  or  $\gamma_S < \gamma_R(\tau_V)$ ). This intuition drives the solutions.

**Proposition 9** *In Cobb-Douglas Model with Spending constraint and the initial Vote on budget size, the coalition can secure any outcome  $(\tau_Q(\gamma), \gamma)$ , where  $\gamma \leq \gamma_Q$ . With final Vote on budget size, the coalition can secure any outcome  $(\tau_R(\gamma), \gamma)$ , where  $\gamma \leq \gamma_R(\tau_V)$ .*

We don't study which particular allocation in these subsets are chosen; we can only conclude that the new allocations are less conservative and more future oriented at the same time, because both  $\tau_Q(\gamma)$  and  $\tau_R(\gamma)$  are strictly increasing, so a decrease in spending implies also decrease in taxes, and vice versa. In other words, the coalition cannot make a new allocation more conservative and more current-consumption oriented than the allocation Q or R.

## 4.2 Relative deficit limit

Begin with the more simpler final Vote on budget size. Since  $\gamma_i(\tau)$  is linear and begins in  $(\tau, \gamma) = (0, 0)$ , it implies a constant  $b_i$  for each  $\tau$ . For the median legislator, we denote it  $b_R$ . Therefore, for any  $b > b_R$ , the constraint is inactive, because majority of legislators are not affected. For binding constraints  $b \leq b_R$ , legislators optimize exactly on this constraint, and the optimum is  $\tau_V$ .

The initial Vote on budget size is only different because we have no explicit derivation of conditional optima  $\tau_i(\gamma)$ . For given  $\gamma$ , we don't know whether  $\tau_Q(\gamma) < (1 + b_S)\tau_V$ , which is the condition applied in the last stage. Therefore,

the Legislature in the last stage, when spending is set and relative deficit is constrained, optimizes on the upper envelope of these two functions. When deficit constraint is binding, the Legislature follows the median legislator V, and the optimum is  $\tau_V$ .

**Proposition 10** *In Cobb-Douglas Model with Relative deficit constraint and the initial Vote on budget size, the coalition can secure any outcome  $(\tau_V, \gamma)$ , where  $\gamma \leq \gamma_Q$ . With final Vote on budget size, the coalition can secure any outcome  $(\tau_V, \gamma)$ , where  $\gamma \leq \gamma_R(\tau_V)$ .*

The interval from which the coalition can select is depicted on Figure 5, including also interval for Spending limit.

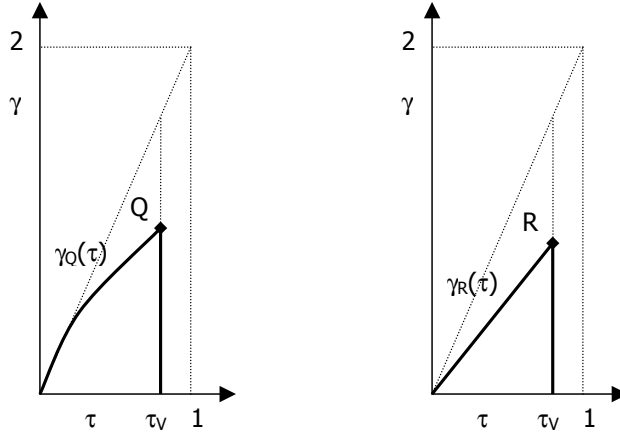


Figure 5: Feasible allocations in Cobb-Douglas Model (initial/final Vote)

### 4.3 Implications

The Cobb-Douglas Model extends the Quasi-Linear Model in two ways. First, volatility and skewness of distribution, when induced by constraints, relates to taxes, spending, and deficit levels. Second, the initial vote changes equilibrium budget, but not in any predictable direction.

Properties of the Spending limit are very similarly to the Quasi-Linear Model: the limit reduces both tax and spending levels, and deficits are unchanged (final Vote), or changed just a little (initial Vote). Spending constraint is stronger than Deficit limits, because it binds not only spending, but also tax rates.

Relative deficit limit works differently than in the Quasi-Linear Model. Tax rate remains unchanged, and the limit only changes the proportion of first-period to second-period spending. Thus, it induces no volatility in taxes. The only problem with interpretation of this constraint is that such type of constraint

is not used often, and the more frequently used Absolute deficit constraint has not been examined yet.

Again, fiscal governance indices may provide insufficient information. First, the initial vote not necessarily decreases spending level, or tax. Second, each nominal limit is suitable for a different policy bias. Deficit limit helps to reduce first-period spending, but not taxes, so it may be help in restoring intertemporal social optimum. In Cobb-Douglas Model, however, it is toothless for intratemporal inefficiency such as common-pool problem, because it imposes no constraint on excessive public sector. Spending limit, in contrary, reduces both spending and taxes, so it solves for excessive spending, but not for intertemporal inefficiency. The limits are not equivalent; a theoretical purist wouldn't mix them in a single index.

In Quasi-Linear Model, the limits were used only by moderately conservative coalitions. In Cobb-Douglas Model, the use of limits is more sophisticated. Spending limit is more likely used when a coalition consists of conservatives, regardless of probability of survival (indicated, for example, by age). We may say that Spending limit is in common interest of young and old conservatives. The Relative deficit limit is more used by coalitions of legislators with large probability of survival, regardless of preference for total size of the budget. In other words, this limit is in common interest of young legislators, both conservative and public-good loving ones. To conclude, we young conservatives are those who tend to use the constraints at most, but which constraint they use depends on with whom they create a coalition.

## 5 Conclusion

Because the public good is single and homogenous, the legislative process we have modeled does not suffer from allocation inefficiencies of the common-pool type. The problem is the pure conflict of interest that cannot be overcome under given flat tax system and in the absence of compensations.

We have shown that this conflict is settled in the absence of procedural fiscal rules and enforceable coalitional commitments. The outcome is stable regardless of who holds executive power, because in the legislature, legislators in opposition can perfectly exploit differences within the ruling coalitions when voting in separate stages. When some nominal fiscal rule is present, the outcome is coalition-dependent. Spending limit groups interests of conservative legislators, and Deficit limit induces future-oriented legislators cooperate. When coalitions appear randomly (we don't have a dynamic model allowing for endogenous coalition-making), the fiscal governance implies macroeconomic volatility. Moreover, the volatility may not decrease when broader coalitions (by increased majority quota) are required. And last, but surely not least, fiscal governance invites strategic delegation effect.

Policy implications of fiscal governance are thus twofold. In common-pool problems, fiscal governance works as a coordination device; in pure conflicts of fiscal preferences, it is a protection device. This ambiguity implies that strong

fiscal governance may both eliminate and magnify fiscal costs of political fragmentation. The fact that multi-party governments find it easier to rely on Commitment mode, as Hallerberg (1999) observes, not necessarily means motivation for efficiency, but for mutual protection. Also notice that common measures of fiscal governance may be misleading, because the limits solve different biases in different specifications.

To conclude: in political economy where coalitions cannot commit legislators, higher fiscal governance improves fiscal policy only if macroeconomic volatility is not too costly.

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## **A Proofs**

To be completed.