Mandatory Spending, Political Polarization, and Macroeconomic Volatility

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Abstract

Political polarization combined with political turnover have been shown to amplify economic fluctuations (Azzimonti and Talbert, 2014). This paper analyzes a fiscal policy institution capable of reducing the volatility caused by these political frictions. We introduce the distinction between mandatory and discretionary public spending in a political model of optimal fiscal policy. We show that different legislative nature of these components of government spending leads to a divergent impact of mandatory and discretionary spending on politically-driven macroeconomic volatility. Increasing the fraction of mandatory spending in total government spending reduces the volatility; increasing the fraction of discretionary spending has the opposite effect. The presence of the legislative requirements behind the changes in mandatory public spending can explain simultaneous rise in political polarization and decline in the U.S output volatility after the 1980s.

Keywords: business cycles; optimal fiscal policy; mandatory and discretionary public spending; macroeconomic volatility; political economy; political polarization.

JEL Classification Numbers: E6, H1, H3, H4.

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1 Introduction

In democratic societies, the government role is to improve economic performance and welfare. Periodic elections serve as disciplining mechanism that helps politicians work towards fulfillment of socially-desirable government objectives. One problem with such democratic arrangement is that society may not enjoy complete agreement about what policy should be implemented by the government. Social divisions (by region, by income level, or other) imply that government objectives may differ across political parties representing different social groups. This phenomenon, called political polarization, have been shown to increase economic policy uncertainty and amply business cycles (Azzimonti and Talbert, 2014). Politically-driven fluctuations arise because of periodic elections (political turnover) that cause shifts in government ideology (political polarization). Thus, democratic political process can hinder consumption smoothing unless there are institutions that restrict its influence on government policies.

The aim of this paper is to analyze a fiscal policy institution capable of reducing economic fluctuations caused by these political frictions. We introduce the distinction between mandatory and discretionary public spending in a political model of optimal fiscal policy. Mandatory spending, which is more rigid than discretionary spending, restricts the government's ability to select its preferred policy. This restriction leads to lower divergence between the fiscal variables set by alternating governments and therefore, reduces the fluctuations caused by political frictions.

The time-series data for the U.S., where mandatory and discretionary government outlays are explicitly defined and documented since 1962,[1] exhibit trends consisted with predictions of the model. The U.S. output volatility has declined since the 1980s even though the political polarization has significantly increased during the same time. We relate this decline to the presence of the legislative requirements behind the changes in mandatory spending in the U.S., as described in our model. We calibrate the model to match the output volatility and the structure of government spending in the U.S. during 1962–1985. We then conduct several counterfactual experiments to evaluate the impact

[1]Discretionary spending is defined as expenditure that is governed by annual or other periodic appropriations (possible examples are defense and public order spending). Mandatory spending is defined as expenditure that is governed by law, rather than by periodic appropriations (possible examples are health care and social security). See, for example, Levit, Austin, and Stupak (2015).

of political frictions and mandatory spending on output volatility in the U.S., comparing time periods before and after 1985. According to the model, if output volatility were caused only by political frictions and there were no legislative restrictions behind the changes in mandatory spending, output volatility would have increased by 35% after 1985 due to increased political polarization. If output volatility were caused only by political frictions, political polarization stayed constant, and the government faced legislative requirements behind the changes in mandatory spending, output volatility would have decreased by 25% after 1985 due to the increase in mandatory spending. A rise in political polarization combined an increase in the fraction of mandatory spending, both observed after 1985, can explain a decline in output volatility in the U.S. after 1985, assuming that political frictions are the only source of volatility.

This study borrows from Bowen, Chen, and Eraslan (2014), who model mandatory spending in a legislative bargaining framework and discuss its efficiency relative to discretionary spending. Similar to these authors, we consider an economy with political frictions in the form of political turnover and polarization and we assert that mandatory spending allows to achieve political compromise in the context of public good provision. Differently from these authors, in our model the output is endogenously determined, which allows us to analyze the consequences of mandatory spending for macroeconomic volatility.

This paper is related to a large literature that recognizes political institutions as a cause of inefficient government policies and a channel of policies' impact on macroeconomic volatility. Acemoglu et al. (2003) demonstrate the existence of institutions-policies-volatility link empirically using the historically determined component of institutions to identify causality in a cross section of countries. A number of theoretical studies use political frictions to explain procyclicality of government expenditures (Ilzetski, 2011; Alesina, Campante, and Tabellini, 2008; Woo, 2009); higher that socially optimal public debt and taxes (Battaglini and Coate, 2008; Yared, 2010); under-accumulation of physical capital and public over-spending (Azzimonti, 2011; Azzimonti, 2015). Fatás and Mihov (2003, 2006) provide empirical evidence that governments that intensively rely on discretionary spending induce significant macroeconomic volatility. Institutional arrangements that constrain discretion allow to reduce macroeconomic volatility, even though the ability of governments to react to business cycle fluctuations can be also reduced.

This paper is related to the literature on the possible causes of the decline in macroeconomic volatility in the mid 1980s – the Great Moderation. Stock and Watson (2003), Bernanke (2004), Summers (2005), and Galí and Gambetti (2009), among many others, discuss three possible explanations of the Great Moderation: structural changes in the economy, better monetary policy, and "good luck." In this work we suggest that better fiscal policy could also have contributed to the decline in the U.S. output volatility.

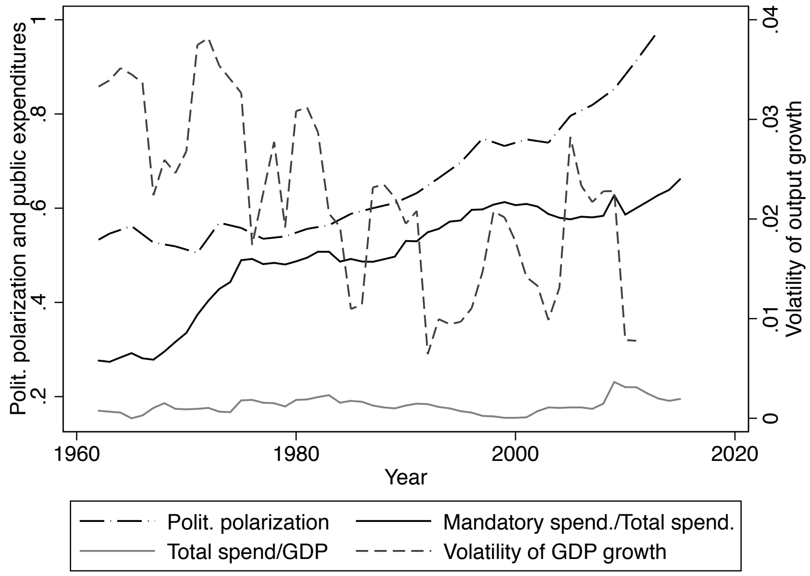
The remainder of the paper is organized as follows. Section 2 reviews the trends in the U.S. data on political polarization, mandatory and discretionary government spending, and output volatility during 1962–2015. Section 3 presents a model that combines these variables in a dynamic political economy framework. Section 4 evaluates the contribution of mandatory spending and political polarization to output volatility in the model, compares it to the U.S. data, and conducts several counterfactual experiments. Section 5 concludes and discusses several possible extensions.

2 The Data

In this section, we review the recent trends that have characterized the behavior of public spending and its mandatory and discretionary components, political polarization, and macroeconomic volatility in the U.S between 1962 and 2015. The data sources are as follows. Political polarization measure is taken from Poole and Rosenthal (2000). The original time-series of political polarization are bi-annual, we transform the data to the annual frequency using linear interpolation. The data on public spending and GDP is from the U.S. Government Budget historical tables. There, mandatory and discretionary outlays are explicitly defined and reported on annual basis starting from year 1962. As a measure of total government spending, we use the sum of mandatory and discretionary outlays, excluding net interest payments. The output volatility is measured as the standard deviation of output growth over five-year rolling window periods.

Figure (1) presents the time-series of mandatory spending as a share of total government spending, total government spending as a share of GDP, and political polarization (on the left axis) and the time-series of the measure of output volatility (on

Figure 1: Political polarization, mandatory spending, and output growth volatility in the U.S.



Data source: Government spending and output are from Historical Tables of the United States Government Budget; political polarization is from Poole and Rosenthal (original bi-annual time-series have been interpolated to annual data).

the right axis). Both the political polarization and the mandatory spending increased significantly between 1960 and 2015. In particular, the degree of political polarization increased from 0.505 to 0.976, with the major rise occuring after 1985. The fraction of mandatory spending in total government spending increased from around 27% to 66%. The share of total government spending in the GDP accounted for approximately 18% and did not change significantly during 1962–2015.

The output volatility decreased over the same time period. This reduction in output volatility, after the 1980s as compared with pre-1980s, has been documented in the literature as the "Great Moderation." We follow the literature and split the data into pre- and post-1985 subperiods to compute the moments that characterize our variables of interest. Table (1) reports the results. The volatility is computed as the average standard deviation of output growth over five-year rolling window periods, corresponding to the variable depicted in Figure (1), and the standard deviation of output detrended with HP (Hodrick and Prescott, 1997) filter using the smoothing parameter 100. On average, the volatility decreased by around 25%, the share of mandatory spending increased by

50%, and polarization increased by 38% between the two subperiods.

Table 1: The U.S. data moments, 1962–2015.

	1962–1984		1985–2015	
	Mean	St.Dev.	Mean	St.Dev.
Polit. polarization	0.544	0.019	0.740	0.108
Mandatory spend./Total spend,in %	40.00	9.406	57.56	4.716
Total spend/GDP, in %	17.93	1.299	18.16	1.885
Volatility of GDP growth	0.029	0.006	0.016	0.006
GDP HP-filtered	0.000	0.033	0.000	0.029

Note: The first two columns report statistics for time period 1962–1984; the last two columns report statistics for time period 1985–2015. Government spending and output are from Historical Tables of the United States Government Budget; political polarization is from Poole and Rosenthal (2000). The output volatility is measured as the standard deviation of real GDP per capita growth over five-year rolling window periods and as the standard deviation of the HP-filtered (with smoothing parameter 100) logarithm of real GDP per capita.

Next, we consider a dynamic political economy model that combines the variables described in Figure (1) and Table (1). We use the model to investigate whether the changes in the structure of government spending and/or political polarization can explain any of the reduction in output volatility documented in Table (1).

3 The Model

Consider a discrete-time infinite-horizon economy populated by two types of agents, L and R, of equal measure with total population normalized to one. While they have identical income, the two types of agents have different preferences over the size of the public sector.[2] The instantaneous utility of type $h \in L, R$ agent j is the following:

[2]Given that there is no income inequality, the differences in preferences are driven by ideological rather than economic motives.

$$u(c_j, n_j) + \lambda_h v(G), \tag{1}$$

where c_j denotes the agent's consumption of private goods, n_j denotes labor hours, and G denotes aggregate public spending. Following Greenwood, Hercowitz and Huffman (1988), we assume that preferences over consumption and labor satisfy

$$u(c, n) = \log \left(c - \frac{1}{\varphi} \frac{n^{1+\frac{1}{\epsilon}}}{1 + \frac{1}{\epsilon}} \right), \tag{2}$$

where ϵ is the elasticity of labor. Agents discount the future at rate $\beta \in [0, 1)$.

There are infinitely many competitive firms that produce a single consumption good and hire labor each period so as to maximize profits. Firms have access to a technology linear in labor:

$$y = n, \tag{3}$$

where n is the aggregate labor hours and labor productivity is normalized to one.[3] Given that the firms are competitive, the wage rate is equal to one.

The government raises revenues via a proportional tax τ that is chosen every period, so private consumption is

$$c_j = (1 - \tau) n_j. \tag{4}$$

Tax revenues are used to finance the provision of public goods. The government budget constraint is

$$G = \tau n. \tag{5}$$

Combining the public and private sectors of the economy, the economy resource constraint reads as follows:

$$c + G = n, \tag{6}$$

where c denotes aggregate private consumption.

Competitive firms decide how much labor to hire given wages. Agents choose consumption and leisure, taking wages and government policy as given. It is convenient to formulate government policy in terms of tax rate rather than public spending and let

[3] We could add exogenous stochastic process for labor productivity and evaluate how mandatory spending reduces volatility due to the exogenous productivity shocks. This is not the main question of the paper and is therefore left for future research.

the aggregate public spending adjust to balance the government budget. A competitive equilibrium given government policy is defined below.

A competitive equilibrium given government policy τ*, is a set of allocations,* $\{c_j(\tau), n_j(\tau)\}$*, prices* $w(\tau)$*, and public spending* $G(\tau)$ *such that:*

(i). Agents maximize utility subject to their budget constraint. Agent j's labor supply satisfies

$$u_1(c_j(\tau), n_j(\tau))(1-\tau)w + u_2(c_j(\tau), n_j(\tau)) = 0,$$

where

$$c_j(\tau) = (1-\tau)wn_j(\tau).$$

(ii). Firms maximize profits, so $w = 1$*.*

(iii). Markets clear: $n(\tau) = \int_j n_j(\tau)$*.*

(iv). The government budget constraint is satisfied: $G(\tau) = \tau n(\tau)$*.*

Given the additive separability of the utility derived from the provision of public goods, the solution to the agent maximization problem is independent of the agent's type. Hence, we can think of the competitive equilibrium as characterized by the decisions of a representative agent with $n_j(\tau) = n(\tau)$ and $c_j(\tau) = c(\tau)$. Given the assumed utility functions, the optimal allocations resulting from the agent maximization problem are as follows:

$$c(\tau) = (1-\tau)^{1+\epsilon}, \tag{7}$$

$$n(\tau) = (1-\tau)^{\epsilon}. \tag{8}$$

Next, we characterize the government policy.

3.1 Government Policy

The role of the government in this economy is to provide public goods. Given the disagreement between groups over the size of the public sector, political parties will endogenously arise in a democratic environment (Azzimonti, 2015). There are two parties, L and R, representing each group in the population and competing for office every period. The probability of winning the election conditional of being in power during the last period is $P \geq 0.5$ and the probability of loosing the election to the opposition is $1 - P$.[4]

The total government spending G consists of mandatory and discretionary public expenditures:

$$G = g + x, \tag{9}$$

where g denotes mandatory public spending and x denotes discretionary public spending.

The two types of public expenditures are combined in the agent's utility as follows:

$$v(G) = \theta \log(g) + (1 - \theta) \log(x + x_0), \tag{10}$$

where θ is the relative weight on mandatory versus discretionary spending, and x_0 is a constant. The presence of $x_0 > 0$ ensures that the utility is bounded when $x = 0$.

The elected party chooses the tax rate and the allocation of government resources between mandatory and discretionary spending so as to maximize the utility of its own type. There is no disagreement about the composition of public spending, therefore for both parties the optimal mandatory and discretionary spending are fractions θ and $1 - \theta$, respectively, of the total government spending, adjusted by the constant x_0:

$$g(\tau) = \theta G(\tau) + \theta x_0, \tag{11}$$

$$x(\tau) = (1 - \theta) G(\tau) - \theta x_0. \tag{12}$$

Under these choices of mandatory and discretionary spending, the utility from the total government spending simplifies as follows:

$$v(G(\tau)) = \log(G(\tau) + x_0) + \log(\theta^\theta (1 - \theta)^{1-\theta}). \tag{13}$$

The parties agree on the composition but disagree on the size of public sector and therefore, will impose different tax rates. The distinction between mandatory and discretionary public spending combined with the disagreement on the total size of public sector are the main drivers of the results highlighted in this paper.

[4] Azzimonti (2011) endogenizes the probability P in a voting model in which the outcome of the election is dictated by political preference shock as well as voters' expectations about the economic outcomes.

Discretionary spending is defined as expenditure that is governed by annual or other periodic appropriations. Mandatory spending is defined as expenditure that is governed by law, rather than by periodic appropriations. We follow the modeling approach by Bowen, Chen and Eraslan (2014) to account for different legislative requirements behind the changes in these public spending components. In particular, we assume that the party in power chooses the current public spending, g and x, subject to the approval by the opposition (the party which lost the elections) with the alternative being the status quo.[5] The status quo consists of the previous period level of mandatory spending, which we denote by s, and zero discretionary spending. The opposition approves the incumbent policy if its utility from that policy is greater than that under the status quo. We assume that the opposition party always accept the policy suggested by the party in power if it is indifferent between acceptance and rejection. Then, in equilibrium all the proposals are accepted.

Given that the optimal mandatory and discretionary spending are the constant fractions of total tax revenues, it proves more convenient in the subsequent analysis to re-formulate the status quo in terms of mandatory and discretionary spending into the status quo in terms of tax rate and discretionary spending. In particular, we consider the government policy as the choice of the tax rate by the incumbent, subject to the approval by the opposition with the status quo being the previous period tax rate, which we denote by τ_s, and zero discretionary spending. There is correspondence between τ_s and s as follows: $s = \theta(\tau_s(1-\tau_s)^\epsilon + x_0)$. The tax rate required to finance the status quo mandatory spending s, which we denote by $\eta(\tau_s)$, can be computed from the government budget constraint as follows:

$$\eta(\tau_s)(1-\eta(\tau_s))^\epsilon = \theta(\tau_s(1-\tau_s)^\epsilon + x_0). \tag{14}$$

The instantaneous utility derived from the public sector under the status quo expenditures is given by:

$$v(G(\tau_s)) = \theta\log(\theta\tau_s(1-\tau_s)^\epsilon + \theta x_0) + (1-\theta)\log(x_0). \tag{15}$$

[5]Thus, we consider a political system with unanimity rule. As in Bowen, Chen and Eraslan (2014), we justify this assumption by the fact that many political systems have institutions that limit a single party's power, for example, the "checks and balances" included in the U.S. Constitution. Under these institutions, if the majority party's power is not suffciently high, then it needs approval of the other party to set new policies (Bowen, Chen and Eraslan, 2014).

3.2 Markov-perfect equilibrium

There is no commitment technology, so promises made by any party before elections are not credible unless they are optimal ex-post. As nicely explained in Klein, Krusell, and Rios-Rull (2008) and Azzimonti (2015), among other related studies, the party in power plays a game against the opposition, taking the opposition policy as given. We focus on Markov-perfect equilibria (MPE), defined as a set of strategies that depend only on the current, payoff-relevant state of the economy. Given that the firms and agents problems are static, and the government budget constraint includes only contemporaneous variables, the status quo level of taxes, τ_s, is the only endogenous payoff-relevant state of the economy. The other, exogenous, state variable is the identity of the party in power. The party in power decides on the optimal policy knowing that it will be replaced by the opposition with probability $1-P$ and given the legislative requirements behind the changes in mandatory and discretionary spending. The value function of type h agent when his party is in power will be denoted by $V_h(\tau_s)$ and when his party is out of power by $W_h(\tau_s)$.

Suppose party L is in power. Its objective function in the current period is given by:

$$\max_{\tau} u(c(\tau), n(\tau)) + \lambda_L v(G(\tau)) + \beta(PV_L(\tau_s') + (1-P)W_L(\tau_s')) \tag{16}$$

$$s.t.: u(c(\tau), n(\tau)) + \lambda_R v(G(\tau)) + \beta(PW_R(\tau_s') + (1-P)V_R(\tau_s')) \geq$$

$$(1-\lambda_R)u(c(\eta(\tau_s), n(\eta(\tau_s))) + \lambda_R[\theta \log(\theta\tau_s(1-\tau_s)^{\epsilon} + \theta x_0) + (1-\theta)\log(x_0)] +$$

$$\beta(pW_R(\eta(\tau_s)) + (1-p)V_R(\eta(\tau_s))), \tag{17}$$

$$\tau_s' = \tau, \eta(\tau_s)(1-\eta(\tau_s))^{\epsilon} = \theta(\tau_s(1-\tau_s)^{\epsilon} + x_0). \tag{18}$$

where $c(\tau)$ and $n(\tau)$ are given by (7) and (8), respectively, and $G(\tau) = \tau n(\tau)$.

Political Equilibrium: An equilibrium satisfies

i. Given the value functions V_h and W_h with $h \in \{L, R\}$, and competitive equilibrium *allocations, the party h's policy function $\mathcal{T}_h(\tau_s)$ satisfy:*

$$\{\mathcal{T}_h(\tau_s)\} \in \arg\max_{\tau} u(c(\tau), n(\tau)) + \lambda_h v(G(\tau)) + \beta(PV_h(\tau_s') + (1-P)W_h(\tau_s'))$$
$$s.t.: u(c(\tau), n(\tau)) + \lambda_{\neg h} v(G(\tau)) + \beta(PW_{\neg h}(\tau_s') + (1-P)V_{\neg h}(\tau_s')) \geq$$
$$u(c(\eta(\tau_s)), n(\eta(\tau_s))) + \lambda_{\neg h}[\theta \log(\tau_s n(\tau_s) + \theta x_0) + (1-\theta)\log(x_0)] +$$
$$\beta(pW_{\neg h}(\eta(\tau_s)) + (1-p)V_{\neg h}(\eta(\tau_s))),$$
$$\tau_s' = \tau,$$
$$\eta(\tau_s)(1-\eta(\tau_s))^{\epsilon} = \theta(\tau_s(1-\tau_s)^{\epsilon} + x_0).$$

ii. *Given the policy functions $\mathcal{T}_L(\tau_s)$ and $\mathcal{T}_R(\tau_s)$ and competitive equilibrium allocations, the value functions V_h and W_h with $h \in \{L, R\}$ satisfy functional equations:*

$$V_h(\tau_s) = u(c(\mathcal{T}_h(\tau_s)), n(\mathcal{T}_h(\tau_s))) + \lambda_h v(G(\mathcal{T}_h(\tau_s))) +$$
$$\beta(PV_h(\mathcal{T}_h(\tau_s)) + (1-P)W_h(\mathcal{T}_h(\tau_s))),$$
$$W_h(\tau_s) = u(c(\mathcal{T}_{\neg h}(\tau_s)), n(\mathcal{T}_{\neg h}(\tau_s))) + \lambda_h v(G(\mathcal{T}_{\neg h}(\tau_s))) +$$
$$\beta(PV_h(\mathcal{T}_{\neg h}(\tau_s)) + (1-P)W_h(\mathcal{T}_{\neg h}(\tau_s))).$$

iii. *Given the value and policy functions, consumption and labor constitute competitive equilibrium allocations.*

Next, we characterize incumbent h's optimal choices, the role of the status quo constraint imposed by the legislative requirements behind the choice of mandatory public spending, and equilibrium dynamics of the economy.

3.3 Characterization

The disagreement between the two agent types about the public sector size implies that the two parties prefer different tax rates. We measure the magnitude of this disagreement by the absolute value of the difference between the relative weights the two types of agents put on the public versus private consumption, λ_L and λ_R. We refer to this difference as the degree of *political polarization* in the economy. Equal weights imply that there is no political polarization in the society; greater $|\lambda_L - \lambda_R|$ corresponds to greater political polarization.

Without the status quo constraint imposed by the legislative requirements on the choice of mandatory public spending, the problem of the government would be static and the optimal fiscal policy would consist of tax rates proportional to the weights λ_L and λ_R. Given exogenous political turnover and the fact that the allocations and output are functions of government policy, the economy would be characterized by fluctuations due to political changes. Greater political polarization would imply greater fluctuations due to political changes as in Azzimonti and Talbert (2014).

The status quo constraint, when binding, forces the party in power to choose the policy closer to that preferred by the opposition. To see this, notice that both parties enjoy higher utility when the tax rate is closer to their unconstrained optimal taxes. This implies that the tax rates chosen under the binding status quo constraint lie in the interval restricted by the tax rates that would be chosen if there were no status quo constraint. The fluctuations due to political changes are therefore of smaller magnitude under the (at least occasionally) binding status quo constraint. We formalize this intuition below.

We assume without loss of generality that $\lambda_R < \lambda_L$ and we denote by $\tau_h^\star$ the tax rate that would be chosen by the party h if there were no status quo constraint. Given the competitive equilibrium allocations, this tax can be found from the first order conditions associated with unconstrained government maximization problem (16). In particular, after substituting the functional forms, the unrestricted tax $\tau_h^\star$ is defined by the following equation:

$$\lambda_h(1-\tau_h^\star)^\epsilon(1-\tau_h^\star(1+\epsilon)) - (1+\epsilon)(\tau_h^\star(1-\tau_h^\star)^\epsilon + x_0) = 0,\ h \in \{L, R\}. \tag{19}$$

The instantaneous utility is concave in τ and the set defined by the status quo constraint is compact. Therefore, the value functions are concave in the interval where the status quo constraint is binding. The value functions are constants that depend on $\tau_L^\star$ and $\tau_R^\star$ for the values of state variable for which the constraint is not binding.

Proposition 1: Introducing the status quo constraint reduces politically-driven volatility.

Proof is relegated to Appendix.

The status quo constraint, specifying the level of mandatory spending that must be followed if there is no agreement between the parties on the fiscal plan, serves as a guarantee of some reservation utility level for the opposition. It induces the party in power to set the tax rate closer to that preferred by the opposition and, through the impact of fiscal policy on allocations and output, reduces the politically-driven fluctuations in the economy.

Corollary 1. In equilibrium, the tax rates τ_s lie in the interval $[\tau_R^\star; \tau_L^\star]$.

The dynamics of the economy depends non-trivially on the parameters of the model, θ, x_0, and λ_L and λ_R. The constant x_0 is fixed and defines the set of tax rates for which the constraint is binding. Higher x_0 implies that the reservation utility of the opposition is higher, which increases the bargaining power of the opposition. Thus, higher x_0 corresponds to a larger set of status quo tax rates (or mandatory spending levels) for which the constraint is binding.

We characterize the influence of the weight on mandatory spending, θ, and of political polarization, $\lambda_L - \lambda_R$, on the equilibrium policies for a particular case when $\beta = 0$ in the proposition below.

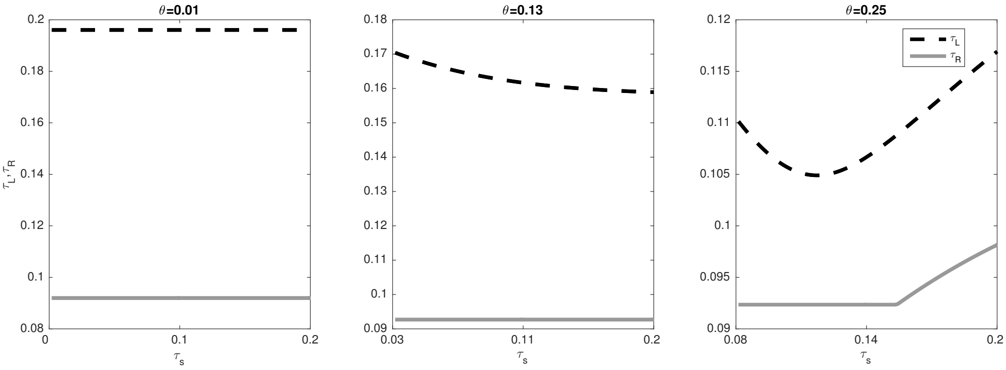
Proposition 2. Assume $\beta = 0$ and the status quo constraint is (at least occasionally) binding. Keeping other parameters constant, higher weight on mandatory spending, θ, leads to more binding status quo constraint. Keeping other parameters constant, higher political polarization, $\lambda_L - \lambda_R$, leads to more binding status quo constraint.

Proof is relegated to Appendix.

Corollary 2. Assume $\beta = 0$ and the status quo constraint is (at least occasionally) binding. Keeping other parameters constant, higher weight on mandatory spending, θ, reduces politically-driven volatility. Keeping other parameters constant, higher political polarization, $\lambda_L - \lambda_R$, reduces politically-driven volatility.

If the status constraint does not bind, the changes in θ affect only the fraction of mandatory spending in total government spending, without any consequences for the volatility or the level of taxes. For binding status quo, higher θ implies that mandatory spending is more important for both parties, and therefore, the bargaining power of the opposition is greater. This leads to smaller differences between the policies chosen

Figure 2: Policy Functions and the Status Quo Constraint



Note: Figure presents the policy functions for party R (grey line) and party L (dashed line) for θ=0.01, 0.13, and 0.25 in the first, second, and third graph, respectively. The remaining parameters are as follows: λ_R= 1.6475, λ_L=2.7621, x_0=0.2234, $\beta = 0.95$, $P = 0.83$.

by different parties, and therefore, lower volatility due to political frictions. Similar intuition applies to the changes in political polarization, $\lambda_L - \lambda_R$.

Our numerical simulations suggest that the results outlined in Proposition 2 and Corollary 2 also hold for general case with $\beta \in [0, 1)$. Figure (2) presents the policy functions for three different values of θ, keeping other parameters constant. For low values of θ, the equilibrium is characterized by unrestricted policies as neither party faces binding constraint when choosing its tax rate. For the intermediate levels of θ, only the party L's constraint is binding. For high values of θ, both parties face binding status quo constraint. The pattern is very similar for different values of $\lambda_L - \lambda_R$, keeping other parameters constant. The impact of an increase in political polarization, $\lambda_L - \lambda_R$, on output volatility depends on whether the status quo constraint is binding. When the status quo constraint does not bind, greater polarization leads to more divergent policies and higher volatility. When the status quo constraint is binding, an increase in polarization makes the status quo restriction more important for negotiations and brings the party L's and R's tax rates closer together. The value functions resemble policy functions and therefore, are not shown on the graph.

Importantly, change in any of the parameters affect all the variables. For example, an increase in political polarization leads to an increase in the average fraction of mandatory spending and lower average total government spending (or lower income taxes). This is the consequence of the strategic behavior of the party in power: in more polarized society, where the status quo constraint is frequently binding, it is optimal for the incumbent to choose more mandatory spending, and in this way to increase its reservation utility and bargaining power for the next period, when it may not be re-elected.

We quantify the impact of political polarization and mandatory spending on macroeconomic volatility controlling for the level of taxes and total government expenditures in a calibrated version of the model in the next section.

4 Quantitative Analysis

In this section, we calibrate the model and test whether the changes in political polarization, $|\lambda_L - \lambda_R|$, and/or changes in the fraction of mandatory spending, θ, can explain any of the reduction in output volatility reported in Table (1).

We solve the model using value functions iterations on the grid of states. This is a convenient numerical approach given that the value function is nondifferentiable at some points (at which the status quo constraint becomes binding).

4.1 Calibration

A time period represents a year. We use the discount factor $\beta = 0.95$ and the probability of re-election $P = 0.83$ as in Azzimonti and Talbert (2014).

For convenience, we translate the parameters characterizing the weights that the two types of agents put on their utility from the public sector, λ_L and λ_R, into the average economy-wide weight on the public sector, λ, and polarization measure, Δ, as follows:

$$\lambda_R = \lambda - \Delta, \ \lambda_L = \lambda + \Delta. \tag{20}$$

We are interested in the following moments from the U.S. data: the average fraction of mandatory spending in total government spending, the average fraction of total public spending in the GDP, and the average volatility of output, computed over the subperiods before and after 1985, as reported in Table (1). We ask how much of the change in these moments between the two subperiods can be accounted for by the change in the weight on mandatory spending, θ and/or the change in political polarization, Δ.

Note that these three moments are not mutually independent in the model, therefore, we can match only two of them. In particular, we choose λ, Δ and θ together to match the average volatility of output and the average fraction of mandatory spending in total government spending in the U.S. over the first subperiod, 1962–1984. Given these parameters, the value of parameter x_0 defines the subset of state variables for which the status quo constraint is binding.

Theoretically, there exists a range of x_0 for which the status quo constraint is never binding, occasionally binding for one party, occasionally binding for both parties, always binding for one party, and always binding for both parties. The only restriction imposed on x_0 by the model is that its value is such that the level of discretionary spending defined by equation (12) is positive.

In calibration, the value of x_0 jointly with λ, Δ and θ influences the moments of interest. This fact implies that the range of x_0-s which are relevant for the U.S. data moments is significantly restricted. In particular, we could not find a value of x_0 such that the moments of interest are replicated by the model and both parties have (at least occasionally) binding status quo constraint. Therefore, we proceed with the analysis for a value of x_0 for which only party L's status quo constraint is always or occasionally binding.

The implications of the model depend on whether the status quo constraint is binding. We do not know whether this constraint was binding for the U.S. economy during 1962–1984. We consider three possibilities and compare the outcomes to evaluate how relevant is the status quo constraint for explanation of the data reported in Figure (1) and Table (1).

First, we choose x_0 (together with λ, Δ, θ to match the moments of interest for subperiod 1962–1984) so that party L's status quo always binds. This is our baseline calibration.

Second, we use the same value of x_0 and adjust λ and θ so that the two moments of interest (output volatility and the fraction of mandatory spending in the first subperiod) are still replicated by the model but party L's status quo constraint does not bind. It becomes occasionally binding when the fraction of mandatory spending increases, as in the second subperiod of the U.S. data.

Third, we again use the same x_0 and assume that there is no particular legislative regulations for mandatory spending, so that the party in power does not face the status quo constraint. In this third case, we again adjust λ and θ so that the two moments of

Table 2: Calibrated parameters.

Parameter	Value when L's status quo binds always; occasionally; never	Target (in U.S. data over 1962–1984)
β	0.95	Azzimonti and Talbert (2014)
P	0.83	Azzimonti and Talbert (2014)
λ	2.2048; 1.7703; 1.7703	tax rate ≈ 0.18
Δ	0.5573	st.dev(output growth)=0.033
θ	0.1144; 0.1343; 0.1343	mean(Mand. spend/Total spend)=0.4
x_0	0.2234	100%;50%;0% of states are binding for party L

interest (output volatility and the fraction of mandatory spending in the first subperiod) are matched by the model. Note that party R's constraint is never binding in all three calibrations.

The parameter values corresponding to the three cases and the targeted moments are reported in Table (2).

Having obtained the parameter values, we evaluate the impact of a change in political polarization, reflected in the change in Δ, and the impact of a change in the fraction of mandatory spending, reflected in the change in Δ and/or θ, on output volatility, keeping the share of total government spending in output constant as in the data (by adjusting parameter λ), and assuming that the only source of economic fluctuations is political turnover. The results are reported below.

4.2 Polarization, Mandatory Spending, and Volatility

We now compare the data from the first and second subperiods, as reported in Table (1). The fraction of mandatory spending increased from around 40% to around 60% while the fraction of total government spending in output, corresponding to the tax rate in the model, stayed the same. The output volatility decreased and the political polarization increased by 38% in the second subperiod compared with the first one. Can these trends

Table 3: Counterfactual Experiments: The impact of Polarization and Mandatory Spending on Volatility.

Experiment	Output volatility		
with L's status quo binding	always	occasionaly	never
θ increases to match $g/G = 0.6$	0.0245	0.0297	0.0330
Δ increases by 38% and θ increases to match $g/G = 0.6$	0.0252	0.0309	0.0445
Δ increases to match $g/G = 0.6$	0.0142*	0.0423*	0.0788*

Note: Each row reports the output volatility computed as the average standard deviation of simulated and HP-filtered output series. In the experiments, λ is adjusted so that the tax rate stays the same as in the first subperiod, corresponding to the calibration reported in Table (2).
*The admisible change in λ is not sufficient to maintain the tax rate as in the first subperiod, corresponding to the calibration reported in Table (2).

be related to the legislative requirements behind the structure of government spending, as outlined in our model?

We conduct three counterfactual experiments and evaluate the consequences for the calibrations featuring always, occasionally, and never binding status quo constraint of party L.

First, we increase the weight on mandatory spending, θ, so that the fraction of mandatory spending in total government spending increases from 40% to 60%, as in the data. At the same time, we adjust λ so that the fraction of total government spending in output (corresponding to tax rate in the model) stays constant, as in the two subperiods in the data (the value in the model is around 0.12 rather than 0.18 in the data). We keep political polarization constant in this experiment.

The results for output volatility are reported in the first row of Table (3). When party L's status quo constraint is binding on the whole state space (the first column of Table (3)), output volatility decreases from 0.0330 to 0.0245. When there is no status quo constraint imposed on the parties competing for government and their policy choices are unrestricted, the output volatility is not affected by the change in preferences for mandatory spending (the third column of Table (3)). In this case there is no legislative distinction between mandatory and discretionary spending and the only impact of a change in θ is a change in the composition of public spending. In the intermediate case, the status quo constraint is not binding when the fraction of public spending is 40% but it becomes occasionally binding when the fraction of mandatory spending increases to 60%. As a consequence, the output volatility decreases but by less than in the case of always binding contraint. In particular, the volatility decreases from 0.0330 to 0.0297 when the status quo constraint is occasionally binding.

In the second experiment, we increase the political polarization by 38%, as in the data, and we let the weight on mandatory spending adjust to accommodate further necessary increase in the fraction of mandatory spending. Again, we adjust λ to keep the tax rate the same as in the first subperiod. The results are reported in second row of Table (3). For always or occasionally binding status quo constraint, an increase in political polarization combined with an increase in the fraction of mandatory spending leads to a smaller decline in output volatility as compared with the first experiment. This is because an increase in polarization moves the tax rates preferred by the two parties further apart. If there were no status quo constraint, this rise in political polarization would cause a significant increase in output volatility, as the one reported in colunm (1): from 0.0330 to 0.0445 in the first and second subperiods, respectively. Given that in the data there was a simultaneous increase in political polarization and a decline in volatility, we can conclude that the status quo constraint is an important determinant of fiscal policy outcomes.

Finally, in the third experiment we ask whether a rise in political polarization could account for a rise in the share of mandatory spending in the U.S. in the second subperiod. We increase Δ to match the fraction of mandatory spending in total governmment spending, 60%, keeping θ constant. In this case, the attempt to adjust λ to keep the tax rate constant was not successful, therefore the results are reported for tax rates lower than those corresponding to the calibration in Table (2). The third row of Table (3) reports the output volatility obtained in this experiment. When the status quo constraint always binds, the volatility decreases to 0.0142; while it increases to 0.0423 and 0.0788 when the status quo constraint occasionally or never binds, respectively. This third experiment is helpful to evaluate the role of political polarization for the fraction of mandatory spending: growing polarization leads to higher fraction of mandatory spending even if the preferences for mandatory spending are unchanged.

What is the main message of the above experiments? The institutional restrictions on budgetary process could significantly reduce the politically-driven fluctuations in fiscal policy outcomes. If these fluctuations constituted the only source of macroeconomic volatility, the legislative requirements behind the changes in mandatory spending could reduce or even neutralize the negative consequences of political frictions for macroeconomy.

5 Conclusion

We presented a model where the institutional restrictions on budgetary process reduce the divergence of the policies set by political parties that disagree on the size of the government and alternate in power. The restrictions consist of the legislative requirement for the incumbent and the opposition to agree on the structure of public spending, including its mandatory and discretionary components. Without the agreement, the status quo policy is implemented. We showed that such organization of the budgetary process implies that the impact of political frictions on macroeconomic volatility is significantly reduced. Our model can explain why macroeconomic volatility can fall jointly with an increase in the political polarization.

This paper aimed to present the results in a concise form, leaving several promising extensions for further research. One extension would be to add exogenous productivity shock and evaluate the impact of the status quo constraint on the macroeconomic volatility in the presence of exogenous fluctuations in productivity. Intuitively, the mechanism would be similar to the one discussed in this paper: the response of the policies set by the opposing parties to exogenous shock would be less divergent under the status quo constraint. Such an extension would be interesting in terms of quantitative evaluation of how much of macroeconomic volatility caused by productivity shocks could be explained by the institutional restrictions in the form of the constraint considered in this paper. Another extension would be to add public debt to the model, which could serve as an additional tool in the political game. Another important extension would be to add physical capital and to evaluate the importance of mandatory spending in developed and developing countries. The absence of the legislative requirements behind the mandatory spending or the lack of enforcement of such requirements could be a potential explanation of more pronounced business cycles in developing countries (discussed by Azzimonti and Talbert, 2014) and, perhaps, could add to the explanation of procyclical fiscal policies in developing countries.

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Appendix

Proof of Proposition 1

Proof. We compare the stationary equilibrium polices with and without the status quo constraint. Without the status quo constraint, the L and R parties choose their optimal taxes $\tau_L^\star$ and $\tau_R^\star$, respectively. Assume that party R is in power. The status quo τ_s is binding when

$$W_L(\tau_R^\star) \leq W_L(\eta(\tau_s)). \tag{21}$$

Applying the implicit function theorem to (14), obtain that $\eta(\tau_s)$ is increasing in τ_s. Given concavity of W, it must hold that $\eta(\tau_s) < \tau_L^\star$. Given the concavity of V and the fact that $\tau_h^\star$ is continuous and increasing in λ_h, the following inequalities hold:

$$V_R(\tau_L^\star) < V_R(\eta(\tau_s)) < V_R(\tau_R^\star), \tag{22}$$

$$\tau_R^\star < \eta(\tau_s) < \tau_L^\star. \tag{23}$$

Thus, the optimal policy for party R when the status quo constraint is binding is to choose $\hat{\tau_R} \in (\tau_R^\star, \eta(\tau_s)]$.

Same logic applies when the party L is in power. Its optimal strategy under the binding status quo constraint is to choose $\hat{\tau_L} \in [\eta(\tau_s), \tau_L^\star)$.

Given that the volatility of output, labor, consumption, and taxes in this economy is defined by the difference of the tax rates implemented by different parties in power, we conclude that the economy with the status quo constraint is less volatile that the economy without such constraint, given that $|\hat{\tau_L} - \hat{\tau_R}| < |\tau_L^\star - \tau_R^\star|$. ■

Proof of Proposition 2

Proof. The status quo constraint is a function of τ_s and parameters. After substituting the consumption and labor functions, it reads:

$$F(\tau_s; \theta, x_0, \lambda_h, \lambda_{\neg h}) = \log(1-\tau)^{1+\epsilon} + \lambda_{\neg h}\log(\tau(1-\tau)^\epsilon + x_0) + \lambda_{\neg h}\log(\theta^\theta(1-\theta)^{1-\theta}) -$$
$$-\log(1-\eta(\tau_s;\theta,x_0))^{1+\epsilon} - \lambda_{\neg h}\theta\log(\theta\tau_s(1-\tau_s)^\epsilon + \theta x_0) - \lambda_{\neg h}(1-\theta)\log(x_0).$$

We aim to show that $F(\tau_s; \theta, x_0, \lambda_h, \lambda_{\neg h})$ is decreasing in θ. From (19), $\tau_\theta = 0$. Applying the implicit function theorem to (14), we obtain $\frac{d\eta}{dx_0} = -\frac{-\theta}{(1-\eta)^{\epsilon-1}(1-\eta(1+\epsilon))} > 0$. Then,

$\frac{\partial F(\tau_s;\theta,x_0,\lambda_h,\lambda_{\neg h})}{\partial\theta} = -\lambda_{\neg h}\log\frac{(1-\theta)\tau_s(1-\tau_s)^\epsilon+x_0}{x_0} - \lambda_{\neg h} < 0$, because $\frac{(1-\theta)\tau_s(1-\tau_s)^\epsilon+x_0}{x_0} > 1$, given that discretionary spending must be positive: $(1-\theta)\tau_s(1-\tau_s)^\epsilon - \theta x_0 > 0$.

We next aim to show that $F(\tau_s;\theta,x_0,\lambda_h,\lambda_{\neg h})$ is decreasing in polarization, $(\lambda_h - \lambda_{\neg h})$. From (19), $\frac{d\tau_h}{d\lambda_h} > 0$. From (14), η does no depend on $(\lambda_h - \lambda_{\neg h})$. We can rewrite the status quo constraint as follows: $F(\tau_s;\theta,x_0,\lambda_h,\lambda_{\neg h}) = u(\tau_h,\lambda_{\neg h}) + \lambda_{\neg h}v(G(\tau_h)) - u(\tau_s,\lambda_{\neg h}) - \lambda_{\neg h}v(G(\tau_s))$. Then, $\frac{\partial F(\tau_s;\theta,x_0,\lambda_h,\lambda_{\neg h})}{\partial(\lambda_h-\lambda_{\neg h})} = (u(\tau_s,\lambda_{\neg h})_{\tau_h} + \lambda_{\neg h}v_{\tau_h})\frac{d\tau_h}{(\lambda_h-\lambda_{\neg h})} + \frac{d\lambda_{\neg h}}{(\lambda_h-\lambda_{\neg h})}(v(G(\tau_h)) - v(G(\tau_s)))$.

i). Assume party L is on power. Given that $\lambda_L - \lambda_R > 0$, $\lambda_h - \lambda_{\neg h} > 0$ and $\frac{d\tau_h}{(\lambda_h-\lambda_{\neg h})} > 0$. For the opposition, the unrestricted tax rate preferred by the incumbent is too high, therefore $(u(\tau_s,\lambda_{\neg h})_{\tau_h} + \lambda_{\neg h}v_{\tau_h}) < 0$. Finally, $(v(G(\tau_L)) - v(G(\tau_s)) > 0$, as $\tau_L > \tau_s$ (from Proposition 1) and $\frac{d\lambda_{\neg h}}{(\lambda_h-\lambda_{\neg h})} < 0$. Therefore, $\frac{\partial F(\tau_s;\theta,x_0,\lambda_L,\lambda_R)}{\partial(\lambda_L-\lambda_R)} < 0$.

ii). Assume now that party R is on power. Given that $\lambda_R - \lambda_L > 0$, $\lambda_h - \lambda_{\neg h} < 0$ and $\frac{d\tau_h}{(\lambda_h-\lambda_{\neg h})} < 0$. For the opposition, the unrestricted tax rate preferred by the incumbent is too low, therefore $(u(\tau_s,\lambda_{\neg h})_{\tau_h} + \lambda_{\neg h}v_{\tau_h}) > 0$. Finally, $(v(G(\tau_L)) - v(G(\tau_s)) < 0$, as $\tau_R < \tau_s$ (from Proposition 1) and $\frac{d\lambda_{\neg h}}{(\lambda_h-\lambda_{\neg h})} > 0$. Therefore, $\frac{\partial F(\tau_s;\theta,x_0,\lambda_R,\lambda_L)}{\partial(\lambda_R-\lambda_L)} < 0$.

Combining i) and ii), we conclude that $\frac{\partial F(\tau_s;\theta,x_0,\lambda_h,\lambda_{\neg h})}{\partial(\lambda_h-\lambda_{\neg h})} < 0$. ∎