

Mechanisms for the Control of Fiscal Deficits*

Hans Peter GRÜNER

University of Mannheim and CEPR, London

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Abstract

This paper shows that a simple two-stage voting mechanism may implement a constrained optimal state dependent decision about the size of the fiscal deficit. I consider a setup with strategic fiscal deficits similar to Alesina and Tabellini (1990). Three groups of voters are informed about the relative desirability of current public spending. Voters differ in their preferences for public goods and swing voters' preferences may change over time. The current government decides on the current spending mix and it has an incentive to strategically overspend. A simple two-stage mechanism under which a deficit requires the approval by a supermajority in parliament approximates a constrained optimal decision and under certain conditions increases social welfare relative to both a strict rule and a laissez faire constitution. When the current majority is small, political bargaining may further increase social welfare. However, when the current majority is large, a supermajority mechanism with bargaining leads to a biased spending mix and it may reduce welfare whereas the laissez faire mechanism may yield the first best. An appropriately adjusted majority threshold can avoid inefficient bargaining whenever necessary.

Keywords: Fiscal policy rules, constitutional choice, mechanism design.

JEL-Classification: D82, H62.

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1 Introduction

Designers of fiscal policy institutions have to deal with a fundamental trade-off. On the one hand, elected policymakers face limited or uncertain periods in office which can create a bias towards excessive spending. This bias needs to be corrected through an appropriate regulation of fiscal policy. On the other hand, fiscal flexibility is desirable because new information about economic circumstances and political preferences may require a flexible fiscal policy reaction. Any suitable institutional arrangement has to address both problems at the same time. This paper formally studies institutional arrangements that reduce strategic fiscal deficits while still permitting some fiscal flexibility.

There are many different reasons to increase government spending at a specific point of time. This includes periods of Keynesian unemployment, natural disasters, war, the occurrence of a particularly profitable public investment opportunity or situations in which the fiscal multiplier is particularly large (as some economists have argued at the beginning of the financial crisis in 2008). In such situations there may be a consensus that the government should spend more money, while voters and elected politicians may still disagree about the direction of spending.¹

It is well established in the literature (Alesina and Tabellini, 1990, and Tabellini and Alesina, 1990) that the disagreement about the direction of public spending may lead to strategic overspending. Tying policymakers' choices through strict constitutional deficit ceilings is a direct way of addressing this problem. In order to maintain some fiscal flexibility, constitutions often contain exemption clauses that permit exceptions under circumstances that make a fiscal policy response particularly desirable². However, formulating exception clauses can be very difficult when relevant information about the need for discretionary fiscal policy responses is not contractible *ex ante* or not verifiable *ex post*.³ It would be prohibitively costly to fully specify at the constitutional stage, what

¹Note that these are intrinsic events in the sense of Goenka (1994) who argues that fiscal flexibility also permits the government to deal with sunspots (extrinsic uncertainty).

²For an early empirical analysis of fiscal rules see von Hagen (1991) and for a discussion of the role of strict fiscal rules and exemption clauses in constitutions see Wyplosz (2005).

³According to article 3 of the European fiscal compact "the Contracting Parties may temporarily deviate from their respective medium-term objective or the adjustment path towards it only in exceptional circumstances". In line with this, exemption clauses were recently included in new institutional arrangements in France, Germany, Italy, and Spain. However, similar constitutional rules have produced rather disappointing outcomes in the past. E.g. between 1969 and 2009, Article 115 of the German constitution ruled out that the federal government's annual fiscal deficit exceeds the annual amount of public investment. However, under exceptional economic circumstances the rule was not supposed to

kind of situation makes an elevated fiscal deficit (or a surplus) acceptable in the (partly distant) future and to specify the appropriate size of the deficit. Even if some relevant events can be specified in a constitution, it may be difficult to verify their realization ex-post. Any constitution that addresses the problems of fiscal sustainability and fiscal flexibility has to specify how the political system shall deal with non contractible and non verifiable information.

This paper addresses this constitutional choice problem from a mechanism design perspective. In my model, fiscal policy decisions should ideally depend on the realization of two random variables: The desired spending mix of the majority of citizens and the relative desirability of public spending at different points of time. Voters differ in their preferences for two public goods. Moreover, all voters and all policymakers are equally well informed about the relative desirability of current vs. future public spending. This is why, for any given spending mix, all voters would agree on the optimal time path for public spending. However, I assume that neither the spending mix nor the desirability of current public spending are contractible at the constitutional stage. In this environment, it is the role of political institutions to base decisions regarding the spending mix and the deficit on voters' preferences and on the realization of the preference for current spending. By assumption, the constitution can only specify how decision rights are allocated to political parties. The political party that represents the majority of citizens should choose the (current majority's desired) spending mix. However, as in Alesina and Tabellini (1990) and Tabellini and Alesina (1990) this government has an incentive to strategically overspend. In such a situation, a welfare maximizing choice of the spending level requires that the government spends less than it would like to. I derive conditions under which a simple revelation mechanism can either approximate or fully implement such a welfare maximizing outcome.

A mechanism designer who wants to implement a spending level for the current legislative period is operating under the constraint that, at any point of time, the spending mix is the one that the current political majority prefers. For a given realization of the preference for present spending, I call a spending level constrained optimal if it maximizes social welfare under this constraint. I first analyze a simple revelation mechanism that asks both political parties for simultaneous announcements regarding the realized preference parameter. The mechanism then implements the corresponding deficit. If the

be binding and the government could unilaterally decide that an exception is acceptable. Moreover, the concept of investment in Article 115 has been quite vague. In 1989 the German constitutional court argued that the rule is useless because government debt continued to increase significantly while the rule was in place.

two announcements differ, a low default spending level is implemented. When the relative desirability of current government spending is sufficiently large or sufficiently small, this mechanism implements the constrained optimal collective choice. Moreover, for any given strict budget rule one can find a default maximum spending level such that the corresponding revelation mechanism yields a higher social welfare than a strict rule.

Any revelation mechanism requires a structured procedure with simultaneous announcements that are then transformed into outcomes. Such a procedure may be difficult to implement in practice. In a second step, I show that a similar state dependent outcome can be implemented by a simple three-step supermajority mechanism. In the first step, the government asks the parliament to accept a specific deficit level that may exceed a prespecified value. The approval of the deficit requires a supermajority in parliament whenever the deficit exceeds the prespecified value. In the second step, the parliament may accept or reject the proposal. If the proposal is rejected then the size of the budget may not exceed the prespecified size. In the third step the government decides on the spending mix, taking into account the parliament's decision. I show that, for any given budget rule one can find a supermajority mechanism that yields a higher social welfare.

In a two-party system, a supermajority mechanism grants the opposition party a veto right on any budget that exceeds a prespecified absolute or relative deficit level. In this sense it closely resembles the practice in the U.S. where the government can only increase government debt beyond a prespecified value if the House and the Senate both give their approval. Over the last 30 years the composition of the two chambers and the president's party affiliation only fit together in 8 years. This effectively turned the U.S. mechanism into a rule that most of the time gives both parties a veto right on any budget that is not in line with the debt ceiling - similar the supermajority mechanism that is studied in the present paper. The present paper shows that such a mechanism may in principle play a useful role. However, the (de facto) veto right has the drawback that it grants the opposition considerable political power exactly when a deficit would be particularly useful. It is likely that the opposition uses its right to veto an increase of the size of the budget in order to negotiate the spending level and the spending mix with the government. A good example is the Republican attempt to use the budget of 2013 to prevent the Affordable Healthcare Act (Obamacare).⁴ Such attempts may distort the spending mix - an outcome that has often been criticized because it lacks democratic legitimacy.

⁴Currently (2017), "Democratic leaders are discussing possible strategies to tie the debt ceiling to blocking tax cuts, a significant shift for a party that has spent the past eight years arguing that debt-limit increases should be free of conditions." (<https://www.bloomberg.com/news/articles/2017-06-06/trump-wants-u-s-debt-ceiling-increase-by-august-spokesman-says>).

This paper shows that it depends on the underlying distribution of individuals' preferences whether a supermajority requirement increases or reduces social welfare compared to a laissez faire constitution. In this context, the size of the current majority plays an important role. A society which is almost equally split into two political camps is likely to benefit from a supermajority mechanism with bargaining because the bargaining process may lead to a more moderate spending mix which increases social welfare. If, instead, the opposition is small, the distortion of the spending mix away from the majority's preferred outcome may reduce social welfare. A laissez faire constitution may also perform well when there is a high probability of a political change and when all members of the current majority's preferences are strongly correlated.

Accordingly, the constitution should ideally adjust the majority threshold to the underlying political situation. A too low majority threshold can lead to excessive spending and a too uneven spending mix. A too large threshold may lead to too little concentration of the spending mix. However, a properly chosen supermajority threshold can make sure that a government which is supported by a large enough majority in parliament does not need the approval of the current opposition.

An analysis of costs and benefits of fiscal policy rules has to be based on a politico-economic theory of elevated fiscal deficits. The formal analysis of budget procedures has been pioneered by Ferejohn and Krehbiel (1987). Important early strategic explanations of elevated deficits have been put forward by Alesina and Drazen (1989), Alesina and Tabellini (1990), Tabellini and Alesina (1990), and Lizzeri (1999)⁵. A more recent extension for the case where governments determine both debt and future entitlements is Bouton, Lizzeri and Persico (2017).

While Alesina and Drazen (1989) emphasize that political indivisibilities can lead to a war of attrition and delayed fiscal consolidation, Tabellini and Alesina (1990) explore how excessive deficits arise when incumbent parties strategically overspend when they risk to lose the upcoming election. Lizzeri (1999) explains deficits via competition of political parties that play a multi period game of Myersonian political competition. The present model of constitutional design is based on the explanation put forward in Alesina and Tabellini (1990). It is a modified version of their two period case and it extends their analysis by specifying the informational environment in more detail.

A recent analysis of constitutional measures to overcome excessive deficits in Azzimonti, Battaglini and Coate (2015). Their model is based on the dynamic legislative bargaining model in Battaglini and Coate (2008). In this model randomly selected agenda

⁵See also Persson and Svensson (1989).

setters propose tax rates, deficits, public good provision and non-distortionary pork-barrel spending. In equilibrium, pork barrel spending occurs when public goods are less productive. In an extension of the original paper, Azzimonti, Battaglini and Coate find that a balanced budget rule has short run costs and long run benefits that may outweigh these costs. Moreover, a supermajority rule for the deficit level does not alter the equilibrium policy outcome or equilibrium welfare. The present analysis relies on a different policy process - one with a two party system in which the key conflict is not about the allocation of pork barrel transfers but about the composition of public spending. A particular focus is on the role of renegotiation of the spending mix under a supermajority mechanism.

Several economists have proposed that exceptionally high fiscal deficits should only be permitted if they are backed by a supermajority in parliament⁶. The underlying idea is that there should be more widespread support for deficits when exceptional circumstances affect many individuals in the same way⁷. A first formalization of this argument can be found in Becker, Gersbach, and Grimm (2010). In their model, there is a single public good and voters differ in their preference for private and public consumption. The parliamentary decision procedure yields an outcome that is put up for a vote against the status quo. A flexible majority threshold for this vote which increases with the proposed fiscal deficit may reduce the equilibrium deficit⁸. The same holds for an inflexible upper bound on the deficit. The advantage of a flexible majority rule is that it permits that the equilibrium deficit increases when all voters' present income declines. The present paper is also based on the idea that the political system should filter out the situations in which fiscal deficits do not receive widespread support. It uses a different formal framework that permits to analyze additional issues. Modelling a two-dimensional information aggregation problem permits to analyze the effect of fiscal policy institutions on the level and composition of public spending. The paper provides a welfare analysis of different alternative mechanisms. Moreover, the present paper studies the role of parliamentary negotiations that may arise when the opposition is granted a veto right regarding the deficit level.

A model that analyzes how fiscal policy institutions in a currency union should deal with new information about the desirability of fiscal deficits is Kiel (2003, chapter 3). She studies a fiscal policy mechanism design problem with cross border externalities. Several

⁶German Council of Economic Advisors (2007) and Council of Economic advisors to the German Ministry of the Economy (2008).

⁷German Council of Economic Advisors (2007, p.101).

⁸The concept of a flexible majority rule has been introduced in Gersbach and Erlenmeyer (1999).

countries have idiosyncratic stochastic spending needs. A mechanism maps the vector of spending needs into a vector of fiscal deficits and monetary transfers. Under some conditions, an ex-post efficient social choice can be implemented even under an interim participation constraint. In a recent related recent paper, Santoro (2017) studies transfer free mechanisms for fiscal policy in a monetary union. In his paper types are drawn from a binary distribution and spending has an externality that emerges from the common monetary policy response to the vector of deficits.

The present paper is also related to several papers that study the trade-off between policy credibility and flexibility, including Rogoff (1985), Aghion and Bolton (2003) and Dal Bo (2006). Rogoff (1985) studies the optimal choice of the characteristics of a monetary policymaker. Dal Bo (2006) shows that committees deciding under a super-majority rule can replicate the choice of a conservative policymaker, the advantage being that the committee can pick the appropriate majority threshold for each issue. Aghion and Bolton (2003) study a trade-off between policy credibility and flexibility on the constitutional stage. A constitution that imposes a larger majority threshold reduces the chance to efficiently reforms, but it also reduced the risk of excessive redistribution. The present paper focuses on public spending decisions of fiscal policymakers who are selected by the population in an election and on budgetary bargaining between political parties.

2 The model

2.1 Voters and political parties

Consider a country with a population consisting of three homogenous groups of individuals. There are two divisible public goods, x and y and two legislative periods, 1 and 2.⁹ In both periods, the government has a given revenue of $1/2$. In the first period, the government spends s_1 and it needs to raise debt at an interest rate of zero if $s_1 > 1/2$. The zero interest rate also applies to deposits. Debt has to be fully repaid in the second period which is why spending in that period has to satisfy $s_2 \leq 1 - s_1$. In both periods, both public goods have the same price 1. The members of one group, called x voters, always wish to consume more of good x than of good y . The members of another group (y voters) always wants to consume more of good y than of good x . Both groups represent a share of $1/2 - \varepsilon$ of society with $\varepsilon > 0$. The third group (with a population share of 2ε) are swing voters who in period 1 wish to consume more of good x than of good y . With a

⁹An alternative interpretation of the model is that good x represents transfers to the poor and good y tax cuts for the rich.

given probability p , this may change in period $t = 2$. All voters know, which of the three groups they belong to.

There are two political parties (X and Y) that represent the two groups of society with stable preferences. Both parties compete for office in each of the two legislative periods 1 and 2. Their objective is to maximize the utility of their respective constituency, the x - and the y -voters. Parties cannot commit to any specific platform when they compete.¹⁰ In particular, they cannot commit to a platform for period 2 in period 1. An election merely determines both parties' vote shares in parliament and so allocates the right to choose policies. Swing voters have no specific political representation.

Note that the model slightly departs from Alesina and Tabellini (1990) and Tabellini and Alesina (1990) in the way in which the political process is modelled. As in Alesina and Tabellini (1990) I take the party system as given and I assume that parties represent specific constituencies.¹¹ As in Tabellini and Alesina (1990) I assume that the composition of the voting population may change. What is different in my paper is that I model swing voters who can change their mind (and know that this may be the case). This permits that the change of majority can be properly taken into account in a welfare analysis.

If swing voters' preferences change then this implies a change in government in period 2. Voters vote as if they were pivotal, i.e. they always vote for their preferred party. I will show later that in period 1, swing voters vote for party X if the probability of a change of the political majority satisfies $p < \bar{p} > 1/2$, which I will assume throughout the paper. The political parties are treated as the informed agents. Alternative assumptions regarding the structure of the party system, the motivation of party representatives and the commitment power of parties will be discussed in section 5.

If instead public spending and debt decisions were both decided by majority rule, the swing voters would always be pivotal and the outcome would coincide with the constrained welfare maximum. Hence, the distortion in the present model that leads to excessive spending is that swing voters are not directly represented in the party system. While this assumption is natural to study existing two party systems, its main purpose is to simplify the analysis of voting decisions and incentive compatibility constraints. It is important to note that a political misrepresentation of some voters is not needed to create a deficit bias: A strategic incentive to overspend also obtains when all voters are represented by a

¹⁰This assumption is particularly justified in cases where it comes to coalition bargaining (Baron, Diermeier and Fong, 2012). Limited commitment also naturally arises when policymakers have a limited time horizon.

¹¹Similar to Alesina and Tabellini (1990), Bouton, Lizzeri and Persico (2017) assume that the majority party changes from period 1 to 2 with an exogenously given probability.

political party as long as individual voters do not know their future preferences for sure.¹²

Preferences of x -voters, y -voters and swing voters are represented by the following von Neumann Morgenstern utility functions.

$$u^x(x_1, y_1, x_2, y_2) = \theta \cdot u(x_1, y_1) + u(x_2, y_2), \quad (1)$$

$$u^y(x_1, y_1, x_2, y_2) = \theta \cdot v(x_1, y_1) + v(x_2, y_2), \quad (2)$$

$$u^z(x_1, y_1, x_2, y_2) = \theta \cdot u(x_1, y_1) + \eta u(x_2, y_2) + (1 - \eta) v(x_2, y_2), \quad (3)$$

where the indices refer to periods 1 and 2 and where $\eta = 1$ if swing voters' preferences continue to be more in favor of consuming good x and $\eta = 0$ otherwise. The stochastic preference parameter θ measures the relative desirability of public spending in period 1. It is commonly known by all voters but not verifiable. It is drawn from a given distribution $\phi(\theta)$ on $[a, b] \subset \mathbb{R}^+ \setminus \{0\}$ which is known by the designer at the constitutional stage (i.e. before period 1). All voters become informed about the realization of θ in period 1. I assume that x - and y -voters' preferences are different and symmetric in the following sense:

$$v(x, y) = u(y, x) \text{ and } v(x, y) \neq u(x, y). \quad (4)$$

The utility function $u(x, y)$ is strictly concave. Moreover, I assume that utility values are determined by the period t spending level s_t and the spending share $\chi_t := x_t / (x_t + y_t)$ as follows:

$$u(s_t \chi_t, s_t (1 - \chi_t)) = f(s_t) \cdot u(\chi_t, (1 - \chi_t)). \quad (5)$$

with $f' > 0$. At a relative price of 1, x (y) voters want to consume a share $\chi^* > 1/2$ of good x (y) in each period. I define

$$\bar{u} : = u(\chi^*, 1 - \chi^*), \quad (6)$$

$$\underline{u} : = u(1 - \chi^*, \chi^*). \quad (7)$$

Throughout the paper, I will assume monotonicity and concavity of the function f , i.e.: $f'' < 0$, and $f'(0) = \infty$. This guarantees that the desired first period spending level s_1 lies in the interior of the interval $[0, 1]$, i.e. voters do not wish to spend everything

¹²See section 5 for details. In the alternative setup there are only two groups of voters and two political parties. In the second period some of the x -voters turn into y -voters. However, in period 1 voters do not know yet whether this will happen and if so which group they will belong to. Since there is a chance that the majority changes but preferences of the majority of current x -voters do not, there is an incentive to overspend.

in period 1 or 2. A special limit case is the linear case where $f(s_t) = s_t$. In this case, voters either want to spend everything in period 1 or in period 2. One prominent utility function in this class is the additive Cobb-Douglas utility function where

$$u(s_t \chi_t, s_t(1 - \chi_t)) = (s_t \chi_t)^\alpha (s_t(1 - \chi_t))^{1-\alpha} = s_t \chi_t^\alpha (1 - \chi_t)^{1-\alpha}. \quad (8)$$

2.2 Predetermined spending

Trivially, in an environment with correlated private information, a mechanism designer can achieve a lot if he can threaten agents with a particularly undesired outcome. In the present setup such a threat could take the form of imposing an extremely low public spending level (e.g. zero) in period 1. However, in practice states often engage in long run contractual commitments that impose a lower bound on public spending.¹³¹⁴ This is why I assume that, at the beginning of period 1, some spending decisions related to this period can only be altered at a prohibitively high cost. I denote by $\check{s} < 1/2$ the level of predetermined spending in period 1 and by $\check{\chi}$ the share of predetermined spending that is earmarked for good x . Thus, an amount of at least $\check{\chi} \cdot \check{s}$ has to be spend on good X and at least $(1 - \check{\chi}) \check{s}$ has to be spend on good Y . The level of predetermined spending imposes a lower bound on the maximum spending level that a constitution can impose.

2.3 The constitutional stage

The objective of this paper is to find appropriate constitutional arrangements that deal with a two-dimensional information aggregation problem. The problem is to find institutions that assign a feasible time path for public spending on the goods x and y to any joint realization of the majority's preferences regarding the spending mix (in both periods) and the preference parameter θ .

In an unrestricted setup and with perfectly correlated types θ , one can easily implement a social choice that maximizes expected social welfare. Just consider a direct revelation mechanism that asks both political parties to submit an announcement about the realization of θ . If the two parties' announcements differ, the mechanism only provides a prespecified mix of public goods. Otherwise, the mechanism provides the welfare

¹³Such commitments can help to overcome credibility problems. Long term contracts for public servants are useful when employees make relationship specific investments that only pay off for them if the employment relationship lasts long enough. Similar credibility problems arise in some procurement relationships.

¹⁴Bouton, Lizzeri and Persico (2017) go further and endogenize the predetermined spending.

maximizing mix of public goods which lies between what x -voters and y -voters want. This mix would have to take both parties' electoral support into account. Clearly, such a mechanism is incentive compatible if the prespecified mix of public goods is sufficiently unattractive for both parties. However, there are practical difficulties with such an approach. One problem is that it is difficult to fully specify in a constitution how the desired mix of public spending varies with the size of both groups. The list of public goods and the list of states of the world would have to be quite long. Moreover, the set of available public goods and the preferences regarding these goods may evolve over time. This is why I assume that the spending mix is not contractible at the constitutional stage.¹⁵

In what follows, I assume that the constitutional rules can allocate the right to choose the budget and that one can also impose constraints on public spending. Any such constraint has to respect the predetermined spending requirements for period 1. In particular, it is possible to leave the decision about the spending mix to the current government or to the opposition or to permit bargaining between both parties once the information θ has realized.

2.4 Desired spending levels

It is useful to first define state dependent optimal spending levels from the perspective of the two political parties as well as the state dependent welfare maximizing spending level. The following definition refers to a situation where in both periods the party representing the majority regarding the spending mix unilaterally fixes the spending mix, i.e. party X forms the government in period 1, whereas, in period 2 party X (Y) forms the government with probability $1 - p$ (p).

Definition 1 *Consider the case where, in each period, the majority party has the right to choose the spending mix. Define $s^P(\theta)$ ($P \in \{X, Y\}$) as the desired state dependent period 1 spending level of Party P and $s^W(\theta)$ as the state dependent welfare maximizing period 1 spending level, i.e.*

$$s^X(\theta) = \arg \max_s \theta \cdot f(s) \cdot \bar{u} + f(1-s) \cdot ((1-p)\bar{u} + p\underline{u}), \quad (9)$$

$$s^Y(\theta) = \arg \max_s \theta \cdot f(s) \cdot \underline{u} + f(1-s) \cdot (p\bar{u} + (1-p)\underline{u}), \quad (10)$$

¹⁵Another problem is that a particularly unattractive budget would not be renegotiation proof because both parties would prefer a set of alternatives. This problem will be addressed in section 5.

and

$$\begin{aligned}
s^W(\theta) &= \arg \max_s \theta \cdot f(s) \left(\left(\frac{1}{2} + \varepsilon \right) \bar{u} + \left(\frac{1}{2} - \varepsilon \right) \underline{u} \right) \\
&\quad + f(1-s)(1-p) \left(\left(\frac{1}{2} + \varepsilon \right) \bar{u} + \left(\frac{1}{2} - \varepsilon \right) \underline{u} \right) \\
&\quad + f(1-s)p \left(\left(\frac{1}{2} - \varepsilon \right) \underline{u} + \left(\frac{1}{2} + \varepsilon \right) \bar{u} \right) \\
&= \arg \max_s (\theta \cdot f(s) + f(1-s)) \cdot \left(\left(\frac{1}{2} + \varepsilon \right) \bar{u} + \left(\frac{1}{2} - \varepsilon \right) \underline{u} \right) \\
&= \arg \max_s \theta \cdot f(s) + f(1-s). \tag{11}
\end{aligned}$$

Note that $s^W(\theta)$ represents a constrained welfare maximizing choice in the sense that the elected party still chooses the spending mix in each period. It is also the desired spending level of swing voters. Lemma 1 specifies properties of the three group's optimal spending functions. It also shows that swing voters have an incentive to support party X in period 1 if p is not too large which I will assume throughout the paper.

Lemma 1 (i) For all $\theta \geq 0$ we have $s^{X'}(\theta), s^{W'}(\theta), s^{Y'}(\theta) > 0$.

(ii) For all $\theta > 0$ we have $s^X(\theta) > s^W(\theta) > s^Y(\theta)$.

(iii) There is a threshold $\bar{p} > 1/2$ so that in period 1, swing voters vote for party X if $p < \bar{p}$.

Proof: See the appendix.

In the case where $\theta = 1$ a balanced budget ($\bar{s} = 1/2$) maximizes social welfare because it equates marginal welfare across both periods. The form of the functions $s^X(\theta)$, $s^Y(\theta)$, and $s^W(\theta)$ is depicted in Figure 1. Note that concavity as in figure 1 is not needed for our results and that it requires additional assumptions.

In order to facilitate the analysis that follows, I assume that the minimum spending level \check{s} and $\check{\chi}$ are such that - for the lowest possible realization of θ , a , party X can still implement its preferred spending mix in period 1, i.e.

$$\check{\chi} \cdot \check{s} \leq \chi^* \cdot s^X(a) \wedge (1 - \check{\chi}) \cdot \check{s} \leq (1 - \chi^*) \cdot s^X(a) \tag{12}$$

$$\Leftrightarrow \check{s} \leq \min \left\{ \frac{1 - \chi^*}{1 - \check{\chi}}, \frac{\chi^*}{\check{\chi}} \right\} \cdot s^X(a). \tag{13}$$

I also assume that the welfare maximizing policy sometimes includes a fiscal deficit and sometimes a surplus. Hence, the support of the distribution of types $\phi(\theta)$ on $[a, b]$ is such that

$$0 < s^{W^{-1}}(\check{s}) < a < 1 < b.$$

Figure 1 here: Desired spending levels of both parties ($s^X(\theta)$, $s^Y(\theta)$), welfare maximizing spending level $s^W(\theta)$ and the curves $\tilde{s}^X(\theta, \bar{s}, \chi^*)$ and $\tilde{s}^Y(\theta, \bar{s}, \chi^*)$ from Definition 2.

3 Mechanisms

3.1 Laissez faire and budget rules

Before I turn to more sophisticated mechanisms, I first briefly discuss two practically relevant benchmark arrangements.

Under a laissez faire constitution, an election is held in each period. In each period the elected government may choose both the spending mix and the spending level subject to the first period's minimum spending constraint. In this case, the $t = 2$ government spends its desired share χ^* or $1 - \chi^*$ of the remaining budget $1 - s$ on good x . Taking this into account, the $t = 1$ government's payoff is concave in period 1 spending s with a unique maximum at $s^X(\theta)$.

For all $\varepsilon > 0$ and for all possible realizations of θ , the laissez faire outcome does not maximize social welfare because the preferences of the current y -voters and the preferences of swing voters are not taken into account by party X . There is too much spending on good x relative to good y in period 1 and there also is too much overall spending in period 1. The principal reasons for the welfare losses differ for different parameter constellations. When the group of swing voters is very large, most voters know that their preferred spending mix will be implemented in both periods. In this case, the excessive deficit is the main source of welfare losses. The deficit arises because party X strategically overspends in the interest of a small group of voters with stable preferences. Instead, when the political majority is very stable, there is almost no overspending because party X expects that it will continue to form the government in period 2. However, also taking into account the preferences of y -voters there is excessive spending on good x unless the group of swing voters is very large.

A constitution that relies on a strict spending rule fixes a maximum expenditure for period 1, $\bar{s} \geq \check{s}$. In both periods, the spending mix is the same under such a rule as in the laissez faire case. Obviously, the optimal strict spending rule performs better than a laissez faire constitution when there is no need for fiscal policy discretion (e.g. when θ can only assume one single value). The laissez faire constitution instead performs better

when fiscal discretion is important.¹⁶

3.2 Incentive compatibility

A mechanism that links government spending to the realization of the preference parameter θ has to provide incentives to directly or indirectly reveal this information. As a theoretical benchmark, I start by analyzing a direct revelation mechanism. Such a mechanism simultaneously asks both political parties for announcements regarding the realization of the preference parameter θ . The period 1 spending level s is then directly made a function of the two announcements. In theory such a mechanism can in principle force the government to implement some spending level for sure, i.e. can force the government to spend more money on public goods than it actually wants to. However, since governmental savings can hardly be excluded in practice, it is more appropriate to assume that the mechanism can only specify a maximum spending level $\bar{s} \geq \check{s}$.

As a first step, it is useful to characterize a period 1 spending level that makes party $P \in \{X, Y\}$ indifferent to a default spending level \bar{s} in combination with a spending mix $\chi = \chi^*$ when party X has the right to manage public spending in period 1 and the elected party selects the spending mix in period 2. This spending level will play an important role in the opposition's incentive compatibility constraint: When θ assumes a large value, it specifies the highest deficit that is acceptable for a political party if the alternative is the low default spending level \bar{s} .

Definition 2 *Consider a given default period 1 spending level \bar{s} and a default spending mix $(\chi^*, 1 - \chi^*)$. For all $\theta \geq (s^Y)^{-1}(\bar{s})$ define $\tilde{s}^Y(\theta, \bar{s}, \chi^*)$ as the maximum solution to*

$$\begin{aligned} & \theta f(\tilde{s}^Y(\theta, \bar{s}, \chi^*)) \underline{u} + f(1 - \tilde{s}^Y(\theta, \bar{s}, \chi^*)) ((1 - p) \underline{u} + p\bar{u}) \\ & = \theta f(\bar{s}) \underline{u} + f(1 - \bar{s}) ((1 - p) \underline{u} + p\bar{u}). \end{aligned} \quad (14)$$

For $\theta < (s^Y)^{-1}(\bar{s})$ define $\tilde{s}^Y(\theta, \bar{s}, \chi^)$ as the minimum solution to (14).*

¹⁶To see why, consider the simple binary case where θ is drawn from the set $\{1, \bar{\theta}\}$ (where $\bar{\theta} > 1$) according to some given distribution. When $\bar{\theta} = 1$ and $\bar{s} = 1/2$, swing voters know that their desired spending mix will be implemented in both periods. This is why they do not want to run a fiscal deficit. The joint welfare of the (equal sized) groups of x - and y -voters is maximized if the budget is balanced, taking into account that the current government chooses spending. The laissez faire constitution leads to a strictly lower welfare level than the balanced budget rule. It follows from the continuity of all expected payoffs in $\bar{\theta}$ that this also holds in an environment of $\bar{\theta} = 1$. All voters' desired spending level for period 1 converges to 1 as $\bar{\theta}$ goes to infinity. The welfare difference is increasing and unbounded which is why the laissez faire constitution is better for large enough values of $\bar{\theta}$.

For all $\theta \leq (s^X)^{-1}(\bar{s})$ define $\tilde{s}^X(\theta, \bar{s}, \chi^*)$ as the minimum solution to

$$\begin{aligned} & \theta f(\tilde{s}^X(\theta, \bar{s}, \chi^*)) \bar{u} + f(1 - \tilde{s}^X(\theta, \bar{s}, \chi^*))((1-p)\bar{u} + p\underline{u}) \\ &= \theta f(\bar{s}) \bar{u} + f(1 - \bar{s})((1-p)\bar{u} + p\underline{u}). \end{aligned} \quad (15)$$

where $\bar{u} := u(\chi^*, 1 - \chi^*)$ and $\underline{u} := u(1 - \chi^*, \chi^*)$.

For $\theta > (s^Y)^{-1}(\bar{s})$ define $\tilde{s}^X(\theta, \bar{s}, \chi^*)$ as the maximum solution to (15).

Note that when $\theta > (s^Y)^{-1}(\bar{s})$ equation (14) has two solutions, one being $\tilde{s}^Y(\theta, \bar{s}, \chi^*) = \bar{s}$. Generally, the value $\tilde{s}^Y(\theta, \bar{s}, \chi^*)$ is larger than \bar{s} and it specifies the upper bound of an acceptable deficit from the perspective of the opposition party Y once it faces the alternative spending level. When $\theta = (s^Y)^{-1}(\bar{s})$ the unique solution is \bar{s} .

The following Lemma lists further properties of these two functions (see figure 1 for two curves $\tilde{s}_\theta^X(\theta, \bar{s}, \chi^*)$ and $\tilde{s}_\theta^Y(\theta, \bar{s}, \chi^*)$ satisfying properties (i)-(iv)).

Lemma 2 (i) For $\tilde{s}^Y > \bar{s}$ we have $\tilde{s}_\theta^Y(\theta, \bar{s}, \chi^*) > 0$.

(ii) For $\tilde{s}^X < \bar{s}$ we have $\tilde{s}_\theta^X(\theta, \bar{s}, \chi^*) > 0$.

(iii) For all $\bar{s} \in (0, 1/2)$ there is a value $\theta > (s^Y)^{-1}(\bar{s})$ such that $\tilde{s}^Y(\theta, \bar{s}, \chi^*) = s^W(\theta)$.

(iv) For all $\bar{s} \in (0, 1/2)$ there is a value $\theta < (s^X)^{-1}(\bar{s})$ such that $\tilde{s}^X(\theta, \bar{s}, \chi^*) = s^W(\theta)$.

Proof: See the appendix.

The revelation principle implies that any normal form mechanism can be replaced by a mechanism of the following sort.

Definition 3 (*Revelation mechanism*) A revelation mechanism asks both political parties for announcements $\hat{\theta}_X$ and $\hat{\theta}_Y$ and enforces a maximum spending level

$$s^{\max}(\hat{\theta}_X, \hat{\theta}_Y) = \begin{cases} f(\hat{\theta}_X) & \text{if } \hat{\theta}_X = \hat{\theta}_Y \\ \bar{s} & \text{otherwise} \end{cases}. \quad (16)$$

where $\bar{s} \in [\check{s}, 1/2]$ is a default spending level. The party that wins the majority in period 1(2) decides on the spending mix in period 1(2).

The default period 1 spending \bar{s} would have to be specified in the constitution, e.g. through a requirement to always balance the budget. The following Lemma describes the best possible outcome that can be achieved by such a mechanism for any given default spending level \bar{s} .

Lemma 3 *The following social choice of the spending level is truthfully implementable through a Bayesian Nash equilibrium:*

$$g(\theta, \bar{s}) := \begin{cases} s^X(\theta) & \text{if } s^X(\theta) \leq \bar{s} \\ \bar{s} & \text{if } \tilde{s}^Y(\theta, \bar{s}, \chi^*) < \bar{s} < s^X(\theta) \\ \min\{s^W(\theta), \tilde{s}^Y(\theta, \bar{s}, \chi^*)\} & \text{if } \tilde{s}^Y(\theta, \bar{s}, \chi^*) \geq \bar{s} \end{cases} . \quad (17)$$

Proof: See the appendix.

Figure 2 shows how the spending functions $g(\theta, \bar{s})$ approximates the welfare maximizing function $s^W(\theta)$. Note that by assumption the minimum spending constraints are not binding for any $\theta \in [a, b]$. The grey curve characterizes the equilibrium outcome if $\theta \in [a, b]$. Obviously, the entire function $s^W(\theta)$ can generally not be implemented if the interval $[a, b]$ is sufficiently large and has full support.¹⁷

Different default spending levels \bar{s} lead to the implementation of different approximations of $s^W(\theta)$. Figure 2 makes clear that for any given default spending level $\bar{s} < s^W(b)$, the spending function $g(\theta, \bar{s})$ weakly socially dominates the spending function implemented by a strict rule with the spending level \bar{s} . The reason is that the implemented spending level always lies weakly closer to the welfare maximal one, i.e. $\bar{s} < g(\theta, \bar{s}) < s^W(\theta) < s^X(\theta)$ if $\tilde{s}^Y(\theta, \bar{s}, \chi^*) \geq \bar{s}$. Hence, if the support of $\phi(\theta)$ is large enough, any given strict rule is strictly dominated by a revelation mechanism.

The following proposition goes further and states that one can always find a default spending level \bar{s} , so that the revelation mechanisms that implements $g(\theta, \bar{s})$ is superior to the laissez faire policy as well. The proof proceeds as follows. It starts with a strict rule that implements the welfare maximizing spending mix at the upper bound of the type space. Next, it marginally relaxes this rule which marginally increases welfare. Finally it makes use of the fact that this rule is dominated by a revelation mechanism that uses the rule's spending limit as a default spending limit. Both results are summarized in the following Proposition.

Proposition 1 (i) *For any given default spending level $\bar{s} < s^W(b)$, the spending function $g(\theta, \bar{s})$ that can be implemented with a revelation mechanism weakly socially dominates the spending functions implemented by a strict rule with the spending level \bar{s} . (ii) There always is a spending level \bar{s} such that the laissez faire constitution is strictly dominated by a revelation mechanism.*

¹⁷An exception is the case where predetermined spending is so small that $\tilde{s}^Y(\theta, \bar{s}, \chi^*) > s^W(a)$. In this case it is possible to implement the constrained optimal choice $s^W(\theta_l)$ on the entire interval $[a, b]$. Similarly, in the special case of a binary type space $\{1, \bar{\theta}\}$, $s^W(\theta)$ can be implemented if $\tilde{s}^Y(\bar{\theta}, \bar{s}, \chi^*) > s^W(\bar{\theta})$.

Figure 2 here: The implemented spending level $g(\theta, \bar{s})$ under a revelation mechanism. The relevant range for θ is given by its support $[a, b]$.

Figure 2:

Obviously, the above type of mechanism has many other equilibria because both parties can coordinate on other social choice functions $s^{\max}(\theta)$ when they make their announcements. In the tradition of the mechanism design literature I assume that the planner - in this case the constitutional assembly - can select its preferred social choice function. The function $g(\theta, \bar{s})$ is optimal for any given \bar{s} .

3.3 A simple three-stage mechanism

Under a direct revelation mechanism both parties have to simultaneously and independently announce a θ value or, equivalently, the corresponding spending level. It may be difficult to organize such a procedure in practice because members and leaders of political parties tend to communicate a lot outside any structured mechanism. Moreover, in practice it is rather unlikely that there is a perfect consensus about the size of θ . It may also be difficult to “report” such a preference parameter. It is therefore worthwhile to analyze alternative mechanisms that produce similar results. The following supermajority mechanism approximates the results from the previous revelation mechanisms. Moreover, it solves the equilibrium multiplicity problem of the normal form revelation mechanism.

Definition 4 (*Supermajority mechanism*) *In period 1, after observing θ , the government proposes a spending level s , where s may not exceed $s^W(\bar{\theta})$. The opposition can accept or reject this proposal. If the proposal is rejected, the government can not spend more than a default spending level $\bar{s} \geq \check{s}$. If the proposal is accepted then the government may raise debt accordingly. The government chooses the spending mix.*

Under this mechanism, any proposal in between \bar{s} and $\tilde{s}^Y(\theta, \bar{s}, \chi^*)$ is accepted by party Y. Party X will propose its most preferred spending level $s^X(\theta)$ when it lies between \bar{s} and $\tilde{s}^Y(\theta, \bar{s}, \chi^*)$, and it proposes $\tilde{s}^Y(\theta, \bar{s}, \chi^*)$ otherwise. This supermajority mechanism implements the same social choice function as the revelation mechanism if θ can not become too large.¹⁸

¹⁸A quantitative assessment of the size of the value of θ up to which both mechanisms yield the same outcome would require a calibration of the present model.

Lemma 4 *The following social choice of the spending level in period 1 is implementable as a subgame perfect Nash equilibrium of the supermajority mechanism with default spending level \bar{s} .*

$$h(\theta, \bar{s}) := \begin{cases} \min \{ \bar{s}, s^X(\theta) \} & \tilde{s}^Y(\theta, \bar{s}, \chi^*) \leq \bar{s} \\ \max \{ \bar{s}, \tilde{s}^Y(\theta, \bar{s}, \chi^*) \} & \text{otherwise} \end{cases}. \quad (18)$$

Proof: See the appendix.

Figure 3 here: The implemented spending level $h(\theta, \bar{s})$ under a supermajority mechanism.

The outcome of the supermajority mechanism is weakly monotonous in the realization of the preference parameter θ . The supermajority mechanism delivers a result which, for low enough θ values, replicates the social choice depicted in Figure 2. For higher values the outcome differs (see Figure 3). Hence, the outcome of this sequential mechanism yields a lower expected social welfare than the one of the simultaneous move game if the support of the distribution of θ is large enough. Obviously, social welfare under the supermajority mechanism exceeds welfare under a strict budget rule because, for all θ , the implemented social choice is preferred to \bar{s} by both types of voters. A similar argument to the one in the proof of proposition 1 can be made to show that any strict rule is dominated by a supermajority mechanism. To summarize:

Proposition 2 *(i) For any given default spending level $\bar{s} < s^W(b)$, the spending function $h(\theta, \bar{s})$ that can be implemented with a supermajority mechanism socially dominates the spending functions implemented by a strict rule with the spending level \bar{s} . (ii) There always is a spending level \bar{s} such that the laissez faire constitution is strictly dominated by a supermajority mechanism.*

3.4 Choosing the default spending level \bar{s}

Generally, the optimal choice of the default spending level \bar{s} in the revelation mechanism or the supermajority mechanism is not trivial. It depends on predetermined spending \check{s} and $\check{\chi}$ and on the underlying distribution of types $\phi(\theta)$.

It is important to note that it is not always optimal to pick the lowest feasible value \check{s} for \bar{s} . Consider the simple example of a binary distribution on $\{\theta_l, \theta_h\}$ with $\theta_h > \theta_l$. Let $s^W(\theta_l) > \check{s}$ and assume for simplicity that $\check{\chi} = \chi^*$. It is easy to see that, when θ_h is large

enough, the revelation mechanism with a default spending level $\bar{s} = s^W(\theta_l)$ implements the constrained optimal choice $s^W(\theta)$. Obviously, at $\theta = \theta_l$, both parties are indifferent between $s^W(\theta_l)$ and the (identical) outside option \bar{s} . For large enough values θ_h , both parties strictly prefer $s^W(\theta_h)$ to the outside option $\bar{s} = s^W(\theta_l)$. Consider now the case where predetermined spending \check{s} lies below $s^W(\theta_h)$ which permits to lower \bar{s} . Picking an \bar{s} slightly below $s^W(\theta_l)$ makes party Y strictly prefer the disagreement result to the welfare maximal value of s . This implies that the social choice in case of the low realization of θ does not maximize social welfare. The same argument can be made in the case of a supermajority mechanism if $s^W(\theta_h) = \tilde{s}^Y(\theta, \bar{s}, \chi^*)$ for $\bar{s} = s^W(\theta_l)$. I will pick up the issue of optimally choosing the threshold \bar{s} in the following section on ex-post bargaining.

4 Bargaining about spending level and spending mix

4.1 Welfare enhancing bargaining

The supermajority mechanism that we have studied so far enables the opposition party to veto any budget that leads to an excessive deficit. This makes the opposition more powerful than it would be in a purely majoritarian system. One can expect that the opposition party makes use of its veto power to jointly negotiate the first period spending level and spending mix. Such attempts of the parliamentary minority can in deed frequently be observed (an example is the U.S. Republicans' 2013 attempt to renegotiate Democratic healthcare legislation) and they are often criticized because they may distort the political outcome away from what the majority wants. This section analyzes the role of ex-post political bargaining and shows that it may actually play a useful role.

Consider the model of the previous section with the following modified timing of events. At the beginning of period 1, party X forms the government. The preference parameter θ realizes and is observed by both political parties. Next, the government and the opposition engage in bargaining. In line with the intertemporal non-contractability of public spending, I assume that bargaining only concerns period 1 spending and debt. Thus, the bargaining outcome is a tuple (s_1, χ_1) . If bargaining does not lead to an agreement then party X has to pick a spending level $s \leq \bar{s}$ and it can freely choose the first period spending mix, i.e. it chooses $\chi_1 = \chi^*$. The outcome of the bargaining process is modeled as the Nash bargaining solution.

The key ingredients for the Nash bargaining solution are the utility possibility set and the disagreement utilities of both political parties. In the appendix, I fully characterize the set of utility combinations that can be reached as a bargaining outcome (proof of

Proposition 3) and (in the proof of Lemma 5) I derive the first order conditions for the Nash bargaining solution. In the main text, I provide a graphical analysis of the utility possibility set in a simple symmetric case that helps to understand the following results intuitively. The utility possibility set can be constructed as follows. After the first period budget has been determined, there are public fund $1 - s$ available for $t = 2$ government spending. Thus, the expected period 2 utility of x -voters is given by $f(1 - s) \tilde{u}(p)$ where $\tilde{u}(p) = ((1 - p)u(\chi^*) + pu(1 - \chi^*))$. Similarly, one can define $f(1 - s) \tilde{u}(1 - p)$ as the expected period 2 utility of y -voters. Thus, the utility combinations that can be reached with various decisions $(s_1, \chi_1) \in [0, 1]^2$ are

$$\begin{pmatrix} u^x \\ u^y \end{pmatrix} = f(1 - s) \begin{pmatrix} \tilde{u}(p) \\ \tilde{u}(1 - p) \end{pmatrix} + \theta f(s) \begin{pmatrix} u(\chi_1) \\ u(1 - \chi_1) \end{pmatrix}. \quad (19)$$

Figure 4 specifies the utility combinations that can be reached for one given value of the spending mix χ_1 by varying the level of spending s . The blue straight line represents the component $f(1 - s) \begin{pmatrix} \tilde{u}(p) \\ \tilde{u}(1 - p) \end{pmatrix}$ and the brown ones the component $\theta f(s) \begin{pmatrix} u(\chi_1) \\ u(1 - \chi_1) \end{pmatrix}$. The slope of the blue straight line above unity implies $p > 1/2$. Point A obtains when $s = 0$ and the origin when $s = 1$. The green utility possibility curve AA' represents those combinations of utilities that obtain by varying $s \in [0, 1]$ and keeping χ_1 constant. According to Lemma 1, beginning from $s = 0$, both x - and y -voters' utility first increases with s until the maximum utility of x -voters is reached at $s = s^X(\theta)$. Following this, the utility of x -voters falls while the utility of y -voters increases until $s = s^Y(\theta)$.¹⁹ In the third segment, both x - and y -voters' utility decreases until $s = 1$.

Point B represents the optimal choice of spending s of party X , point C the optimal choice of party Y . Different values of χ_1 lead to different (green) utility possibility curves as depicted in Figure 5 that considers two specific values χ^* and $1 - \chi^*$. Point A represents the laissez faire outcome which maximizes the utility of x -voters by choosing $(s_1, \chi_1) = (s^X(\theta), \chi^*)$. Point B represents the outcome which maximizes the utility of y -voters. Varying $(s_1, \chi_1) \in [0, 1]^2$ spans the (orange) utility possibility set U with Pareto frontier $P(\mathbf{U})$.

¹⁹The functions $\hat{u}^x(s)$ and $\hat{u}^y(s)$ that are based on the components of (19) are concave in s with positive and negative derivatives on the open interval $(s^X(\theta), s^Y(\theta))$. The corresponding segment of the green utility possibility curve is concave as can be seen by taking the first and second derivative of $\hat{u}^x(\hat{u}^{y^{-1}}(u^y))$.

In Proposition 3, I compare the outcome of a supermajority mechanism with and without bargaining and the laissez faire constitution in the case of a population consisting almost exclusively of x - and y -voters. This case can be easily analyzed graphically because social welfare is the sum of the two parties' utilities. The proposition states that bargaining may play a welfare enhancing role compared to laissez faire and to a supermajority rule because it leads to a more equilibrated spending mix. To get an intuition for both results, it is useful to consider the special symmetric case where both parties have the same probability of winning in the second period election. This case can be analyzed more easily because the utility possibility set U and the disagreement point are both symmetric around the 45 degree line. Figure 6 displays the outcomes of various institutions in the special case where $p = 1/2$ and $\bar{s} = 0$. The disagreement outcome B obtains when party X sticks to the spending limit, i.e. when $s_1 = 0$. The disagreement utilities of x - and y -voters are identical. Using point B , one can derive the outcome C under a supermajority mechanism without bargaining. It maximizes the utility of x -voters while guaranteeing y -voters the same utility that they derive from the default policy $s_1 = 0$. The overall set of feasible utility combinations spans from the laissez faire outcome which maximizes the utility of x -voters by choosing $(s_1, \chi_1) = (s^X(\theta), \chi^*)$ (point A) to point E which corresponds to a situation where party Y optimally chooses the tuple (s_1, χ_1) . The Nash bargaining solution D is the one that maximizes the Nash product. Starting at point A (or point C) and varying χ_1 in $[1 - \chi^*, \chi^*]$ yields a concave symmetric (around the 45 degree line) utility possibility curve that is included in the set U . This is why the bargaining outcome which maximizes the Nash product $(u^X - u_0^X) \cdot (u^Y - u_0^Y)$ must yield higher social welfare than point A and point C . Thus, bargaining dominates the outcome of a laissez faire constitution and also the outcome without bargaining.

The first of these two results can be generalized. It holds for general values p and for general values \bar{s} . The second result holds in an environment of the symmetric case considered here.

Proposition 3 *Consider a population consisting almost exclusively of x - and y -voters and let $\theta > 1$.*

(i) There is a supermajority mechanism with bargaining that yields strictly higher social welfare than a laissez faire constitution.

(ii) There is an environment including the symmetric case $p = 1/2$ and $\bar{s} = 0$ so that ex-post bargaining strictly increases the social welfare generated by a supermajority mechanism.

Proof: See the appendix.

Ex post bargaining balances the spending mix. This effect can be undesirable when the group of swing voters is large. This can be easily shown in the extreme case where the population consists almost only of swing voters ($\varepsilon = 1/2$) and when the current majority is perfectly stable ($p = 0$). In this case, a laissez faire constitution yields the welfare maximizing spending mix in both periods. Since the majority is perfectly stable, it also yields an optimal intertemporal allocation of resources. A supermajority mechanism with bargaining instead distorts the spending mix and the spending level and so reduces social welfare. For the same reason, ruling out bargaining under a supermajority mechanism may be of advantage. With an appropriately low \bar{s} , the supermajority mechanism replicates the laissez faire solution whereas bargaining distorts the composition of public spending.

The graphical representation of the Nash bargaining solution in the symmetric case also permits to study the selection of the default spending level \bar{s} . Consider again the case of a divided society (i.e. the case where $\varepsilon = 0$). When the efficient frontier of the set of available outcomes U , $P(\mathbf{U})$ is concave, the choice of $\bar{s} = 0$ leads to a welfare maximizing combination of (s_1, χ_1) . Raising the amount \bar{s} shifts the bargaining outcome to the right and reduces welfare. Thus, in a perfectly symmetric environment the optimal spending limit is as small as possible.

The central role of the size of the majority in period 1 raises the question of an appropriate constitutional design that deals with the fact the the size of the majority is not known at the constitutional stage. The following Lemma establishes useful invariance and monotonicity properties of the outcome of the three mechanisms under consideration for a given commonly known realization of the parameters θ, p, s . Actually, both the spending level and the spending mix do not vary with the size of all three groups. Therefore, social welfare is linear in the group composition.

Lemma 5 (i) *The laissez-faire policy outcome, the outcome of a supermajority mechanism without bargaining and the outcome of a supermajority mechanism with bargaining are all three independent of the size of the group of swing voters.*

(ii) *Social welfare under a laissez-faire constitution and under a supermajority rule without bargaining is linear and strictly increasing in the size of the group of swing voters. The welfare ranking of the two mechanisms is independent of the size of the group of swing voters.*

(iii) *Social welfare under a supermajority rule with bargaining is linear in the size of the group of swing voters.*

Proof: See the appendix.

Linearity implies that, if the supermajority mechanism with bargaining produces a higher welfare than a laissez faire constitution at $\varepsilon = 0$, either the welfare generated by a supermajority mechanism with bargaining is always (i.e. for all ε) higher than the welfare generated by a laissez faire constitution, or there is a unique cutoff value $\varepsilon^* \in (0, 1)$ below which a supermajority rule with bargaining yields a strictly higher welfare level than a laissez faire constitution. Actually, there are values θ and $p \in [0, \bar{p}]$ for which a unique cutoff value $\varepsilon^* \in (0, 1)$ actually exists, i.e.

Lemma 6 *There are values θ and $p \in [0, \bar{p}]$ for which the welfare ranking of a supermajority mechanisms with bargaining and laissez faire depends on the size of the group of swing voters.*

Proof: See the appendix.

Figure 4 here: Utility combinations for a given spending mix χ_1 and varying spending levels s_1 .

Figure 5 here: Utility combinations for given spending mixes χ^* and $1 - \chi^*$ and varying spending levels s_1 .

Figure 6 here: The symmetric case.

4.2 Constitutional choice

Based on the previous results one can address the problem of constitutional choice. Since it is not possible to effectively rule out legislative bargaining, I focus on the comparison of a laissez faire constitution and a supermajority rule with bargaining. So far, in this section I took the preference parameter θ , the probability of a change of the majority party p and the size of the group of swing voters ε as given. However, at the constitutional stage, it is unlikely that these parameters are known.²⁰ Consider a given joint and independent distribution of p and θ , $\gamma(p, \theta)$. For any such distribution the optimal choice of the constitution depends on the realization of the size of the group of swing voters.

²⁰This does not rule out that, at the constitutional stage, there may be some information available about the stability of voters' political preferences.

Lemma 7 *Consider a given joint and independent distribution of p and θ , $\gamma(p, \theta)$ with the property that a supermajority rule with bargaining yields higher welfare than a laissez faire constitution at $\varepsilon = 0$. There is a cutoff value $\varepsilon^* \in [0, 1]$ below which a supermajority rule with bargaining yields a weakly higher welfare level than a laissez faire constitution or bargaining is always superior to laissez faire.*

Proof: See the appendix.

The option to negotiate the spending mix and the spending level may increase social welfare. However, when there are many swing voters, a small opposition party may be able to substantially change the political outcome which reduces social welfare compared to the laissez faire constitution. Therefore, for any given joint distribution of p and θ , one would need to know the size of the group of potential swing voters in order to choose one of the two mechanisms. Tailoring mechanisms in this sense would be difficult in practice because the political environment may change over time²¹. However, a properly chosen supermajority threshold can make sure that a large enough majority does not need the opposition's approval. An optimal adjustment to the stochastic size of the group of swing voters can be achieved with a supermajority threshold of size $1 + \varepsilon^*$. If the size of the current majority exceeds this threshold, then party X does not require the consent of party Y for a deficit and the mechanism turns effectively into a laissez faire mechanism. To summarize:

Proposition 4 *Consider a joint and independent distribution of ε, p and θ . A supermajority mechanism with bargaining that uses an appropriate majority threshold leads to an optimal choice (conditional on the realization of ε) between a supermajority mechanism with bargaining and a laissez faire constitution.*

5 Political representation of swing voters

So far, I have assumed that swing voters have no direct political representation, in the sense that there is no party that shares swing voters' interest in good x and in a moderate expenditure policy. On the one hand this may seem to be a reasonable assumption because voters with unstable preferences may find it more difficult to establish a party with a recognizable party identity. However, on the other hand, swing voters have a clear interest in a more moderate deficit than "full" supporters of the current majority and they

²¹See Engelmann and Grüner (2013) for a discussion of the interim choice of mechanisms.

have voting rights. In this section, I briefly discuss how the policy outcome is affected if swing voters have more political influence than in the baseline model.

A straightforward way to model a political representation of swing voters is to assume that all x -voters are potential swing voters. More specifically, assume that with probability p a fraction of the group of x -voters of size 2ε turns into y -voters. In case of such a preferences switch, the corresponding voters are drawn randomly from the set of x -voters. Hence, each individual x -voter's preferences shift with probability $2\varepsilon p / (1 + \varepsilon)$. Moreover, x -voters know that if their own preference shifts, they become part of a new majority of y -voters. If some x -voters' preferences shift then x -voters whose preferences do not shift become a minority in period 2.

In this setting, party X represents the interest of a homogenous group of voters that knows that there is a probability that a subgroup of its members' preferences may change. It is easy to verify that when $p < 1$ and when $2\varepsilon < 1$, for all realizations of θ the deficit under a laissez faire constitution exceeds the one in a constrained welfare maximum.

It is also straightforward to verify that the supermajority mechanism performs similarly to the case in which swing voters can be distinguished from x -voters. What changes is that party X suggest a lower deficit than before because it now represents potential swing voters. This mechanism still outperforms a strict rule with the same benchmark spending level.

Concerning the negotiation of the spending level and the spending mix, one obtains a stronger result regarding the role of large preference shifts. When $2\varepsilon = 1$, x -voters know that their desired spending mix will always be implemented. This is why the probability p leaves the desired spending level of x -voters unaffected. They always pick the welfare maximizing spending level. Therefore, a laissez faire constitution always realizes the first best when $2\varepsilon = 1$. A supermajority mechanism with bargaining may still yields a higher social welfare than a laissez faire mechanism when ε is small.²²

²²Another way of modelling a stronger political influence of swing voters is to assume that two competing parties can commit to political platforms. This makes parties compete for the swing voters and so it makes this group politically more influential. Consider the case where two parties can commit to a spending level for period 1 but not to the spending mix. Assume that indifferent voters choose party X . Party X can only attract a majority if it makes swing voters strictly better off than party Y . Party X 's best reply to a given spending level offered by party Y is to make swing voters indifferent or - if this yields a majority of votes - to pick its preferred deficit. Party Y can only attract a majority if it makes swing voters strictly better off than party X . If this makes party Y worse off than party X 's offer, then party Y should pick a platform that makes it lose the election. Party X has an advantage. If, in period 1, both parties propose the same spending level, swing voters and x -voters are both attracted by party X . Obviously, in equilibrium party Y cannot win the election. There are equilibria in which party Y loses

6 Conclusion

This paper addresses the trade off between fiscal discipline and fiscal flexibility. It studies this trade-off in a setup with non-contractible and partly private information about voters' desired spending mixes and their desired spending levels. The paper has two main findings. The first main finding is that, under certain conditions, a simple revelation mechanism yields a constrained welfare maximizing state dependent budget decision. The result of the revelation mechanism can be approximated by a simple supermajority mechanism. However, the supermajority mechanism sometimes gives the opposition a veto right that it may use to influence the spending mix. The second main finding concerns the conditions under which a supermajority mechanism outperforms a laissez faire constitution when bargaining cannot be ruled out. If the opposition is small in size, the introduction of a supermajority mechanism may actually lower expected social welfare. When the two political camps have similar size, supermajority mechanisms may instead perform very well. A properly chosen supermajority threshold can make sure that a large enough current majority does not need the approval of the current opposition.

Several extensions of the present basic framework can be considered in further research. One extension is to analyze the political feasibility of a supermajority rule. In the present model, the acceptance of supermajority mechanism by the political actors would depend on the institutional status quo. If the status quo constitution is a laissez faire mechanism then the elected government opposes the introduction of a supermajority mechanism while the current opposition favors it. In the present setup with only two periods there is no scope for a deal between both parties because the opposition has nothing to offer. This may be different when there are many periods so that future election results are not perfectly known. Moreover, a reform would be feasible before the period 1 election results are known. In this case both political parties should be in favor of a supermajority mechanism and the outcome of constitutional bargaining would be constrained optimal. The participation in a mechanism can be also facilitated by properly choosing the status quo (Cramton, Gibbons, and Klemperer, 1987). The introduction of a supermajority

the election. The constraint on these equilibria is that party X chooses a spending level so that party Y cannot make swing voters better off without making itself worse off. In some of these equilibria party X overspends relative to the welfare maximum. The deficit is undesired from the perspective of the swing voters whose desired deficit level maximizes social welfare. A supermajority mechanism can improve the outcome. It is more complicated to study the case in which both spending level and spending mix are part of a policy platform. In this case the three groups of voters all have distinct ideal points (χ_1, s) . In this case there often is no Nash equilibrium in political platforms.

mechanism may be facilitated if the status quo is a constitution with a strict rule and if there is a strong preference for current spending. In this case, even if the election results of the first period are known, there may be scope for constitutional negotiations between both parties.

In a setup with more than two periods the debt level may play an important role as a state variable. A focus of further research should be on how constraints on fiscal policy should be adjusted to the participating countries' debt levels. This would permit to study rules such as the Eurozone's 1/20th rule that links spending to the current debt level.

In a dynamic context one can also consider that predetermined government expenses as a state variable can be chosen strategically. Recent research by Bouton, Lizzeri and Persico (2017) studies this case and assumes that the period 1 government can impose two constraints on the one in period 2: the repayment of debt and the payment of entitlements (private goods) for its supporters. In this context they find that a constraint on government debt makes entitlements grow. The present paper does less in one sense (it does not model the choice of entitlements) and more in another (it focuses explicitly on informational frictions and solves for optimal information aggregation mechanisms). Doing both in a single model is an interesting and challenging task.

It would also be worthwhile to endogenize the party structure in a setup where individual preferences cannot be categorized into a finite number of groups. Such an analysis could also consider cases where there are more than two public goods. Moreover, the analysis could be extended for different preferences regarding the source and size of public revenues.

The present paper has focused on one prominent strategic deficit explanation for excessive deficits. It is worthwhile to also study the performance of different mechanisms if political polarization and indivisibilities lead to elevated deficits (see Alesina and Drazen, 1989, and Grüner, 2013). Moreover, in a model with multiple public goods and more voter diversity, one could attempt to further investigate the optimal size of the required majority for a deficit of a given size.²³ It would also be important to find out how exactly one should quantitatively adjust the size of the majority to the size of the deficit that has been requested.

The focus of this paper is on purely national solutions for the problem of strategic deficits. When part of the relevant information is internationally observable, one might consider a solution where international decision makers are also involved in the decision

²³See Becker, Gersbach, and Grimm (2010) for an analysis of a flexible majority rule in the case where the government provides a single public good.

procedure. In this context, it would be desirable to further study the case in which excessive debt generates externalities across countries (see Kiel, 2004 for a first analysis). Such an extension should address the efficiency, individual rationality and renegotiation proofness of hybrid (national and international) mechanisms for the control of fiscal deficits.

7 Appendix

7.1 Proof of Lemma 1

(i) Consider first the function $s^W(\theta)$. The optimality of s requires that $\theta = \frac{f'(1-s)}{f'(s)}$. Therefore the inverse of $s^W(\theta)$ satisfies $\frac{d\theta}{ds} = \frac{-f'(s)f''(1-s) - f'(1-s)f''(s)}{f'(s)^2} > 0$ which establishes the strict monotonicity of $s^W(\theta)$. The same type of argument can be made for the functions $s^X(\theta)$ and $s^Y(\theta)$.

Part (ii) follows directly from the three FOCs for x -, y - and swing voters,

$$\begin{aligned}\theta &= \frac{f'(1-s)}{f'(s)} \cdot \frac{((1-p)\bar{u} + p\underline{u})}{\bar{u}}, \\ \theta &= \frac{f'(1-s)}{f'(s)} \cdot \frac{(p\bar{u} + (1-p)\underline{u})}{\underline{u}},\end{aligned}$$

and

$$\theta = \frac{f'(1-s)}{f'(s)},$$

and from

$$\frac{(p\bar{u} + (1-p)\underline{u})}{\underline{u}} > 1 > \frac{((1-p)\bar{u} + p\underline{u})}{\bar{u}}.$$

(iii) Consider first the case where $p = 1/2$. In this case, both parties would pick the same spending level if elected in period 1. Swing voters strictly prefer party X in period 1 because it chooses their preferred spending mix. Next, consider the case where $p = 0$. Party X maximizes swing voters utility by choice of (s_1, χ_1) whereas party Y would overspend and it would spend too much on good Y from swing voters' perspective. Party X's first period spending rises when p increases while party Y's first period spending would decline in p (as one can easily see from the above FOCs). Therefore, swing voters' utility decreases in p if party X is in power and it increases in p if party Y is in power. The result follows from the continuity of swing voters' utilities in p .

7.2 Proof of Lemma 2

(i) Rewrite (14) as

$$\theta = \frac{(f(1-\bar{s}) - f(1-\tilde{s}^Y))((1-p)\underline{u} + p\bar{u})}{(f(\tilde{s}^Y) - f(\bar{s}))\underline{u}}.$$

and take the derivative

$$\frac{d\theta}{d\tilde{s}^Y} = \frac{(f(\tilde{s}^Y) - f(\bar{s}))f'(1-\tilde{s}^Y) - (f(1-\tilde{s}^Y) - f(1-\bar{s}))f'(\tilde{s}^Y)}{(f(\tilde{s}^Y) - f(\bar{s}))^2} \cdot \frac{((1-p)\underline{u} + p\bar{u})}{\underline{u}}$$

We have

$$\begin{aligned} \frac{d\theta}{d\tilde{s}^Y} > 0 &\Leftrightarrow \\ (f(\tilde{s}^Y) - f(\bar{s}))f'(1-\tilde{s}^Y) &> (f(1-\tilde{s}^Y) - f(1-\bar{s}))f'(\tilde{s}^Y). \end{aligned} \quad (20)$$

The concavity of $f(s)$ implies that for $\tilde{s}^Y > \bar{s}$ and $\tilde{s}^Y > 1/2$

$$\begin{aligned} f'(1-\tilde{s}^Y) &> \frac{f(1-\bar{s}) - f(1-\tilde{s}^Y)}{\tilde{s}^Y - \bar{s}} > \frac{f(\tilde{s}^Y) - f(\bar{s})}{\tilde{s}^Y - \bar{s}} > f'(\tilde{s}^Y) \\ &\Leftrightarrow f'(1-\tilde{s}^Y)(\tilde{s}^Y - \bar{s}) > f(1-\bar{s}) - f(1-\tilde{s}^Y) \\ &> f(\tilde{s}^Y) - f(\bar{s}) > f'(\tilde{s}^Y)(\tilde{s}^Y - \bar{s}). \end{aligned}$$

This in turn implies (20). For $\tilde{s}^Y > \bar{s}$ and $\tilde{s}^Y < 1/2$ the concavity of $f(s)$ implies that

$$\begin{aligned} \frac{f(\tilde{s}^Y) - f(\bar{s})}{\tilde{s}^Y - \bar{s}} &> f'(\tilde{s}^Y) > f'(1-\tilde{s}^Y) > \frac{f(1-\bar{s}) - f(1-\tilde{s}^Y)}{(1-\bar{s}) - (1-\tilde{s}^Y)} \\ &\Leftrightarrow f(\tilde{s}^Y) - f(\bar{s}) > f'(\tilde{s}^Y)(\tilde{s}^Y - \bar{s}) \\ &> f'(1-\tilde{s}^Y)(\tilde{s}^Y - \bar{s}) > f(1-\bar{s}) - f(1-\tilde{s}^Y). \end{aligned}$$

This also implies (20).

(ii) Rewrite (15) as

$$\theta = \frac{(f(1-\bar{s}) - f(1-\tilde{s}^X))((1-p)\bar{u} + p\underline{u})}{(f(\tilde{s}^X) - f(\bar{s}))\bar{u}}$$

The derivative $\frac{d\theta}{d\tilde{s}^X}$ is positive iff

$$(f(\tilde{s}^X) - f(\bar{s}))f'(1-\tilde{s}^X) < (f(1-\bar{s}) - f(1-\tilde{s}^X))f'(\tilde{s}^X). \quad (21)$$

The concavity of $f(s)$ implies that for $\tilde{s}^X < \bar{s}$ and $\tilde{s}^X < 1/2$

$$\frac{f(\tilde{s}^X) - f(\bar{s})}{\tilde{s}^X - \bar{s}} > f'(\tilde{s}^X) > f'(1 - \tilde{s}^X) > \frac{f(1 - \bar{s}) - f(1 - \tilde{s}^X)}{(1 - \bar{s}) - (1 - \tilde{s}^X)}.$$

This in turn implies (21). For $\tilde{s}^X < \bar{s}$ and $\tilde{s}^X > 1/2$ the concavity of $f(s)$ implies that

$$f'(1 - \tilde{s}^X) > \frac{f(1 - \bar{s}) - f(1 - \tilde{s}^X)}{(1 - \bar{s}) - (1 - \tilde{s}^X)} > \frac{f(\tilde{s}^X) - f(\bar{s})}{\tilde{s}^X - \bar{s}} > f'(\tilde{s}^X).$$

This also implies (21).

(iii) Consider given values \bar{s}, χ^* . I proceed by inverting the functions $s^W(\theta)$ and $\tilde{s}^Y(\theta, \bar{s}, \chi^*)$. The inverse of $s^W(\theta)$ is given by $\theta = f'(1 - s^W)/f'(s^W)$ and the inverse of $\tilde{s}^Y(\theta, \bar{s}, \chi^*)$ by $\theta = \frac{(f(1-\bar{s})-f(1-s))((1-p)\underline{u}+p\bar{u})}{(f(s)-f(\bar{s}))\underline{u}}$. For a given value $s = s^W = \tilde{s}^Y$, these inverse functions assume identical values if

$$\frac{f'(1-s)}{f'(s)} = \frac{f(1-\bar{s}) - f(1-s)}{f(s) - f(\bar{s})} \frac{((1-p)\underline{u} + p\bar{u})}{\underline{u}}$$

The left hand side is strictly monotonously increasing, unbounded for $s \rightarrow 1$, and positive for $s = \bar{s} > 0$.

The RHS can be rewritten as

$$\begin{aligned} & \frac{f(1-\bar{s}) - f(1-s)}{s - \bar{s}} \frac{s - \bar{s}}{f(s) - f(\bar{s})} \frac{((1-p)\underline{u} + p\bar{u})}{\underline{u}} \\ = & \frac{f(1-\bar{s}) - f(1-s)}{1 - \bar{s} - (1-s)} \frac{s - \bar{s}}{f(s) - f(\bar{s})} \frac{((1-p)\underline{u} + p\bar{u})}{\underline{u}} \end{aligned}$$

with limit

$$\frac{f'(1-\bar{s})}{f'(\bar{s})} \frac{((1-p)\underline{u} + p\bar{u})}{\underline{u}}$$

for $s \rightarrow \bar{s}$. Hence, at $s = \bar{s} \in (0, 1/2)$ the RHS exceeds the LHS. Moreover, since the RHS is bounded, there must exist at least one intersection point in $(\bar{s}, 1)$ where $s^W(\theta) = \tilde{s}^Y(\theta, \bar{s}, \chi^*)$.

(iv) Proceeding like in (iii) yields the result. Q.E.D.

7.3 Proof of Lemma 3

Consider the following direct revelation mechanism asking for announcements $\hat{\theta}_X$ and $\hat{\theta}_Y$:

$$s(\hat{\theta}_X, \hat{\theta}_Y) = \begin{cases} \min \left\{ s^W(\hat{\theta}_X), \tilde{s}^Y(\hat{\theta}_X, \bar{s}, \chi^*) \right\} & \text{if } \hat{\theta}_X = \hat{\theta}_Y \geq \tilde{s}^{Y^{-1}}(\bar{s}, \bar{s}, \chi^*) \\ \bar{s} & \text{otherwise} \end{cases}. \quad (22)$$

Consider first the incentive compatibility constraint of the opposition and assume that the government announces θ truthfully. It follows from definition 2 that the opposition at least weakly prefers truthtelling to any false announcement. It follows from Definition 1 that the government optimally replies with truthtelling as well. Hence, we do have a Bayesian Nash equilibrium. Q.E.D.

7.4 Proof of Proposition 1

Part (i) of the proposition has already been shown in the main text. It remains to be shown that there always is a spending level \bar{s} such that the laissez faire constitution is dominated by a revelation mechanism. I proceed in three steps.

Step 1: Consider first the case of a strict spending rule that enforces the welfare maximizing spending level at the highest possible preference parameter $\theta = b$, i.e. let $\bar{s} = s^W(b)$. In this case the state dependent spending level with a revelation mechanism is identical to the laissez faire one if $s^X(\theta) \leq \bar{s}$, and it equals \bar{s} otherwise. This yields higher welfare than the laissez faire solution because on the interval $[s^{X^{-1}}(\bar{s}), b)$ we have $s^W(\theta) < \bar{s} < s^X(\theta)$.

Step 2: Next note that a further welfare improvement can be realized if one marginally reduces \bar{s} . This is so because the marginal welfare effect of a reduction of \bar{s} is strictly positive for all $\theta \in [s^{X^{-1}}(\bar{s}), b)$ and zero for $\theta = b$ (since, at $\theta = b$ we are already in the optimum). Thus welfare is marginally increased.

Step 3: Now consider such a welfare increasing strict rule with the property that $\bar{s} < s^X(b)$. According to part (i), this rule is weakly dominated by the revelation mechanism that implements $g(\theta, \bar{s})$. Thus, this revelation mechanism strictly dominates laissez faire.

7.5 Proof of Lemma 4

It is optimal for party Y to accept everything that is at least as good as $\tilde{s}^Y(\theta, \bar{s}, \chi^*)$. Q.E.D.

7.6 Proof of Proposition 3

(i) The proof makes use of the properties of the utility possibility set which, jointly with the disagreement outcome determines the Nash bargaining solution. Denote the period 2 utility of x -voters by $\tilde{u}(p) = ((1-p)u(\chi^*) + pu(1-\chi^*))$. A first period spending level s and a first period expenditure composition χ_1 lead to the following utility vector:

$$\begin{pmatrix} u^x \\ u^y \end{pmatrix} = f(1-s) \begin{pmatrix} \tilde{u}(p) \\ \tilde{u}(1-p) \end{pmatrix} + \theta f(s) \begin{pmatrix} u(\chi_1) \\ u(1-\chi_1) \end{pmatrix}. \quad (23)$$

I call U the set of outcomes $\begin{pmatrix} u^x \\ u^y \end{pmatrix}$ that is available with arbitrary $(s, \chi_1) \in [0, 1]^2$.

Unless $p = 1/2$ the component $\begin{pmatrix} \tilde{u}(p) \\ \tilde{u}(1-p) \end{pmatrix}$ is asymmetric (in the sense that $\tilde{u}(p) \neq \tilde{u}(1-p)$) whereas the set of vectors $\begin{pmatrix} u(\chi_1) \\ u(1-\chi_1) \end{pmatrix}$ that is generated through variations in $\chi_1 \in [\chi^*, 1-\chi^*]$ is symmetric (see Figures 4 and 5 and their explanation in the main text).

Consider now the case where the group of swing voters is small, i.e. where ε is close to zero. In this case, social welfare is approximately given by the sum of utilities $u^x + u^y$. I want to show that the bargaining outcome yields a higher sum of payoffs of x and y -voters than the laissez faire solution.

For any disagreement point, the bargaining outcome must lie on the efficient frontier of the set of available outcomes U , $P(\mathbf{U})$. Thus, to proof (i) it is sufficient that all elements of $P(\mathbf{U})$ that are Pareto-superior to the disagreement point

$$\begin{pmatrix} u^x \\ u^y \end{pmatrix} = f(1-\bar{s}) \begin{pmatrix} \tilde{u}(p) \\ \tilde{u}(1-p) \end{pmatrix} + \theta f(\bar{s}) \begin{pmatrix} u(\chi^*) \\ u(1-\chi^*) \end{pmatrix}$$

yield a higher sum of utilities $u^x + u^y$ than the laissez faire solution. Figure 7 makes clear why this is the case when the utility possibility set or the disagreement utilities are not symmetric. The main text already treats the symmetric case. Figure 7 considers (w.l.o.g.) the case where $p < 1/2$, which is why in point B , $u^x = \tilde{u}(p) > \tilde{u}(1-p) = u^y$. Point A is the bliss point of x -voters $(s^X(\theta), \chi^*)$ and point A' describes the utility outcome of $(s^X(\theta), 1-\chi^*)$. All the utility combinations on the linear segment $A-A'$ yield identical social welfare. The concave yellow curve AA' describes the utility combinations that can be reached by varying $\chi \in (1-\chi^*, \chi^*)$ while maintaining first period spending $s^X(\theta)$. These utility combinations yield strictly higher welfare than A . The disagreement point lies on the green concave segment AB where B corresponds to the case with the strictest spending limit $\bar{s} = 0$. If laissez faire yields higher welfare than a supermajority mechanism with bargaining then the disagreement utility vector must lie on the concave segment BC (otherwise the disagreement point would already yield higher welfare than laissez faire). This segment in turn lies inside the triangle ADE . Thus, to complete the proof it suffices to show that any disagreement point inside the triangle ADE yields an outcome with a

higher welfare than point A . Point F is the utility outcome if y -voters can choose (s, χ_1) . Thus, the set of Pareto-optima $P(\mathbf{U})$ extends from A to F . Any outcome with lower welfare than point A must lie strictly below the extended straight line AA' , i.e. on the segment FG of $P(\mathbf{U})$. Next note that the curve AA' is symmetric around the straight line with slope 1 that goes through the points E and H . The highest Nash product must at least assume the same value as in point H . All points with identical Nash product to point H lie above the extended straight line AA' which has slope -1 . Thus, the bargaining outcome must yield strictly higher welfare than point A which represents the laissez faire outcome.

Figure 7 here: An asymmetric case.

(ii) The result follows from the analysis of the symmetric case in the main text and from the continuity of all payoffs in p and ε .

7.7 Proof of Lemma 5

(i) First, consider the laissez faire constitution: Under a laissez faire constitution, party X selects its preferred spending mix in the first period. In the second period the majority picks its preferred spending mix. The spending level of the first period is determined by party X not taking into account that swing voters and y -voters prefer a lower spending level.

Second, consider the supermajority rule without bargaining. Again, the policy choice of party X does not take the group sizes into account.

Third, consider the supermajority rule with bargaining between party X and party Y . The size of the group of swing voters is irrelevant for both groups' payoffs. This is why the Nash bargaining solution is independent of the size of the group of swing voters. In more detail, consider a given realization of θ and a given value p . Define $\tilde{u}(p) := pu + (1 - p)\bar{u}$. Hence, $f(1 - s)\tilde{u}(p)$ is the expected overall utility of x voters in the second period when the transition probability is p and the first period spending level is s . Similarly, $f(1 - s)\tilde{u}(1 - p)$ is the expected overall utility of y voters in the second period. Denote by u^P (u_0^P) the (disagreement) utility of the constituency of party P . The Nash product is:

$$\begin{aligned}
N(s, \chi_1) &= (u^X - u_0^X) \cdot (u^Y - u_0^Y) \\
&= (\theta f(s) u(\chi_1) + f(1-s) \tilde{u}(p) - u_0^X) \\
&\quad \cdot (\theta f(s) u(1-\chi_1) + f(1-s) \tilde{u}(1-p) - u_0^Y) \\
&= \theta^2 f(s)^2 u(\chi_1) \cdot u(1-\chi_1) \\
&\quad + \theta f(s) f(1-s) (\tilde{u}(1-p) u(\chi_1) + \tilde{u}(p) u(1-\chi_1)) \\
&\quad + f(1-s)^2 ((\tilde{u}(p)) \tilde{u}(1-p)) \\
&\quad - u_0^X \cdot (\theta f(s) u(1-\chi_1) + f(1-s) \tilde{u}(1-p) - u_0^Y) \\
&\quad - u_0^Y \cdot (\theta f(s) u(\chi_1) + f(1-s) \tilde{u}(p) - u_0^X).
\end{aligned} \tag{24}$$

The first-order conditions are

$$\begin{aligned}
N'_{\chi_1} &= \theta^2 f(s)^2 (-u(\chi_1) \cdot u'(1-\chi_1) + u'(\chi_1) \cdot u(1-\chi_1)) \\
&\quad + \theta f(s) f(1-s) (\tilde{u}(1-p) u'(\chi_1) - \tilde{u}(p) u'(1-\chi_1)) \\
&\quad + u_0^X \cdot \theta f(s) u'(1-\chi_1) \\
&\quad - u_0^Y \cdot \theta f(s) u'(\chi_1) = 0.
\end{aligned} \tag{25}$$

and

$$\begin{aligned}
N'_s &= \theta^2 2f(s) f'(s) u(\chi_1) \cdot u(1-\chi_1) \\
&\quad + \theta (-f(s) f'(1-s) + f'(s) f(1-s)) (\tilde{u}(1-p) u(\chi_1) + \tilde{u}(p) u(1-\chi_1)) \\
&\quad - 2f(1-s) f'(1-s) ((\tilde{u}(p)) \tilde{u}(1-p)) \\
&\quad - u_0^X \cdot (\theta f'(s) u(1-\chi_1) - f'(1-s) \tilde{u}(1-p)) \\
&\quad - u_0^Y \cdot (\theta f'(s) u(\chi_1) - f'(1-s) \tilde{u}(p)) = 0.
\end{aligned} \tag{26}$$

Both expressions do not include the size of the group of swing voters, ε .

(ii) Welfare under a laissez faire constitution is a linear and increasing function of ε :

$$\begin{aligned}
W^{LF} &= \theta f(s^X(\theta)) \left(\left(\frac{1}{2} + \varepsilon \right) \bar{u} + \left(\frac{1}{2} - \varepsilon \right) \underline{u} \right) \\
&\quad + f(1-s^X(\theta)) \left(\left(\frac{1}{2} + \varepsilon \right) \bar{u} + \left(\frac{1}{2} - \varepsilon \right) \underline{u} \right). \\
&= (\theta f(s^X(\theta)) + f(1-s^X(\theta))) (\check{u} + (\bar{u} - \underline{u}) \varepsilon).
\end{aligned}$$

Welfare under a supermajority rule without bargaining is a linear and increasing function of ε :

$$\begin{aligned} W^{SMNB} &= \theta f(\tilde{s}^Y(\theta, \bar{s}, \chi^*)) \left(\left(\frac{1}{2} + \varepsilon \right) \bar{u} + \left(\frac{1}{2} - \varepsilon \right) \underline{u} \right) \\ &\quad + f(1 - \tilde{s}^Y(\theta, \bar{s}, \chi^*)) \left(\left(\frac{1}{2} + \varepsilon \right) \bar{u} + \left(\frac{1}{2} - \varepsilon \right) \underline{u} \right) \\ &= (\theta f(\tilde{s}^Y(\theta, \bar{s}, \chi^*)) + f(1 - \tilde{s}^Y(\theta, \bar{s}, \chi^*))) (\bar{u} + (\bar{u} - \underline{u}) \varepsilon). \end{aligned}$$

The welfare ranking of both depends on whether

$$\theta f(\tilde{s}^Y(\theta, \bar{s}, \chi^*)) + f(1 - \tilde{s}^Y(\theta, \bar{s}, \chi^*)) > \theta f(s^X(\theta)) + f(1 - s^X(\theta))$$

and thus not on ε .

(iii) Linearity follows from part (i).

7.8 Proof of Lemma 6

Consider the case where $p = 0$ and where $\bar{s} = 0$. According to proposition 3, when $\varepsilon = 0$ (i.e. there are no swing voters) a supermajority rule with bargaining yields a higher welfare level than a laissez faire constitution because the former perfectly balances the first period spending mix and it leads to the welfare maximizing spending level whereas the latter distorts both values.

Consider instead the case where $p = 0$, $\bar{s} = 0$ and where ε is close to 1. In this case, welfare is entirely represented by the utility of swing voters. From their perspective, the bargaining outcome yields a distorted (equal) spending mix in the first period. The laissez faire outcome instead leads to a welfare maximum because swing voters know that they do not change their policy preferences for sure.

7.9 Proof of Lemma 7

We have already established that the difference of welfare under supermajority rule with bargaining and a laissez faire constitution is a linear function of ε which is non-negative for $\varepsilon = 0$. Call this function $D(\varepsilon, p, \theta) = \zeta(p, \theta) \cdot \varepsilon + \alpha(p, \theta)$. Note that this decomposition is permitted according to Lemma 5. The expected welfare difference of the two mechanisms

is

$$\tilde{D}(\varepsilon) : = \frac{\int_0^1 \int_0^1 D(\varepsilon, p, \theta) \cdot \gamma(p, \theta) \cdot dp \cdot d\theta}{\int_0^1 \int_0^1 \gamma(p, \theta) \cdot dp \cdot d\theta} \quad (27)$$

$$= \frac{\int_0^1 \int_0^1 \zeta(p, \theta) \cdot \gamma(p, \theta) \cdot dp \cdot d\theta}{\int_0^1 \int_0^1 \gamma(p, \theta) \cdot dp \cdot d\theta} \cdot \varepsilon + \frac{\int_0^1 \int_0^1 \alpha(p, \theta) \cdot \gamma(p, \theta) \cdot dp \cdot d\theta}{\int_0^1 \int_0^1 \gamma(p, \theta) \cdot dp \cdot d\theta}. \quad (28)$$

This function is linear in ε and non-negative for $\varepsilon = 0$. The Proposition follows.

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