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OPTIMAL MECHANISMS FOR THE CONTROL OF FISCAL DEFICITS*

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 à la Tabellini and Alesina (1990). Three groups of voters are informed about the productivity 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. Under certain conditions, a simple two-stage mechanism in which a deficit requires the approval by a supermajority in parliament implements a constrained optimal decision. 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 reduces welfare whereas the laissez faire mechanism may yield the first best. An appropriately adjusted majority threshold can deal with this problem.

JEL Classification: D82 and H62
Keywords: constitutional choice, fiscal policy rules and mechanism design

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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. 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.

Tying policymakers' choices through strict constitutional deficit ceilings is a direct way of addressing the problem of strategic overspending. In order to maintain some fiscal flexibility, constitutions often contain exemption clauses that permit exceptions under circumstances that make a fiscal policy response particularly desirable. 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. It would be prohibitively costly to fully specify at the constitutional stage, what 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 listed in a constitution, it may be difficult to verify their realization ex post. Hence, the constitution has to deal with non-contractible or non verifiable information about the future state of the economy.

This paper addresses this constitutional choice problem from a mechanism design perspective. I assume that fiscal policy decisions should depend on two kinds of information: The desired spending mix of the majority of citizens and the productivity of public spending at different points of time. In my model voters differ in their preferences for two public goods. Moreover, all voters and all policymakers are equally well informed about the productivity of current public spending. This is why, for any given spending mix, all voters agree on the optimal time path for public spending. However, neither the spending mix nor the productivity of current public spending are fully contractible at the constitutional stage. In my model, it is the role of political institutions to base decisions regarding spending mix and deficit on voters' preferences and on the realization of the productivity of current spending. By assumption, the constitution can only specify how decision rights are allocated to political parties. This is why the government party selects its desired spending mix even if this is not maximizing social welfare. In most of the paper, this is taken to be a constraint of the mechanism designer's optimization problem. As in Tabellini and Alesina (1990) an unconstrained government has an incentive to strategically overspend.

The present paper derives conditions under which a relatively simple revelation mechanism can implement a constrained optimal outcome in which the debt level is chosen optimally for all possible realizations of the productivity of public spending. The revelation mechanism asks both political parties for simultaneous announcement regarding the realized productivity parameter and implements a corresponding deficit. If the two announcements differ, a low default spending level is implemented. I show that, when voter preferences are not too different or when the potential productivity of government spending is sufficiently large, this mechanism implements a constrained optimal state dependent collective choice.

The revelation mechanism requires a structured announcement procedure which may be difficult to implement in practice. 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 exceeds 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 budged may not exceed the prespecified size. In the third step the government decides on the spending mix, taking into account the parliament's decision.

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 supermajority rule in most of these years.

The present paper shows that a mechanism which is similar to the one applied in the U.S. may in principle play a useful role.[1] However, a supermajority mechanism 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

[1] In Italy the entire budget (i.e. spending level and composition) has to be approved by two chambers with often opposite majorities (Article 81 of the Italian constitution). This procedure is different from the supermajority mechanism that grants the government the right to choose the spending mix.

mix with the government. This in turn may distort the spending mix. It depends on the features of the underlying distribution of individuals' preferences, whether a supermajority 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.

The supermajority mechanism studied in this paper is an alternative to fiscal policy arrangements which are currently introduced in some of the countries of the Eurozone. Some of these new arrangements give the government the right to announce the existence of special economic circumstances. Exemption clauses are e.g. included in the new institutional arrangements in France and Italy. The results generated by such constitutional rules have often been rather disappointing in the past. 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 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.

The present paper is related to a vast theoretical literature about the sources of excessive deficits and institutional measures to overcome the problem. This literature includes the formal analysis of budget procedures pioneered by Ferejohn and Krehbiel (1987) and strategic explanations of deficits in Alesina and Drazen (1989) and Tabellini and Alesina (1990). The present model is built on Tabellini and Alesina (1990) who have shown that the possibility of a change of the political majority makes policymakers overspend on their preferred projects.[2] This paper extends their analysis by including time varying voter preferences and spending productivity.

Several economists have proposed that exceptionally high fiscal deficits should only be permitted if they are backed by a supermajority in parliament[3]. The underlying idea is that there should be more widespread support for deficits when exceptional circumstances affect many individuals in the same way[4]. 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 deficit[5]. 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.

Another model that analyzes how fiscal policy institutions should deal with new information about the desirability of deficits is Kiel (2003, chapter 3). She studies a fiscal policy mechanism design problem with cross border externalities. Several countries have idiosyncratic stochastic spending needs. A mechanism maps the vector of spending needs into a vector of fiscal deficits. Her paper studies a static case and it does not derive endogenously why the deficit bias arises.

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's (1985) seminal paper studies the optimal choice of the character-

[2] See also Persson and Svensson (1989), Lizzeri (1999), and Battaglini and Coate (2008).

[3] Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung (2007) and Wissenschaftlicher Beirat beim Bundesministerium für Wirtschaft und Technologie (2008).

[4] Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung (2007, p.101).

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

istics 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 baseline model

2.1 Consumers

Consider a country with a large population consisting of three homogenous groups of individuals. There are two divisible public goods, x and y and two legislative periods, 1 and 2. In both periods, the government has a given revenue of 1/2. In the first period, the government can raise debt (or deposit money) at an interest rate of zero. Debt has to be fully repaid in the second period. 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 given probability p, this may change in period $t = 2$. All voters know, which of the three groups they belong to.[6]

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

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

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

$$u^s(x_1, y_1, x_2, y_2) = \theta \cdot u(x_1, y_1) + \delta u(x_2, y_2) + (1 - \delta) v(x_2, y_2), \tag{3}$$

where the indices refer to periods 1 and 2 and where $\delta = 1$ if swing voters' preferences continue to be more in favor of consuming good x and $\delta = 0$ otherwise. The parameter θ

[6]In Section 5, I consider an alternative setup with only two groups in which it may occur that in the second period some of the x-voters turn into y-voters.

measures the relative efficiency (or desirability) of public spending in period 1. It is drawn from a given distribution $\phi(\theta)$ 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:

$$v(x,y) \neq u(x,y) \tag{4}$$
$$v(x,y) = u(y,x). \tag{5}$$

The utility function $u(x,y)$ is strictly concave and homothetic. 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:

$$u(s_t\chi_t, s_t(1-\chi_t)) = f(s_t)\cdot u(\chi_t,(1-\chi_t)), \tag{6}$$

with $f' > 0$, $f'' < 0$, and $f'(0) = \infty$. 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 $\bar{u} := u(\chi^*, 1-\chi^*)$ and $\underline{u} := (1-\chi^*, \chi^*)$.

2.2 Parties and voting

I assume that 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. 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.

Voters vote sincerely for their preferred party. In period 1, swing voters vote for party X because, as will become clear below, party X picks the same spending level as party Y but it chooses the swing voters' preferred spending mix in that period. If the swing voters change their preferences then this implies a change in government in period 2. 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.

2.3 Predetermined spending

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[7]. In practice, states engage in various long run commitments. Many state employees have long run contracts. Long run contracts may be useful when an employee has to make a relationship specific investment that only pays off for him if his employment lasts long enough. Another area where similar credibility problems may arise are procurement relationships. Procurement contracts may often only be revoked at a high cost.

I denote by $\check{s}$ 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. Throughout the paper, I will assume that $\check{s} < 1/2$ and that $\check{s}$ and $\check{\chi}$ are such that party X can still implement its preferred spending mix if there are no further restrictions, i.e. I assume that

$$\check{\chi} \cdot \check{s} \leq \chi^* s^* \;\wedge\; (1-\check{\chi})\,\check{s} \leq (1-\chi^*)\, s^* \Leftrightarrow \check{s} \leq \min\left\{\frac{1-\chi^*}{1-\check{\chi}}, \frac{\chi^*}{\check{\chi}}\right\} s^*. \tag{7}$$

2.4 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 productivity 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 the prespecified mix of public goods. Otherwise, the mechanism provides the welfare maximizing mix of public goods which lies between what x-voters and y-voters want. Clearly, this mechanism would be incentive compatible if the prespecified mix of public goods is sufficiently unattractive for both parties.

However, there are practical difficulties with such an approach. The first problem is that it is difficult to fully specify in a constitution how the desired mix of public spending varies with the state of the economy. One reason is that this list of public goods and

[7] In principle one could also add a similar constraint to the second period. I only consider it for the first period because it is important for parties' default options.

the list of states of the world would have to be quite long. A second reason is that 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. A third practical problem is that a particularly unattractive budget would not be renegotiation proof because both parties would prefer a set of alternatives.[8]

In what follows, I assume that the constitution allocates the right to make the current spending decision. The constitution may specify default spending levels that have to respect the predetermined spending requirements. I consider the options to leave the decision about the budget to the current government or to the opposition. These decision makers also have to respect the predetermined spending requirements. In section 4 I study the case where both parties can bargain about the budget.

3 Results

3.1 Laissez faire constitution and strict budget rules

It is useful to first define the state dependent optimal spending levels of the two parties as well as the welfare maximizing spending level taking into account that, in both periods, the government party unilaterally fixes the spending mix.

Definition 1 *Consider the case where, in each period, the majority party has the right to choose the spending mix. Define $s^P(\theta)$ $(P \epsilon \{X, Y\})$ 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.*

$$s^X(\theta) = \arg\max_s \theta \cdot f(s) \cdot \bar{u} + f(1-s) \cdot ((1-p)\bar{u} + p\underline{u}), \tag{8}$$
$$s^Y(\theta) = \arg\max_s \theta \cdot f(s) \cdot \underline{u} + f(1-s) \cdot (p\bar{u} + (1-p)\underline{u}), \tag{9}$$

and

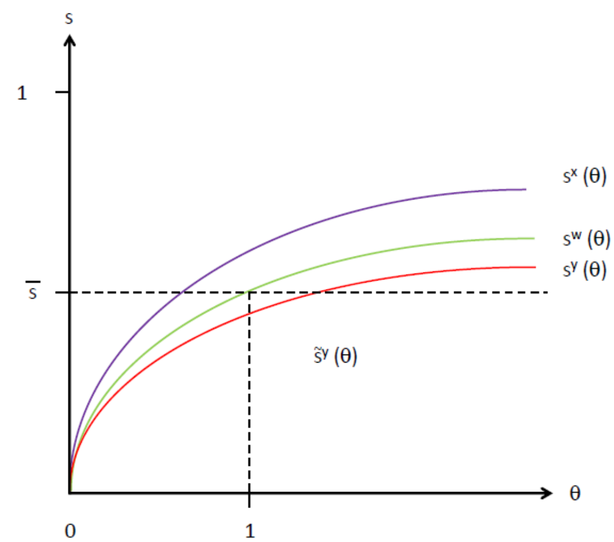
$$s^W(\theta) = \arg\max_s \theta \cdot f(s) \cdot \left(\left(\frac{1}{2}+\varepsilon\right)\bar{u} + \left(\frac{1}{2}-\varepsilon\right)\underline{u}\right) \tag{10}$$
$$+f(1-s) \cdot \left(\left(\frac{1}{2}+\varepsilon\right)\bar{u} + \left(\frac{1}{2}-\varepsilon\right)\underline{u}\right).$$

Note that $s^W(\theta) = \arg\max_s \theta \cdot f(s) + f(1-s)$. The form of the functions $s^X(\theta)$, $s^Y(\theta)$, and $s^W(\theta)$ is depicted in Figure 1. The socially optimal value of period 1 spending

[8]This problem will be addressed in section 5.

increases with the realization of θ. In the case where $\theta = 1$ a balanced budget $(\bar{s} = 1/2)$ maximizes social welfare because it equates marginal welfare across periods. Obviously, for $\theta > 0$ we have that $s^X(\theta) > s^W(\theta) > s^Y(\theta)$. The monotonicity and concavity of the desired period 1 spending in θ can also easily be verified.[9]

Figure 1



Desired spending levels of both parties and welfare maximizing spending level. It is assumed that party X determines the spending mix in period 1 and the majority party in period 2.

Under a laissez faire constitution, an election is held in each period. Moreover, in each period the elected government may choose both the spending mix and the spending level subject to the 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 the 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

[9] The optimality of s requires that $(\theta f(s) + f(1-s))\left(\frac{1+2\varepsilon}{2}\bar{u} + \frac{1-2\varepsilon}{2}\underline{u}\right)$ is maximized. The first order condition is $\theta = \frac{f'(1-s)}{f'(s)}$. Therefore the inverse of $s^W(\theta)$ satisfies $\frac{d\theta}{ds} = \frac{-f'(s)f''(1-s) - f'(1-s)f''(s)}{f'(s)^2} > 0$, and $\frac{d^2\theta^*}{ds^2} = \frac{\left(f'(s)f''(1-s) + f'(1-s)f''(s)\right)2\left(f'(s)\right)f''(s)}{f'(s)^4} > 0$.

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 these cases, 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 group of swing voters is small and 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, there is excessive spending on good x compared to the welfare maximizing spending mix.

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. The balanced budget rule performs better than a laissez faire constitution when there is no need for fiscal discretion. To 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 $\bar{\theta} = 1$. The laissez faire constitution instead performs better when fiscal discretion is very important. 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 $\bar{\theta}$.

3.2 A welfare maximizing mechanism

I now turn to more general mechanisms which determine the fiscal deficit and allocate the right to choose the spending mix. A direct revelation mechanism simultaneously asks both political parties for announcements regarding the realization of the information parameter θ. The period 1 spending level s is then directly made a function of the two announcements. Note that 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 than what it actually wants. Since transfers to taxpayers can hardly be excluded in practice, I rather assume that the mechanism can only specify a maximum spending level $\bar{s}$ which must be compatible with the size of the predetermined expenditures

$\check{s}$, i.e. $\bar{s} \geq \check{s}$. The following definition characterizes a period 1 spending level that makes party $P \in \{X, Y\}$ indifferent to a default spending level $\bar{s}$ in combination with a default spending mix $\bar{\chi}$ when party X has the right to manage public spending in period 1 and the elected party selects the spending mix in period 2.

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

$$\begin{aligned} & \theta f\left(\tilde{s}^Y(\theta, \bar{s}, \bar{\chi})\right) \underline{u} + f\left(1-\tilde{s}^Y(\theta, \bar{s}, \bar{\chi})\right)((1-p)\underline{u} + p\bar{u}) \\ = \; & \theta f(\bar{s})\, u((1-\bar{\chi}, \bar{\chi})) + f(1-\bar{s})((1-p)\underline{u} + p\bar{u}), \end{aligned} \tag{11}$$

and $\tilde{s}^X(\theta, \bar{s}, \bar{\chi})$ *as the unique solution to*

$$\begin{aligned} & \theta f\left(\tilde{s}^X(\theta, \bar{s}, \bar{\chi})\right) \bar{u} + f\left(1-\tilde{s}^X(\theta, \bar{s}, \bar{\chi})\right)((1-p)\bar{u} + p\underline{u}) \\ = \; & \theta f(\bar{s})\, u((\bar{\chi}, 1-\bar{\chi})) + f(1-\bar{s})((1-p)\bar{u} + p\underline{u}). \end{aligned} \tag{12}$$

The following definition introduces a direct mechanism that combines some fiscal discipline with some fiscal flexibility. For low realizations of θ the mechanism implements a default spending level $\bar{s}$. For intermediate values of θ, it makes y-voters indifferent to the spending level $\bar{s}$, and, for high values of θ, it implements the welfare maximizing spending level.

Definition 3 ***(Revelation mechanism 1)*** *Revelation mechanism 1 specifies a default maximum spending level* $\bar{s} \in \{\check{s}, 1/2\}$ *for period* 1. *The mechanism asks both political parties for announcements* $\hat{\theta}_X$ *and* $\hat{\theta}_Y$ *and enforces a maximum spending level*

$$s^{\max}\left(\hat{\theta}_X, \hat{\theta}_Y\right) = \begin{cases} \max\left\{\bar{s}, \min\left\{s^W\left(\hat{\theta}_Y\right), \tilde{s}^Y\left(\hat{\theta}_Y, \bar{s}, \chi^*\right)\right\}\right\} & \text{if } \hat{\theta}_X = \hat{\theta}_Y \\ \bar{s} & \text{otherwise} \end{cases}. \tag{13}$$

The party that wins the majority in period 1(2) decides on the spending mix in period 1(2).

Note that in principle, the default period 1 spending $\bar{s}$ could be specified in the constitution, e.g. through a requirement to always balance the budget. Alternatively, it could be set equal to the share of predetermined spending $\check{s}$, e.g. by permitting the government to only spend money on a subset of predetermined spending items.

The following propositions considers the simple case where θ is drawn from the set $\{1, \bar{\theta}\}$. In this case, revelation mechanism 1 may maximize social welfare.

Proposition 1 *Let θ be drawn from the set $\{1, \bar{\theta}\}$ with a given probability distribution $(q, 1-q)$. (i) Revelation mechanism 1 has a truthtelling equilibrium. (ii) For any given value $\bar{s}$ there is a value θ^+, so that for $\bar{\theta} > \theta^+$ revelation mechanism 1 yields a constrained optimal spending level. (iii) Let $\check{\chi} = \chi^*$. The welfare maximizing value of $\bar{s}$ is $\check{s}$, i.e. it is as small as possible.*

Proof Part (i) The incentive compatibility constraints of party X and party Y obviously hold for $\theta = 1$. It remains to consider the incentive compatibility constraint of Party Y when $\theta = \bar{\theta}$. It follows directly from definition 1 that this constraint holds with equality when $\tilde{s}^Y(\bar{\theta}, \bar{s}, \check{\chi}) \leq s^W(\bar{\theta})$. Otherwise it holds with inequality. The incentive compatibility constraint of party X is implied by the one of party Y because $\tilde{s}^X(\theta, \bar{s}, \chi^*) > \tilde{s}^Y(\theta, \bar{s}, \chi^*)$ for all $\theta > 0$.

(ii) The incentive compatibility constraint of party Y is

$$\begin{aligned} & \bar{\theta} f(s)\,\underline{u} + f(1-s)\left((1-p)\,\underline{u} + p\bar{u}\right) && (14) \\ \geq\ & \bar{\theta} f(\bar{s})\,\underline{u} + f(1-\bar{s})\left((1-p)\,\underline{u} + p\bar{u}\right) \Leftrightarrow \\ \bar{\theta}\ \geq\ & \frac{f(1-\bar{s}) - f(1-s)}{f(s) - f(\bar{s})} \cdot \frac{(1-p)\,\underline{u} + p\bar{u}}{\underline{u}}. && (15) \end{aligned}$$

As θ goes to infinity, $s = \min\{s^W(\theta), \tilde{s}^Y(\theta, \bar{s})\}$ goes to 1 which is why the right hand side of (15) converges to $\frac{f(1-\bar{s})}{f(1)-f(\bar{s})} \cdot \frac{(1-p)\underline{u}+p\bar{u}}{\underline{u}}$, while the left hand side is unbounded. This proves part (ii).

(iii) This follows from the strict monotonicity of $\tilde{s}^Y(\theta, \bar{s}, \chi^*)$ in $\bar{s}$. *Q.E.D.*

The following proposition formulates two conditions under which revelation mechanism 1 achieves a constrained welfare maximum.

Proposition 2 *Let θ be drawn from the set $\{1, \bar{\theta}\}$ with a given probability distribution $(q, 1-q)$. (i) For given voter preferences, revelation mechanism 1 with maximum period 1 spending level $\bar{s}$ weakly (strictly) dominates the strict rule with spending level $\bar{s}$ for all (some) values of $\bar{\theta} > 1$. The revelation mechanism is strictly better than the strict rule if $\bar{\theta}$ is large enough. (ii) For a given value $\bar{\theta}$, revelation mechanism 1 with default spending level $\bar{s} = 1/2$ always implements the constrained optimal spending level when the ratio $\bar{u}/\underline{u}$ is small enough.*

Proof Part (i) is a direct consequence of (13).

Part (ii) A welfare maximum is reached if the following expression is maximized:

$$\theta f(s)\left((1-p)\,\underline{u} + p\bar{u}\right) + f(1-s)\left((1-p)\,\underline{u} + p\bar{u}\right), \tag{16}$$

or if $\theta = \frac{f'(1-s)}{f'(s)}$. It follows from the concavity of $f(s)$ that for all $s > 1/2$

$$\frac{f'(1-s)}{f'(s)} > \frac{f\left(\frac{1}{2}\right) - f(1-s)}{f(s) - f\left(\frac{1}{2}\right)}. \tag{17}$$

By assumption we have $s^W(\theta) > 1/2 > s^W(\theta) - 1$. Hence,

$$\frac{f'\left(1 - s^W(\theta)\right)}{f'\left(s^W(\theta)\right)} = \theta > \frac{f\left(\frac{1}{2}\right) - f\left(1 - s^W(\theta)\right)}{f\left(s^W(\theta)\right) - f\left(\frac{1}{2}\right)}. \tag{18}$$

At $s = s^W$ the incentive compatibility constraint can be written

$$\theta \geq \frac{f\left(\frac{1}{2}\right) - f\left(1 - s^W(\theta)\right)}{f\left(s^W(\theta)\right) - f\left(\frac{1}{2}\right)} \cdot \frac{(1-p)\underline{u} + p\bar{u}}{\underline{u}}. \tag{19}$$

For $\bar{u} = \underline{u}$ (18) implies (19). Hence, the incentive compatibility constraint of party Y for $\theta = \bar{\theta}$ holds at $\min\left\{s^W(\theta), \tilde{s}^Y(\theta, \bar{s})\right\}$ if, the ratio $\bar{u}/\underline{u}$ is small enough. *Q.E.D.*

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. It is therefore worthwhile to study alternative mechanisms that produce similar results. The following mechanism is called supermajority mechanism because an excessive deficit has to be supported by the opposition party.

Definition 4 ***(Supermajority mechanism)*** *In period 1, after observing θ, the government proposes a spending level s, where s may not exceed $s^W\left(\bar{\theta}\right)$. 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.*

This supermajority mechanism implements the same social choice function as revelation mechanism 1 if θ can not become too large.

Proposition 3 *Let θ be drawn from the set $\left\{1, \bar{\theta}\right\}$ with a given probability distribution $(q, 1-q)$. If $\bar{s} < \tilde{s}^Y\left(\bar{\theta}, \bar{s}, \chi^*\right) \leq s^W\left(\bar{\theta}\right)$ then the supermajority mechanism with default spending level $\bar{s}$ implements the same social choice function as revelation mechanism 1 with default spending level $\bar{s}$.*

Proof This mechanism has an equilibrium in which the period 1 government asks for a deficit $s = \max\left\{\bar{s}, \tilde{s}^Y(\theta, \bar{s})\right\}$. Party Y does not veto this proposal unless $\theta = 1$. The spending level for $\theta = \bar{\theta}$ is $\tilde{s}^Y\left(\bar{\theta}, \bar{s}, \chi^*\right) = \min\left\{s^W\left(\bar{\theta}\right), \tilde{s}^Y\left(\bar{\theta}, \bar{s}, \chi^*\right)\right\}$. *Q.E.D.*

3.4 Continuous types

The previous analysis can be easily extended to the case with a continuum of types θ. Consider a distribution $\phi(\theta)$ on $[a, b]$ with

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

This means that the welfare maximizing policy sometimes includes a fiscal deficit and sometimes a surplus. Moreover, for the lowest possible realization of θ, spending wishes of both parties ($s^X(a)$ and $s^Y(a)$) do not fall below the level of predetermined spending, $\check{s}$. Based on the previous results, one can state the following proposition.

Proposition 4 *Consider the case where the government can be forced to spend any amount $\bar{s} > \check{s}$. The following social choice of the spending level in period* 1 *is truthfully implementable as a Bayesian Nash equilibrium:*

$$f(\theta) := \begin{cases} \max\left\{s^W(\theta), \tilde{s}^X(\theta, \bar{s}, \chi^*)\right\} & \tilde{s}^X(\theta, \bar{s}, \chi^*) \leq \bar{s} \\ \bar{s} & \tilde{s}^Y(\theta, \bar{s}, \chi^*) < \bar{s} < \tilde{s}^X(\theta, \bar{s}, \chi^*) \\ \min\left\{s^W(\theta), \tilde{s}^Y(\theta, \bar{s}, \chi^*)\right\} & \tilde{s}^Y(\theta, \bar{s}, \chi^*) \geq \bar{s} \end{cases}. \tag{20}$$

(ii) Consider the case where the government can not be forced to spend any amount $\bar{s} > \check{s}$. The following social choice of the spending level in period 1 *is truthfully implementable through a Bayesian Nash equilibrium:*

$$g(\theta) := \begin{cases} s^X(\theta) & s_X(\theta) \leq \bar{s} \\ \bar{s} & \tilde{s}^Y(\theta, \bar{s}, \chi^*) < \bar{s} < s_x(\theta) \\ \min\left\{s^W(\theta), \tilde{s}^Y(\theta, \bar{s}, \chi^*)\right\} & \tilde{s}^Y(\theta, \bar{s}, \chi^*) \geq \bar{s} \end{cases}. \tag{21}$$

(iii) 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 $\bar{s}$.*

$$h(\theta) := \begin{cases} \min\left\{\bar{s}, s^X(\theta)\right\} & \tilde{s}^Y(\theta, \bar{s}, \chi^*) \leq \bar{s} \\ \max\left\{\bar{s}, \tilde{s}^Y(\theta, \bar{s}, \chi^*)\right\}. & \textit{otherwise} \end{cases}. \tag{22}$$

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

$$s\left(\hat{\theta}_X,\hat{\theta}_Y\right)=\begin{cases}\max\left\{s^W\left(\hat{\theta}_X\right),\tilde{s}^X\left(\hat{\theta}_X,\bar{s},\chi^*\right)\right\} & \text{if } \hat{\theta}_X=\hat{\theta}_Y\leq\tilde{s}^{X^{-1}}\left(\bar{s},\bar{s},\chi^*\right)\\ \min\left\{s^W\left(\hat{\theta}_X\right),\tilde{s}^Y\left(\hat{\theta}_X,\bar{s},\chi^*\right)\right\} & \text{if } \hat{\theta}_X=\hat{\theta}_Y\geq\tilde{s}^{Y^{-1}}\left(\bar{s},\bar{s},\chi^*\right)\\ \bar{s} & \text{otherwise}\end{cases}. \quad (23)$$

It follows from definition 1 that truthtelling is a Bayesian Nash equilibrium.

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

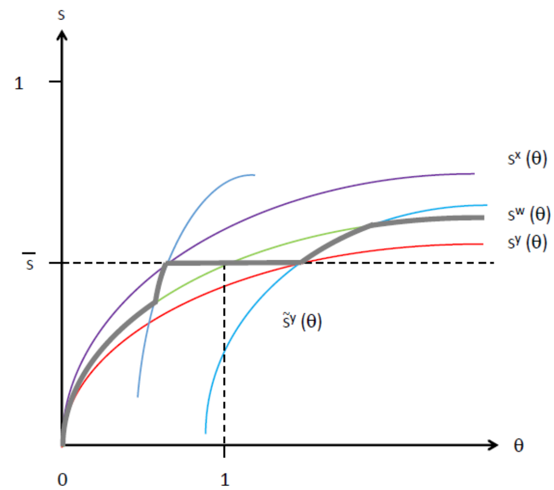
$$s\left(\hat{\theta}_X,\hat{\theta}_Y\right)=\begin{cases}\min\left\{s^W\left(\hat{\theta}_X\right),\tilde{s}^Y\left(\hat{\theta}_X,\bar{s},\chi^*\right)\right\} & \text{if } \hat{\theta}_X=\hat{\theta}_Y\geq\tilde{s}^{Y^{-1}}\left(\bar{s},\bar{s},\chi^*\right)\\ \bar{s} & \text{otherwise}\end{cases}. \quad (24)$$

It follows from definition 1 that truthtelling is a Bayesian Nash equilibrium.

(iii) 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.*

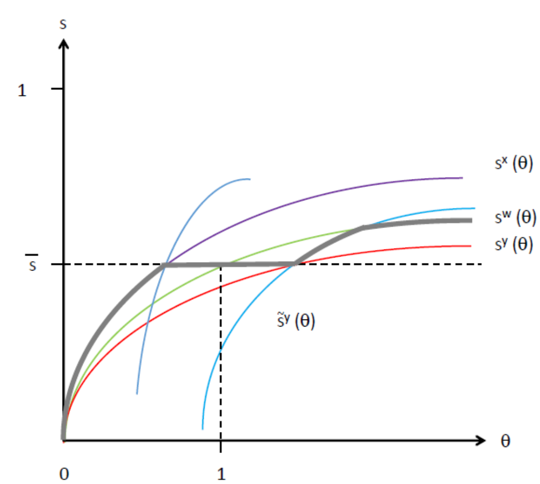
The outcome of the supermajority mechanism is weakly monotonous in the realization of the information parameter θ. The outcome of this sequential mechanism yields a lower expected social welfare than the one of the simultaneous move game if the support of the distribution of θ is large enough. Figures 2 and 3 show how the spending functions related to parts (i) and (ii) of the proposition approximate the welfare maximal one $s^W(\theta)$. Different default spending levels lead to different approximations of this function. The supermajority mechanism delivers a result which, for low enough θ values, replicates the social choice depicted in Figure 3.

Figure 2



The implemented spending level $(f(\theta))$ under a revelation mechanism in case that the government can be forced to spend any amount $\bar{s} > \check{s}$.

Figure 3



The implemented spending level $(g(\theta))$ under a revelation mechanism if party X can not be forced to spend an amount $\bar{s} > \check{s}$.

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 "non-standard" deficit requested by the government. This makes the opposition more powerful than it would be in a purely majoritarian system. In practice one would expect that the opposition party makes use of its veto power. It may so be able to informally and jointly negotiate the period 1 spending level and spending mix with party X. I now assume that the spending mix can be the issue of such a negotiation among the two political parties. The Nash bargaining solution shall describe the outcome of the bargaining process.[10] I begin the analysis considering a given commonly known realization of the productivity parameter θ. The following two lemmata establish useful invariance and monotonicity properties of the bargaining outcome.

Lemma 1 *(i) The laissez-faire policy outcome is independent of the size of the group of swing voters. (ii) The bargaining outcome is independent of the size of the group of swing voters.*

Proof (i) 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. (ii) Bargaining takes place 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 (see the appendix for details) is independent of the size of the group of swing voters. *Q.E.D.*

Lemma 2 *(i) Social welfare under a laissez-faire constitution is linear and strictly increasing in the size of the group of swing voters. (ii) Social welfare under a supermajority rule with bargaining is linear in the size of the group of swing voters.*

Proof (i) We know from lemma 1 that the laissez-faire outcome is independent of the size of the group of swing voters. Social welfare is a weighted average of the three groups' utilities. It is given by $2\left((1+\varepsilon)\,\bar{u}+(1-\varepsilon)\,\underline{u}\right)$. This establishes linearity in ε. When the size of the group of swing voters increases, the unequal spending mix that obtains in both periods is optimal for a larger part of the population. (ii) Decisions do not depend on the

[10]I derive conditions for the Nash bargaining solution in the appendix.

size of the three groups. Social welfare is a weighted average of the three groups' utilities where the weights are ε, $1-2\varepsilon$, and ε. *Q.E.D.*

Based on the two previous results, we can now study the optimal choice among the supermajority mechanism with bargaining and a laissez faire constitution. When the group of swing voters is small, bargaining leads to a more equal mix of public goods which increases welfare. This may be different when the group of swing voters is large and the current majority rather stable. In this case, the distortion of the spending mix generated by bargaining may reduce social welfare.

Lemma 3 *(i) Let $\varepsilon^* \in (0,1)$. Consider any given productivity θ and any given probability $p \in [0,1]$. Either the welfare ranking of the supermajority mechanism with bargaining and the laissez faire constitution does not depend on ε, or there is a unique value $\varepsilon^* \in (0,1)$ below (above) which a supermajority rule with bargaining yields a strictly higher (lower) welfare level than a laissez faire constitution. (ii) For any given default spending level $\bar{s} < 1$, there are values θ and $p \in [0,1]$ for which such a unique cutoff value $\varepsilon^* \in (0,1)$ exists.*

Proof Part (i) follows directly from lemma 2.

(ii) Consider the case where $p = 0$. Under a laissez faire constitution, the spending level chosen by party X in period 1 is the welfare maximizing one. In both periods, the spending share of good x is χ^*. I will now show that, when $\varepsilon = 0$ and when θ is large enough, a supermajority rule with bargaining yields a higher welfare level than a laissez faire constitution. Let u^P $\left(u_0^P\right)$ be the (disagreement) utility of the constituency of party P. Moreover, define $U^P := \lim_{\theta\to\infty} \frac{u^P}{\theta}$, and $U_0^P := \lim_{\theta\to\infty} \frac{u_0^P}{\theta}$. It follows that $U_0^X = f(\bar{s})\,\bar{u}$ and $U_0^Y = f(\bar{s})\underline{u}$. The laissez faire constitution yields normalized utilities $\left(U^X, U^Y\right) = \left(f(1)\,\bar{u}, f(1)\,\underline{u}\right)$ for parties X and Y. The bargaining outcome must be associated with a lower spending share of good X than χ^* because χ^* maximizes the utility of party X which yields an infinite slope of the utility possibility frontier at $\left(U^X, U^Y\right) = \left(f(1)\,\bar{u}, f(1)\,\underline{u}\right)$. Hence, the bargaining outcome yields a higher social welfare than laissez faire.

When ε goes to 1, welfare under the laissez faire constitution and the maximum welfare converge because χ^* becomes the desired spending share of good X for all voters. Instead, the outcome under a supermajority rule with bargaining does not depend on ε and it does not maximize social welfare. Hence, when θ is large enough, a supermajority rule with bargaining yields a strictly higher (lower) welfare level than a laissez faire constitution for $\varepsilon = 0$ (1). This and the linearity results from lemma 2 yields the result. *Q.E.D.*

4.2 Constitutional choice

Based on the previous results, we can now turn to the analysis of the constitutional choice. It is reasonable to assume that at the constitutional stage not only the value of θ but also the probability of a change of the majority party p and the size of the group of swing voters ε is stochastic.[11] In a first step, the following lemma considers a given joint and independent distribution of p and θ, $\gamma(p,\theta)$. For any such distribution the choice of the constitution (laissez fare vs. supermajority with bargaining) depends on the realization of the size of the group of swing voters.

Lemma 4 *Consider any given joint and independent distribution of p and θ, $\gamma(p,\theta)$. There is a cutoff value $\varepsilon^* \in [0,1]$ below (above) which a supermajority rule with bargaining yields a weakly higher (lower) welfare level than a laissez faire constitution.*

Proof 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 $D(\varepsilon, p, \theta) = \delta(p,\theta) \cdot \varepsilon + \alpha(p,\theta)$. The expected welfare difference of the two mechanisms is

$$\tilde{D}(\varepsilon) \quad : \quad = \frac{\int_0^1 \int_0^1 D(\varepsilon, p, \theta) \cdot \gamma(p,\theta) \cdot dp \cdot d\theta}{\int_0^1 \int_0^1 \gamma(p,\theta) \cdot dp \cdot d\theta} \tag{25}$$

$$= \frac{\int_0^1 \int_0^1 \delta(p,\theta) \cdot \gamma(p,\theta) \cdot dp \cdot d\theta}{\int_0^1 \int_0^1 \gamma(p,\theta) \cdot dp \cdot d\theta} \cdot \varepsilon + \frac{\int_0^1 \int_0^1 \alpha(p,\theta) \cdot \gamma(p,\theta) \cdot dp \cdot d\theta}{\int_0^1 \int_0^1 \gamma(p,\theta) \cdot dp \cdot d\theta}. \tag{26}$$

This function is linear in ε and non-negative for $\varepsilon = 0$. The proposition follows. *Q.E.D.*

To summarize, 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

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

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 time[12]. However, in the context of the present model, a properly chosen supermajority threshold can make sure that a large enough current majority does not need the approval of the current opposition. To see why, consider joint and independent distribution of ε, p and θ. From lemma 4 we know that there is a threshold $2\varepsilon^*$ for the size of the group of swing voters below (above) which a supermajority mechanism with bargaining is better than (not as good as) a laissez faire constitution. An automatic adjustment an ex-ante unknown size of the group of swing voters can be achieved by a majority threshold for a deficit of size $1+\varepsilon^*$. If the current majority exceeds this threshold, then party X does not require the support of a supermajority for a deficit. Therefore the mechanism turns effectively into a laissez faire mechanism. To summarize:

Proposition 5 *Consider any joint and independent distribution of ε, p and θ. A supermajority mechanism with bargaining that uses an appropriate majority threshold lead to an optimal choice (conditional on the realization of ε) between a supermajority mechanism with bargaining and a laissez faire constitution.*

5 Robustness and extensions

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

5.1 All x-voters are potential swing voters

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 y-voters. In case of such a preferences switch, the corresponding voters are drawn randomly from the set of x-voters. Hence,

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

each individual x-voter's preferences shift with probability $2\varepsilon p/(1-2\varepsilon)$. 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. 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.

5.2 Two parties with credible platforms

Another 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 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.[13]

5.3 Three parties and proportional representation

Consider next an electoral system with proportional representation in which swing voters are represented by a third political party. The preferred policy of this party is to choose the majority's desired spending mix but not to run a deficit when $\theta = 1$. The median voter in parliament along both policy dimensions would be a member of this party. Accordingly, a system of proportional representation should display low deficits even if there is no supermajority mechanism in place.

5.4 The political economy of supermajority rules

Our analysis shows that there are situations in which the introduction of supermajority mechanisms increases welfare compared to a laissez faire situation or a strict fiscal rule. Such supermajority mechanisms (or rules that work similarly most of the time) exist in some countries but they are not widespread. In the present model, the acceptance of supermajority mechanism by the political actors depends on the institutional status quo. If the status quo constitution is a laissez faire one, an elected government opposes the introduction of a supermajority mechanism and the current opposition favors it. The outcome is generally suboptimal. However, there is no scope for a deal between both parties because - in the present setup with only two periods - the opposition has nothing to offer. This may be different when there are many periods because in this case, future election results are not perfectly known.

A reform is feasible if one considers a laissez faire constitution before the period 1 election result is known. In this case both political parties are in favor of a supermajority mechanism and the outcome of constitutional bargaining is constrained optimal.

It is well known that the participation in a mechanism depends can be facilitated by properly choosing the status (see e.g. Cramton, Gibbons, and Klemperer, 1987).

[13] 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 goups of voters all have distinct ideal points (χ_1, s). In this case there often is no Nash equilibrium in political platforms.

The introduction of a supermajority mechanism may be facilitated if the status quo is a constitution with a strict rule and if θ is large. In this case, even if the election results of the first period are known, there may be scope for constitutional negotiations between both parties when the productivity of public spending is high.

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. This paper studies a dynamic fiscal mechanism design problem with two periods and two public goods. It is important to understand how robust the present results are in a setup with more periods. When there are more periods, the size of the debt level might play a role as a state variable. The Eurozone states agreed to put more emphasis on the current debt level (the 1/20th rule). A particular focus of further research should be on how constraints on fiscal policy should be adjusted to the participating countries' debt levels. In a dynamic context one should also consider that predetermined government expenses as a state variable can be chosen strategically.

Another topic for further research is the role and the emergence of the party structure. It would be worthwhile to endogenize this 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 the strategic deficit explanation for excessive deficits. It is important to study the performance of a supermajority if other factors such as political polarization and resulting indivisibilities (Alesina and Drazen, 1989) are the key drivers of deficits (see also Grüner, 2013).

In the present model, a supermajority rule with a large majority threshold implies that all (i.e. both) parties must accept the deficit. When there is considerable voter - and party - heterogeneity, one may expect that a unanimity requirement leads to a lack of flexibility or significant distortions of public spending. In a model with multiple public goods and more voter diversity, one could attempt to determine the optimal size of the required majority for a deficit of a given size.[14] It would also be important to find out how one can empirically 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 procedure. In this context, it would be desirable to study the case in which excessive debt generates externalities across countries. Such an extension should address the efficiency, individual rationality and renegotiation proofness of hybrid (national and international) mechanisms for the control of fiscal deficits.

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

7 Appendix

7.1 The Nash bargaining solution

Consider a given realization of θ and a given value p. Define $\tilde{u}(p) := p\underline{u} + (1-p)\bar{u}$. 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. Denote by u^P $\left(u_0^P\right)$ the (disagreement) utility of the constituency of party P. The Nash product is:

$$\begin{aligned}
N(s,\chi_1) &= \left(u_X - u_0^X\right)\cdot\left(u_Y - u_0^Y\right) \\
&= \left(\theta f(s)\,u(\chi_1) + f(1-s)\,\tilde{u}(p) - u_0^X\right) \\
&\quad \cdot\left(\theta f(s)\,u(1-\chi_1) + f(1-s)\,\tilde{u}(1-p) - u_0^Y\right) \\
&= \theta^2 f(s)^2\,u(\chi_1)\cdot u(1-\chi_1) \\
&\quad +\theta f(s)\,f(1-s)\left(\tilde{u}(1-p)\,u(\chi_1) + \tilde{u}(p)\,u(1-\chi_1)\right) \\
&\quad +f(1-s)^2\left(\left(\tilde{u}(p)\right)\tilde{u}(1-p)\right) \\
&\quad -u_0^X\cdot\left(\theta f(s)\,u(1-\chi_1) + f(1-s)\,\tilde{u}(1-p) - u_0^Y\right) \\
&\quad -u_0^Y\cdot\left(\theta f(s)\,u(\chi_1) + f(1-s)\,\tilde{u}(p) - u_0^X\right).
\end{aligned} \tag{27}$$

The first-order conditions are

$$\begin{aligned}
N'_{\chi_1} &= \theta^2 f(s)^2\left(-u(\chi_1)\cdot u'(1-\chi_1) + u'(\chi_1)\cdot u(1-\chi_1)\right) \\
&\quad +\theta f(s)\,f(1-s)\left(\tilde{u}(1-p)\,u'(\chi_1) - \tilde{u}(p)\,u'(1-\chi_1)\right) \\
&\quad +u_0^X\cdot\theta f(s)\,u'(1-\chi_1) \\
&\quad -u_0^Y\cdot\theta f(s)\,u'(\chi_1) = 0.
\end{aligned} \tag{28}$$

and

$$\begin{aligned}
N'_s &= \theta^2 2f(s)\,f'(s)\,u(\chi_1)\cdot u(1-\chi_1) \\
&\quad +\theta\left(-f(s)\,f'(1-s) + f'(s)\,f(1-s)\right)\left(\tilde{u}(1-p)\,u(\chi_1) + \tilde{u}(p)\,u(1-\chi_1)\right) \\
&\quad -2f(1-s)\,f'(1-s)\left(\left(\tilde{u}(p)\right)\tilde{u}(1-p)\right) \\
&\quad -u_0^X\cdot\left(\theta f'(s)\,u(1-\chi_1) - f'(1-s)\,\tilde{u}(1-p)\right) \\
&\quad -u_0^Y\cdot\left(\theta f'(s)\,u(\chi_1) - f'(1-s)\,\tilde{u}(p)\right) = 0.
\end{aligned} \tag{29}$$

Both expressions do not include the size of the group of swing voters, ε (lemma 1).

7.2 The welfare maximum

Consider first the welfare maximizing size of the first period budget and spending mix when the ruling party in period 2 determines the spending mix in that period. Welfare is given by

$$
\begin{aligned}
W(s,\chi_1) &= \left(\frac{1}{2}-\varepsilon\right)\left(u^X+u^Y\right)+2\varepsilon u^S \qquad (30)\\
&= \left(\frac{1}{2}-\varepsilon\right)\cdot\\
&\quad (\theta f(s)\,u(\chi_1)+f(1-s)\,\tilde{u}(p)\\
&\quad +\theta f(s)\,u(1-\chi_1)+f(1-s)\,\tilde{u}(1-p))\\
&\quad +2\varepsilon\left(\theta f(s)\,u(\chi_1)+f(1-s)\,u(\chi_2)\right),
\end{aligned}
$$

where χ_2 denotes the second period spending share of good X. The first-order conditions are

$$
\begin{aligned}
W_s' &= \left(\frac{1}{2}-\varepsilon\right)\left(\theta f'(s)\left(u(\chi_1)+u(1-\chi_1)\right)-f'(1-s)\left(\tilde{u}(p)+\tilde{u}(1-p)\right)\right) \qquad (31)\\
&\quad +2\varepsilon\left(\theta f'(s)\,u(\chi_1)-f'(1-s)\,u(\chi_2)\right).
\end{aligned}
$$

and

$$
W_{\chi_1}=\left(\frac{1}{2}-\varepsilon\right)\left(\theta f(s)\,u'(\chi_1)-\theta f(s)\,u'(1-\chi_1)\right)+2\varepsilon\left(\theta f(s)\right)u'(\chi_1). \qquad (32)
$$

The optimal spending level is characterized by

$$
\frac{f'(s)}{f'(1-s)}=\frac{1}{\theta}\frac{\left(\frac{1}{2}-\varepsilon\right)\left(\tilde{u}(p)+\tilde{u}(1-p)\right)+2\varepsilon u(\chi)}{\left(\frac{1}{2}-\varepsilon\right)\left(u(\chi)+u(1-\chi)\right)+2\varepsilon u(\chi)}, \qquad (33)
$$

and the optimal spending mix by

$$
\frac{u'(\chi)}{u'(1-\chi)}=\frac{\frac{1}{2}-\varepsilon}{\frac{1}{2}+\varepsilon}. \qquad (34)
$$

Hence, for $\varepsilon=0$ the budget should be balanced (lemma 2).

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