Uniformity requirement and political accountability

Matthias Wrede*

RWTH Aachen University and CESifo

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Abstract

This paper discusses the fundamental hypothesis of policy uniformity under centralized decision making, which underlies Oates' famous decentralization theorem. The theorem has, in more recent times, come under pressure owing to the prediction that local public goods are provided to minimum winning coalitions rather than uniformly. The focus of this paper is on the impact of uniformity rules on political accountability. Using the concept of minimum winning coalitions, it is shown that the power of voters over politicians vanishes if election districts receive different levels of local public goods. However, the setting up of sufficiently strong uniformity rules means that voters regain power. According to Oates' theorem, uniformity is the main disadvantage of centralization but, according to the analysis undertaken in this paper, centralization without uniformity would be even worse.

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*Address: RWTH Aachen University, Faculty of Business and Economics, Templergraben 64, 52056 Aachen, Germany, email: `mwr@fiwi.rwth-aachen.de`.

1 Introduction

In the European Union, the question of which functions of government should be decentralized is at the top of the political agenda. For example, the European Commission and some national governments were recently arguing about the assignment of issues such as the competition policy. Even in the theoretical literature, it is still an unsolved question as to which level of government should take responsibility for particular policy areas. While centralized systems have been justified by spillovers of local public goods and economies of scale in the decision making process, the costs of uniformity have been a main argument in favor of decentral decision making. According to Oates (1972) famous decentralization theorem, a decentralized provision of local public goods is preferable to centralized decision making because a uniform level of local public goods does not reflect different local tastes. The literature on fiscal federalism has typically been written in the spirit of the decentralization theorem although not all authors agree on the assumption of a uniform provision of local public goods. The theoretical literature on distributive policy making suggests that minimum winning coalitions determine the outcome in the legislature [see the seminal work by Buchanan and Tullock (1962) and Riker (1962)]. An obvious conjecture is that the majority adopt policies that benefit themselves at the expense of the minority. Hence, the majority would not distribute benefits uniformly. Since empirical studies report that minorities are not completely excluded from the benefits of distributive legislation, a more universalistic legislation that offers insurance against the risk of expropriation has been suggested [see Weingast (1979), Shepsle and Weingast (1981)]. However, even under a universalistic approach, a centrally determined policy need not be uniform. Recently, Besley and Coate (2003) and Lockwood (2002) continued this type of work using different types of political economy approaches. Besley and Coate (2003) employ the citizen-candidate model and focus on strategic delegation. The analysis by Lockwood (2002) is based on a distinguished status quo being the last item on the agenda. Both papers explicitly dropped the uniformity assumption. A common result is that the relationship between, on the one hand, the size of spillovers and the degree of heterogeneity, and, on the other hand, the merits of centralization, is non-monotonic. However, both papers demonstrated possible disadvantages of a differentiated public good supply in centralized systems. In the Besley and Coate (2003) model, the drawbacks of centralization with a non-cooperative legislature are uncertainty in the identity of the minimum winning coalition and misallocation, namely a bias in public spending towards the members of the minimum winning coalition. Finally, another strand of the literature discusses mobility as an alternative source of uniformity [see Bolton and Roland (1997), Hansen and Kessler (2004)].

This paper raises the question of whether or not voters benefit from uniform taxation and a uniform provision of public goods in a centralized system with a focus on political accountability. Seabright (1996) already suggested that the power of voters over governments is weak in a centralized system. The reason is that the voting system generates externalities, since a vote for the government in one district has an impact on other districts. Seabright (1996), Persson and Tabellini (2000), Besley and Smart (2003), and Hindricks and Lockwood (2005) argued that decentralization increases accountability which, in turn, is welfare increasing if preferences or circumstances differ among districts. However, this paper argues that accountability also improves under a uniformity rule for taxes and public expenditure in a centralized state.

The paper employs the political accountability model which was developed by Barro (1973) and further elaborated by Ferejohn (1986) [see also Persson and Tabellini (2000) and Wrede (2004)]. Barro (1973) and others showed, in a single-district model, that voters successfully control foresighted politicians with the help of retrospective threshold strategies. The argument is put forward within a simple framework, in which the government is maximizing its rent, the rent being equal to tax revenue minus public expenditure. When voters reelect the incumbent if and only if their utility exceeds a specific threshold, they can deter the government to a large extent from misusing tax revenues provided that the present value of future rents is higher than the realizable instantaneous rent.

This paper discusses how powerful voters are if the country is divided into several election districts. In a multi-district country, politicians can play some voting districts off against others. Therefore, the impact of a uniformity rule is the main subject of this paper. The main results are the following: First, in a multi-district country, voters are unable to limit the power of the federal government through retrospective voting strategies, which are only based on individual threshold utility levels. The intuition is that a sophisticated government meets only the requirements of a minimum winning coalition of election districts. Since voters compete for membership in the minimum winning coalition, the government can completely expropriate them. The majority of districts are unable to exploit the minority, since the former have no power. Second, if the government is bound by the constitution to uniform taxes and to a uniform public good supply, voters regain power. If they coordinate their voting behavior, they are able to enforce comparatively low taxes and a positive public good supply which, in turn, satisfies the preferences of the median district. Because of the uniformity constraint, neither can the government play districts off against each other nor are the majority of districts able to exploit the minority. Third, if only one of the policy instruments - be it the tax rate or the public good supply - is perfectly within the government's discretion, then, again voters lose their power. A possible outcome is that voters have no power at all.

The paper is organized as follows: Section two presents the outline of the model. Section three determines the equilibria without policy restrictions. Sections four and five discuss equilibria with complete and incomplete uniformity requirements. Section six concludes.

2 Election districts and political accountability

The country is divided into n election districts with the population size in each district and the number of votes in each district normalized at one, where $n > 2$ and n is odd. An individual derives utility from private spending C, public spending G, and leisure $\bar{L} - L$, where $\bar{L}$ denotes the time endowment and L denotes labor.[1] The utility function of the representative voter is

$$U : \Re_0^{+3} \times \Re^{+} \rightarrow \Re, \text{ with } U(C, L, G, a) := C + \psi(\bar{L} - L) + a\varphi(G), \tag{1}$$

where the functions $\psi(\cdot)$ and $\varphi(\cdot)$ are strictly monotonically increasing, strictly concave and three times differentiable. Furthermore, $\varphi(0) = 0$, $\lim_{G \to 0} \varphi'(G) = \infty$, $\psi'(0) > w$, $\lim_{L \to 0} \psi'(\bar{L} - L) = 0$,[2] and $\psi'''(\cdot) \geq 0$, where w denotes the exogenous wage rate, with $w \in \Re^{+}$.[3] The parameter a determines the relative evaluation of public spending. The

[1] The individual's behavior is modelled as by Wrede (2002).

[2] This assumption could be relaxed.

[3] A prime indicates the derivative. For example: $\varphi'(G) = d\varphi(G)/dG$.

budget constraint of an individual reads $C \leq (1-\tau)wL$, τ denotes the wage tax rate and $\tau \in [0,1]$ by constitutional rules. Utility maximization with respect to C and L leads to $\psi'(\bar{L}-L) = (1-\tau)w$ for $0 \leq L \leq \bar{L}$ if $\tau < 1$. The labor supply function is written as $L : [0,1] \rightarrow \Re_0^+$, with $L = L(\tau)$, where $L' = w/\psi''(\bar{L}-L)$ for $0 \leq L \leq \bar{L}$ and $L(1) = 0$. Tax revenue in a district is therefore determined by the tax rate:

$$R : [0,1] \rightarrow \Re_0^+, \text{ with } R(\tau) := \tau w L(\tau). \tag{2}$$

The assumptions on the utility function and the budget constraint guarantee that the tax revenue function $R(\cdot)$ is Laffer-curve shaped, i.e., $R(\cdot)$ is strictly concave with a unique revenue maximizing tax rate $\bar{\tau}$ strictly greater than zero and smaller than one. From utility maximization, the indirect utility function

$$V : [0,1] \times \Re_0^+ \times \Re^+ \rightarrow \Re, \text{ with } V(\tau, G, a) := (1-\tau)wL(\tau) + \psi(\bar{L} - L(\tau)) + a\varphi(G), \tag{3}$$

can be derived, where the partial derivatives are $\partial V(\tau, G, a)/\, \partial\tau = -wL(\tau)$ and $\partial V(\tau, G, a)/\, \partial G = a\varphi'(G)$. The former is strictly negative for $\tau < 1$; the latter is strictly positive.

Economic fundamentals are assumed to be the same in the various districts, but preferences with respect to public spending possibly differ across regions. Without loss of generality, the parameter values a_i, where i indicates the district, are ordered according to size: $0 < a_1 \leq \cdots \leq a_n$.[4] Nevertheless, due to the additive separability, the labor supply functions and the tax revenue functions are the same in all districts. In the (τ, G)-space preferences show the single crossing property: indifference curves of individuals with different preference parameters a cross only once. For each bundle $(\tau, G) \in [0,1] \times \Re^+$,

$$a_j > a_i \Leftrightarrow -\frac{\partial V(\tau, G, a_j)/\partial\tau}{\partial V(\tau, G, a_j)/\partial G} < -\frac{\partial V(\tau, G, a_i)/\partial\tau}{\partial V(\tau, G, a_i)/\partial G} \tag{4}$$

holds. The higher a is, the flatter the indifference curve is.

In representative democracies, elected politicians decide upon public spending and taxes. The political system is assumed to be centralized in the sense that, although the country is divided into election districts, only one politician or one party determines public

[4]The partial derivative of the indirect utility function with respect to the preference parameter a is also positive. This restricts interpersonal comparison. Since this paper carries out a positive rather than a normative analysis, the issue of interpersonal comparability could be neglected.

spending and taxes for the whole country. The analysis is concerned with either a pure presidential system or a party system with strong party leaderships. The paper considers malevolent and risk neutral politicians, whose objective is simply to maximize expected present values of rents. As it is standard in this literature [see, e.g., Persson and Tabellini (2000)], rents are equal to tax revenue minus public expenditure. By means of retrospective voting strategies, voters can control malevolent but foresighted politicians if the former are able to commit to a particular reelection strategy. This paper only considers simple retrospective voting strategies that are based on utility thresholds.

This paper sets up a two-stage extensive form game, where, first, voters simultaneously choose reelection strategies and, second, the incumbent decides with full discretion on tax rates and public good quantities in all districts and this, in turn, determines payoffs of voters. The payoff of the incumbent depends on whether or not he or she complies to the reelection strategies in a majority of districts. This two-stage model stands for a fully intertemporal model, where voters and politicians act repeatedly. The full model that the paper has in mind could roughly be characterized as follows: In each election, infinitely lived voters choose between the incumbent and an opponent who is identical in all respects from the viewpoint of the voters. Voting strategies condition the decision about reelection on the policies in the preceding term and not on the entire history. Explicit side payments among voters in different districts are excluded. When a politician, who is voted out of office by the voters, will never be reelected again, a non-complying incumbent gets only actual rents, which are equal to the difference between tax revenue and benevolent public spending in the entire country. An always-complying, infinitely lived incumbent expects additional rents from his or her staying in office forever. Voters maximize the expected present value of utility by their choice of reelection strategy; incumbents choose tax rates and public goods so as to maximize the expected present value of rents. The subgame perfect equilibrium of the two-stage model, which this paper sets up, is meant to approximately represent an equilibrium in stationary Markov strategies of the so-characterized, fully intertemporal model.

The formal description of the two-stage extensive form game is as follows: There are $n+1$ players, n voters numbered $1, \ldots, n$, and one incumbent: player $n+1$. The set of players is denoted by $\mathcal{N}$. At the first stage, in each district i the voter determines a threshold utility level $\hat{V}_i$, where $\hat{V}_i \in \Re$. Voters choose simultaneously at the first stage. At the second stage, the incumbent observes the actions of all voters at the first stage and chooses tax rates and public good quantities for all districts: $\{(\tau_1, G_1), \ldots, (\tau_n, G_n)\} \in \left([0,1] \times \Re_0^+\right)^n$. The set of actions is denoted by $\mathcal{A}$. Terminal nodes are determined by threshold utility levels and policy choices. The set of histories, i.e., of sequences of threshold utilities and policy actions, is denoted by $\mathcal{H}$. The policy choices of the incumbent induce payoffs of voters: $\Pi_i : [0,1] \times \Re_0^+ \to \Re$, with $\Pi_i(\tau_i, G_i) = V(\tau_i, G_i, a_i)$ for voter i, $i = 1, \ldots, n$. Since policy choices in districts other than the home district and thresholds have no direct impact on a voter's payoff, they are not explicitly included as arguments of voter' payoff functions. The payoff of the incumbent directly depends on both threshold utilities and policy choices:

$$\begin{aligned}\Pi_{n+1} : &\left(\Re \times [0,1] \times \Re_0^+\right)^n \to \Re, \\ &\text{with } \Pi_{n+1}\left(\left(\hat{V}_1, \tau_1, G_1\right), \ldots, \left(\hat{V}_n, \tau_n, G_n\right)\right) \\ &:= \beta \sum_{i=1}^{n} [R(\tau_i) - G_i] \text{ if } \exists M \subseteq \{1, \ldots, n\}, \\ &\qquad \text{with } M = \{j | V(\tau_j, G_j, a_j) \geq \hat{V}_j\} \text{ and } |M| \geq n^o, \\ &= \sum_{i=1}^{n} [R(\tau_i) - G_i] \text{ otherwise,}\end{aligned} \tag{5}$$

where $n^o := (n+1)/2$ and $\beta \in (1, \infty)$. The condition which ensures the c.p. higher payoff is fulfilled when the incumbent chooses a policy which meets the thresholds of a majority of voters and he or she is, therefore, reelected. β captures the idea of future rents after reelection for complying incumbents. For example, one might think of $\beta = 1/(1-\delta)$, where $\delta \in (0,1)$ is the discount factor of an incumbent with an infinite horizon. The set of payoff functions is denoted by Π. Hence, the game is specified as $\Gamma = (\mathcal{N}, \mathcal{A}, \mathcal{H}, \Pi)$. The following analysis restricts itself to pure strategies. While a pure strategy of a voter determines one particular action from his or her action set, namely a utility threshold $\hat{V}_i$, a pure strategy of the incumbent determines for each possible combination of voters' actions a policy choice, i.e., $((\tau_1, G_1), \ldots, (\tau_n, G_n))$ dependent on $\hat{V}$. $\hat{V}$ denotes the set of thresholds. The strategy set of player i is denoted by S_i. The set of strategy sets is denoted by $S \equiv \prod_{j=1}^{n+1} S_j$ and s is an element of S. The strategy of player i is denoted by s_i. Strategies of all voter beside voter i are indicated by s_{-i}. Player i's payoff function depending on strategies is denoted by $\pi_i : S \rightarrow \Re$.

As the standard solution concept, the paper uses the subgame perfect equilibrium:

Definition 1 *$s^* \in S$ is a subgame perfect equilibrium (SPE) of the $n+1$ player extensive form game Γ if and only if for all subgames (a) for all players $i \in \{1, \ldots, n\}$ and for all $s_i \in S_i$, $\pi_i(s^*) \geq \pi_i(s_i, s^*_{-i}, s^*_{n+1})$, and (b) for all $s_{n+1} \in S_{n+1}$, $\pi_{n+1}(s^*) \geq \pi_{n+1}(s^*_1, \ldots, s^*_n, s_{n+1})$ holds.*

Since voters act simultaneously at the first stage of the game, there is only one strict subgame, namely the second stage, where the incumbent makes his or her choice. An SPE is called an SPE with reelection if it induces tax rates and expenditures such that there exists a subset $M \subseteq \{1, \ldots, n\}$, with $M = \{j | V(\tau_j, G_j, a_j) \geq \hat{V}_j\}$ and $|M| \geq n^o$. Otherwise, it is called an SPE without reelection.

In order to take the possible co-operation of voters in different election districts into account, an additional solution concept that requires stability against deviations by coalitions of voting districts at the first stage of the game will be considered. In normal form games, the strong Nash equilibrium [Aumann (1959)], which is stable against deviations by any conceivable coalition, is a commonly used concept. In order to capture the idea of the strong Nash equilibrium, the strong subgame equilibrium is introduced:

Definition 2 *$s^* \in S$ is a strong subgame perfect equilibrium (SSPE) of the $n+1$ player extensive form game Γ if and only if (a) s^* is a subgame perfect equilibrium and (b) for all $J \subseteq \{1, \ldots, n\}$ and for all $s_J \in \prod_{j \in J} S_j$ there exists an agent $i \in J$ such that $\pi^i(s^*) \geq \pi^i(s_J, s^*_{-J}, s^*_{n+1})$.*

An SSPE is a subgame equilibrium which is stable against deviations by any conceivable coalition of voters. It should be stressed that this definition excludes coalitions of voters with the incumbent.

3 Policy without restrictions

The game is solved by backward induction. Hence, the analysis starts with the decision of the incumbent when voters' actions have already been taken. For every district i, voters have determined thresholds $\hat{V}_i$, such that they promise to vote for the incumbent in the election if and only if $V(\tau_i, G_i, a_i) \geq \hat{V}_i$. On the one hand, if the incumbent decides not to meet the demand of voter i, he or she certainly chooses the revenue maximizing tax rate $\bar{\tau}$ and $G_i = 0$ in district i. The policy $(\bar{\tau}, 0)$ will be called Leviathan policy. Since $\varphi(0) = 0$ is assumed, $V(\tau, 0, a_i) = V(\tau, 0, a_j)$, for all a_i, a_j and $\tau \in [0, 1]$. Hence, the Leviathan policy is, for all voters, equally bad. On the other hand, if the incumbent plans to meet the requirements of voter i, he or she chooses

$$(\tilde{\tau}_i, \tilde{G}_i) \in \arg \max_{(\tau,G)\in[0,1]\times\Re_0^+} R(\tau) - G \text{ s.t. } V(\tau, G, a_i) \geq \hat{V}_i. \tag{6}$$

Since the incumbent is reelected if he or she satisfies a simple majority of voters, he or she chooses, at least in $n^o - 1$ districts, the Leviathan policy. In order to determine whether he or she should try to seek reelection, the incumbent uses $(\tilde{\tau}_i, \tilde{G}_i)$ of (6) to calculate net revenue $R(\tilde{\tau}_i) - \tilde{G}_i$ and puts the districts in non-ascending order with respect to net revenue. This ordered list for $\hat{V}$ is called $\Phi^{\hat{V}}$. The set which contains the first n^o elements of the list $\Phi^{\hat{V}}$ is called $W_1^{\hat{V}}$ (minimum winning coalition). This set is called a winning coalition because the incumbent may be interested in satisfying the members of this coalition in order to be reelected. Since maximum net revenues in different districts may be of equal size, various permutations of districts are possible without changing the order of net revenue. The number of feasible permutations which do not change net revenue for the first n^o entries in the list is denoted by $K^{\hat{V}}$. Analogously to $W_1^{\hat{V}}$, for the k-th feasible permutation of $\Phi^{\hat{V}}$, a minimum winning coalition $W_k^{\hat{V}}$ is defined. There are at most $n!/(n^o - 1)!$ minimum winning coalitions. Now, it is possible to determine the optimum policy for the incumbent at the second stage of the game.

Lemma 1 *If*

$$\beta \left\{ (n - n^o)R(\bar{\tau}) + \sum_{i \in W_1^{\hat{V}}} \left[R(\tilde{\tau}_i) - \tilde{G}_i \right] \right\} < nR(\bar{\tau}), \tag{7}$$

the incumbent chooses in each district the Leviathan policy $(\bar{\tau}, 0)$. Otherwise, there are $K^{\hat{V}}$ (possibly) different revenue maximizing policies. The k-th policy, $k \leq K^{\hat{V}}$, is characterized as follows: The incumbent chooses $(\tilde{\tau}_i, \tilde{G}_i)$ for all $i \in W_k^{\hat{V}}$ and $(\bar{\tau}, 0)$ for all $i \notin W_k^{\hat{V}}$.

Proof. If (7) holds, the incumbent cannot gain from meeting the requirements of a majority of voters. Hence, he or she maximizes instantaneous gross revenue in all districts. Otherwise, he or she chooses one of the minimum winning coalitions which guarantees him or her the highest net revenue and meets their members' requirements. Obviously, the incumbent maximizes once more gross revenue in all non-member districts. □

The government would not seek reelection if net revenue is lower than with an overall Leviathan policy. Furthermore, only the members of a minimum winning coalition of districts face the opportunity of not being completely expropriated by the government.

Now, the first stage of the game is considered. The game has many different equilibria. First, an infinite number of SPEs without reelection obviously exists. If more than n^o districts determine their thresholds, such that condition (7) is fulfilled, the government maximizes instantaneous rents in all districts and is not reelected. A single district does not have the power to assure reelection and, therefore, would not benefit from deviating. Second, there is also an SPE with reelection with $(\tau_i, G_i) = (\bar{\tau}, 0)$, for all $i \in \{1, \ldots, n\}$, where at least $n^0 + 1$ election districts set thresholds $\hat{V}_i \leq V(\bar{\tau}, 0, a_i)$. Once again, a single district cannot change the outcome. The following proposition even states that the equilibrium outcome of the game is always the Leviathan outcome.

Proposition 1 *In every SPE of the game, voters will be completely expropriated, i.e.,* $(\tau_i, G_i) = (\bar{\tau}, 0)$, *for all* $i \in \{1, \ldots, n\}$.

Proof. By contradiction: Suppose that there is an SPE where $\tau_i \leq \bar{\tau}$ and $G_i > 0$ or $\tau_i < \bar{\tau}$ and $G_i \geq 0$ holds for district i. Due to lemma 1, this has to be an SPE with reelection. Hence, $i \in W_k^{\hat{V}}$. Since $\tau_i < \bar{\tau}$ or $G_i > 0$, $\hat{V}_i > V(\bar{\tau}, 0, a_i)$ and $V(\tau_i, G_i, a_i) = \hat{V}_i$ have to hold. Then, there exists a district j with $j \notin W_k^{\hat{V}}$ and $\hat{V}_j \geq V(\tau_i, G_i, a_j)$. District j benefits from a reduction of its utility threshold $\hat{V}_j$ to $V(\tau_i, G_i, a_j) - \epsilon$, where ϵ is a small real number, such that j becomes a member of the minimum winning coalition, since $V(\tau_i, G_i, a_j) > V(\bar{\tau}, 0, a_j) = V(\bar{\tau}, 0, a_i)$. This contradicts the equilibrium assumption. □

All SPEs lead to the worst possible outcome for voters and maximize instantaneous rents. The various SPEs differ with respect to voters' thresholds but not in their payoffs for voters. However, if the incumbent is reelected, his or her payoff is $\beta n R(\bar{\tau})$, if not, it is only $nR(\bar{\tau})$.

Even those districts with a weak preference for the public good (a small a_i) cannot form a coalition and prevent the government from expropriating all member districts. Since the incumbent always expropriates some districts, at least one district will always break up this coalition by successfully undercutting. Two assumptions drive this result: Side payments are excluded and each voter makes his or her reelection decision conditional only on his or her own utility. If a sufficiently large majority of voters promised to reelect the incumbent if and only if all members of this group achieved a certain utility level, equilibria would exist, where voters are better off than under the Leviathan policy.

Facing no restrictions when determining public spending and taxes, the government is able to totally abuse its power, since it can safely expropriate the minority of voters, a fact, which, in turn, all voters are aware of. Retrospective threshold voting strategies are powerful instruments for controlling politicians in a nationwide election without election districts. However, voters lose all their power if, on the one hand, the country is divided into election districts although political decisions are still centralized and if, on the other hand, the government can choose different policy strategies in different election districts.

Finally, since SSPEs are also SPEs, no SSPE can exist where voters are better off than under the Leviathan policy.

4 Uniformity requirement

Now, the government is restricted to uniform taxes and spending: $\tau_i = \tau$ and $G_i = G$ for all $i = 1, \ldots, n$. The analysis starts again with the second stage, where voters have already set their utility thresholds. The incumbent calculates those uniform tax rates and uniform expenditure levels which maximize his or her payoff, subject to the constraint that a majority of election districts are satisfied:

$$(\tilde{\tau}^u, \tilde{G}^u) \in \arg \max_{(\tau,G)\in[0,1]\times\Re_0^+} R(\tau) - G \tag{8}$$

$$\text{s.t. } \exists M, \text{with } |M| \geq n^o, \text{ where } M = \{i | V(\tau, G, a_i) \geq \hat{V}_i\} \subseteq \{1, \ldots, n\}.$$

At the optimum, either $\hat{V}_i < V(\bar{\tau}, 0, a_i)$ for some districts or the threshold need to be binding for at least $|M| - n^o + 1$ districts, such that for a binding threshold in district i:

$V(\tau, G, a_i) = \hat{V}_i$. Otherwise, the government could increase net revenue by changing the tax rate or the expenditure level. If, e.g., the government has an "excess" majority of three districts, thresholds have to bind in four districts. The optimum policy of the incumbent can be easily determined and is summarized by the following lemma.

Lemma 2 *If*

$$n\beta \left[R(\tilde{\tau}^u) - \tilde{G}^u\right] < nR(\bar{\tau}), \tag{9}$$

the incumbent chooses in each district the Leviathan policy $(\bar{\tau}, 0)$. Otherwise, the policy choice is in all districts $(\tilde{\tau}^u, \tilde{G}^u)$.

The government has lost its ability to discriminate against specific districts. Hence, from an analysis of the first stage follows immediately that multiple SPEs exist. First of all, there is an infinite number of SPEs without reelection. If at least $n^o + 1$ districts determine their thresholds $\hat{V}_i$, such that $\beta [R(\tau) - G] \geq R(\bar{\tau})$ is unrealizable without violating the utility thresholds, no single district can change the policy outcome. For identical preferences of a sufficient large majority of voters, i.e., $a_i = a$ for at least $n^o + 1$ districts, it can be easily seen that the game also possesses an infinite number of SPEs with reelection. For example, if $n^o + 1$ voters with identical preferences set one and the same utility threshold, which, in turn, induces a tax rate and public expenditure that do not fulfill (9), the government meets the requirements of the winning coalition and no single player can gain from a deviation. Even when a homogeneous majority does not exist, there is an infinite number of SPEs with reelection and with $R(\tau) - G < R(\bar{\tau})$. Hence, under the uniformity rule, the government will no longer expropriate voters in all SPEs. Even further, the uniformity rule generates the opportunity for voters to cooperate. With reference to the median voter with preference parameter a_{n^o}, SSPEs can be characterized as follows:

Proposition 2 *Under the uniformity requirement, there always exists an SSPE. For every SSPE holds: The equilibrium tax-expenditure tuple (τ^u, G^u) fulfills (a)*

$$(\tau^u, G^u) \in \arg \max_{(\tau,G)\in[0,1]\times\Re_0^+} V(\tau, G, a_{n^o}) \ s.t. \ \beta [R(\tau) - G] = R(\bar{\tau}), \tag{10}$$

and (b) $V(\tau^u, G^u, a_i) > V(\bar{\tau}, 0, a_i)$, for all $i \in \{1, \ldots, n\}$, and (c) there exists a set of voters $M \subseteq \{1, \ldots, n\}$, with $M = \{j | V(\tau^u, G^u, a_j) \geq \hat{V}_j\}$ and $|M| \geq n^o$.

Proof. (1) If (a) is fulfilled, $\tau^u \leq \bar{\tau}$ obviously holds. Furthermore, $\tau^u = \bar{\tau}$ and $G = 0$ does not satisfy the restriction of (a). Moreover, $\tau^u \neq \bar{\tau}$, since for $\tau = \bar{\tau}$ and $G > 0$, $R'(\tau) = 0$, but for all i: $-\left(\partial V(\tau, G, a_i)/\partial \tau\right) / \left(\partial V(\tau, G, a_i)/\partial G\right) > 0$. Hence, $\tau^u < \bar{\tau}$ and $G^u \geq 0$ and, therefore, (a) implies (b).

(I) Sufficiency: (2) The incumbent cannot gain from a deviation. (3) Thresholds set by a majority of voters, say $\{1, \ldots, n^o\}$, which induce the outcome of (a), are stable against deviations of a coalition of any size at the first stage. That is, there does not exist a majority of voters who set thresholds such that all members of this coalition benefit from the deviation: First, all tuples (τ, G), with $\beta\,[R(\tau) - G] < R(\bar{\tau})$, violate the reelection condition and harm all voters. Second, due to the reelection condition, the median voter cannot increase utility. Third, because of the single crossing property, all tuples (τ, G) with $\beta\,[R(\tau) - G] = R(\bar{\tau})$, $G \geq 0$ and $\tau > \tau^u$ yield to $V(\tau, G, a_i) < V(\tau^u, G^u, a_i)$ for all $i \in \{1, \ldots, n^o - 1\}$. Fourth, because of the single crossing property all tuples (τ, G) with $\beta\,[R(\tau) - G] = R(\bar{\tau})$, $G \geq 0$ and $\tau < \tau^u$ yield to $V(\tau, G, a_i) < V(\tau^u, G^u, a_i)$ for all $i \in \{n^o{+}1, \ldots, n\}$. Fifth, by a similar argument, all tuples (τ, G) with $\beta\,[R(\tau) - G] > R(\bar{\tau})$ can be excluded.

(II) Necessity: (4) In an SSPE, voters will obviously never determine thresholds, which induce the Leviathan policy $(\bar{\tau}, 0)$. (5) In an SSPE, with (τ^u, G^u), $\beta\,[R(\tau^u) - G^u] = R(\bar{\tau})$ has to hold, since otherwise either the incumbent chooses the Leviathan policy or, e.g., all voters can cooperatively improve their utility by slightly increasing their thresholds $\hat{V}$. (6) Due to the single crossing property and the shape of the gross revenue function, (a) has to hold in an SSPE. If (a) did not hold, thresholds which induce a tax-expenditure bundle that fulfills (a) would find the support either of voters $\{1, \ldots, n^o\}$ or of voters $\{n^o, \ldots, n\}$.

(III): Existence: (7) There always exist tuples (τ, G) with $\tau < \bar{\tau}$ and $G \geq 0$ which fulfill $\beta\,[R(\tau) - G] = R(\bar{\tau})$. (8) For each tuple (τ, G) with $0 \leq \tau < \bar{\tau}$ and $G \geq 0$ and for each voter i, a threshold utility $\hat{V}_i$ exists, such that $V(\tau, G, a_i) = \hat{V}_i$. (9) Due to (7) and (8), for net revenue $R(\bar{\tau})/\beta$ a tuple (τ, G) with $\tau < \bar{\tau}$ and $G \geq 0$ exists, such that a set of thresholds $\hat{V}$ exists which induces an SPE in the sole subgame where the tuple (τ, G) is chosen. Hence, the outcome of (a) can be supported by thresholds as SPE in the subgame. □

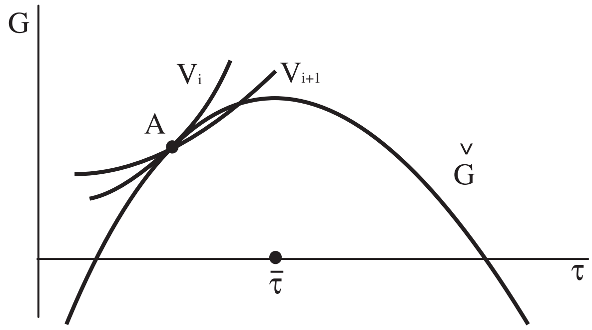

Figure 1: Single crossing property and decisions

The power of the median voter can easily be explained with the help of figure 1. Due to the strict concavity of the revenue function, $\check{G} : [0, 1] \to \Re$, with $\check{G}(\tau) := R(\tau) - R(\bar{\tau})/\beta$, is also strictly concave. If A, where $\hat{G} > 0$, is a most preferred tax-expenditure bundle of voter i along $\check{G}(\tau)$, due to the single crossing property, voter $i + 1$ certainly prefers bundle A to all bundles along $\check{G}(\tau)$ (with $\hat{G} \geq 0$) where the tax rate and expenditure are lower.[5] Hence, the choice of the median voter divides the tax-expenditure bundles along $\check{G}(\tau)$ (with $\hat{G} \geq 0$) in a neighborhood of A into two parts: One part harms the set of voters $\{1, \ldots n^o - 1\}$, the other one harms the set $\{n^o + 1, \ldots, n\}$.

In every SSPE, the reelection condition is fulfilled as an equation, i.e., $n\beta \left[R(\tau) - G\right] = nR(\bar{\tau})$, the median voters' preferences are satisfied and the government is reelected. All voters are better off than in an SPE in the absence of a restriction designed to ensure uniformity. Hence, if an additional stage to the game were added at the beginning of the game, where voters decide collectively on a uniformity restriction, foresighted voters would unanimously approve a restriction designed to ensure uniformity (irrespective of whether or not foresight is blurred by a veil of ignorance).

5 Partial uniformity requirement

When the government is restricted to a uniform tax rate, i.e., $\tau_i = \tau$, for all $i = 1, \ldots, n$, but not to uniform spending, it can still play voting districts off against each other. This

[5] This argument does not require strict convexity of indifference curves.

section shows that the outcome might be as bad as without any restriction. It is useful to split the policy choice of the incumbent into several steps. Since the incumbent never chooses a tax rate above $\bar{\tau}$, those tax rates will be neglected. The incumbent determines first for each tax rate $\tau \leq \bar{\tau}$ and each voter the lowest (non-negative) expenditure level which satisfies the utility threshold:

$$\begin{aligned} G_i^{\hat{V}} :& [0, \bar{\tau}] \rightarrow \Re_0^+, \\ & \text{with } G_i^{\hat{V}}(\tau) := \min G \text{ s.t. } V(\tau, G, a_i) \geq \hat{V}_i \text{ and } G \geq 0, \text{ for all } i \in \{1, \ldots, n\}. \end{aligned} \tag{11}$$

Using these functions, the incumbent puts the districts for each tax rate $\tau \leq \bar{\tau}$ in non-descending order with respect to $G_i^{\hat{V}}(\tau)$. This ordered list for $\hat{V}$ and τ with partial uniformity is called $\Phi_p^{\hat{V},\tau}$. $K_p^{\hat{V},\tau}$ and $W_{p,k}^{\hat{V},\tau}$ are defined analogously to the case without any restriction. Then, the incumbent calculates for each tax rate the lowest total expenditure level:[6]

$$G^{\hat{V}} : [0, \bar{\tau}] \rightarrow \Re_0^+, \text{ with } G^{\hat{V}}(\tau) := \sum_{i \in W_{p,1}^{\hat{V},\tau}} G_i^{\hat{V}}(\tau). \tag{12}$$

Afterwards, he or she maximizes net revenue with respect to the tax rate.

$$\tilde{\tau}^p \in \arg \max_{\tau \in [0, \bar{\tau}]} nR(\tau) - G^{\hat{V}}(\tau). \tag{13}$$

Finally, the incumbent determines the expenditure levels. For all members of the minimum winning coalition, he or she chooses expenditures which ensure reelection, i.e., $\tilde{G}_i^p = G_i^{\hat{V}}(\tilde{\tau}^p)$, for all $i \in W_{p,k}^{\hat{V},\tilde{\tau}^p}$. All other districts get nothing, i.e., $\tilde{G}_i^p = 0$, for all $i \notin W_{p,k}^{\hat{V},\tilde{\tau}^p}$. Having done this calculation, the incumbent compares the outcome with the outcome of an overall Leviathan policy and makes his or her choice. The following lemma summarizes these considerations and describes the optimum policy of the incumbent at the second stage of the game:

Lemma 3 *If*

$$\beta \left\{ nR(\tilde{\tau}^p) - \sum_{i \in W_{p,1}^{\hat{V},\tilde{\tau}^p}} \tilde{G}_i^p \right\} < nR(\bar{\tau}), \tag{14}$$

[6] If a finite solution to (11) does not exist for at least n^o districts, $G^{\hat{V}}(\tau)$ will be set equal to ∞.

the incumbent chooses in each district the Leviathan policy $(\bar{\tau}, 0)$. *Otherwise, there are* $K_p^{\hat{V}}$ *(possibly) different revenue maximizing policies. The k-th policy,* $k \leq K_p^{\hat{V}}$, *is characterized as follows: The incumbent chooses* $(\tilde{\tau}^p, \tilde{G}_i^p)$ *for all* $i \in W_{p,k}^{\hat{V},\tilde{\tau}^p}$ *and* $(\tilde{\tau}^p, 0)$ *for all* $i \notin W_{p,k}^{\hat{V},\tilde{\tau}^p}$.

The entire game has obviously at least two types of equilibria: First, an SPE without reelection, Leviathan policy in all districts, and more than n^o sufficiently high utility thresholds such that (14) is fulfilled. Second, an SPE with reelection, Leviathan policy in all districts, and more than n^o thresholds such that $\hat{V}_i \leq V(\bar{\tau}, 0, a_i)$. The next proposition makes clear that voters cannot escape the Leviathan policy in equilibrium.

Proposition 3 *In every SPE of the game with a partial uniformity requirement, voters will be completely expropriated, i.e.,* $(\tau_i, G_i) = (\bar{\tau}, 0)$, *for all* $i \in \{1, \ldots, n\}$.

Proof. By contradiction: (1) Suppose that there is an SPE where $\tau_i = \tau \leq \bar{\tau}$ and $G_i > 0$ hold for district i. Due to lemma 3 this has to be an SPE with reelection. Hence, $i \in W_{p,k}^{\hat{V},\tau}$. Since $G_i > 0$, $\hat{V}_i > V(\tau, 0, a_i)$ and $V(\tau, G_i, a_i) = \hat{V}_i$ have to hold. Then, there exists a district j with $j \notin W_{p,k}^{\hat{V},\tau}$ and $\hat{V}_j \geq V(\tau, G_i, a_j)$. District j benefits from a reduction of its utility threshold $\hat{V}_j$ to $V(\tau, G_i, a_j) - \epsilon$, where ϵ is a small real number, such that j becomes a member of the minimum winning coalition, since $V(\tau, G_i, a_j) > V(\tau, 0, a_j) = V(\tau, 0, a_i)$. This contradicts the equilibrium assumption. (2) Suppose that there is an SPE where $\tau < \bar{\tau}$ and $G_i = 0$ hold for all districts. Due to lemma 3, this has to be an SPE with reelection. Since $\lim_{G \to 0} \varphi'(G) = \infty$, a small public good supply for all members of a minimum winning coalition $W_{p,k}^{\hat{V},\tilde{\tau}^p}$ and a slightly higher tax rate raises net revenue of the government without violating thresholds of the winning coalition, since $R'(\tau) > 0$ and $\lim_{G \to 0} -(\partial V(\tau, G, a_i)/\partial \tau) / (\partial V(\tau, G, a_i)/\partial G) = 0$. This is in contradiction to an equilibrium in the subgame. □

If spending varies across districts, voters are unable to enforce a positive expenditure level, since they compete in public goods for the "goodwill" of the government. But even worse, an SPE, where the uniform tax rate is lower than the revenue maximizing rate $\bar{\tau}$, does not exist, since the government would benefit from a small public good supply (in the districts of the minimum winning coalition) and a slightly higher tax rate without putting reelection at risk. To summarize, a partial uniformity restriction is useless. If $\lim_{G\to 0}\varphi'(G)$ were finite, an SPE with $\tau < \bar{\tau}$ and $G = 0$ might exist (since part (2) of the proof does not apply). But even then, the government does not provide any public good.

6 Concluding remarks

Using a political economy approach, this paper developed a justification for policy uniformity which the traditional approach identified as the main disadvantage of centralized decision making. According to the political accountability model in a multi-district framework, voters in every district determine thresholds that the government needs to meet in order to be reelected. However, a sophisticated government serves only a minimum winning coalition of election districts. Hence, a Bertrand equilibrium type result was derived first. Since voters compete for membership in the minimum winning coalition, the government can completely expropriate voters. This result contradicts the positive assessment of retrospective voting strategies in a single-district framework. The power of voters over politicians vanishes if the government has the opportunity to serve different districts differently. The second result was that voters regain power if governments have to set tax rates uniformly and have to provide local public goods uniformly. Governments can no longer easily play some voting districts off against others. If some cooperation among voters is possible, the government certainly obtains only the minimum rent. Voters are as powerful as in a single election district. This result does not require identical districts. Even with heterogeneous districts (without cyclical decisions), all voters benefit from uniformity, since some public good supply is always better than nothing. However, missing uniformity rules for some policy variables brings exploitation back. The basic message of the paper is simple: According to Oates' theorem, uniformity is the main disadvantage of centralization but, according to the analysis under-taken in this paper, centralization without uniformity would be even worse.

Some of the assumptions that have been used in the model can be easily relaxed. The existence of (small) global positive spillovers of local public goods would not change the results, since spillovers that spread evenly affect neither the Leviathan subgame perfect equilibrium nor the nature of the strong subgame perfect equilibrium under the uniformity rule. Even if voters' attitudes towards leisure were to be heterogeneous, the qualitative results would probably be similar. Using the notion of an e-equilibrium, the Leviathan outcome would prevail in an equilibrium in the absence of a uniformity rule, although some districts, which generate high tax revenue, would be only partially exploited. Moreover, the qualitative results would also hold if districts were not equally seized. Furthermore, the notion of uniformity is particularly strong. However, if the constitution restricts diversity independent of voting behavior, the nature of the analysis and the results would be similar. Moreover, the basic insight of the model should still be true if a qualified majority rule instead of the simple majority rule were to be applied.

Commitment of voters in each district requires immobility of households after the first stage. The merits of mobility are outside the model. Mobile households are able to escape regionally concentrated exploitation and enforce therefore, at least to some degree, uniformity of taxes and public services by themselves. Since social mobility is relatively low, the model could also be used to discuss uniformity or generality issues of tax rules with respect to social groups or classes.

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