Tax Rules*

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Abstract

Tax schemes are more restricted by constitutional rules than subsidies. We show in this paper that such a differential treatment of taxes and subsidies has several advantages when incentive problems of the agenda-setter are taken into account. In particular, tax rules may prevent the proposal of inefficient projects that benefit only a small lobby group. We propose "redistribution efficiency" as a socially desirable property of proposals and find that tax rules always guarantee this kind of efficiency. We show that rules on subsidies combined with discretion regarding taxes always yield socially inferior proposals. Finally, tax rules induce the agenda-setter to look for potential improvements of public projects.

Keywords: constitutional design, provision of public projects, voting, taxes and subsidies

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Taxation shall be equal and uniform.
(The Texas Constitution, Article 8, Sec. 1 (a))

1 Introduction

The above quote exemplifies the fact that taxation is frequently restricted by constitutional rules. This is not only the case in Texas, but also in many other states in the U.S. and in other countries. In Germany, for example, general restrictions on taxation follow from the principle of equality laid out in the German constitution.[1] While there are constitutional principles restricting the set of tax schemes that can be adopted, subsidies can be channeled flexibly to small subgroups of the population (for examples, see the next section).

The widespread use of constitutional rules on taxes may appear puzzling.[2] In standard models of mechanism design, tying the benevolent mechanism designer's hands by imposing restrictions on potential tax schemes can never be welfare-improving.[3] However, our paper considers an agenda-setter who pursues her own interests. We show that this justifies constitutional restrictions on taxes. We also explore the limitations of this widespread procedure.

We consider a large polity in which an agenda-setter can make a proposal about the adoption of a public project and the distribution of taxes and subsidies. The proposal is adopted if it is supported by a majority of voters. Our model involves three potential sources of inefficiencies. First, the agenda-setter may want to provide a public project if it is beneficial to her, although the project may be undesirable from a utilitarian perspective. Second, the agenda-setter may want to raise more taxes than necessary in order to pay out subsidies to herself or to other citizens. Third, the agenda-setter may not want to look for the most efficient variant of the public project.

[1] Herdegen and Schön (2000), pp. 52-53, state that the principle of equality with respect to taxation follows from the German constitution (Art. 3 para. 1 Grundgesetz). On p. 3, Ordower (2006) notes that "The Constitutional Court ... requires a compelling justification for legislation that results in any distributional inequalities causing like taxpayers to pay unequal amounts of tax." He reports that the German Constitutional Court has ruled out, for example, value-based taxes that do not apply the same valuation standard to all and a tax that the government was unable in practice to assess and collect uniformly.

[2] Elkins (2006) argues that, as yet, there is no convincing normative justification for horizontal equity, i.e. the requirement that similarly situated taxpayers should face equal tax burdens (p. 87).

[3] For a survey of the literature on mechanism design, see Jackson (2001).

We compare constitutions with tax and/or subsidy rules with a constitution without such rules. We find that rules on taxes act as a mechanism that tends to align the private interests of the agenda-setter with the interests of the public. More precisely, we obtain four major findings.

First, tax rules may prevent the agenda-setter from securing the necessary majority of voters for socially inefficient projects that benefit only a small lobby group. By contrast, the absence of tax rules enables the proposer to enforce any project with positive private benefits to herself, irrespective of its social desirability. She can tailor taxes and subsidies such that she and a majority benefit from the proposal at the expense of a minority that suffers strongly from high taxes. Second, tax rules reduce wasteful subsidies to a minimum, i.e. only redistribution-efficient proposals are made. The intuition for this finding is that under tax rules a large amount of total subsidies also implies high taxes for the agenda-setter. Third, an additional rationale for tax rules materializes when project characteristics are endogenous. We show that only constitutions involving tax rules will induce the agenda-setter to enhance project efficiency. Fourth, we find that, in the absence of tax rules, subsidy rules yield high welfare losses. Such a constitution is inferior to one with no rules on taxes and subsidies. This follows from the observation that the agenda-setter's desire to secure high subsidies for herself entails a high general level of subsidies when subsidy schemes are restricted by constitutional law. As subsidies have to be financed by distortionary taxes, this results in substantial welfare losses.

Overall, our paper provides a rationale suggesting that if incentive problems for the agenda-setter are taken into account, constitutional tax rules exhibit several advantages over a scheme in which financing, project decision, and subsidies can be chosen arbitrarily by the agenda-setter.

In addition, we find that a constitution with rules on both taxes and subsidies is robust to counter-proposals, whereas the other constitutions under consideration are prone to cycles of project adoption and project reversal.

The paper is organized as follows: We review the related literature in Section 2. Section 3 develops the basic framework. Sections 4-7 examine the outcomes for constitutions that differ with respect to their rules on taxes and subsidies. In Section 8 we examine the welfare implications of different constitutions. Section 9 discusses socially optimal constitutional rules for different categories of projects. We analyze endogenous project design in Section 10. We discuss the robustness of our findings and possible extensions to our model in Section 11. Section 12 concludes.

2 Relation to the Literature and Examples

There are no other studies inquiring why a polity may adopt strict tax rules but still allow flexibility in using subsidies in public-project provision. At a more general level, our paper is a contribution to constructive constitutional economics, as outlined in the seminal study by Buchanan and Tullock (1962). Using the veil-of-ignorance device (see Rawls (1971)), Buchanan and Tullock (1962) examine the costs and benefits of majority rules.[4] Aghion and Bolton (2003) refine and expand this approach. When a society faces deadweight costs of redistribution, simple majority or supermajority rules are preferred to unanimity as a way of overcoming vested interests. Gersbach (2004, 2009) shows that increasingly sophisticated agenda and decision rules further improve the efficiency of public-project provision when the set of admissible projects is small.

In this paper we focus on the efficiency properties of the simple majority or super-majority rule when it is coupled with tax or subsidy rules. Our main insight is that tax rules exhibit a variety of advantages and can rationalize the separation of tax laws based on constitutional principles from public-project provision and subsidies.[5]

There is an extensive body of literature on optimal mechanisms for providing public goods when income taxes are a source of public-goods finance and the mechanism designer is benevolent. For example, Hellwig (2004) shows that when both income taxation and public-sector pricing are plagued by incentive considerations at the citizen level, it is desirable to use a combination of income taxation and admission fees to finance public goods. Our focus is on the incentive problem of the agenda-setter, and we derive a rationale for constitutional tax rules.

[4] Closely related ideas have been developed by Rae (1969) and Taylor (1969).

[5] In our model, subsidies can be used to ensure the majority necessary for the adoption of a proposal and thus represent the institutionalized way of forming majorities in advanced democracies. There is an extensive body of literature on vote buying (see Groseclose and Snyder (1996) and Dekel et al. (2008), among others), where agenda-setters buy votes by using a stock of wealth.

The different degrees of flexibility in taxes and subsidies can be illustrated by various examples. First, after German re-unification a new tax ("solidarity tax") was introduced in Germany to finance a variety of projects in the Eastern part of the country. While the funds can be used flexibly, e.g., for specific infrastructure projects, taxes are raised on all incomes (including those of people living in East Germany). Second, subsidies within the economic stimulus packages in the ongoing economic crisis can be directed to specific geographical regions, sectors, or firms like car manufacturers or banks. The programs are financed from general taxes. Third, in Switzerland subsidies go to small groups like Romanies, house-owners in mountainous regions, youth organizations, and dairy farmers whose cows are given fodder that is not stored in silos.[6]

The flexibility of subsidies is often used to gain the majority necessary for the adoption of a proposal. For example, the votes of some Democrat members of Congress and Senate who were skeptical about the U.S. health-care reform were secured by distributing funds to their districts.[7]

3 Model

3.1 Set-up

We consider a society facing the standard problem of public-project provision and financing. Citizens are indexed by j and are uniformly arranged on the unit interval. The provision of a public project yields utility v_j $\forall j \in [0,1]$ and involves per-capita costs $k \geq 0$. If the project is not adopted, the status quo will prevail; we normalize the utility under the status quo to zero for all citizens.

The project characteristics are as follows. For simplicity of exposition, we assume $v_j \in \{V_w, V_l\}$ with $V_w \geq 0$ and $V_w > V_l$. Accordingly, we refer to individuals obtaining V_w from the public project provision as "project winners" and to individuals receiving benefits V_l as "project losers." A fraction p of individuals are project winners, the rest

[6] See http://www.efv.admin.ch.

[7] See The Washington Post, "Cornhusker Kickback gets the boot in health bill" (18 March 2010), The New York Post, "GOP blasts kickback health fix" (22 December 2009), Neue Zürcher Zeitung, "Tag der Entscheidung" (29 March 2010)).

of the population are project losers ($0 \leq p \leq 1$). Without loss of generality, we assume the project winners to be located on the interval $[0, p]$ and the project losers to be located on the interval $(p, 1]$.

We adopt the standard "veil of ignorance" procedure for constitutional design. The social choice problem is reduced to a two-period setting. The first period is the constitutional period and the second the legislative period. In the constitutional stage, society decides about the rules governing the legislative process. In the legislative period, decisions about the project, taxation, and subsidization are made. The details of this process are spelled out in subsection 3.3.

Subsidies may be paid to a particular subset of citizens. These subsidies and the project's costs will be financed by taxes. While in most contributions only net taxes or subsidies are considered, the distinction between taxes and subsidies is crucial in our framework. Suppose, for example, that an agent would have to pay a particular amount of taxes and would receive the respective proceeds as subsidies. Then losses occur in our model because only distortionary taxes are available. This effect would be ignored in a model where only net taxes matter.

Subsidies and taxes are constrained to be non-negative. Moreover, there is some maximal level of subsidies per capita denoted by $\hat{s}$ with $\hat{s} \geq V_w - V_l$.[8] Let $\mathbb{S}$ be the set of all non-negative Lebesgue-measurable functions on the unit interval that do not exceed $\hat{s}$. Thus a subsidy scheme involved by a proposal π is a function $s(\pi) \in \mathbb{S}$, where $s_j(\pi)$ is the subsidy designated for individual j. Accordingly, let $\mathbb{T}$ be the set of all non-negative Lebesgue-measurable functions on the unit interval. Then each tax scheme can be written as a function $t(\pi) \in \mathbb{T}$, where $t_j(\pi)$ denotes the tax burden for j implied by proposal π. Moreover, we use $g(\pi) \in \{0, 1\}$ as a variable indicating whether the project will be adopted ($g(\pi) = 1$) or not ($g(\pi) = 0$) according to proposal π.[9] We note that $g(\pi) = 0$ involves a purely redistributive proposal where some citizens pay taxes to subsidize others.

We have already mentioned that we consider distortionary taxes, i.e. for each unit of taxes that is paid by a particular individual, only a fraction $1/(1 + \lambda)$ $(\lambda > 0)$ can be

[8]The assumption $\hat{s} \geq V_w - V_l$ simplifies the exposition, but does not qualitatively affect our findings.

[9]Lizzeri and Persico (2001) consider a model where the agenda-setter must choose between redistribution and public-project provision. In our model, it is possible to combine public projects with redistribution.

used to finance the project or subsidies. There are various interpretations of λ. It may represent resources used for collecting and transferring funds from citizens to the state. The deadweight costs λ may also represent the disincentive to work if wages are taxed. The assumption of linear deadweight costs can be justified by the relationship between taxes paid for the public project and individual income, the former being sufficiently smaller than the latter. Now the society's budget constraint is

$$(1+\lambda)\left[g(\pi)k + S(\pi)\right] = T(\pi), \tag{1}$$

where we have introduced total subsidies $S(\pi) := \int_0^1 s_j(\pi)\,dj$ and total tax revenues $T(\pi) := \int_0^1 t_j(\pi)\,dj$ implied by proposal π. We assume $V_w - (1+\lambda)k > 0$ and $V_l - (1+\lambda)k < 0$.

Now we are in a position to give a formal description of the general set of possible proposals.

$$\Pi := \left\{\pi \in \{0,1\} \times \mathbb{S} \times \mathbb{T} \mid (1+\lambda)\left[g(\pi)k + S(\pi)\right] = T(\pi)\right\}. \tag{2}$$

3.2 Constitutions

In the constitutional period all citizens are assumed to be identical and do not know whether they will be project winners or project losers. Moreover, the project's parameters V_w, V_l, k, and p are not known with certainty. Citizens design a constitution or an incomplete social contract governing the supply of public goods, given a commonly known distribution of the project parameters.[10]

Under the incomplete contract perspective, rules cannot depend on project characteristics, as those characteristics are not verifiable in court. Consequently, the rules that can be adopted in the constitutional period can constrain the tax and subsidy schemes the agenda-setter is allowed to use, but cannot be project-specific. In this paper we adopt the perspective that in the constitutional period the decision rule that will be used later is given. In particular, we assume that a proposal will be adopted if it receives at least a fraction m of all votes. The only assumption we make is that

[10] Incomplete social contracts have been studied by Aghion and Bolton (2003) and Gersbach (2009), among others.

$\frac{1}{2} \leq m < \min\left\{\frac{1}{1+\lambda} + p, 1\right\}$.[11] As we show later this assumption will significantly simplify our analysis.

In our model a constitution is simply a set of rules that constrain the set of proposals the agenda-setter can make. Accordingly, Π represents a particular constitution, namely one without any further rules. In the course of the article we will consider less discretionary constitutions and impose rules on tax and/or on subsidy distribution. These constitutions represent subsets of Π.

More specifically, we will consider the constitutional rule of uniform taxation. Because we abstract from heterogeneity of households with respect to income, uniform taxation is the only tax rule that is non-discriminatory in our framework. Real-world tax systems are obviously complex and discriminate between different sources of income and involve higher tax rates for higher incomes. The important feature of real-world tax systems that we aim to capture in our model is that they are restricted by constitutional rules. Thus the agenda-setter is not free to tax individuals arbitrarily and, in particular, he cannot exempt close friends, party members, and himself from taxation. Uniform taxation represents a tractable approach to model these restrictions.

It will be useful to define the set of all possible projects. It comprises all quadruples (V_w, V_l, k, p) that satisfy the assumptions we have introduced so far. Formally, it is given by

$$\begin{aligned} \mathcal{P} :=& \{(V_w, V_l, k, p) \in \mathbb{R}^+ \times \mathbb{R} \times \mathbb{R}^+ \times [0; 1] : \\ & p > m - 1/(1+\lambda), V_w > (1+\lambda)k, V_l < (1+\lambda)k, \hat{s} \geq V_w - V_l\}, \end{aligned} \quad (3)$$

where $\mathbb{R}$ and $\mathbb{R}^+$ denote the sets of real numbers and non-negative real numbers respectively. The prior distribution of the project parameters can now be described by a joint probability density function on $\mathcal{P}$. At this stage, we do not specify a particular form for this density function.

[11] Plausible estimates of λ lie between 0.2 and 0.5 (see Stuart (1984), Ballard et al. (1985), and Browning (1987)). For these estimates and the simple majority rule ($m = 1/2$) the assumption $1/2 \leq m < \min\{1/(1+\lambda) + p, 1\}$ is always fulfilled.

3.3 The legislative period

In the legislative period, each individual observes v_j and k, and all individual valuations become common knowledge.[12] One particular individual can make a proposal π, which comprises a tax and a subsidy distribution as well as the specification whether the project should be provided or not. The proposal is put to a vote; it is adopted if at least a fraction m of all voters support it. Our framework thus corresponds to the government form of direct democracy (as practiced e.g. in California (US) or Switzerland) or parliamentary democracy with perfect representation of its citizens.[13] There are different ways of modeling which citizen has the right to set the agenda. We adopt the view that in a democracy it is impossible to deter beneficiaries of public projects from making proposals.[14] Hence we directly assume that the agenda-setter is a project winner. Without loss of generality, we assume that the agenda-setter is $j = 0$. The agenda-setter makes a proposal that must obey the constitutional rules, otherwise the proposal is declared to be unconstitutional and the status quo prevails.

If proposal π is adopted, the utility of individual $j \in [0; 1]$ will be[15]

$$u_j(\pi) = g(\pi)v_j + s_j(\pi) - t_j(\pi). \tag{4}$$

We assume that each individual will vote in favor of the proposal if and only if $u_j(\pi) \geq 0$. It will be useful to define the indicator function $I(\pi)$, which adopts a value of 1 if the proposal is implemented and of zero otherwise.

$$I(\pi) := \begin{cases} 1 & \text{if } u_j(\pi) \geq 0 \text{ for at least a fraction } m \text{ of voters} \\ 0 & \text{otherwise.} \end{cases} \tag{5}$$

Thus we can write the expected utility of individual j as $U_j(\pi) = I(\pi)u_j(\pi)$ given proposal π has been made. In addition, the utilitarian welfare measure for a particular proposal π amounts to

$$W(\pi) := I(\pi)\left[(pV_w + (1-p)V_l - k(1+\lambda))g(\pi) - \lambda S(\pi)\right]. \tag{6}$$

[12] An interesting variant of our model would involve citizens having private information about their types $v_j \in \{V_w, V_l\}$, while the value of p is commonly known. This variant leads to results similar to those in this paper. A formal analysis of this case is available upon request.

[13] An electorate is perfectly represented in parliament if groups of citizens are represented in parliament in the same proportions as in society as a whole and if members of parliament vote in line with the interests of their electorate.

[14] Another approach commonly applied is random selection of agenda-setters (see Gersbach (2009)).

[15] We assume that the income of individuals is sufficient to pay taxes under any proposal considered in the paper.

For the sake of simplicity, we introduce the following tie-breaking rule: If the agenda-setter is indifferent between several proposals, she will choose a proposal with the highest $u_0(\pi)$, i.e. a proposal that if implemented would yield the highest utility for her.

3.4 Socially efficient solutions

As a starting point it is instructive to consider socially optimal proposals. Consider a social planner who maximizes the utilitarian welfare measure by choosing and implementing a proposal $\pi \in \Pi$ for a given realization of the project parameters V_w, V_l, k, and p. It is obvious that the following lemma holds:

Lemma 1

A socially optimal proposal π has the following characteristics:

$$g(\pi) = \begin{cases} 1 & \text{for } pV_w + (1-p)V_l \geq (1+\lambda)k \\ 0 & \text{for } pV_w + (1-p)V_l < (1+\lambda)k \end{cases} \quad (7)$$

$$S(\pi) = 0. \quad (8)$$

In particular, the social planner will never choose a positive level of total subsidies because of the losses caused by distortionary taxation. We note that the socially optimal solution is not unique in general because for $g(\pi) = 1$ the social planner is indifferent with respect to all possible tax schemes raising the revenues necessary to finance the project.

If the project parameters p, V_w, V_l, and k were verifiable, it would be straightforward to characterize a constitution guaranteeing the optimal level of welfare. However, as discussed before, we assume that constitutional rules cannot depend on project characteristics, as even for perfectly observable costs and benefits of projects it is plausible that the project characteristics are not verifiable in court.

3.5 Evaluation criteria

In the following we establish several desirable properties of constitutions. For this purpose it will be useful to define the following concept:

Definition 1

For a given constitution $\widetilde{\Pi} \subseteq \Pi$*, a proposal* $\pi \in \widetilde{\Pi}$ *with* $I(\pi) = 1$ *is redistribution-efficient if no* $\pi' \in \widetilde{\Pi}$ *exists with* $S(\pi') < S(\pi)$*,* $g(\pi) = g(\pi')$ *and* $I(\pi') = 1$*. A proposal with* $I(\pi) = 0$ *is always redistribution-efficient.*

Thus we refer to a proposal π that ensures the adoption of the project as redistribution-efficient if no alternative proposal exists that would guarantee the adoption of the project while involving strictly lower total subsidies. Clearly, redistribution-efficiency is a desirable property of proposals, as it keeps wasteful redistribution to a minimum.

Definition 2

We refer to a constitution under which only redistribution-efficient proposals are made as a constitution satisfying $GREP$ *(guarantees redistribution-efficient proposals).*

Now we turn to an additional desirable property of constitutions. While it is plausible that designing socially desirable projects is difficult, it may be much easier to conceive of socially harmful projects that benefit only a small lobby group. As a result, one important feature of a constitution may be that it prevents the adoption of projects of this kind. To be more precise, we define the set of lobby projects $LP(\varepsilon) \subset \mathcal{P}$ for $\varepsilon < 1/2$ as

$$LP(\varepsilon) := \{(V_w, V_l, p, k) \in \mathcal{P} \mid |V_w - k(1+\lambda)| < |V_l - k(1+\lambda)| \text{ and } p \leq \varepsilon\}$$

Note that condition $|V_w - k(1+\lambda)| < |V_l - k(1+\lambda)|$ can be interpreted as the net benefits of project winners being lower than the net losses of project losers. For $p < 1/2$ this obviously implies $pV_w + (1-p)V_l < (1+\lambda)k$. Thus, $LP(\varepsilon)$ is a subset of $\mathcal{P}$ and comprises only socially extremely undesirable projects.

Definition 3

A constitution satisfies the property of "protection against lobby projects" (henceforth PALP) if a value for $\varepsilon \in (0; 1/2)$ *exists such that all projects in the set* $LP(\varepsilon)$ *are never adopted in equilibrium.*

As a consequence, a constitution satisfying PALP will be desirable under a veil of ignorance if bad lobby projects are sufficiently likely a priori.

The reversal of some projects, like the construction of public buildings or infrastructure, may be prohibitively costly compared to the benefits involved. But in other cases project reversal may be relatively easy. Examples are a reform of penal law or changes to the tax system. For these cases, we cannot rule out the eventuality of one of the project losers proposing to reverse the project after a proposal has been adopted. In the tradition of the literature on political institutions, in which institutions that are prone to cycles are deemed undesirable, we assume that a sequence of project adoption, reversal, renewed project adoption, and so forth is not desirable (see the survey by Coughlin (1990)). Thus we propose robustness against counter-proposals (henceforth $RACP$) as another desirable criterion for evaluating constitutions. More specifically, we assume that potentially reversible projects involve negligible costs k, i.e. $k = 0$. So if the original project involves $p = p^0$, $V_l = V_l^0$, and $V_w = V_w^0$, reversal of the project can be characterized by $p = 1 - p^0$, $V_l = -V_w^0$, and $V_w = -V_l^0$.

In order to consider the reversal of projects, we have to specify a game involving a sequence of legislative stages. For simplicity of exposition we assume that agenda-setters and voters are short-sighted when making a proposal or voting. For example, when a decision is to be taken, voters do not take into account the eventuality of the project being reversed in the future. To sum up, a potentially reversible project can be reversed if both itself and the reversal of the project can be adopted in an equilibrium of our basic model.

We are now in a position to define $RACP$ as follows:

Definition 4
A constitution displays robustness against counter-proposals ($RACP$) if no potentially reversible project can be reversed by a respective counter-proposal.

Obviously, it may be possible to rule out project reversal directly in the constitution. However, in a richer framework with project costs and benefits that are uncertain before implementation, such a constitutional rule may be disadvantageous as it eliminates the possibility to reverse projects that have turned out to be much less desirable than expected. Then constitutions displaying $RACP$ may be desirable.

4 Arbitrary Tax Code and Arbitrary Subsidy Scheme

In our first scenario we impose no additional rules on taxes and subsidies, i.e. the agenda-setter can choose any proposal $\pi \in \Pi$.

Proposition 1

For constitution Π the agenda-setter will always choose a proposal π^* with $g(\pi^*) = 1$, $t_0(\pi^*) = 0$, $s_0(\pi^*) = \widehat{s}$, and $I(\pi^*) = 1$.

Proof:

The agenda-setter solves the following problem:

$$\max_{\pi \in \Pi} \{(g(\pi)V_w + s_0(\pi) - t_0(\pi))I(\pi)\} .$$

It is obvious that $g(\pi) = 1$, $t_0(\pi) = 0$, and $s_0(\pi) = \widehat{s}$ guarantee maximum utility for the agenda-setter, provided that the proposal is actually adopted. Importantly, a proposal with $g(\pi) = 1$, $t_0(\pi) = 0$, and $s_0(\pi) = \widehat{s}$ that entails $I(\pi) = 1$ always exists. For example, the agenda-setter can impose zero taxes on all individuals from the interval $(0; m]$ and tax all individuals from the interval $(m, 1]$ identically to cover the costs for the project k and the subsidies $S(\pi)$ that may be necessary to gain support from all members in $(0; m]$. □

We obtain the following lemma:

Lemma 2

For constitution Π a proposal chosen by the agenda-setter may be redistribution-inefficient. Therefore constitution Π does not satisfy GREP.

Proof:

The proof of this lemma is straightforward. Suppose a redistribution-efficient proposal π^* exists that maximizes the agenda-setter's utility. It is obvious that for π^* some project losers exist who receive no subsidies ($s_j(\pi^*) = 0$). Now we can modify π^* by introducing positive subsidies for these individuals, which are financed by additional taxes for these very persons. The resulting proposal would also be adopted, but is clearly not redistribution-efficient. Thus for each redistribution-efficient proposal we can find a multitude of proposals that are not redistribution-efficient. □

In addition, as all projects are adopted, we can immediately conclude that the following lemma holds:

Lemma 3

Constitution Π *does not satisfy* $PALP$*.*

Intuitively, the high degree of flexibility for the proposer enables her to adopt any project, independently of its characteristics. Hence socially detrimental lobby projects are always implemented.

Finally we note

Lemma 4

Constitution Π *does not satisfy* $RACP$*.*

As any project can be adopted by a suitable tax-subsidy scheme, it is obvious that any reversible project can be reversed by a respective counter-proposal.

5 Uniform Tax Code and Arbitrary Subsidy Scheme

Now we impose the requirement that all individuals have to be treated identically with respect to taxation. As a consequence, we consider the following constitution:

$$\Pi_T := \{\pi_T \in \Pi \mid t_j(\pi_T) = t_i(\pi_T) \quad \forall i, j \in [0,1]\} . \tag{9}$$

Here the agenda-setter can only choose proposals from $\Pi_T \subset \Pi$. For notational convenience we define

$$V_w^* := (1+\lambda)\frac{k-(m-p)V_l}{1-(1+\lambda)(m-p)}. \tag{10}$$

Note that, for $p < m$, $V_w^* > 0$ follows from the assumption $m < \min\{\frac{1}{1+\lambda} + p, 1\}$. It is straightforward to verify $V_w^* - V_l > 0$, which follows from $V_l - (1+\lambda)k < 0$.

Proposition 2

For constitution Π_T *a unique*[16] *equilibrium proposal* π_T^* *exists.*

[16] More precisely, the proposal is unique up to relabeling individuals and redistribution within masses of Lebesgue measure zero. We will use "unique" in this sense throughout the paper.

1. For $V_w \geq V_w^*$ and $p < m$, π_T^* is given by $g(\pi_T^*) = 1$, $t_j(\pi_T^*) = V_w^*$ $\forall j \in [0,1]$, and

$$s_j(\pi_T^*) = \begin{cases} \hat{s} & \text{for } j = 0 \\ 0 & \text{for } j \in (0,p] \\ V_w^* - V_l & \text{for } j \in (p,m] \\ 0 & \text{for } j \in (m,1]. \end{cases} \tag{11}$$

2. For $V_w < V_w^*$ and $p < m$, π_T^* is given by $g(\pi_T^*) = 0$, $t_j(\pi_T^*) = 0$ $\forall j \in [0,1]$, and

$$s_j(\pi_T^*) = \begin{cases} \hat{s} & \text{for } j = 0 \\ 0 & \text{for } j \in (0,1]. \end{cases} \tag{12}$$

3. For $p \geq m$, π_T^* is given by $g(\pi_T^*) = 1$, $t_j(\pi_T^*) = (1+\lambda)k$ $\forall j \in [0,1]$, and

$$s_j(\pi_T^*) = \begin{cases} \hat{s} & \text{for } j = 0 \\ 0 & \text{for } j \in (0,1]. \end{cases} \tag{13}$$

The equilibrium proposal is always adopted.

The proof of Proposition 2 is given in Appendix A. According to Proposition 2, the agenda-setter will always choose the maximum level of subsidies for herself, which is plausible as the subsidies to an individual do not affect aggregate subsidies and thus the uniform tax rate with a continuum of citizens. In the following, we discuss the three cases mentioned in the proposition separately.

For $p \geq m$, the project winners alone can enforce the adoption of the project. As a consequence, a proposal will secure the necessary majority, even if it involves zero total subsidies, i.e. subsidies only to a group of Lebesgue measure zero.

For $p < m$, it is necessary to subsidize some project losers to induce them to accept the project. In the proof we show that V_w^* represents the level of taxes that is necessary to finance these subsidies. For $V_w \geq V_w^*$, the project winners' gains V_w from the project exceed this tax level. However, for $V_w < V_w^*$ the benefits of the project winners are so low that they are not willing to finance the subsidies necessary to induce some project losers to support the proposal. Thus the agenda-setter will choose a proposal π_T with $g(\pi_T) = 0$.

It is important to note that the agenda-setter always chooses a redistribution-efficient proposal. A proposal with a higher level of total subsidies $S(\pi)$ would entail a higher level of taxes, which would be harmful to the agenda-setter. We summarize this observation in the following lemma:

Lemma 5
Constitution Π_T *satisfies* $GREP$, *i.e. proposal* π_T^* *is always redistribution-efficient.*

In Appendix B we also show

Lemma 6
Constitution Π_T *satisfies* $PALP$.

The lemma is a consequence of the fact that for lobby projects with very small p, $V_w < V_w^*$ holds. Consequently, the level of taxes required for financing the subsidies necessary to secure project adoption would be unacceptably high to project winners.

We note that projects with $k = 0$, $p < m$, and $V_w \geq V_w^*$ are susceptible to counter-proposals. As a consequence, we obtain

Lemma 7
Constitution Π_T *violates* $RACP$.

Despite the presence of a strict rule on taxation, Π_T still provides the agenda-setter with sufficient flexibility such that for some projects both the adoption of the project and project reversal can be achieved.

6 Arbitrary Tax Code and Uniform Subsidy Scheme

Now we consider a constitution that allows for arbitrary tax schemes. However, we limit the subsidy schemes to those that treat all citizens identically. Hence we restrict our attention to the set of proposals $\Pi_S \subset \Pi$ with

$$\Pi_S := \{\pi_S \in \Pi \mid s_j(\pi_S) = s_i(\pi_S) \quad \forall i, j \in [0,1]\}. \tag{14}$$

For this case we obtain

Proposition 3
For constitution Π_S *each equilibrium proposal* π_S^* *can be characterized by* $g(\pi_S^*) = 1$, $s_j(\pi_S^*) = \hat{s}\ \forall j \in [0,1]$, $t_0(\pi_S^*) = 0$, *and* $I(\pi_S^*) = 1$.

Proof:

The agenda-setter solves the following problem:

$$\max_{\pi \in \Pi_S} \{(g(\pi)V_w + s(\pi) - t_0(\pi))I(\pi)\}.$$

It is obvious that $t_0(\pi) = 0$, $s(\pi) = \hat{s}$, $g(\pi) = 1$ guarantee the highest possible payoff for the agenda-setter, provided that she can induce enough voters to support such a proposal. It is always possible to secure the necessary majority by taxing only the individuals from the interval $(m; 1]$. In this case, non-taxed project winners will vote in favor of π (as $V_w + \hat{s} > 0$) as well as non-taxed project losers (as $V_l + \hat{s} > 0$), which implies $I(\pi) = 1$. □

As each proposal under Π_S involves the maximum amount of total subsidies $S(\pi) = \widehat{s}$ and a proposal would also be accepted for slightly lower total subsidies, we obtain

Lemma 8

Under constitution Π_S the equilibrium proposal is never redistribution-efficient. As a consequence, Π_S violates $GREP$.

As constitution Π_S enables the proposer to implement all projects, even very poor ones, we obtain

Lemma 9

Constitution Π_S does not satisfy $PALP$.

In a similar vein, the ability to implement all projects has the implication that robustness to counter-proposals fails to hold.

Lemma 10

Constitution Π_S does not satisfy $RACP$.

7 Uniform Tax Code and Uniform Subsidy Scheme

Finally we consider a constitution that stipulates that all citizens be treated equally with respect to subsidies and taxes. Hence the set of feasible proposals reduces to $\Pi_{ST} \subset \Pi$, where

$$\Pi_{ST} := \Pi_T \cap \Pi_S. \tag{15}$$

For this constitution we obtain

Proposition 4

For constitution Π_{ST} the equilibrium proposal π^*_{ST} is unique with $s_j(\pi^*_{ST}) = 0$, $t_j(\pi^*_{ST}) = (1+\lambda)k \ \forall j \in [0,1]$, and $g(\pi^*_{ST}) = 1$. For this proposal $I(\pi^*_{ST}) = 1$ iff $p \geq m$.

Proof:

The agenda-setter solves the following problem:

$$\max_{\pi \in \Pi_{ST}} \left\{ (g(\pi)(V_w - (1+\lambda)k) + s(\pi) - (1+\lambda)s(\pi))I(\pi) \right\}.$$

Under constitution Π_{ST}, introducing subsidies is not worthwhile for the agenda-setter as the taxes necessary to finance them are always higher. Thus a positive level of subsidies makes the proposal less attractive to all citizens, including the agenda-setter herself. As the agenda-setter always prefers project adoption, she will always propose implementing the project. □

We note that, for $p \geq m$, the project winners are sufficiently numerous to enforce the project. For $p < m$ the project losers can block the project.

Because the proposal never involves subsidies, we can conclude

Lemma 11

Proposal π^*_{ST} is always redistribution-efficient. Thus Π_{ST} satisfies $GREP$.

Our finding that projects with $p < m$ are never adopted immediately implies that it is impossible to implement lobby projects.

Lemma 12

Constitution Π_{ST} satisfies $PALP$.

Interestingly, under constitution Π_{ST} a project will be adopted if and only if $p > m$, which immediately implies

Lemma 13

Constitution Π_{ST} satisfies $RACP$.

8 Welfare Comparison

In this section we compare social welfare. In Appendix C we derive the expressions for welfare for each constitution under a specific realization of project parameters V_w, V_l, k, and p.

For constitution Π welfare cannot be pinned down exactly, because a multitude of redistribution-inefficient proposals exist in addition to the redistribution-efficient proposals. However, it is possible to compute an upper bound for welfare by computing welfare for redistribution-efficient proposals. In addition, the proposal with the highest possible level of total subsidies $\widehat{s}$ yields a lower bound for welfare under Π.

$$\begin{aligned} W(\pi^*) &\leq pV_w + (1-p)V_l - (1+\lambda)k - \begin{cases} \lambda(m-p)\max\{0, -V_l\} & \text{if } p < m \\ 0 & \text{if } p \geq m \end{cases} \\ W(\pi^*) &\geq pV_w + (1-p)V_l - (1+\lambda)k - \lambda\hat{s} \end{aligned}$$

Under constitution Π_T the project is adopted if $p \geq m$ or if $p < m$ and $V_w \geq V_w^*$. Subsidies are only paid in the latter case. Hence the utilitarian welfare measure amounts to

$$W(\pi_T^*) = \begin{cases} pV_w + (1-p)V_l - (1+\lambda)k - \lambda(m-p)(V_w^* - V_l) & \text{if } p < m \text{ and } V_w \geq V_w^* \\ 0 & \text{if } p < m \text{ and } V_w < V_w^* \\ pV_w + (1-p)V_l - (1+\lambda)k & \text{if } p \geq m. \end{cases} \tag{16}$$

Under constitution Π_S the project will always be adopted. Moreover, the agenda-setter will choose the maximum level of subsidies for herself and, because of the uniform subsidy rule, for all other citizens as well.

$$W(\pi_S^*) = pV_w + (1-p)V_l - (1+\lambda)k - \lambda\hat{s} \tag{17}$$

Under constitution Π_{ST} no subsidies occur. Thus the project will be adopted if and only if it is beneficial to a majority.

$$W(\pi_{ST}^*) = \begin{cases} 0 & \text{if } p < m \\ pV_w + (1-p)V_l - (1+\lambda)k & \text{if } p \geq m. \end{cases} \tag{18}$$

We note that constitutions Π and Π_S both yield project adoption for any admissible combination of the exogenous variables. However, Π_S entails a higher level of total subsidies in general. As a consequence, constitution Π_S is inferior to constitution Π and thus never represents the socially optimal constitution. Intuitively, the desire of the agenda-setter to receive high subsidies together with the rule that all other citizens are also required to receive the same level of subsidies induces excessive redistribution under Π_S. Consequently, Π_S would never be adopted under a veil of ignorance.

For the other three constitutions Π, Π_T, and Π_{ST} no general ranking with respect to welfare can be established that would hold for all admissible values of the exogenous variables. Which one of these would be selected would depend on the distribution of project parameters V_w, V_l, k, and p in general.

We can rank constitutions Π, Π_T, and Π_{ST} according to their degree of restrictiveness, with Π the least restrictive and Π_{ST} the most restrictive constitution. Note that the less restrictive the constitution is, the larger the set of parameter values will be for which the project is adopted. This is intuitive, as less restrictive constitutions grant the agenda-setter higher flexibility in designing a proposal that will secure the majority of votes. In particular, the least restrictive constitution Π yields project adoption for any combination of parameters. The most restrictive constitution Π_{ST} entails project adoption for $p \geq m$ only.

The most restrictive constitution Π_{ST} has the advantage of eliminating any redistribution activity. However, for some parameter constellations this may involve costs, as projects are never adopted if $p < m$, although they may be socially desirable.

In order to achieve a clear-cut welfare ranking of constitutions Π, Π_T, and Π_{ST}, we need to impose more structure on the prior distribution of project characteristics. One plausible assumption is that lobby projects are easy to conceive and therefore occur substantially more frequently than other, socially beneficial projects. In this case, we obtain the following corollary to Lemmas 3, 6, 9, and 12:

Corollary 1

If lobby projects are sufficiently likely to occur,[17] *constitutions featuring restrictions on taxation, i.e.* Π_T *and* Π_{ST}*, lead to higher levels of welfare than constitutions that allow for arbitrary tax schemes.*

[17] The derivation of a formal condition is straightforward and available upon request.

The corollary is a direct consequence of the fact that Π_T and Π_{ST} prevent the adoption of lobby projects.

9 Specific Project Categories

In the following we consider the implications of our model for different categories of projects. Two arguments support this approach. First, it may be known at the constitutional stage that a specific class of projects presents the major challenge facing the polity. Second, and perhaps more importantly, while it may not be possible to write constitutional rules dependent on project characteristics, it is plausible for different constitutional rules to be designed for different categories of projects. Project categories are likely to be verifiable, while the exact project parameters V_l, V_w, p, and k are not.

Accordingly, in the following we examine the optimal constitutional rules for different project categories. First we focus on the case of economic reform projects, then we examine locally beneficial projects.

9.1 Economic reforms

We focus here on the special case of economic reforms, which represent a subset of $\mathcal{P}$. One characteristic of economic reforms, such as labor-market reforms or product-market reforms leading to more intense competition, is that they are unlikely to involve substantial direct costs k. Thus we set $k = 0$. Moreover, it is plausible to assume that economic reforms will differ in the effect they have on small interest groups and the large majority of the population. More specifically, we distinguish between socially beneficial economic reforms and socially detrimental reforms.

Socially beneficial reforms, such as the liberalization of the agricultural sector, are harmful to a small interest group, i.e. those working in this sector. However, they are beneficial to the rest of society as they stand to gain from lower prices or lower subsidies, which in turn imply lower taxes. For this class of reforms we assume that p is larger than m and that the total benefits are positive, i.e. $pV_w + (1-p)V_l > 0$.

Socially detrimental reforms, like measures leading to lower competition in a specific sector, benefit only a small interest group, for example the shareholders of the firms in the specified sector. As a consequence, for these reforms $p < m$ and $pV_w + (1-p)V_l < 0$ hold.

For economic reforms constitution Π_{ST} will always implement the first-best. All socially desirable projects are adopted, and socially harmful projects are never implemented. Moreover, there are no losses from redistribution. We summarize this finding in the following proposition:

Proposition 5

For economic reforms, constitution Π_{ST} always leads to the first-best outcome.

We note that constitutions Π and Π_S are definitely inferior to Π_{ST}, as under the first two constitutions all reforms are adopted, including the socially detrimental ones. Constitution Π_T may only lead to a welfare level identical to the one implied by constitution Π_{ST} if $V_w < V_w^*$ holds for all socially detrimental reforms. Unless this is the case, Π_T is strictly inferior to Π_{ST} from an aggregate welfare perspective. Hence, as far as economic reforms are concerned, highly restrictive constitutional rules maximize citizens' utility from an ex-ante perspective under a veil of ignorance.

9.2 Locally beneficial projects

Next we study the case of locally beneficial projects, such as hospitals, bridges, kindergartens, or theaters. These projects yield benefits to some of the citizens who live in the vicinity, but largely leave the utility for the majority of citizens unchanged. Accordingly, we assume $p < 1 - m$ and $V_l = 0$. For simplicity we assume in the following that costs k are uniformly distributed on the interval $[0; \overline{k}]$ ($\overline{k} > 0$) and that V_w and p are drawn from a degenerate distribution. In Appendix D we show

Proposition 6

For locally beneficial projects there exists a critical value of $\overline{k}$, denoted by $\hat{k}$, such that

1. *if $\overline{k} < \hat{k}$, then citizens will prefer Π_T to Π_{ST} from an ex-ante perspective;*
2. *if $\overline{k} > \hat{k}$, then citizens will prefer Π_{ST} to Π_T from an ex-ante perspective;*
3. *if $\overline{k} = \hat{k}$, then citizens will be indifferent with respect to Π_{ST} and Π_T from an ex-ante perspective.*

To sum up, whether citizens would choose Π_{ST} or Π_T under a veil of ignorance depends on the distribution of the project's costs. If expected project costs are low, which corresponds to a low value of $\overline{k}$, then citizens will prefer Π_T because this constitution will enable some projects to be adopted. However, it also involves losses due to the taxes that need to be levied in order to subsidize some of the project losers. Conversely, for high expected costs (or high $\overline{k}$) citizens would prefer Π_{ST}, as this constitution eliminates the implementation of locally beneficial projects completely.

10 Endogenous Project Characteristics

So far, we have discussed which proposal will be chosen by the agenda-setter for given characteristics of the project. However, it seems reasonable to assume that the project parameters V_w, V_l, k, and p are not exogenously given, but can be influenced by the agenda-setter to some extent. While it is plausible to assume that the proposer will attempt to design a project with high levels of V_w, which is to her own benefit, the interesting question arises as to the circumstances under which she may also affect project parameters k, p and V_l in a desirable way. An improvement of the project along these lines does not make the project more valuable to the agenda-setter directly. Instead, it increases its benefits for other citizens.

More specifically, we assume that the agenda-setter can exert effort to affect the project parameters before she makes the proposal. This effort creates costs $c > 0$ for her. These costs are assumed to be so small that they have no bearing on welfare.[18] We consider three different scenarios:

1. Improvement of the project for project losers:

$$V_l = \begin{cases} \underline{V_l} & \text{if the agenda-setter does not exert effort} \\ \overline{V_l} > \underline{V_l} & \text{if the agenda-setter exerts effort.} \end{cases} \quad (19)$$

2. Increase of the fraction of project winners:

$$p = \begin{cases} \underline{p} & \text{if the agenda-setter does not exert effort} \\ \overline{p} > \underline{p} & \text{if the agenda-setter exerts effort.} \end{cases} \quad (20)$$

[18] Thus our model has the potential to explain why inefficient projects are chosen. For an interesting paper that provides an explanation why inefficient redistribution policies may occur in equilibrium see Drazen and Limão (2008).

3. Reduction of the project's costs:

$$k = \begin{cases} \overline{k} & \text{if the agenda-setter does not exert effort} \\ \underline{k} < \overline{k} & \text{if the agenda-setter exerts effort.} \end{cases} \tag{21}$$

In Appendix E we show

Proposition 7

1. *Under constitutions Π and Π_S the agenda-setter has no incentive to enhance the project under all three scenarios.*

2. *Under constitution Π_{ST} the agenda-setter may enhance the project by increasing p and by decreasing project costs k. She will never improve V_l.*

3. *Under constitution Π_T the agenda-setter may enhance the project under all scenarios.*

Under constitutions Π and Π_S the agenda-setter can always achieve project adoption and does not pay any taxes under her equilibrium proposal. Consequently, her utility does not depend on parameters V_l, p, and k. Thus there are no incentives to incur the costs necessary for the improvement of the project under all scenarios. Similarly, the agenda-setter would never facilitate an increase in V_l under constitution Π_{ST}. Exerting effort does not reduce taxes for her, nor does it increase the likelihood of the project being adopted.

There are, however, several cases where the agenda-setter may profit from exerting effort. This applies to constitutions involving tax rules, i.e. for Π_T and Π_{ST}. Tax rules may induce agenda-setters to exert effort for two reasons. First, exerting effort may secure the adoption of a project that would otherwise be rejected. For example, if $\underline{p} < m$ and $\overline{p} \geq m$, exerting effort to increase p will be optimal for the agenda-setter for sufficiently small c under constitution Π_{ST}. Second, the agenda-setter may want to improve the project, as this lowers the subsidies necessary to gain support for the proposal, which in turn lowers her tax burden.

11 Robustness and Extensions

In this section we discuss possible extensions and modifications to our model in order to check the robustness of our results.

Finite number of voters In this paper, we consider a continuum of voters. As a consequence, the subsidies paid to an individual citizen, in particular the agenda-setter, do not affect the society's budget constraint. If we considered finitely many citizens, the subsidies received by the agenda-setter would result in additional taxes for citizens. However, as long as the number of citizens is sufficiently large, the tax burden for individual citizens arising from the agenda-setter's subsidies are small. As a consequence, our results would carry over to a model with a finite but large number of voters.

Inequity In our model inequity does not affect welfare. This is a consequence of our assumption that utility is linear in wealth and the gains from the project. For concave utility functions, redistribution might be welfare-enhancing. However, individual voters' utility changes from a single public project are relatively small compared to total utility from private consumption and other public goods. A linear approximation to citizens' utility functions can be justified in such cases.

Special treatment of agenda-setter We next explore alternative tax and subsidy rules that would apply to all citizens except for the agenda-setter; the agenda-setter could propose arbitrary taxes and subsidies for himself.

Subsidy rules modified along these lines would enable the agenda-setter to reap high subsidies without forcing him to propose a high level of total subsidies. This might reduce the disadvantages of subsidy rules.

Tax rules that allow for special treatment of the agenda-setter would not have the disciplining effect that tax rules have in our framework; if the agenda-setter does not have to carry the tax burden of the ordinary layman, he will have less incentives to reduce distortionary taxation. Hence tax rules should not involve exemptions for the agenda-setter.

12 Conclusions

In this paper we have examined four constitutions with different restrictions on taxes and subsidies. We have shown that a constitution that imposes only the restriction of identical treatment with respect to subsidies is always inferior to a constitution that imposes no restrictions on taxes and subsidies. Thus constitution Π_S would never be chosen at the constitutional stage.

In addition, we have identified four advantages of tax rules. First, they always lead to redistribution-efficient proposals. As the agenda-setter has to pay the same amount of taxes as any other citizen, she avoids excessive subsidies. Second, tax rules may induce the agenda-setter to exert effort in order to improve the project. Exerting effort may reduce the subsidies required to enlist the support of sufficiently many voters, which also reduces taxes for the agenda-setter. Moreover, under tax rules alone the likelihood of project adoption is higher for more favorable projects. Third, constitutions without tax rules grant a high degree of flexibility to the agenda-setter, which enables her to gain support for any project, irrespective of its character. By contrast, constitutions with tax rules prevent the adoption of extremely bad projects that benefit only a small minority p, involve high costs k, and bring low benefits V_l for losers. Fourth, a constitution with rules both on taxes and subsidies displays the desirable feature of robustness against counter-proposals. To sum up, our paper provides a rationale for the observation that decisions on project cum subsidies are usually made independently of decisions on rules that determine how government expenditures are financed.

A Proof of Proposition 2

Step 1: Recall that $u_0(\pi) = g(\pi)(V_w - (1+\lambda)k) + s_0(\pi) - (1+\lambda)S(\pi)$. Thus uniform taxes imply the following problem for the agenda-setter:

$$\max_{\pi \in \Pi_T} \left\{ \left(g(\pi)(V_w - (1+\lambda)k) + s_0(\pi) - (1+\lambda)S(\pi) \right) I(\pi) \right\}.$$

Step 2: We first construct the optimal proposal for the agenda-setter when the project is not proposed. We denote this proposal by $\tilde{\pi}$ and claim that it is given by $g(\tilde{\pi}) = 0$, $t_j(\tilde{\pi}) = 0$, $\forall j \in [0,1]$ and

$$s_j(\tilde{\pi}) = \begin{cases} \hat{s} & \text{for } j = 0 \\ 0 & \text{for } j \in (0,1]. \end{cases}$$

To prove our claim, we first observe that, in equilibrium, proposal $\tilde{\pi}$ will be adopted (i.e. $I(\tilde{\pi}) = 1$) as $u_j(\tilde{\pi}) \geq 0$, $\forall j \in [0,1]$. Second, any other proposal that does not include project adoption would yield a smaller $u_0(\pi)$ because $\tilde{\pi}$ involves the minimum level of taxes and the highest possible level of subsidies for the agenda-setter. Hence proposal $\tilde{\pi}$ maximizes $u_0(\pi)I(\pi)$ under the restriction that $g(\pi) = 0$.

Step 3: We now consider proposals that involve project adoption. In contrast to Step 2, we have to distinguish between several constellations for parameters p, m, V_w, V_l and k when characterizing the proposal that maximizes the agenda-setter's utility from this subset of proposals.

Step 4: Consider the case $p \geq m$.

We claim that the optimal proposal for the agenda-setter is given by π with $g(\pi) = 1$, $t_j(\pi) = (1+\lambda)k$ and $s_j(\pi) = s_j(\tilde{\pi})$, $\forall j \in [0,1]$. First, we note that this proposal will be adopted (i.e. $I(\pi) = 1$) as $u_j(\pi) > 0$, $\forall j \in [0,p]$. Second, any other proposal that stipulates project adoption would yield a smaller $u_0(\pi)$, which establishes the claim.

Step 5: For the agenda-setter, the proposal π described in Step 4 is preferable to proposal $\tilde{\pi}$, as

$$U_0(\tilde{\pi}) = \hat{s} < \hat{s} + V_w - (1+\lambda)k = U_0(\pi).$$

Hence, in case $p \geq m$, the proposal described in Step 4 will be chosen by the agenda-setter.

Step 6: Consider the case $p < m$ and $V_w \geq V_w^*$.

The proposal that yields the highest utility for the agenda-setter among the proposals stipulating project adoption is $g(\pi) = 1$, $t_j(\pi) = V_w^*$, $\forall j \in [0, 1]$ and

$$s_j(\pi) = \begin{cases} \hat{s} & \text{for } j = 0 \\ 0 & \text{for } j \in (0, p] \\ V_w^* - V_l & \text{for } j \in (p, m] \\ 0 & \text{for } j \in (m, 1]. \end{cases}$$

The claim is the consequence of three facts. First, the proposal π described above will be adopted in equilibrium (i.e. $I(\pi) = 1$) because $u_j(\pi) \geq 0$, $\forall j \in [0, p]$ and $U_j(\pi) = 0$, $j \in (p, m]$, as can be verified easily. Second, any other proposal π' with $S(\pi') < S(\pi)$ would not be adopted. This follows directly from the fact that a smaller $S(\pi)$ implies that either the fraction of subsidized project losers is smaller than $m - p$ or the subsidy given to each subsidized project loser is smaller than $V_w^* - V_l$, or both. Then the fraction of voters supporting π' would be smaller than m and thus $I(\pi') = 0$. Third, there is no other proposal π' with $S(\pi') \geq S(\pi)$ that yields higher utility for the agenda-setter.

Hence there is no proposal π with $g(\pi) = 1$ that yields higher utility to the agenda-setter than the proposal described above if $p < m$, $V_w \geq V_w^*$.

Step 7: For the agenda-setter, the proposal π defined in Step 6 is preferable to proposal $\tilde{\pi}$ as

$$U_0(\tilde{\pi}) = \hat{s} \leq \hat{s} + V_w - V_w^* = U_0(\pi).$$

Hence, proposal π will be made if $p < m$ and $V_w \geq V_w^*$,.

Step 8: Consider the case $p < m < \frac{1}{1+\lambda}$ and $V_w < V_w^*$.

Then the proposal that yields the highest utility for the agenda-setter among the proposals stipulating project adoption is $g(\pi) = 1$, $t_j(\pi) = (1+\lambda)[ps^{\mathcal{W}}(\pi) + (m -$

$p)s^{\mathcal{L}}(\pi)]$, $\forall j \in [0,1]$ and

$$s_j(\pi) = \begin{cases} \hat{s} & \text{for } j = 0 \\ s^{\mathcal{W}} & \text{for } j \in (0,p] \\ s^{\mathcal{L}} & \text{for } j \in (p,m] \\ 0 & \text{for } j \in (m,1], \end{cases}$$

where

$$s^{\mathcal{W}} = \frac{1-(1+\lambda)(m-p)}{1-(1+\lambda)m}(V_w^* - V_w),$$
$$s^{\mathcal{L}} = \frac{(1+\lambda)k - (1+\lambda)pV_w - (1-(1+\lambda)p)V_l}{1-(1+\lambda)m}.$$

This follows from three observations. First, this proposal π will be adopted in equilibrium (i.e. $I(\pi) = 1$), as $u_j(\pi) = 0$, $\forall j \in (0,m]$. Second, any other proposal π' with $S(\pi') < S(\pi)$ would not be adopted. The reasons are the same as in Step 6. Third, there is no other proposal π' with $S(\pi') \geq S(\pi)$ and $g(\pi') = 1$ that yields higher utility to the agenda-setter.

Step 9: For the agenda-setter, proposal $\tilde{\pi}$ is preferable to the proposal π outlined in Step 8, as

$$U_0(\tilde{\pi}) = \hat{s} > \hat{s} + V_w - V_w^* > U_0(\pi).$$

Hence, in the case $p < m < \frac{1}{1+\lambda}$ and $V_w < V_w^*$, proposal $\tilde{\pi}$ will be implemented.

Step 10: Consider finally the case $\max\left\{p, \frac{1}{1+\lambda}\right\} < m$ and $V_w < V_w^*$.

As will be explained in the following, it is not possible to construct a proposal stipulating project implementation that could secure the necessary quorum of m.

From Step 8 we know that if $V_w < V_w^*$, it will be necessary to subsidize not only a fraction of $m-p$ project losers but also all project winners. This is due to the fact that V_w is not high enough to compensate project winners for the utility loss incurred by tax V_w^*. In this case, the total fraction of subsidized voters is equal to m, so the fiscal costs for increasing all subsidies by one dollar are equal to $(1+\lambda)m$. The benefit from receiving one dollar of redistribution is equal to one. As $(1+\lambda)m > 1$, the costs of redistribution are higher than the benefit from redistribution, so project losers cannot be compensated for their utility loss.

B Proof of Lemma 6

We show that an $\varepsilon > 0$ exists such that $V_w < V_w^*$ holds for all $|V_w - k(1+\lambda)| < |V_l - k(1+\lambda)|$ and $p < \varepsilon$. We note that

$$\begin{aligned} V_w^* - V_w &= (1+\lambda)\frac{k-(m-p)V_l}{1-(1+\lambda)(m-p)} - V_w \\ &= \frac{(1+\lambda)k-(1+\lambda)(m-p)V_l - V_w + (1+\lambda)(m-p)V_w}{1-(1+\lambda)(m-p)} \\ &> \frac{(1+\lambda)k+(1+\lambda)(m-p)\left(V_w - 2k(1+\lambda)\right) - V_w + (1+\lambda)(m-p)V_w}{1-(1+\lambda)(m-p)} \\ &= \frac{\left(2(1+\lambda)(m-p)-1\right)\left(V_w - k(1+\lambda)\right)}{1-(1+\lambda)(m-p)}, \end{aligned}$$

where we have used $-V_l > V_w - 2k(1+\lambda)$. Recall that for all projects $V_w - k(1+\lambda) > 0$ holds. Moreover, for all $p < \frac{1}{2}\frac{\lambda}{(1+\lambda)}$ we have $2(1+\lambda)(m-p)-1 > 0$, which is straightforward to derive with the help of $m \geq 1/2$. If $\varepsilon = \frac{1}{2}\frac{\lambda}{(1+\lambda)}$, $V_w < V_w^*$ and $p < m$ hold for all $p < \varepsilon$. Hence, according to Proposition 2, $PALP$ holds for constitution Π_T. $\square$

C Derivation of Welfare

The utilitarian welfare measure for a particular proposal is given by

$$W(\pi) := I(\pi)[(pV_w + (1-p)V_l - (1+\lambda)k)g(\pi) - \lambda S(\pi)].$$

If proposals are not unique, only upper and lower bounds for welfare may be computed. By Definition 1, a redistribution-efficient proposal yields maximal welfare as deadweight loss from redistribution is minimized for all π for which $g(\pi)I(\pi) = const.$

Constitution Π

(I.) Highest levels of welfare

(i.) $p \geq m$:

The lowest level of $S(\pi)$ for $I(\pi) = 1$ is given by $S(\pi) = 0$. Note that, for this case, the tax scheme must be chosen such that $V_w - t_j \geq 0\ \forall j \in [0, m]$

holds. Otherwise project winners would not support the proposal, and the required majority cannot be achieved.

Hence the highest level of welfare under constitution Π in case $p \geq m$ is given by

$$W = pV_w + (1-p)V_l - (1+\lambda)k.$$

(ii.) $p < m$:

$S(\pi)$ is minimized if the smallest share of voters is subsidized with the smallest amount of subsidies such that $I(\pi) = 1$. The smallest share of subsidized voters occurs if a fraction of $(m-p)$ project losers is subsidized. The minimal subsidy that must be given to them is $\max\{0, -V_l\}$. Again, the tax scheme must be such that project winners and subsidized project losers will support the proposal.

The highest level of welfare under constitution Π in case $p < m$ is given by

$$W = pV_w + (1-p)V_l - (1+\lambda)k - \lambda(m-p)\max\{0, -V_l\}.$$

(II.) Lowest levels of welfare

No matter if $p \geq m$ or $p < m$, the lowest level of welfare occurs if every voter receives the maximal subsidy $\hat{s}$, i.e. $S = \hat{s}$. Hence the lower bound on welfare is given by

$$W = pV_w + (1-p)V_l - (1+\lambda)k - \lambda\hat{s}.$$

Constitutions $\mathbf{\Pi_T}$, $\mathbf{\Pi_S}$ and $\mathbf{\Pi_{ST}}$

Under constitutions Π_T, Π_S, and Π_{ST}, the total amount of subsidies $S(\pi)$ is uniquely given and hence welfare functions can be derived directly from Propositions 2-4.

- Constitution Π_T (see Proposition 2):

$$S(\pi_T^*) = \begin{cases} (m-p)(V_w^* - V_w) & \text{if } p < m \text{ and } V_w \geq V_w^* \\ 0 & \text{otherwise} \end{cases}$$

The project will be proposed and implemented if $p < m$ and $V_w \geq V_w^*$ or if $p \geq m$.

Hence the welfare level under constitution Π_T is given by

$$W(\pi_T^*) = \begin{cases} pV_w + (1-p)V_l - (1+\lambda)k - \lambda(m-p)(V_w^* - V_w) & \text{if } p < m \text{ and } V_w \geq V_w^* \\ 0 & \text{if } p < m \text{ and } V_w < V_w^* \\ pV_w + (1-p)V_l - (1+\lambda)k & \text{if } p \geq m \end{cases}$$

- Constitution Π_S:

  In line with Proposition 3, $S(\pi_S^*) = \hat{s}$ and the project will always be proposed and adopted. Welfare is given by

$$W(\pi_S^*) = pV_w + (1-p)V_l - (1+\lambda)k - \lambda\hat{s}.$$

- Constitution Π_{ST}:

  From Proposition 4, we know that $S(\pi_{ST}^*) = 0$ and that the project will be adopted if and only if $p \geq m$. Hence the welfare level under constitution Π_{ST} is given by

$$W(\pi_{ST}^*) = \begin{cases} 0 & \text{if } p < m \\ pV_w + (1-p)V_l - (1+\lambda)k & \text{if } p \geq m. \end{cases}$$

D Proof of Proposition 6

First we note that, together with $m \geq 1/2$, $p < 1-m$ implies $p < m$. Recall that under constitution Π_{ST} the project will never be implemented if $p < m$ (see Proposition 4). Hence from an ex-ante perspective all citizens obtain a utility of zero under constitution Π_{ST}.

Under constitution Π_T the project may be implemented if $p < m$. More precisely, if $p < m$, the project will be implemented if and only if $V_w \geq V_w^*$ (see Proposition 2). Rewriting this conditions shows that the project will be implemented if and only if

$$k \leq \frac{1-(1+\lambda)(m-p)}{1+\lambda} V_w =: k^*.$$

Hence a citizen's expected utility in the constitutional stage is given by

$$\mathbb{E}[W(\pi_T^*)] = \frac{1}{\overline{k}} \int_0^{\min\{\overline{k},k^*\}} pV_w - (1+\lambda)k - \lambda(m-p)\frac{(1+\lambda)k}{1-(1+\lambda)(m-p)}\, dk, \qquad (22)$$

where we have used the facts that k is uniformly distributed on $[0; \overline{k}]$ and that welfare would be zero for realizations of k with $k > k^*$. Equation (22) can be transformed into

$$\mathbb{E}[W(\pi_T^*)] = \frac{1}{\overline{k}} \left[pV_w \min\{\overline{k}, k^*\} - \frac{1}{2}(1+\lambda)\frac{1-(m-p)}{1-(1+\lambda)(m-p)} \left(\min\{\overline{k}, k^*\}\right)^2 \right].$$

Citizens weakly prefer constitution Π_T over constitution Π_{ST} if and only if $\mathbb{E}[W(\pi_T^*)] \geq 0$, which is equivalent to

$$\min\{\overline{k}, k^*\} \leq \frac{2p(1-(1+\lambda)(m-p))}{(1+\lambda)(1-(m-p))} V_w =: \hat{k}. \tag{23}$$

It is straightforward to show that $k^* > \hat{k}$ for $1 - p > m$. As a consequence, utilitarian welfare is higher for Π_T if $\overline{k} < \hat{k}$. It is higher for Π_{ST} if $\overline{k} > \hat{k}$. □

E Proof of Proposition 7

In order to examine the agenda-setter's incentives for improving the project, it will be useful to consider her utility for given project parameters and for each constitution. From Propositions 1 to 4 we obtain

$$U_0(\pi^*) = \hat{s} + V_w \tag{24}$$

$$U_0(\pi_T^*) = \begin{cases} \hat{s} + V_w - V_w^* & \text{if } p < m \text{ and } V_w \geq V_w^* \\ \hat{s} & \text{if } p < m \text{ and } V_w < V_w^* \\ \hat{s} + V_w - (1+\lambda)k & \text{if } p \geq m. \end{cases} \tag{25}$$

$$U_0(\pi_S^*) = \hat{s} + V_w \tag{26}$$

$$U_0(\pi_{ST}^*) = \begin{cases} 0 & \text{if } p < m \\ V_w - (1+\lambda)k & \text{if } p \geq m. \end{cases} \tag{27}$$

Constitutions involving an arbitrary tax code (i.e. constitutions Π and Π_S) yield a utility level to the agenda-setter that is independent of the project parameters V_l, k, and p. Hence exerting costly effort to enhance a project parameter other than V_w will never be profitable.

Under constitution Π_{ST} the agenda-setter may profit from exerting effort if p can be increased from $\underline{p} < m$ to $\overline{p} \geq m$. For sufficiently small costs c, exerting effort in order to reduce k is optimal for $p \geq m$.

Under constitution Π_T the agenda-setter profits from increasing p from $\underline{p} < m$ to $\overline{p} \geq m$ if c is sufficiently small. Moreover, the agenda-setter has an incentive to increase p even in the case $p < m$, as long as $V_w \geq V_w^*$. If $p < m$ and $V_w < V_w^*$, the agenda-setter has no incentive to enhance project efficiency. If $p \geq m$, the agenda-setter may have incentives to reduce project costs k like under constitution Π_{ST}. If $p < m$ and $V_w \geq V_w^*$, the agenda-setter may profit from increasing V_l and reducing k (as V_w^* is decreasing in V_l and increasing in k).

Finally, we note that the agenda-setter will enhance project efficiency if and only if the net gains from exerting effort exceed the costs involved in the effort. □

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