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ABSTRACT

Bundling and the Unanimity Rule*

In this Paper, we design democratic constitutions that can transcend the shortcomings of the unanimity rule. The constitution embeds the unanimity rule in a set of virtue-supporting principles: (a) broad packages with many public projects (bundling) are allowed, but can only be proposed once in a legislative term; (b) the person who designs the package is also taxed at the highest proposed rate; and (c) subsidies are forbidden. We show that such democratic constitutions can yield efficient public project provision.

JEL Classification: D62, D70 and H40
Keywords: amendment rules, bundling, constitutions, provision of public projects and unanimity rule

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1 Introduction

The unanimity rule ensures that only Pareto optimal changes are adopted in a society. However, if redistribution is costly because of distortionary taxation, winners of public projects may find it too costly to overcome the losers' vested interests, and socially valuable projects will not be undertaken. Therefore, the unanimity rule leads to an undersupply of socially efficient projects and is rarely applied in practice.

In this paper we show that appropriate constitutional rules supplementing the unanimity rule can eliminate the undersupply problem while, at the same time, preserving the virtue of the unanimity rule in allowing only Pareto optimal changes.

We adopt a constitutional perspective. Citizens decide under a veil of ignorance how public project provision and financing should be governed in legislative periods.[1] The constitutional principles a society can adopt must fulfill the fundamental democratic principles of equal voting and proposal making rights. Moreover, constitutional principles cannot require more messages or information from citizens than proposals or voting, including the possibility of non-participation. Thus, democratic constitutions are understood as the liberal democracy constraint on the set of all feasible mechanisms for collectively providing public projects.

Our interest is in the potential of the unanimity rule to reach first-best allocations. We show that in order to reach a first-best allocation, the unanimity rule can be supplemented by the following four constitutional rules:

- Bundling: A chosen proposal designer can propose a package of public projects and a corresponding tax and financing scheme once and only once.
- Amendment rule: If an initial proposal, which might include a whole package of public projects, has been rejected, a second proposal can be made with the restriction that only one single public project may be proposed.

[1] The advantage of the veil of ignorance at the constitutional level is that it allows citizens to agree unanimously on socially efficient decision rules. If, however, the veil of ignorance is incomplete and individuals differ ex-ante with respect to some characteristics, it can be better for all to have more information at the constitutional stage. See Müller (1998) for a discussion of this topic.

- Maximal taxation of the proposal designer, i.e. the proposal designer has to pay the highest taxes that he is proposing.
- A ban on subsidies.

The essential ideas behind such a constitution are illustrated by the following example. Consider two public projects that have some per capita costs to build. The first project (P_1) generates the same gross benefits for all citizens, while there are project winners and project losers if the second project (P_2) is undertaken. Suppose that both projects are socially desirable in terms of net expected utilities when individuals do not know the benefits accruing to them from the projects. Proposing a package with both projects allows a proposal designer to impose relatively high taxes on project winners of P_2 and lower taxes on project losers of P_2 such that all citizens are net beneficiaries from the package. Combining taxation and financing of a bundle of projects in such a way is called *bundling*. Such bundling enables the society to finance both projects without compensating project losers from P_2 by direct subsidies. Accordingly, distortions from taxation can be minimized since taxes have to be raised solely for financing project costs.

The other rules of the constitution ensure that first-best allocations are reached under any realization of benefits and costs from projects. The amendment rule ensures that only socially efficient packages are proposed and that strategic voting is eliminated because packages can only be proposed once. Maximal taxation of proposal designers ensures that only agents that strongly benefit from a package will apply to make a proposal. As a consequence, no individual will want to apply for making a proposal in order to deter the proposal of socially desirable projects. The ban on subsidies means that all subsidies are eliminated and thus losers can only be compensated by lowering their tax burden in a package of public projects, where they benefit from some and lose from other projects. Moreover, a proposal designer cannot tax individuals to channel subsidies to himself or other individuals, which would create undesirable tax distortions.

Our work complements the important insights of Romer and Rosenthal (1983), who have shown that constitutions with an unanimity rule, a proposal making rule, and a

reversion rule if a proposal is rejected are optimal for asymmetric externality problems. In our context, the problem is avoiding socially undesirable tax distortions while at the same time ensuring that a project is undertaken if, and only if, it is socially efficient. Moreover, the current paper follows the incomplete social contract approach outlined in Aghion and Bolton (2003) and extended by Erlenmaier and Gersbach (1999). The novel elements in this paper are twofold. First, we study collective decisions regarding multiple-public-projects which opens up bundling opportunities and allows us to use the unanimity rule if appropriately complemented by other rules. Second, we introduce a legislative process where packages of public projects can be proposed only once, while single-project proposals can be made after a package has been rejected. Such a legislative process helps the implementation of public project packages if, and only if, they are socially desirable.[2]

Our investigation is motivated by a large amount of literature on the virtues and vices of the unanimity rule.[3] Wicksell (1896) was the first to link the unanimity rule with the potential for all to benefit from collective action. The unanimity rule is the only voting rule that always leads to Pareto-efficient public good quantities and tax schemes, as recognized by Wicksell (1896)[4] and in the classic contribution of Buchanan and Tullock (1962) (see Mueller (1995) for a comprehensive survey). Three main criticisms have been leveled at the unanimity rule.[5]

First, searching for a Pareto-efficient allocation may take considerable time, particularly in large communities with diverse interests. The time required to define an issue and to discover a set of Pareto-optimal tax shares may be considerable. This may outweigh the gains of those agents who are saved from paying taxes exceeding their benefits from a public project.

Second, the unanimity rule invites strategic behavior: an individual may strategically

[2] Within the mechanism design approach for the provision and pricing of excludable public goods, Fang and Norman (2003) and Hellwig (2004) show that second-best allocations which maximize aggregate surplus tend to involve bundling of the different public goods.

[3] See Buchanan (1991) and Mueller (1996) for general surveys on constitutional political economy.

[4] Also, the famous Lindahl equilibrium (Lindahl 1919) could be reached under the unanimity rule.

[5] Buchanan and Tullock (1962) identify such disadvantages as external costs of decision-making (see also Breton (1974)).

veto a proposal in order to seek a greater share of the gains from collective action (see Black (1965), Buchanan and Tullock (1962), Barry (1965), Samuelson (1969)). Because of these objections, even those most favorably disposed towards the unanimity rule, such as Wicksell and Buchanan and Tullock, have argued in favor of abandoning this rule.

A third objection against the unanimity rule relates to situations where a society decides about a public project that hurts part of the population. When redistribution is costly because, say, taxation is distorting or because of a free-rider problem in vote trading, compensation of losses might be too expensive. Therefore a public project might not be adopted under the unanimity rule, even if it is socially efficient to undertake the project from an ex-ante or utilitarian perspective. This can lead to a bias in favor of the status quo (see Mueller (1995) and Guttman (1998)).

In our paper we show that the second and third objections can be overcome by embedding the unanimity rule in a set of further rules that allow for one–time bundling, force the proposal designer to pay the highest taxes, and forbid subsidies. These constitutional rules preserve the virtues of the unanimity rule and can also eliminate its disadvantages.[6]

While we are not aware of any real-world constitutions which exactly match the constitution suggested in this paper, there are examples that exhibit some similarities. The German legislation process has been characterized over the last few years by a first chamber (Bundestag) dominated by the winners of the federal elections. But the opposition won the majority of state elections and thus had a blocking majority in the second chamber (Bundesrat), which represents the states. For large packages requiring the support of both chambers, such as an overhaul of the tax code, this constellation led to a de facto unanimity requirement to change the status quo.

This divided government feature in Germany was also present in the United States, where

[6] Guttman (1998) examines a model with a committee that decides on a set of proposals. Exclusion of redistribution among committee members is justified by the free-rider problem that arises when a reasonably sized group of proponents of a proposal has to provide the resources to bribe the other side. In our context, this problem does not occur because the proposal designer can observe the utilities of the other citizens and can endogenously determine a proposal by setting the tax scheme. In a broad package of proposals, redistribution takes place through the tax scheme.

the legislature was dominated by the Republican party while the executive branch has been dominated by the Democrats. Divided governments can lead to de facto unanimity or near-unanimity rules.[7] Our analysis suggests that the unanimity feature of divided governments can be beneficial because proposal designers will need to propose broad packages acceptable to almost everybody if they are to induce a change of the status quo.

The paper is organized as follows. In the next section we present the model and describe all socially efficient allocations. In section 3 we present our unanimity rule constitution and show that it always leads to socially efficient solutions. Section 4 concludes.

2 Model and Treatment Rules

2.1 Model

The basic structure of our model builds on ROMER AND ROSENTHAL (1983) and AGHION AND BOLTON (2003). We consider a standard social choice problem of public project provision and financing. Time is indexed by $t = 0, 1$. The first period $t = 0$ is the constitutional period. In the constitutional period, a society of risk-neutral members decides how public project provision and financing should be governed in the legislative period.

In the legislative period $t = 1$, each citizen is endowed with some private consumption good. The value of an individual's endowment is e. The community can adopt two public projects P_1 and P_2 with per capita costs $k_1 > 0$ and $k_2 > 0$ respectively. Citizens are indexed by i or $j \in [0, 1]$ and we use $v_{l,j}$ to denote the utility of agent j from provision of the public project P_l (expressed in terms of the the consumption good) $(l = 1, 2)$. We assume that P_1 benefits all citizens and – for simplicity of presentation – that the utility from P_1 is identical for all citizens: $v_{1,j} = V_1$ for all $j \in [0, 1]$. Moreover, we assume that $v_{2,j} = V_{2,h}$ for $j \in (q_{h-1}, q_h]\,(h = 1, \ldots, n)$ where $0 = q_0 < q_1 < \ldots < q_n = 1$ and $V_{2,1} < V_{2,2} < \ldots < V_{2,n}$. We call citizens with a nonnegative utility from P_2 *project*

[7] Other justifications for a society wanting to allow for divided governments have been provided in the innovative work of ALESINA AND ROSENTHAL (1995).

winners and the other citizens *project losers*. At $t = 0$, agents do not know what their utility from the public project P_2 will be, i.e., for each citizen his location j on the unit interval is a uniformly distributed random variable. Moreover, we assume that those random variables are independent and hence, by the law of large numbers, the fraction of agents with utility $V_{2,h}$ from the public project in the legislative stage will be equal to $p_h := q_h - q_{h-1}$.

Public projects must be financed by taxes. We assume that taxation is distortionary. Let $\lambda > 0$ denote the shadow cost of public funds. That is, taxation uses $(1+\lambda)$ of taxpayers' resources to levy one unit for public projects or for transfers to citizens. Hence the overall per capita costs of the public projects amount to $(1 + \lambda)k_1$ and $(1 + \lambda)k_2$ respectively. Introducing shadow costs of public funds in this way is standard in the literature and is also used here in a reduced form (for justifications see LAFFONT AND TIROLE (1993)).

We denote the tax payment by t_j and the subsidy of citizen j by s_j, and define the variables $g_l\,(l = 1, 2)$ that indicate whether the public project P_l is provided ($g_l = 1$) or not ($g_l = 0$). Assuming that $v_{l,j}$ is a private benefit that cannot be taxed,[8] the utility of citizen j in the legislative period is given by

$$e + g_1 V_1 + g_2 v_{2,j} - t_j + s_j.$$

Finally, the budget constraint of the society in the legislative period is given by

$$\frac{\int_0^1 t_j \, dj}{(1+\lambda)} = g_1 k_1 + g_2 k_2 + \int_0^1 s_j \, dj.$$

Note that, since taxation is distortionary ($1 + \lambda$ of taxpayers' resources yield 1 unit of resources for public projects), any use of taxes to finance subsidies creates social losses from the ex ante perspective. Taxes are, however, necessary to finance the project costs. We assume throughout the paper that the provision of P_1 is socially efficient, i.e., $V_1 > (1+\lambda)k_1$, and that P_1 is large compared to P_2: $V_1 \geq -V_{2,1}$. The first assumption captures the idea that there are public projects such as security, defense, and the judicial system,

[8] If v_j is a monetary return it could be taxed in addition to e. The results would be unaffected by this modification.

that by common consent should be collectively provided by all citizens. The second assumption implies that the core of unanimously desired public projects in a society is sufficiently large.[9]

2.2 Socially Efficient Solutions

The fact that citizens are risk-neutral implies that it is socially efficient from an ex ante point of view to provide P_1 and P_2 if and only if expected benefits are larger than per capita costs, i.e.,

$$V_2 := \sum_{k=1}^{n} p_k V_{2,k} > (1+\lambda)k_2.$$

Moreover, taxes should only be raised to finance the public projects. From an ex ante point of view, any redistribution activities are waste. We summarize the first-best allocation as follows.

Proposition 1

Any allocation where P_1 is provided, where P_2 is provided if and only if $V_2 > (1+\lambda)k_2$, and where taxes are only raised to finance the public projects, is socially efficient (first-best) in an ex-ante sense.

In the following, we assume that complete social contracts cannot be written at the constitutional stage. As is usual in the incomplete contracting literature, we assume that future states of nature cannot be described precisely and therefore a constitution can only specify rules for future social decision-making. However, utilities are observable for individuals at the time when the proposal is made.[10] A detailed justification of this assumption can be found in Aghion and Bolton (2003).

[9] If the assumption is violated, the strict unanimity rule cannot be applied to achieve first-best allocations.

[10] While this assumption is not realistic in all cases, it seems to be a plausible approximation for quite a large range of public projects , e.g., the construction of roads, labor market reforms, or the scale-down of the defense industry.

2.3 Decision Rules and Inefficiencies

The fundamental question is whether collective decisions embedded in democratic constitutions can achieve socially efficient allocations. Four inefficiencies can occur:

- efficient projects are proposed and are not adopted
- efficient projects are not proposed
- inefficient projects are proposed and adopted
- inefficient redistribution proposals are adopted

We briefly illustrate some of these inefficiencies by an example that will also motivate our investigation. Consider the simplest set-up with only one project P and per capita cost k. P can generate utilities V_1^t and V_1^h ($V_1^t < V_1^h$) with associated probabilities p_1 and p_2 with $p_1 + p_2 = 1$. The expected benefits are $V_1 = p_1 V_1^t + p_2 V_1^h$. We consider different project scenarios and compare the simple majority rule[11] with the unanimity rule. We do not specify a complete collective choice process with making a proposal as we do later. Therefore, the example only illustrates potential outcomes under different rules.

(i) $V_1 > k(1+\lambda)$, $V_1^t > 0$

The unanimity rule and the majority rule can lead to the provision of P and no one needs to be subsidized.

The majority rule, but not the unanimity rule, can be used to implement inefficient redistribution proposals without including P. Inefficient redistribution can also occur under the unanimity rule, but only in conjunction with the project proposals.

(ii) $V_1 > k(1+\lambda)$, $V_1^t < 0$, $p_2 V_1^h - (1+\lambda)(k - p_1 V_1^t) \geq 0$

The unanimity rule can lead to the provision of the project P, but a fraction p_1 of individuals must be subsidized with $|V_1^t|$, which creates expected tax distortions $\lambda\, p_1 |V_1^t|$ from additional taxation of project winners by $\frac{(1+\lambda)\, p_1 |V_1^t|}{p_2}$ per head to finance

[11] The example can easily be extended to super majority rules.

the subsidies. Project winners still desire the project if their (gross) benefits V_1^h are larger than the tax burden $\frac{(1+\lambda)(k-p_1 V_1^t)}{p_2}$, which is the condition in this case. Because of the tax distortions, a first-best allocation is impossible under the unanimity rule. The majority rule can lead to the provision of P with subsidies and associated expected losses of $\lambda \max\{p_1 - \frac{1}{2}, 0\}|V_1^t|$ since only a fraction $\max\{p_1 - \frac{1}{2}, 0\}$ of project losers must be subsidized.

The same considerations as in (i) apply for pure redistribution proposals.

(iii) $V_1 > k(1+\lambda)$, $V_1^t < 0$, $p_2 V_1^h - (1+\lambda)(k - p_1 V_1^t) < 0$

The unanimity rule cannot lead to the provision of P since project winners cannot finance project costs and subsidies without being worse off than under the status quo. The relevant condition $V_1^h > \frac{(1+\lambda)(k-p_1 V_1^t)}{p_2}$ is now violated. Under the majority rule, P can be implemented if project winners are better off by subsidizing $\max\{p_1 - \frac{1}{2}, 0\}$ project losers and bearing the project costs. The relevant condition is $p_2 V_1^h - (1+\lambda)k + (1+\lambda)\max\{p_1 - \frac{1}{2}, 0\} V_1^t > 0$, which always holds if $\lambda < 1$.

The majority rule can be used for undertaking (inefficient) redistribution proposals, while the unanimity rule completely avoids such redistribution activities.

(iv) $V_1 < k(1+\lambda)$

Under the unanimity rule, the project will not be provided, though it may be adopted under the majority rule if $p_2 V_1^h - (1+\lambda)\, k + (1+\lambda)\, \max\{p_1 - \frac{1}{2}, 0\}\, V_1^t > 0$.

The same considerations as in (iii) apply for pure redistribution proposals.

This simple example illustrates the advantages and drawbacks of both the unanimity rule and the simple majority rule. The unanimity rule only allows for Pareto improvements and to a great extent avoids inefficient redistribution, but in a variety of cases socially desirable projects are not undertaken. Under the simple majority rule, the project is provided more often but this includes cases where it is socially undesirable and the majority rule invites inefficient redistribution. Obviously the precise nature of the inefficiencies depends on the precise form of the collective choice process and in particular on the proposal-making process. The task of a constitution is now to encompass rules regarding making a proposal

and decisions such that any of the four possible inefficiencies are avoided, independently of which case (i) to (iv) will occur. This objective will be pursued in the following.

2.4 The Game

We explore whether, and how, optimally designed constitutions can achieve socially efficient allocations. We consider the combination of constitutional and legislative periods as a substitute for the complete social contract that cannot be written. At the constitutional stage, the society decides about the rules governing the legislative processes. The legislative process may be repeated once. We use the index τ to indicate whether we are referring to the initial round of legislation ($\tau = 1$) or to the repetition ($\tau = 2$). The sequence of events for a decision process in this context is summarized as follows:

Stage 1: In the constitutional period, the society decides unanimously about the constitutional principles that govern legislative decision-making.

Stage 2: At the start of the legislative period, citizens observe their location j on the unit interval and the location of all other agents. Citizens decide simultaneously whether to apply for making a proposal ($\psi_{\tau,j} = 1$) or not ($\psi_{\tau,j} = 0$).

Stage 3: Among all citizens that apply, one citizen $a \in [0,1]$ is chosen randomly to make a proposal. The proposal maker designs a project/financing package $\left(g_1, g_2, t_j, s_j\right)_{j\in[0,1]}$ which we denote by $A_{\tau,a}$.

Stage 4: Given $A_{\tau,a}$, citizens decide simultaneously whether to accept the proposal ($\delta_{\tau,j}(A_{\tau,a}) = 1$) or not ($\delta_{\tau,j}(A_{\tau,a}) = 0$).

Stage 5: Repetition of stages 2 – 4 if the initial proposal has not been adopted or if no one has applied for proposal designing. Only one repetition is possible.

We denote stages 2 - 4 and the (potential) repetition as the *legislative process*. Note that if no one applies for proposal making in the initial round, there will still be a repetition. If no one applies in the repetition either, the status quo prevails. Moreover, at the voting

stage individuals know who will be taxed and who will receive subsidies if a proposal is accepted, since taxes and subsidies are personalized. Given a constitution with a set of principles discussed in the next section, we look at subgame perfect implementations in stages 2 to 5. An equilibrium for the subgame that consists of the stages 2 - 5 can be described as a set of strategies

$$\left\{\psi_\tau, A_\tau, \delta_\tau(\cdot)\right\}_{\tau=1,2}$$

where $\psi_\tau = (\psi_{\tau,j})_{j\in[0,1]}$, $A_\tau = (A_{\tau,a})_{a\in[0,1]}$, $\delta_\tau = (\delta_{\tau,j})_{j\in[0,1]}$, and $\delta_{\tau,j} = \delta_j(A_{\tau,a})$ depends on the proposal $A_{\tau,a}$. For the voting game in stage 4 and for the decision about applying to make a proposal (stage 2), we will assume that

- **(EWS)** *agents eliminate weakly dominated strategies.*

EWS is a standard assumption to eliminate the multiplicity of voting equilibria. Since we have a multistage voting process, it is not a priori clear whether EWS will yield unique voting outcomes in all subgames of our model. We will show in lemma 1 and in Proposition 2 that voting strategies across all stages for the specific constitution that we are examining are unique.

In order to simplify the exposition, we assume two tie-breaking rules. To formulate the first tie-breaking rule, we assume momentarily that equilibrium voting strategies in the repetition of the legislative process are unique and that the utility $U_{2,j,a}$ achieved by agent j if agent a makes a proposal in the repetition does not depend on a: $U_{2,j,a} = U_{2,j}$.[12] Both assumptions will be results for the constitution that we will introduce in the next section.

In this case, we can denote the utility payoff as $U_j(A_{1,a}, \Delta_{1,j}, \delta_{1,j})$ of agent j, given that agent a has made the initial proposal $A_{1,a}$ and given the votes $\Delta_{1,j} = (\delta_{1,i})_{i\in[0,1];\, i\neq j}$ of all other citizens and his own vote $(\delta_{1,j})$ in the initial round of legislation. The first tie-breaking rule is given as follows.

[12] Otherwise we would need to work with the expected utility of all realizations $U_{2,j,a}$.

- **(T1)** *Suppose that agent a has made the initial proposal $A_{1,a}$. If*

$$U_j(A_{1,a}, \Delta_{1,j}, 1) = U_j(A_{1,a}, \Delta_{1,j}, 0)$$

for all possible votes $\Delta_{1,j}$ of the other agents, then agent j will vote against the proposal if his net benefit $u_{1,j} := g_1 V_1 + g_2 v_{2,j} + s_j - t_j$ from the proposal is smaller than $U_{2,j}$, and he will vote yes in all other cases.

In order to formulate the second tie-breaking rule, we additionally assume momentarily that the voting strategies $\delta_1(\cdot)$ are unique if (T1) is applied. Again this assumption will be a result when we proceed with our core constitution in the next section. Under this assumption, we can define the utility level $U_j(A_{1,a})$ that an agent j will achieve if agent a has made a proposal $A_{1,a}$ in the initial stage of the legislative process. Denoting the set of all possible proposals by $\mathcal{A}$, we are now ready to formulate the second tie-breaking rule:

- **(T2)** *If an agent j cannot strictly improve his utility by making a proposal, he will not apply for making a proposal.*[13]

T2 means that a proposal maker only applies if there is a possibility that his proposal could yield a higher payoff than would result from the process otherwise. If T2 does not hold, the decision of agents to apply to make a proposal will depend on the constitutional rules.

In what follows we will - without explicit reference - always assume that (EWS), (T1) and (T2) are applied. We are now ready to characterize the expected utility level that a particular constitution can deliver. We say that a constitution $\mathcal{C}$ implements an expected utility U if, given that agents have agreed on $\mathcal{C}$ in stage 1, the following holds:

[13] Formally, T2 means that

$$\sup_{A_{1,j} \in \mathcal{A}} U_j(A_{1,j}) \leq \min\Big\{ e \,,\, \inf_{a \in [0,1],\, a \neq j,\, A_{1,a} \in \mathcal{A}} U_j(A_{1,a}) \Big\}$$

If (EWS), (T1), and (T2) are applied, all possible subgame perfect equilibria under the constitution $\mathcal{C}$ yield the same expected utility U.

We call a constitution *first-best* if it implements the expected utility $\bar{U}_{opt}$ induced by the socially efficient contract, namely

$$\bar{U}_{opt} = \begin{cases} e + V_1 + V_2 - (1+\lambda)(k_1+k_2) & \text{if } V_2 > (1+\lambda)k_2 \\ e + V_1 - (1+\lambda)k_1 & \text{else.} \end{cases}$$

2.5 Constitutional Principles

In this section, we introduce the constitutional rules that are at the disposal of the society. The rules in the constitution have to specify

1. restrictions on the proposals that can be proposed, i.e., definition of all proposals that are constitutional (**proposal rules**). A proposal consists of a project proposal and a financing package;
2. how the nation decides about a proposal (**decision rules**).

As noted above, any rules in a constitution must satisfy the liberal principles of democracies: They should not require more messages or information from citizens than proposals or voting and they should include equal voting and proposal making rights. We will consider the following possibilities to design constitutional rules:

Proposal Rules

- *Maximal taxation of proposal designer* **[MTA]**
  The proposal designer has to pay the maximal tax rate that he levies on other agents in his proposal.
- *No subsidies* **[NS]**
  The proposal designer is not allowed to propose any subsidies.
- The financing package must satisfy the budget constraint.

Decision Rules

- *Unanimity Rule* **[UA]**

  A proposal to change the status quo is only adopted if all citizens vote for the proposal.

- *Bundling and Amendment Rule* **[BAM]**

  If the initial proposal has been rejected, the legislative process (stages 2 - 4 of the sequence of events) is repeated with the restriction that, in the repetition, a constitutional proposal may only contain one single public project (i.e., P_1 or P_2) but not both of them. If the initial and the second proposal have been rejected, no further proposals are possible.

The rule MTA may need particular explanation and discussion. MTA imposes the highest tax on a designer of a proposal that the designer would like to levy on other agents. The rule can be implemented in communities where individuals make proposals and the whole community takes a collective decision. In such a direct democratic setting as we have in our model, individuals applying for proposal making know that they will be taxed according to their own proposal.

The rule MTA is more problematic for representative democracies where public project decisions are taken in parliament and are proposed by parties. Nevertheless, there may be rules in parliamentary democracies that can serve as substitutes for the MTA rule. If projects are financed e.g. by income taxes, parliament members should not be exempted from taxation. Since compensation for members of parliament is quite high compared to the mean or median wage in a society, they would bear a relatively high tax burden. A further requirement and substitute for the MTA rule would be that members of parliament accept an additional burden, when they introduce new public projects that lower the disposable income of citizens. For instance, compensation for parliamentary members may not be adjusted upwards when wages in the private sector increase.[14]

[14]Such compensation restraints occur sometimes automatically when new financial burden on households are introduced since proposing such restraints by a party may attract voters.

3 First-Best Constitutions

In this section we will - as noted above - assume that citizens can identify each other's utility levels V_1 and $v_{2,j}$ and the costs $(1+\lambda)k_l$ of the public projects ($l = 1, 2$, $j \in [0,1]$) in the legislative period. We explore how the following set of constitutional principles can yield a first-best allocation:

$$\mathcal{C}^* := \Big\{[\text{UA}],\ [\text{BAM}],\ \ [\text{MTA}],\ [\text{NS}]\Big\}.$$

The BAM principle allows a proposal designer to take advantage of bundling, and since such a package can only be proposed once, strategic rejection of socially efficient packages is avoided. The NS rule prohibits inefficient redistribution and MTA induces proposal designers only to make proposals that are socially desirable and acceptable by everyone via unanimity rule. In particular, we will prove that

1. A unique subgame perfect equilibrium exists. Denote the respective equilibrium strategies by $\left(\psi^*_\tau, A^*_\tau, \delta^*_\tau\right)_{\tau=1,2}$.

2. If $V_2 > (1+\lambda)k_2$, then there are some $a \in [0,1]$ with $\psi^*_{1,a} = 1$. For all such a, $A^*_a = A_{I*}$, where A_{I*} is a package that contains the provision of both projects, financed by taxes adjusted to the different utility levels from the second project. More formally:

$$A_{I*} = \big(g_1 = 1,\, g_2 = 1,\, t_j = t^*_j,\, s_j = s = 0\big)_{j\,\in[0,1]}$$

where $t^*_j = \min\big\{(1+\lambda)k_1 + v_{2,j},\, \bar{t}\big\}$ and[15]

$$\bar{t} := \min\left\{\, t \,|\, \sum_{h=1}^{n} p_h \min\big\{(1+\lambda)k_1 + V_{2,h},\, t\big\} = (1+\lambda)(k_1+k_2)\right\}.$$

Moreover, $\delta^*_{1,j}(A_{I*}) = 1$ for all $j \in [0,1]$ and hence no repetition of the legislative process is conducted.

[15] Note that $\int_0^1 t^*_j\, dj = (1+\lambda)(k_1+k_2)$.

3. If $V_2 \leq (1+\lambda)k_2$, then no one will apply to make a proposal in the initial stage, i.e., $\psi^*_{1,j} = 0$ for all j, but all agents apply in the second stage ($\psi^*_{2,j} = 1$ for all j) and propose A_{R*} ($A^*_{2,a} = A_{R*}$ for all a), where

$$A_{R*} = \Big(g_1 = 1,\ g_2 = 0,\ t_j = t = (1+\lambda)k_1,\ s_j = s = 0 \Big)_{j\in[0,1]}$$

Note that the tax rates t^*_j takes into account the constitutional rules as follows. Given this definition of t^*_j, the proposer cannot raise anybody's tax rate without either causing them to veto or raising his own tax rate; and cannot lower anybody's tax rate without violating the budget constraint. We begin our analysis by describing the equilibria that occur when the legislative process is repeated.

Lemma 1

Equilibrium strategies in the repetition of the legislative process are unique under constitution $\mathcal{C}^*$. They are given by $(\psi^*_2, A^*_2, \delta^*_2)$, where $\psi^*_{2,j} = 1$, $A^*_{2,j} = A_{R*}$, and $\delta^*_{2,j}(A_{R*}) = 1$ for all $j \in [0,1]$. The resulting utility for all citizens is therefore given by

$$U^* := e + V_1 - (1+\lambda)k_1.$$

Proof.

First of all, note that because of (EWS) and [UA] the voting strategy of agent j is unique if $u_j \neq 0$ where[16]

$$u_j := g_1 V_1 + g_2 v_{2,j} - t_j + s_j.$$

Voting no when the proposal A_{R*} has been made is strictly dominated by voting yes if $u_j > 0$ and vice versa if $u_j < 0$. Hence, proposal A_{R*} will be accepted. Moreover, the following considerations show that there is no other proposal with which the proposal designer could achieve U^* or a higher utility level. In order to achieve a utility of at least U^*, the proposal designer has to make a constitutional proposal that will be adopted. But because of the amendment rule such a proposal involves either $g_1 = 0$ or $g_2 = 0$. If $g_1 = 0$ and $g_2 = 0$, the proposal designer achieves a utility payoff that is not higher than $e < U^*$

[16] To also handle the case $u_j = 0$ we can simply assume that the agent j votes yes in such circumstances. This tie-breaking rule ensures uniqueness also for $u_j = 0$.

because of [NS]. If $g_1 = 0$ and $g_2 = 1$, project losers will vote no (because of [NS]) and thus no project will be undertaken. Finally, if $g_1 = 1$ and $g_2 = 0$, then A_{R*} minimizes the tax burden on the proposal designer, which implies that A_{R*} maximizes his utility.

□

Lemma 1 implies that if the initial proposal is unconstitutional or will be rejected, the resulting utility level for all citizens will be U^*. Hence an initial proposal that is accepted cannot produce lower utility levels for any individual, since otherwise an agent would exercise his veto power under the unanimity rule. Moreover, we observe that the project P_1 that benefits all citizens will always be provided and that project P_2 will never be provided in the repetition. Hence, in order to prove that our constitution is first-best, we must now show that, if $V_2 > (1+\lambda)k_2$, then projects P_1 and P_2 are provided in the initial legislative process and that, if $V_2 \leq (1+\lambda)k_2$, no one will apply in the initial stage of the legislative process. Our main result proved in the appendix is

Proposition 2

Constitution $\mathcal{C}^*$ is first-best.

The proof shows how $\mathcal{C}^*$ works and achieves a first-best allocation. The intuition for our main result is as follows.

First, the ban on subsidies, [NS], means that all subsidies are eliminated and thus losers can only be compensated by lowering their tax burden in a package of public projects, where they benefit from some and lose from other projects. Moreover, a proposal designer cannot tax individuals to channel subsidies to himself or other individuals, which would create undesirable tax distortions.

Second, the amendment rule [BAM] guarantees that the first project P_1 benefiting all citizens is always implemented in the second stage: If it comes to this stage, the proposal A_{R^*} consisting of the provision of P_1 and an uniform tax rate of $(1+\lambda)k_1$ for all citizens is implemented. If the second project P_2 is to be provided, it has to be proposed in the first legislative stage.

Third, a proposal designer who wants to implement P_2 has to compensate losers from P_2 by lower taxes with respect to A_{I*} in order to satisfy the [UA]. Since subsidies are forbidden, the proposal designer needs to include the provision of P_1. If it is socially efficient to provide P_2, then winners will agree to finance the tax cuts for losers since their utility from P_2 is sufficiently high. If, on the other hand, the provision of P_2 is not socially valuable then, given an arbitrary constitutional proposal A that includes P_2, there will be a positive measure of citizens that prefer A_{I*} to A and hence will vote against A.

Fourth, maximal taxation of proposal designers, [MTA], ensures that only agents that strongly benefit from a package will apply to make a proposal. As a consequence, no individual will want to apply for proposal-making in order to deter the proposal of socially desirable projects.

4 Discussion and Conclusion

In this paper, we have argued that two of the chief objections against the unanimity rule - strategic behavior and costly redistribution - can be overcome if the rule is supplemented by appropriate constitutional rules. In particular, allowing proposal designers to propose broad packages of public projects induces them to impose lower taxes on losers of particular projects in order to gain their support. Since such broad packages can only be proposed once, strategic hold-up voting is eliminated. The virtues of the unanimity rule can be preserved while its disadvantages are eliminated.

In extensions of the model and applications, a number of issues should be explored. Our model might be extended to allow for some degree of risk aversion so that the insurance provided by subsidization is ex ante desirable. We note that our scheme already imposes some form of redistribution since taxation of individuals, who benefit little from a bundle of public projects, is low while large beneficiaries pay higher taxes. If risk aversion is sufficiently strong, however, further subsidization of losers from P_2 in our model would be socially desirable. This could be achieved by allowing for subsidies up to a certain limit and by a rule that induces proposal makers to offer such subsidies to losers of P_2.

The latter might be achieved by a variant of the MTA rule when the tax burden of the proposal maker is a function of the maximal tax rate he is proposing, but decreases in the amount of subsidies he is offering to low-taxed people who represent losers. The precise design of such constitutions that simultaneously achieve efficiency and equality objectives will be an important task in future research.

Second, a full fledged constitution must determine the frequency with which broad packages can be proposed. For instance, one could allow one broad package within a legislative term.[17] Third, the unanimity rule may be too strict because an individual voting error or an individual preference for strategic hold-up voting could involve high economic costs. Therefore, it might be better to select super majority rules with majority requirements of 90% or 95% yes-votes in order to change the status quo. Moreover, we could envision a two-tier constitution in which a society or a legislature decides on a broad package once and once only in a particular time frame by unanimity or a super majority rule. While such a two-tier system may not preserve efficiency under all circumstances, it may still be more suited for public project decisions.

These and other issues are relevant when unanimity rule constitutions are being made to work in political processes. The current analysis suggests that there is a potential for societies to rely on the virtues of the unanimity rule by complementing it with additional constitutional rules.

[17] Repeating the whole legislative process might again invite strategic voting. If repetition occurs only once within a legislative term, however, the costs of delay would be large which would make such attempts rather unattractive. Moreover, the constitution C^* does not allow proposal makers to improve their utility because of the MTA rule. Hence, the threat to reject a package is not credible if the game is repeated a finite number of times.

5 Appendix

Proof of Proposition 2:

First note that by (EWS) and (T1) and the uniqueness of equilibrium strategies in the repetition according to Lemma 1, voting strategies $\delta_1^*(\cdot)$ are unique in equilibrium: $\delta_{1,j}^*(A_{1,a}) = 0$ if the net benefit u_j of the proposal $A_{1,a}$ together with the endowment e for citizen j is lower than U^*, and $\delta_{1,j}^*(A_{1,a}) = 1$ otherwise.

According to $(T2)$ and Lemma 1, citizens will only apply for proposal making if there are proposals that produce a higher utility than U^* for them. By the same reasoning as in Lemma 1, the proposal A_{R*} produces the highest utility level for the proposal designer under all proposals that do not contain $g_1 = 1$ and $g_2 = 1$, namely U^*. Therefore agents will only apply for proposal making if there is a constitutional proposal with $g_1 = g_2 = 1$ that will be adopted.

Consider such a proposal. Because of $[UA]$ it can only be adopted if all citizens obtain at least the utility U^*. If it is to be adopted, the tax rate for a citizen j cannot be higher than $(1+\lambda)k_1+v_{2,j}$, otherwise he would exert his veto power. Because of [MTA] and [NS] the proposal designer maximizes his own utility (minimizes his tax burden) by proposing the tax rate t_j^* for agent j. Moreover, in order to make a constitutional proposal, the tax rate for the proposal designer himself cannot be lower than

$$t_a^* = \min\Big\{ (1+\lambda)k_1 + V_{2,n}\,,\, \bar{t}\,\Big\}.$$

Hence, overall tax revenues are bounded from above by $(1+\lambda)k_1 + V_2$. If $V_2 < (1+\lambda)k_2$, then, obviously, the budget constraint cannot be fulfilled. If $V_2 = (1+\lambda)k_2$, then $t_a^* = (1+\lambda)k_1+V_{2,n}$, which implies that the resulting utility for the proposal designer is limited from above by U^*. Therefore, if $V_2 \leq (1+\lambda)k_2$, then by (T2) nobody would apply for proposal making in the initial stage: $\psi_{1,j}^* = 0$ for all j.

If $V_2 > (1+\lambda)k_2$, we have $t_a^* = \bar{t}$ and agents with $v_{2,j} \leq \bar{t} - (1+\lambda)k_1$ will not apply for proposal making, since they cannot achieve a higher utility than U^*. Consider agents with $v_{2,j} > \bar{t} - (1+\lambda)k_1$.[18] For such agents, proposing A_{I*} is the utility-maximizing proposal,

[18] Obviously, at least for agents in $(q_{n-1}, 1]$, this condition is fulfilled if $V_2 > (1+\lambda)k_2$.

since their resulting utility is higher than U^*. Also, A_{I*} implies the lowest tax level for the proposal designer under all constitutional proposals with $g_1 = g_2 = 1$ that will be adopted. Hence, applying for proposal making in the initial stage of the legislative process weakly dominates not applying for agents j with $v_{2,j} > \bar{t} - (1 + \lambda)k_1$.[19] This observation completes the proof.

■

[19]Since all potential proposal designers will propose A_{I*}, such agents are never worse off by applying than by not applying, but, given that no one else applies, $\psi_{1,j} = 1$ is strictly better than $\psi_{1,j} = 0$ for such agents j.

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