Voting on Majority Rules*

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Abstract

We analyze an overlapping generations model of voting on "reform projects". These resemble investments in that they first require some investment expenditure and later pay off. Since the time during which old people get the benefit is shorter, or because older people are more wealthy and hence pay more taxes, they are more conservative (against reforms) than young people.

We show that if people vote on which majority should be required in future elections for a bill to become a law, the winning proposal specifies a supermajority. This result is very robust even if age related conflict is only one determinant among others for voting behavior in the society.

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1 Introduction

Political economy models usually take as given the rules which govern the political decision making, with the simple majority rule being the most popular model. In this paper, we develop a simple yet powerful positive model where the majority rule governing future elections is itself chosen in an election.

We observe a large variety of majority rules governing elections in the real world. On the one side, referenda are usually decided by a simple majority. On the other extreme, many international organizations require unanimity in votes among the member states. In the European Union's council of ministers, some proposals require only a simple majority, some a supermajority of about 71% (62 votes out of 87) and some require unanimous consent.[1] Explicit supermajorities[2] are required in most countries for a change of the constitution, but in some US states also for a tax raise. Even more important could be what we might call implicit supermajorities: In parliamentary systems with a strong committee organization, a legislative proposal usually needs the support of *both* the respective committee and the house. In parliamentary systems with two chambers, certain legislative proposals need the support of both chambers.[3]

Previous rationalizations of qualified majority rules focus on the problem of Condorcet cycles under simple majority rule in n-dimensional elections and on commitment problems; see our literature review below. Our model presents a new rationale for rules requiring qualified majorities in elections. We analyze an overlapping generations model of voting on reform opportunities, which we model as similar to investment projects: At first, there is a cost and then there are benefits. Since voters have a finite lifetime, old voters will be less keen on reforms because they are alive at the time when the costs accrue, but might not live long enough to reap the benefits.

If there is just a simple majority vote on a specific reform project in our model, the reform will be taken if the median voter benefits from this project. The median voter of our basic model is the person of average age, since net benefits from the reform project decrease with age. Imagine now that before any specific reform opportunity arises, there is a *constitutional election* on the majority rule which should govern future *regular elections* on specific projects. In this case, the median voter will vote for a more conservative supermajority rule: He knows that if a reform proposal comes up

[1]See Economist (1999), 13/11/1999, pp.50-52.

[2]By a "supermajority", we mean a rule which requires a certain majority (greater than the 50%, "simple", majority) of the electorate to vote for a change, if the status quo is to be changed.

[3]Tullock (1998), p.216, estimates that legislative rules in the US for changing the status quo are "roughly equivalent to requiring a 60% majority in a single house elected by proportional representation." See also Diermeier and Myerson (1999).

for election right now, a simple majority rule is optimal for him, but in the rest of his future life, he will be older and therefore more likely to suffer from reforms; hence a rule which requires more than just a simple majority will secure that fewer reforms (and only those which are most beneficial) are taken. In fact, he tries to transfer power via the voting rule to his “average future self”, the person who benefits from reforms now as much as the median voter will benefit on average over his remaining life.

From a natural social point of view, the supermajority rule is too conservative. A useful comparison is the rule that maximizes the utility of an individual who is newly born into this society. Consider the US constitution; it was written in the 18th century, but the overwhelming majority of people who ever lived under this constitution were born afterwards. Hence a “socially optimal” constitution should not just be designed to maximize the utility of the generation present at the time when the constitution is written, but also that of subsequent generations which all enter with age 0 into the system. Since a new born individual has on average higher payoffs from reform opportunities than the median voter, the rule which maximizes his expected utility requires a smaller majority rule in regular elections.

The results of the simple basic model are very robust to several extensions that we consider in section 4. First, we analyze more general voting rules that govern the constitutional election (for example, changing the status quo majority rule may itself require a supermajority). We characterize the set of majority rules which are stable with respect to the initial voting rule. Only a subset of supermajority rules is stable with respect to itself. Second, we analyze what happens, if the initial generation who vote on the majority rule are altruistic and care not only about their own payoff, but also about other people’s payoff (the society’s or their children’s, for example). We show that, surprisingly, this leaves the majority rule chosen completely unchanged. Third, we consider what happens if people differ in other non age related characteristics, influencing the costs and benefits of reform for different individuals. This extension is especially important, since usually, age related conflict is only one and possibly not even the most important determinant of voting behavior. As long as the other (non age-related) heterogeneity in the electorate is moderate, the supermajority rule from the basic model does not change. Only if age related conflict is very unimportant, the equilibrium majority rule approaches the simple majority rule.

In Section 5, we provide two examples of supermajority rules, which can be explained by the desire of an initial median voter to transfer power to his average future self. The first example deals with supermajority requirements for a tax increase, which are in effect in some US states. While other models have difficulties explaining why the median voter would transfer power to someone else, our model predicts a supermajority requirement if older people tend to prefer lower tax rates than younger ones. Our second example considers the admission of new members to clubs, as for example the European Union. The initial members may wish to admit new members, but fear that this changes the voting outcome in future elections. A supermajority rule is a possibility for the initial median voter to counteract this loss of importance in future elections.

Several previous papers have analyzed supermajority rules from an economic point of view. Buchanan and Tullock (1962) argue for unanimity rule as the suitable rule governing social choices. Under a simple majority rule, a majority of people could be tempted to implement certain projects which are not socially desirable because they can "externalize" part of the cost associated with this project to the losing minority. Under unanimity rule, only Pareto improving projects are implemented. On the other hand, Guttman (1998) has argued that the unanimity rule leads to a rejection of many projects which are not Pareto improvements, but nevertheless worthwhile from a reasonable social point of view. He shows that in his setting, a simple majority leads to a minimization of both types of errors.

Another rationale for constitutions inhibiting reforms by requiring more than simple majority for major changes is that this solves the problem of time inconsistency of optimal policies. A constitution which protects investment by inhibiting nationalization is valuable only if the constitution cannot be changed too easily after investment has taken place. See Gradstein (1999) for an argument along these lines.

The simple majority rule may lead to cycles in electoral preferences, as shown already by Condorcet (1976). A higher required majority reduces the possibility of cycles; indeed, Caplin and Nalebuff (1988) show that a constitution which requires a $(1 - (n/(n+1))^n)$ majority rules out cycles, if voters have single peaked Euclidean preferences in an n–dimensional space, i.e., if each voter has an "ideal" policy point and other policies are evaluated by voters according to their distance from their ideal point. For n towards infinity, this threshold converges to about 64%. Caplin and Nalebuff use this result to rationalize qualified majority rules. In our model, voters' preferences are single peaked in a one-dimensional policy space, so a simple majority rule would suffice to rule out cycles in our model.

The implications of different majority rules have also been analyzed in settings where voters have congruent interests, but are only imperfectly informed about the consequences of the different alternatives. Inspired by Condorcet's (1976) famous Jury Theorem,[4] several authors have analyzed which majority rule is most efficient in aggre-

[4]Roughly speaking, Condorcet's Jury Theorem states that under simple majority rule, the probability with which a society facing a binary choice problem, will make the correct choice, converges to

gating the information that is dispersed in the electorate. Nitzan and Paroush (1985) find that the probability of a correct choice is maximized under simple majority rule.[5] The issue of information aggregation is not present in our model as we assume that voters hold at all moments the same information.

2 The basic model

Consider an overlapping generations model in continuous time where individuals who are born at time τ die at time $\tau + 1$; at every moment, the same number of people are born and die, so the population is constant and normalized to one. Individuals care only about their own utility, i.e. there are no dynastic concerns about the utility of their children. At each small interval $d\tau$ of time, there is a probability $\lambda d\tau$ that there arises the possibility for a *reform*.

If the opportunity is not taken, each individual gets his outside utility of $\bar{u}$, normalized to 0. If the change is undertaken, every individual has to pay a cost of c. The individual's benefit from a reform that is undertaken depends on two factors: First, the individual's age, and second, a characteristic of the specific reform project, its "value" v (we will describe both factors in more detail in a moment). The net payoff from a reform for an individual of age t is

$$vp(t) - c. \tag{1}$$

Here, the scaling parameter v represents the quality (or "value") of the reform opportunity. From an ex ante perspective, v is a continuous random variable, distributed according to a density function $f(v) > 0$ for $v \in [0; \infty]$, with corresponding distribution function $F(v)$; however, once the possibility for a reform arises, the realization of v for this specific reform becomes common knowledge.[6]

one as the number of voters increases.

[5]For related work in the tradition of Condorcet's Jury Theorem (assuming honest voting), see also Grofman (1975), Grofman, Owen and Feld (1983), Young (1988) and Young (1995) and the literature cited there. Recently, Austen-Smith and Banks (1996) have shown that the assumption of honest voting is problematic and in general inconsistent with a game theoretic view of collective choice. Feddersen and Pesendorfer (1998) analyze information aggregation with strategic voters. They show that in this case, the unanimity rule is dominated by all other majority rules, if there are sufficiently many voters, though they do not derive the optimal majority rule.

[6]Fernandez and Rodrik (1994) analyze difficulties for reform projects even under simple majority rule if it is not known at the time of the vote who are the winners and who are the losers of a reform project before it is undertaken. They show that it is possible that a project which is known to benefit more than half of the population may fail to attract enough support in an election, because the *expected* benefits may be negative for the median voter due to incomplete information among voters about who gains and who loses from the reform.

The function $p(\cdot)$ describes how the payoffs of reforms depend on the individual's age t at the time of adoption. Suppose, for example, that a reform generates a constant stream of benefits v, starting from the time when it is adopted (i.e., in every interval of length $d\tau$, each individual who is alive receives a benefit of $vd\tau$). In this example, an individual of age t gets the benefits for his remaining lifetime of $1-t$ so that the net payoff is $v(1-t)-c$, and hence $p(t)=1-t$ in this example. More generally, we assume that young voters have a higher benefit from a reform than old voters: Formally, $p(\cdot)$ is a decreasing and nonnegative function (but it need not be a linear function, and it need not have $p(1)=0$).

This is a stylized model of the effect of age on the individual's benefits from "reforms", but it captures an important point. Many political or economic reforms resemble investment projects in their return streams: Initially, there is a cost to be borne, but eventually there will be benefits; in such a setting, young people will be able to enjoy the benefits longer and hence will be more inclined to favor reforms than old people. As an example (we will discuss additional examples in section 5), think of a trade liberalization which in the short run may cause unemployment in the formerly protected industry, but which produces long term gains after adjustment has taken place. So, if there are individuals of different age, the oldest ones will not be in favor of the change because they mainly suffer the costs without being able to reap much of the benefits.[7]

Even if the benefits of projects are equal for all people, old people might still be less inclined than young people to implement costly projects. Consider an economy with proportional or progressive taxation and incomes that rise with seniority: Then, old people pay a higher cost share than young people if a project is implemented.

Since v is a random variable ex ante, only some changes should be undertaken while others are not worth the cost. A general rule that specifies that every (or no) reform opportunity should be implemented is certainly suboptimal. Instead, the society in our model determines whether a change should be taken by voting. We analyze two different kinds of elections: A *regular election* is on the question whether or not a particular reform project should be implemented; the change will be taken if and only if at least a specified majority M of the electorate vote for it. Given M, regular elections are easy to analyze: Since the benefits of a reform decrease with age, it is clear that the decisive person in such an election will be the person aged M: If the M-aged individual

[7]An important assumption in our model is that no perfect compensation schemes are feasible which would redistribute enough money from winners to losers of reform such that in the end everyone would agree to a beneficial reform. This assumption is standard (and often even implicit) in the literature, e.g. Fernandez and Rodrik (1991).

is in favor of the proposal, all people younger than M will be in favor as well and the proposal will pass. Conversely, if the M-aged individual is against the reform, all older people will be against the reform and the proposal will fail.

Our main interest is how the majority M required in regular elections is determined. In the beginning of time, there is a *constitutional election* on the majority rule which governs future elections. The constitutional election is decided before the opportunity for a specific reform project arises. We consider two kinds of constitutional elections: One in which those alive at the initial time may vote, and a second one in which all individuals who will ever live under the constitution may vote, even if they are not yet born. Of course, only an election among those who are alive is a realistic scenario; however, the second kind of vote (behind the veil of ignorance) is interesting as a benchmark, since it corresponds to a natural notion of social optimality: The majority rule has an effect not only on those who are alive at the time of the constitutional election but also on those who are born afterwards, so their preferences should be represented as well. The vote on the constitution is decided by simple majority.[8]

3 Results

The majority rule governing regular elections clearly influences people's expected future utility from reforms. In order to analyze which majority rule wins in the constitutional election, we first need to know people's utility as a function of the majority rule in place, and consequently their preferences on this space. Once this is achieved, we can easily analyze how people will vote in the initial, constitutional election.

Since p is a strictly decreasing function, each majority rule in a regular election corresponds to a certain threshold r for the value of reforms; the higher the required majority, the fewer reforms are implemented and consequently the higher is the corresponding r. For example, if there is a simple majority rule, the decisive voter is the person aged 1/2, and he will vote for a reform, if he benefits from it, that is, if $vp(1/2) - c \geq 0$; this gives us a threshold of $r_{MED} = c/p(1/2)$. We use r in our analysis rather than the majority requirement since it is easier to work with.

Consider an individual of age t when there is no reform opportunity at the moment. Let $W(t, r)$ denote the expected *future change* in the lifetime utility of an individual of age t, if there is no reform opportunity at the moment and if reforms in the future are

[8] This assumption might seem somewhat arbitrary, but has the advantage of generating a clear cut result in the basic model. More generally, the required majority in the constitutional election could be some supermajority. We will come back to this point in subsection 4.1.

implemented as they arise if and only if they satisfy $v \geq r$. Hence we have

$$W(t,r) = \sum_{i=1}^{\infty} \int_t^1 [p(t_i)E(v_i|v_i \geq r) - c]\phi_i(t_i,r)dt_i, \tag{2}$$

where $\phi_i(t_i,r)$ is the density function for the event that the ith reform is adopted when the individual has age t_i;[9] clearly, these density functions depend on r, since it influences the probability that reforms are adopted. In case of adoption, the utility change for the individual is $[p(t_i)E(v_i|v_i \geq r) - c]$; here, $E(v_i|v_i \geq r)$ is the expected value of v_i given that we have $v_i \geq r$.

It would be difficult to calculate (2) directly, but a simple consideration shows that the following relationship must approximately hold for Δt small:

$$W(t,r) = W(t + \Delta t, r) + \lambda \Delta t(1 - F(r))[p(t)E(v|v \geq r) - c]. \tag{3}$$

Equation (3) means that the expected future utility change at age t is equal to the expected future utility change at age $t + \Delta t$, plus the expected change arising from reforms between age t and age $t + \Delta t$: With probability $\lambda \Delta t$, there is a reform opportunity within the interval $[t; t + \Delta t]$;[10] in this case, a reform is undertaken if and only if $v \geq r$, which has probability $(1 - F(r))$. Finally, if the reform is undertaken, the (ex ante) expected value of adoption for an age-t-individual is $[p(t)E(v|v \geq r) - c]$.

Letting Δt approach zero, we get a differential equation from (3). Substituting $t = 1$ in (2) yields $W(1,r) = 0$ as a terminal condition, so we can solve the differential equation to yield

$$W(t,r) = \lambda(1 - F(r)) \int_t^1 [p(s)E(v|v \geq r) - c]ds. \tag{4}$$

Maximizing this with respect to r, and using the fact that, by the definition of conditional expectation, $E(v|v \geq r) = \int_r^{\infty} vf(v)dv/(1-F(r))$, yields the first order condition

$$\frac{\partial W(t,r)}{\partial r} = -\lambda rf(r) \int_t^1 p(s)ds + (1-t)\lambda f(r)c = 0. \tag{5}$$

Canceling $f(r)$ and λ and solving for the preferred value threshold as a function of t yields:[11]

$$r(t) = \frac{c}{Z(t)}, \tag{6}$$

[9]Of course, since the ith reform does not necessarily take place during the future lifetime of the individual, each density does not integrate to 1 between t and 1. Reform opportunity i may already have passed before the individual attained age t (in which case $\phi_i = 0$ between t and 1), or it may materialize after the death of the individual.

[10]The probability that there is more than one opportunity is a second order term which can be neglected for Δt small enough.

[11]The first order condition (5) indeed characterizes a global optimum even though the problem need not be globally concave: $\partial W(t,r)/\partial r$ evaluated at $r = 0$ is positive, and the limit of $\partial W(t,r)/\partial r$ for $r \to \infty$ is negative. This implies that the unique solution of (5) given in (6) is a maximum.

where $Z(t) = \int_t^1 p(s)ds/(1-t)$ is the average value of p over the individual's remaining lifetime. Two important observations concerning Z are stated in the following lemma:

Lemma 1. *$Z(t) < p(t)$ and $Z'(t) < 0$ for all $t < 1$.*

Proof. The first claim follows because $p(s) < p(t)$ for all $s > t$. For the second claim, differentiating gives $Z'(t) = \frac{\int_t^1 p(s)ds - (1-t)p(t)}{(1-t)^2} = \frac{Z(t)-p(t)}{1-t}$, and the result follows from $Z(t) < p(t)$. $\square$

Since $Z(t)$ is decreasing, (6) implies that the older people are, the higher is the threshold r which is optimal for them. It is interesting that $r(t)$ in (6) is independent of the distribution of v and of λ. Intuitively, choosing the optimal r is like choosing whether a reform of a specific value $\bar{v}$ should be implemented or not, given that the individual does not know *when* this opportunity will arise during his future lifetime. It does not matter how *probable* it actually is that a reform of value $\bar{v}$ arrives in order to determine whether it is preferable for the individual in expectation to implement or to exclude a reform of value $\bar{v}$. Therefore, $r(t)$ is independent of the distribution of v.

The intuition for the independence of $r(t)$ from λ is that the decisive consideration for each individual is the expected average payoff from reforms in his future life. If λ is high, then there are more reform opportunities (in expectation) in the residual lifetime of an individual than when λ is low. However, the expected payoff per implemented reform opportunity in the future life of an individual aged t today is the same whether λ is small or large.[12]

We can now turn to the analysis of the constitutional elections. We consider first an election at the beginning of time, before any specific reform opportunity arises; all individuals who are alive at this time can vote in the constitutional election, which is governed by a simple majority rule.[13] Since the preferred value threshold $r(t)$ is strictly decreasing in t, the voter aged 1/2 is the median voter in this election. From the median voter theorem, we can conclude that the threshold that wins the election is

$$r_C = r(1/2) = c/Z(1/2) = \frac{c}{2\int_{1/2}^1 p(t)dt}. \tag{7}$$

We can translate this into a majority rule by the following consideration: The pivotal voter in a regular election, aged M, must be just indifferent between passing and rejecting the marginal reform of value $r(1/2)$; hence $p(M) \cdot (c/Z(1/2)) - c = 0$, which

[12] Of course, $r(t)$ would depend on the arrival process of reforms, if λ were not constant in time. If $\lambda(t)$ is increasing in time, then reform opportunities are especially likely to arise when the individual is old, implying that a higher value threshold would be optimal for him.

[13] We will change the assumption of a simple majority rule for the constitutional election in section 4.1

implies $p(M) = Z(1/2) < p(1/2)$ by Lemma 1. Hence M must be larger than 1/2: The median voter always chooses a supermajority.

Why does the median voter not choose to have a simple majority rule for regular elections? It is true that the median voter would then be pivotal in a regular election which happens to take place in the next moment, and could hence secure in this election that exactly all reforms are implemented which are beneficial for him. However, this instantaneous benefit comes at a price later on in the present median voter's future life, as then more reforms are implemented than he would like. It is therefore a worthwhile investment for the median voter to give up power today in order to be more powerful in the future. In fact, the person to whom the power in regular elections is transferred is the median voter's *average future self*: The person whose benefits from potential reforms are now as high as the present median voter's benefits will be on average in his future life.

How large is the supermajority chosen by the median voter in the constitutional election? This depends on the functional form of p. Intuitively, if p is linear, the person who has now the same payoff as the median voter on average in his future life is simply the person who now has the average future age of the median voter, 3/4. If p is convex, the person who has age 3/4 has lower benefits from an immediate reform than the median voter has on average over his future lifetime. Hence, in order to implement his preferred threshold, the median voter must choose a younger pivotal voter and so the equilibrium supermajority rule specifies less than a 3/4 majority. A symmetric argument implies that the supermajority rule is higher than 3/4 is p is concave.

Proposition 1. *1. If p is linear on $[1/2, 1]$, then the supermajority rule chosen in the constitutional election, M_C, specifies a 3/4 majority.*

2. Consider two different age-payoff functions p_1 and p_2. If p_2 is more concave than p_1 on $[1/2, 1]$ in the sense of Pratt (1964), i.e. if $p_2 = h(p_1)$, where $h(\cdot)$ is a strictly concave monotonically increasing function, then the supermajority rule is greater under p_2 than under p_1. In particular, if p is strictly concave (strictly convex), then the supermajority rule chosen is greater (smaller) than 3/4.

Proof. Observe that $M_C = p^{-1}(Z(1/2))$. If $p(t) = a - bt$, then $Z(t) = a - b(1+t)/2$, so $Z(1/2) = a - (3/4)b = p(3/4)$ and therefore $M_C = 3/4$.

The proof of the second part follows Pratt (1964). Writing M_{Ci} for the supermajority rule chosen under the age-payoff function p_i, we have, if $h(\cdot)$ is a strictly concave function,

$$
\begin{aligned}
M_{C2} &= p_2^{-1}\left(\int_{0.5}^{1} p_2(s)2ds\right) = p_2^{-1}\left(\int_{0.5}^{1} h(p_1(s))2ds\right) \\
&> p_2^{-1}\left(h\left(\int_{0.5}^{1} p_1(s)2ds\right)\right) = p_1^{-1}\left(\int_{0.5}^{1} p_1(s)2ds\right) = M_{C1}, \qquad (8)
\end{aligned}
$$

where the inequality follows from the fact that h is concave and that p_i^{-1} is a decreasing function. For the last equality, observe that substituting both sides of $p_2(s) = h(p_1(s))$ into p_2^{-1} shows $s = p_2^{-1}(h(p_1(s)))$, so $p_2^{-1}(h) = p_1^{-1}$. Since any concave (convex) function is more concave (convex) than a linear function, the last claim follows immediately. □

For the positive analysis of voting behavior in the constitutional election among all living people at the beginning of time, it does not matter whether the stream of rewards stops after one period or continues forever after. However, now we want to analyze briefly some normative properties of the solution. For this, let us assume that the costs and payoffs of reform projects apply only to those individuals who are alive at the time the reform is implemented. If the costs of reforms had to be borne only once by the generation which implements the reform while all future generations benefit, it would clearly follow that there are not enough reforms under any voting rule, as all individuals ignore the benefits of reforms accruing to future generations.[14] Even if this trivial externality does not exist, we can show that the majority rule chosen in the constitutional election, is too conservative from a social point of view.

Let us compare the constitutional majority rule with the solutions of two interesting social optimality problems. First, we consider what would happen, if *all* individuals who will ever live in this society could vote in the constitutional election. This exercise corresponds to a natural notion of fairness: The majority rule chosen influences all future generations' welfare, and so one could argue that they should have a right to vote in this election. Another interpretation of this scenario, is that it corresponds to the case that the decision on the majority rule is not made by the whole initial population, but rather by a group of "founding fathers", who care about the utility of future generations, while the rest of the population, which is decisive in ordinary elections, is selfish.[15]

[14]In fact, *every* reform with a positive v is desirable from a social point of view because we have no discounting in the model. This artifact is avoided in a previous version of this paper, Messner and Polborn (2000), where we have analyzed an extension of the model with discounting. However, for reasonable discount rates, the important results change very little.

[15]In section 4.2, we analyze the case that both the "founding fathers" (who determine the majority rule) and the general population (that votes in ordinary elections afterwards) have the same altruistic preferences and care about future generations.

If there is an infinite stream of individuals going through this system, most voters would not yet be born. In order to maximize the (unborn) median voter's payoff which he gets when he enters the system, the equilibrium voting rule is the one preferred by a new born person: $r_{NB} = r(0)$. Since $r(0) < r(1/2)$, the majority required to implement this threshold is less conservative than the one approved in the constitutional election of Proposition 1. In the special case that p is linear, the socially optimal majority rule (according to this criterion) is in fact the simple majority rule because the average age of a new born individual is, by definition, the average age of the population, 1/2. Again, if p is concave, the majority rule would be higher than in the linear case, and for p convex, it would be lower. Of course, a "submajority" rule (corresponding to a less than 50 percent majority) is difficult to implement for stability reasons, because both a proposal and its exact opposite could be passed. Therefore, the best society can do (given this stability constraint) is again to choose a simple majority rule. These arguments are summarized as Proposition 2:

Proposition 2. *Consider the majority rule M_{NB} which maximizes the expected lifetime utility of a new born individual. This majority rule is smaller than the outcome of the constitutional election: $M_{NB} < M_C$. If p is a linear or convex function, then $M_{NB} = 1/2$. If p is strictly concave, then $M_{NB} > 1/2$.*

Proof. The proof proceeds exactly as in proposition 1 and is omitted. □

Another interesting social optimality problem is to maximize $\int_0^1 W(t,r)dt$, the sum of utilities of all individuals alive:

$$\int_0^1 W(t,r)dt = \lambda[1 - F(r)] \int_0^1 \int_t^1 [E(v|v \geq r)p(s) - c]dsdt. \tag{9}$$

Proposition 3. *Let M_U be the majority rule which maximizes the sum of utilities of all individuals alive at the time of the constitutional election as defined in (9). If p is a linear function, then $M_U = 2/3$. If p is strictly concave (strictly convex), then $M_U > 2/3$ ($M_U < 2/3$). Furthermore, $M_{NB} < M_U < M_C$.*

Proof. Differentiating (9) with respect to r and canceling $\lambda f(r)$ gives us as first order condition

$$\int_0^1 [(1-t)c - r \int_t^1 p(s)ds]dt = 0. \tag{10}$$

Changing the order of integration and solving for r yields

$$r_U = \frac{c}{2\int_0^1 tp(t)dt}. \tag{11}$$

Suppose that p is strictly concave; in this case, p lies everywhere below its tangent at $t = 2/3$: $p(t) \leq p(2/3) + p'(2/3)(t - 2/3)$. It follows then that $2\int_0^1 tp(t)dt < 2\int_0^1 t[p(2/3) + p'(2/3)(t - 2/3)]dt = p(2/3) + p'(2/3) \cdot 0$. Using this in (11), we get

$$r_U > \frac{1}{p(2/3)}. \tag{12}$$

Since (12) implies that the person aged 2/3 benefits from the marginal reform, the socially optimal majority rule specifies a majority threshold that is larger than 2/3. For linear p, $r_U = p(2/3)$ (which shows $M_U = 2/3$), and for p convex, a symmetric argument implies $M_U < 2/3$.

For the claim that $M_U < M_C$, a comparison of (7) and (11) shows that we have to prove that $\int_0^1 tp(t)dt - \int_{1/2}^1 p(t)dt = \int_0^{1/2} tp(t)dt + \int_{1/2}^1 (t-1)p(t)dt > 0$. Integrating by parts and denoting $P(t) = \int_0^t p(s)ds$ yields $P(1/2) - \int_0^1 P(t)dt$. By Jensen's inequality, this expression is positive, because $P'' = p' < 0$.

For $M_U > M_{NB}$, r_U as given in (11) must be greater than $r_{NB} = c/\int_0^1 p(s)ds$; hence we have to show that $2\int_0^1 tp(t)dt < \int_0^1 p(t)dt$, or, equivalently, $\int_0^1 (2t-1)p(t)dt < 0$. The left hand side of this inequality is smaller than $\int_0^{1/2}(2t-1)p(1/2)dt + \int_{1/2}^1 (2t-1)p(1/2)dt = 0$. $\square$

The relation between M_U and M_{NB} is quite intuitive. In the utilitarian problem, a sum of utilities of all people alive is maximized. Almost all of the people who are alive are older and therefore more conservative than a new born individual. Hence M_U must be larger than M_{NB}.

Why is the utilitarian qualified majority rule always smaller than that chosen in the constitutional election, although in both scenarios the same electorate is considered? Start from r_C and consider a decrease in the required threshold. By definition of r_C, this leaves the median voter almost indifferent while it benefits younger and hurts older individuals. However, the losses to older individuals are rather small compared with the benefits to younger individuals, because the change in r applies for a longer time for younger individuals.[16] This asymmetry is taken into account in the maximization of $\int_0^1 W(t,r)dt$, but not so in the constitutional election.

4 Extensions

We kept the basic model deliberately simple in order to focus on the basic principle why the median voter transfers power to older voters using a qualified majority rule.

[16] Technically, this follows because $W(1,r) = 0$ for all r, and so W cannot vary too much in r for t near to 1.

As always, simplicity comes at some expense of realism; so the task of the remainder of the paper is to analyze how robust the model is with respect to changes in various assumptions, and to identify economically important cases in which we think the forces identified in this model are at work. While this section deals with more theoretical extensions, section 5 contains some applications.

4.1 Qualified majorities in the constitutional election and time consistency

We assume in the basic model that the required majority in the constitutional election is a simple majority. This setup has the advantage that it generates a unique outcome (namely M_C) applying to all following elections, irrespective of which rule is chosen as the "status quo" in the constitutional election.

Alternatively, and more generally, the required majority *in the constitutional election* could be some other exogenous majority $\mu \geq 1/2$. This generalization of the Condorcet winner concept has first been proposed by Black (1948).[17] If $\mu > 1/2$, it is no longer possible to determine a unique outcome of the constitutional election. Instead, for each $\mu > 1/2$ there is a set of majority rules $\mathcal{M}(\mu)$ such that for each $M \in \mathcal{M}(\mu)$ there is no other majority rule M' which is preferred over M by more than a μ-majority of the population. We will refer to majority rules which have this property as *stable relative to* μ.

Let $t(M)$ denote the age of the individual for whom M is its most preferred majority rule; that is, $t(M)$ solves the equation

$$p(M)\frac{c}{Z(t(M))} - c = 0.^{18} \tag{13}$$

From our analysis in the previous section, we know that $t(M)$ is increasing in M and that all individuals who are older (younger) than $t(M)$ would prefer to have a higher (lower) majority requirement than M. Hence, for any M such that $t(M) > \mu$, more than the necessary share of μ of individuals would prefer a lower majority. Similarly, for any M with $1 - t(M) > \mu$ the share of people who would like to increase the majority threshold would be larger than the constitutionally required share μ. Only if M satisfies $1 - \mu \leq t(M) \leq \mu$, neither an increase nor a decrease of the majority rule

[17] Recently, Barbera and Jackson (2000) have independently and in a different context developed the same concept of "self stability" of majority rules which we introduce below. The term "self-stability" is due to Barbera and Jackson (2000). In an earlier version of the present paper, we used the term "stability" for both μ-stability and self-stability.

[18] For those majority rules M which are smaller (larger) than the majority rule preferred by a new born individual (by a $t = 1$ individual) let $t(M) = 0$ $(t(M) = 1)$.

could find a sufficient majority. Therefore, the set of majority rules which are stable relative to μ, $\mathcal{M}(\mu)$, is given by

$$\mathcal{M}(\mu) = \{M : 1 - \mu \leq t(M) \leq \mu\} . \tag{14}$$

Clearly, M_C is stable for all $\mu \geq 1/2$. But while for $\mu = 1/2$, M_C is the only stable majority rule, the set of stable rules increases with μ and, for $\mu = 1$, all majority rules are stable.

Let us now introduce the notion of *self stability.* Instead of considering a separate and exogenous majority requirement for a choice of the constitution, suppose that people choose only one majority rule M which not only governs future regular elections, but also applies to possible future constitutional changes: Suppose that, at every day in the future, a random voter is recognized and can propose a new constitution M'; people then vote on M' versus the status quo M, and if the new proposal gets a majority of at least M, it becomes the new majority rule. In such a setting, stability of a majority rule M has to be defined relative to M itself: A majority rule M is *self stable*, if there is no other majority rule M' which is preferred over M by a share of the population which is larger or equal than M.

By (14), self stable majority rules must satisfy the conditions $M \geq t(M)$ and $M \geq 1-t(M)$. Remember from the analysis in the previous section that each individual would like to transfer the power to its average future self, and so $M(t) > t$. Conversely, this implies that $t(M)$ is always smaller than M and hence the first condition is always satisfied. As for $M \geq 1 - t(M)$, note that, if a particular M' satisfies the inequality, then all $M \geq M'$ do as well (because $t(M)$ is an increasing function). Hence, the set of all self-stable majority rules is $[\bar{M}, 1]$, where $\bar{M}$ is the unique solution of $M = 1-t(M)$.

How large is $\bar{M}$? Since $t(M_C) = 1/2$ and $M_C > 1/2$, M_C satisfies $M_C > 1-t(M_C)$. Hence, $\bar{M}$ must be smaller than M_C and so, the majority rule chosen by a simple majority, M_C, is stable with respect to itself. On the other hand, we know that a simple majority rule is not stable: There is a simple majority which prefers M_C over $1/2$. Therefore $\bar{M} \in (1/2, M_C)$, and the exact value of $\bar{M}$ depends on the shape of the function p.

Proposition 4. *Let $\bar{M}$ be the unique solution of $M = 1 - t(M)$. All $M \in [\bar{M}, 1]$ are self stable majority rules. For every p, $\bar{M} \in (1/2, M_C)$. Moreover, if p is convex (concave), then $\bar{M} \geq 2/3$ ($\bar{M} \leq 2/3$). In particular, if p is linear, then $\bar{M} = 2/3$.*

Proof. The only remaining claim concerns the effects of the functional form of p. If p is linear, we can rewrite (13) as $p(M) = p((1 + t(M))/2)$ and hence $t(M) = 2M - 1$. Plugging this into $M = 1 - t(M)$, we get $\bar{M} = 2/3$. If p is instead a convex function, Jensen's inequality implies that $t(M) \leq 2M-1$ and therefore $\bar{M} \geq 2/3$; by an analogous argument, one can show that for a concave p, $\bar{M} < 2/3$. $\square$

4.2 Altruism

In the basic model, people care only about their *own* payoff. As a consequence, the median voter effectively exploits the young people and chooses a supermajority rule, while a simple majority rule (or a smaller supermajority) would be socially optimal. In reality, people often also care about their children who are younger and therefore have a higher payoff from reform projects; or people may even care about the payoff for the society as a whole. It is therefore interesting to ask what the consequences of altruistic preferences are for the majority rule chosen.[19]

At first glance, one could conjecture that, if the initial population has altruistic preferences, society chooses a majority rule that is closer to the simple majority rule. However, people's altruistic preferences do not only change their voting behavior in the constitutional election, but also in regular elections. Even if the identity of the pivotal voter were the same as in the purely selfish society of the basic model, more reforms would be taken anyway, if everyone cares very much about the youngest individuals (and in particular, the pivotal voter does). It is therefore unclear whether there is any *additional* incentive in the constitutional election to change the majority rule.

Consider the following, quite general formulation of altruism: The perceived payoff of an individual aged t of a reform of value v is

$$\alpha[vp(t) - c] + (1 - \alpha) \int_0^1 [vp(s) - c] d\kappa(s). \tag{15}$$

Here, α is the weight the individual puts on his own payoff; the second term is the altruistic part of the individual's preferences. $\kappa(s)$ is a weighting function which puts possibly different weights on people of different ages, with $\int_0^1 d\kappa(s) = 1$. For example, if the individual cares about all his fellow citizens' utility in the same way, the weighting would be uniform: $\kappa(s) = 1$; if the individual's altruistic preferences are only concerned with the utility of a new born individual, then κ would be a weighting function with only one atom at $s = 0$: $d\kappa(s) = 1$ for $s = 0$ and $d\kappa(s) = 0$ elsewhere.

Define $K = \int_0^1 p(s) d\kappa(s)$; this is a weighted average of other people's payoffs from reforms, where the "average" is defined with respect to the individual's weighting function. Since (15) can be written as $\alpha vp(t) - c + (1 - \alpha)vK$, the expression which is

[19] In this subsection, we will refrain from any normative comparisons. It is unclear how to construct the analogue of the utilitarian choice problem if people care about each other: Should the utility people derive from other persons' utility count in the social welfare function (hence effectively double counting people's utilities) or not?

parallel to (3) in the basic model, is

$$W(t,r) = W(t+\Delta t, r) + \lambda \Delta t (1 - F(r))[\alpha p(t) E(v|v \geq r) - c + (1-\alpha) K E(v|v \geq r)]. \quad (16)$$

Going through the same steps as in the basic model, we get

$$W(t,r) = \lambda(1 - F(r))[\alpha E(v|v \geq r) \int_t^1 p(s) ds - (1-t)(c - (1-\alpha) K E(v|v \geq r))]. \quad (17)$$

Evaluating at $t = 1/2$ and optimizing with respect to r yields

$$r_A = \frac{c}{\alpha Z(1/2) + (1-\alpha) K}. \quad (18)$$

As expected, the value threshold is the smaller, the more voters care about young individuals' welfare (in which case K is large). In order to translate the value threshold into a majority rule, we use the fact that the pivotal individual must be just indifferent to passing the marginal reform project. Substituting r_A into the pivotal voter's altruistic utility function $\alpha v p(t_P) - c + (1-\alpha) v K$, we get

$$[\alpha p(t_P) + (1-\alpha) K] \frac{c}{Z(1/2)\alpha + (1-\alpha) K} - c = 0. \quad (19)$$

From this, we can solve for the age of the pivotal voter, which is $t_P = p^{-1}(Z(1/2))$, the same as in the basic model.[20]

Proposition 5. *If the individuals' altruistic utility function is given by (15), then the majority rule chosen in the constitutional election is the same as in the basic model.*

Intuitively, voters in the constitutional election have the same mix between selfish and altruistic preferences as they do later on in regular elections. Even an altruistic median voter in the constitutional election tries to transfer power to his average future self (which is now more altruistic as well), and so still chooses a supermajority rule.

4.3 Non-age related heterogeneity

In the basic model, all people of the same age have the same benefit from a reform, and older individuals' benefit is always lower than that of younger individuals. In reality, age is just one determinant of voting behavior, and there are usually also other factors

[20] Another interpretation of these results is as follows: We can write the utility function (15) in the form $p(t)\tilde{V} - \tilde{C}$, where $\tilde{V} = \alpha v$ and $\tilde{C} = c - (1 - \alpha v K)$. So the individual behaves *as if* the values and costs of reform were drawn from the distribution of $(\tilde{V}, \tilde{C})$ and not from the distribution of (v, c). However, we know from the basic model that the distribution function of the value of reforms, $F(r)$, has no influence on the voting rule elected and therefore it does not matter for the equilibrium constitution whether the individuals face the distribution $(\tilde{V}, \tilde{C})$ or (v, c).

influencing the preferences for reforms. Our objective in this subsection is to analyze how robust the supermajority results are in the presence of other, non-age related heterogeneity in the population, and relatedly, make predictions how supermajority rules will vary depending on how important "age" is as a source of conflict in society (as compared to other sources of conflict).

Suppose that individuals differ in their benefits from reform in a second way (other than their age), denoted by $\varepsilon \in [\underline{\varepsilon}, \overline{\varepsilon}]$. We will refer to ε as an individual's preference type. Assume now that the net benefits are given by

$$v\tilde{p}(t, \varepsilon) - c, \tag{20}$$

where $\partial\tilde{p}(t,\varepsilon)/\partial t < 0$, for all ε and $\partial\tilde{p}(t,\varepsilon)/\partial\varepsilon > 0$ for all t. Higher values of ε correspond to higher benefits from reform. Hence, an old individual who has a high value of ε may be more in favor of reform than a young individual with a low value of ε.

An individual's type is drawn at the beginning of its life from some distribution G.[21] In order to simplify the analysis, we assume that there is an infinity of individuals of each age t, so that for each age group, the distribution of the realized ε's is also given by G (hence there is no aggregate uncertainty on the level of an age group). Following the same steps as in section 3, one can show that the preferred value threshold for a (t, ε)-individual is $r(t, \varepsilon) = c/\tilde{Z}(t, \varepsilon)$, where $\tilde{Z}(t, \varepsilon) = \int_t^1 \tilde{p}(s, \varepsilon)ds/(1 - t)$. Since individuals now differ in two dimensions, there is a continuum of median voters in the constitutional election; their preferred value threshold determines the winning supermajority rule.[22] The locus of all median voters in the (t, ε)-space is depicted in Figure 1a (the MV-curve). This curve is upward sloping, because $\tilde{Z}$ is an increasing function of ε and a decreasing function of t.

As in the basic model, these median voters want to transfer power to more conservative pivotal voters in the regular elections. How can we determine this set of pivotal voters and the corresponding supermajority rule? Observe that every median voter has another individual with the same value of ε to whom he would like to transfer the power in a regular election.Therefore, the pivotal voters must lie on an upward sloping curve to the right of the median voter curve in the (t, ε)-space (see the PV-curve in

[21] Alternatively one could consider the case where individuals receive a new draw each time a reform opportunity arises. The analysis of such "ex-post" heterogeneity is somewhat more involved than the case of ex-ante heterogeneity and requires stronger assumptions on the functional forms. An analysis of that case can be found in the working paper version of this article which is available from the authors.

[22] Note that multidimensionality of preferences here does not create any problems for the existence of a Condorcet winner, because all possible proposals are still one-dimensional and all individuals have single peaked preferences over majority rules.

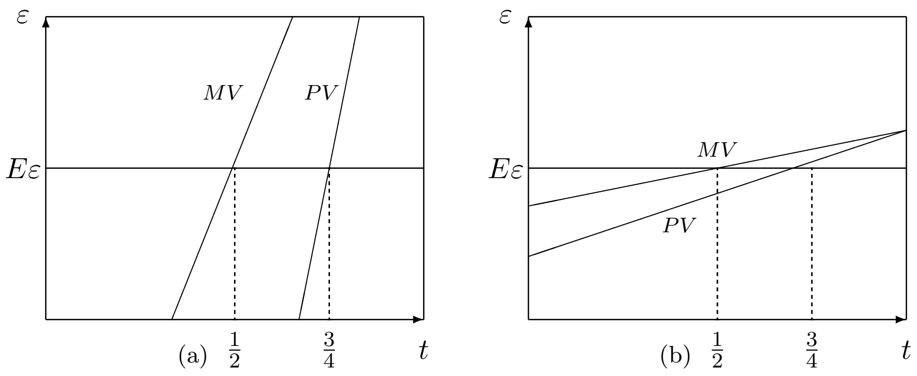

Figure 1: Median voters and pivotal voters with non-age heterogeneity

figure 1a). The supermajority which is chosen in the elections is given by the mass of people to the left of the pivotal voter curve.

In order to determine the size of the supermajority, assume for the moment that $\tilde{p}$ is linear in t for every ε (as in the cases $\tilde{p}(t,\varepsilon) = f(\varepsilon)(a - bt)$ or $\tilde{p}(t,\varepsilon) = h(\varepsilon) + (a - bt)$) and that there is a median voter for each ε. In Figure 1, this means that the median voter curve runs from the top of the (t,ε)-box to its bottom. Consider an individual of type (t_M, ε) on the median voter curve. Applying the same arguments as in Proposition 1, this voter wants to transfer power to an individual of the same preference type ε and age $(1 + t_M)/2$.[23] Hence, for every ε, the pivotal voter curve splits those individuals who are older than the voter on the median voter curve with the same ε, in two equal halves. Consequently, 75 percent of the population are to the left of the pivotal voter curve: The constitutional majority remains at 75 percent, as in the linear case in the basic model.

This result is remarkably robust. First, it is true for an arbitrary distribution G of the preference parameter ε, as long as the median voter line runs from the bottom of the (ε, t) box to its top. Second, if $\tilde{p}$ is concave or convex in t for every ε, the relation between M_C and $3/4$ (greater or smaller) is the same as in the basic model without heterogeneity, though the additional heterogeneity may in general change the specific number. To see this, note that, if p is concave, an analogous argument implies that $M_C > 3/4$ as in the basic model, because from Proposition 1, for every ε, more than half of the voters who are to the right of the median voter curve are between the median voter curve and the pivotal voter curve. Similarly, if p is convex, then $M_C < 3/4$.

The only substantive change in the supermajority rule happens if age is very unim-

[23] Of course, every median voter is indifferent between all individuals on the pivotal voter line, because they vote the same in a regular election. We just pick an individual with the same ε for the sake of the following argument.

portant compared to other preference heterogeneity, so that there are individuals who are always in favor (against) of reforms independently of their age. In that case, the equilibrium supermajority decreases. Suppose for example, that $p(t, \varepsilon) = a - bt + \varepsilon$. Then, the preferred value threshold of a (t, ε) individual is $r(t, \varepsilon) = \frac{c}{a+\epsilon-b(1+t)/2}$. Consequently, the slope of the median voter line is $d\varepsilon/dt = b/2$. If this slope is very small, the median voter curve looks like the one drawn in Figure 1b. Again, these voters transfer power to more conservative pivotal voters, but now the percentage of individuals who are to the left of the pivotal voter line is smaller than 75 percent and approaches 50 percent for $b \to 0$.

Proposition 6. *Consider the model with ex ante heterogeneity. Let r_C be the value threshold which is most preferred by the median voters and suppose that $\frac{c}{\tilde{Z}(0,\underline{\varepsilon})} \leq r_C$ and $\frac{c}{\tilde{Z}(1,\overline{\varepsilon})} \geq r_C$. Then, if $\tilde{p}$ is concave (convex) in t for all $\varepsilon \in [\underline{\varepsilon}, \overline{\varepsilon}]$, the equilibrium majority rule is $M_C \geq (\leq) 3/4$. In particular, if $\tilde{p}$ is linear in t for all ε, $M_C = 3/4$.*

Proof. If the conditions given in the proposition are satisfied, the individual with $(t = 0, \underline{\varepsilon})$ has a preferred value threshold which is lower than the equilibrium value threshold, and the individual with $(t = 1, \overline{\varepsilon})$ has a preferred value threshold which is higher than the equilibrium value threshold. Consequently, the median voter line runs as in Figure 1a and the remainder of the proposition follows from the arguments given in the text. □

5 Discussion and Conclusion

In this concluding section, we would like to discuss some applications, predictions and limitations of our model.

Supermajority rules for tax increases. An area of legislation where the conflict of interest on which our model is based is most evident is public investment spending which is financed through taxation. If, as individuals grow older, their salaries, and consequently the taxes they have to pay, increase, it seems plausible that the preferred tax rate is a decreasing function of age. Also, the benefits from consuming certain publicly provided goods might decrease over time.

Consider the following case which fits the model very well: In the US state of Missouri, a proposal by a school district to raise taxes requires a 2/3 majority in a popular referendum in order to pass.[24] Preferences for educational spending are likely to be heavily influenced by the number of children in the household who still

[24] "In all municipalities, counties and school districts the rates of taxation as herein limited may be increased for their respective purposes when the rate and purpose of the increase are submitted to a

have to graduate from schools, and hence (indirectly) by the individual's age. Even if the median voter has children in schools and prefers a high level of spending at the moment, our model can explain why he would want to transfer the power to raise taxes to someone with a lower preferred tax rate. The median voter's average future preferred spending level is probably considerably lower than his present preferred level, and so he transfers the power to his average future self.

Qualified majority rules for tax increases are also in place in other US states; currently, thirteen of them require a supermajority (in most cases, 2/3 of the legislature) in order to raise taxes.[25] Several points are worth discussing here. First, a 2/3 supermajority requirement in the legislature corresponds probably to a lower supermajority threshold in a referendum: Suppose that representatives in the legislature act according to the preferences of the median voters in their respective districts. Hence, a proposal to increase the tax rate needs the support of only 2/3 of the district median voters, not of 2/3 of the whole population. If the different districts are very similar to each other (in the sense that their respective median voters' preferences are similar to each other), then a popular support of, say, 55 or 60 percent of the population might be sufficient to pass the proposal.[26]

Furthermore, we would expect that preferences on state tax rates are in general less age dependent than preferences on school district financing. As we have seen in section 4.3, the equilibrium supermajority rule is lower if non age-related heterogeneity becomes more important. Hence, this is consistent with the observation above that a 2/3 majority in a legislature is easier to achieve (and, in this sense "lower) than a 2/3 majority in a referendum.

Why don't we observe supermajorities for tax increases in all states, within and outside the US? Our model suggests two different possible explanations. First, the initial rules that govern the choice of the majority rule differ between states. In our basic model, we have assumed that the initial election is governed by a simple majority rule. In practice, there are many states that require a supermajority to change the constitution. If we start with a simple majority rule for tax increases, this rule may be stable (in the sense of section 4.1) with respect to the rule on changing the constitution.

vote and two-thirds of the qualified electors voting thereon shall vote therefor." (Missouri constitution, Article 10, section 11 c: "Increase of tax rate by popular vote").

[25] These states are Arizona, Arkansas, California, Colorado, Delaware, Florida, Louisiana, Mississippi, Nevada, Oklahoma, Oregon, South Dakota and Washington; This account is based on Knight (2000).

[26] Note that this is the same effect which gives the strongest party in first-past-the-post election systems a disproportionate share of the seats in the legislature. On the other hand, if the legislature were elected by proportional representation, then a 2/3 majority in the parliament would correspond roughly to a 2/3 majority in the population.

According to the Book of the States (2000), 10 of the 13 supermajority states allow a change of the constitution by a referendum on a popular initiative: In these states, it is rather plausible that the constitution will take the form preferred by the median voter, the decisive person in the constitutional election. In contrast, of the 37 non-supermajority states only 8 allow for a popular initiative to change the constitution,[27] and almost all of them have procedures that require more than just a simple majority in the legislature in order to change the constitution; similar rules apply in most European states. In such a setting, it is more plausible that a simple majority rule for tax increases is stable.

Another possible explanation is suggested by section 4.3: States may differ in the extent of non-age related heterogeneity. Remember that the aim of the median voter in the constitutional election is to transfer power to his average future self. In a parliamentary electoral system with single member districts (like the one used in most Anglosaxon countries), he is constrained to choose the median voter of another district as the pivotal voter. In a very homogeneous state, the median voters in the other electoral districts are very similar to the median voter in the median district (the decisive voter in the constitutional election), and in order to have the desired effect, the majority rule must specify a quite high majority. In the other extreme case, if electoral districts are very different from each other, the constitutional median voter does not expect that his preferences in the future will resemble those of the median voter in any other electoral district, and hence should prefer to keep a simple majority rule.

This result could explain the cross sectional variation in the US, if the states which introduced the supermajority rule were internally more homogeneous than the United States as a whole, and than those states which rejected supermajority rules.[28]

Voting on club admission. An important application of our model is voting in clubs about whether and which new members should be admitted to the "club". A club is understood here in a broad sense as a community of several individuals who have united in order to supply some impure public good to each other.[29] Examples of clubs include labor unions, political organizations like the European Union or the department of economics at a university. In all these organizations, the question how

[27]Moreover, it seems that popular initiatives are not too easy to implement even in those non-supermajority states which in principle allow for them. Of the 80 proposals submitted to a referendum in all states between 1994 and 1997, only 23 were in non-supermajority states. Several large non-supermajority states with a provision for popular initiatives like Illinois and Michigan did not see any constitutional initiative at all in this 4 year period.

[28]The homogeneity of a state, i.e. the degree to which the preferences of the median voters of different districts are different, is of course difficult to measure.

[29]See Buchanan (1965).

many persons and who should be admitted to the club is of considerable importance, and members may have considerably differing tastes. An important phenomenon in this context is that the admission of a new member changes the electorate in the future. A qualified majority rule may be used to protect old members against the dilution of their voting share in future elections.

In an interesting paper, Roberts (1999) analyzes the dynamic evolution of a club that votes on the number of members in every period, using a simple majority rule. A dynamic evolution of the club's membership arises, because new club members change the median preference over new members in the group, and consequently, the identity of the pivotal voter in the next election. Adding an initial vote on the majority rule which is used to admit new members would likely lead to similar effects as in our model: In order to secure that later decisions are more in line with his preferences, the initial median voter will choose a supermajority rule.

Consider for example the expansion of the European union. At first sight, this seems to be a case where our overlapping generations model is not applicable, since member states do not die (or leave in another way when they become old). However, the only force necessary for a qualified majority requirement in the equilibrium constitution is that old voters benefit less from a reform (i.e. the admission of a new member state) than young voters. This has a natural interpretation (although different from the one in the model) in the case of the European union: It is quite plausible to assume that states benefit more from a neighboring state becoming a member of the EU than if the enlargement pertains to a far distant state.[30] Geographically, it is clear that old members will mainly have borders with other old members while new members usually have borders with non-member states. Hence new members' utility from the next candidate joining will be (in general, at least) higher than for old members. As a protection against being ultimately in the minority, old voters may wish to establish a supermajority requirement for the decision about new members. In the case of the European union, this is the case: The admission of a new member state requires unanimity.[31]

Concluding remarks Many social decision rules state explicitly or implicitly that changes of the status quo require a qualified majority. In an overlapping generations model, we supply a simple and new explanation for qualified majority rules: If people's preferences depend on their age in a systematic way, a supermajority rule is a way for the median voter to transfer power to his "average future self".

[30]For example, this is the case if nations trade more the nearer they are to each other, because of transportation costs.

[31]While our basic model never predicts a unanimity rule, section 4.1 shows that the unanimity rule is always stable with respect to itself.

While our model presents one new explanation for supermajority rules, there may of course exist other reasons as well for supermajorities. Previous rationalizations of supermajority rules have focused on efficiency of these rules in specific settings (Buchanan and Tullock, 1962), the problem of Condorcet cycles under simple majority rule in n-dimensional elections (Caplin and Nalebuff, 1988) and on commitment problems (e.g., Gradstein (1999)), and we see these theories as complementary to ours. However, one advantage of our model is that it is specific enough to generate predictions about the circumstances, in which we would expect to see supermajority rules, and that are in principle testable.

Also, supermajority rules are possibly not the only means of shifting power to older voters in the setting of our model. For example, voting age provisions that exclude some young people from voting work in the same direction. For instance, in Italy, the minimum voting age for the senate is 25 years.

On the other hand, if there are no institutional features that favor older voters, people cannot implement the effect of a supermajority rule in a representative democracy by just electing someone who is older than the median voter as a representative. In fact, the median voter in our model would always vote for himself as the representative, knowing that the representative ages at the same pace as the median voter and therefore always reflects his preferences.

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