# A simple scheme to improve the efficiency of referenda ☆

Alessandra Casella [a,b,c,d,*], Andrew Gelman [e,f]

[a] *Department of Economics, Columbia University, United States*
[b] *GREQAM, France*
[c] *NBER, United States*
[d] *CEPR, United Kingdom*
[e] *Department of Statistics, Columbia University, United States*
[f] *Department of Political Science, Columbia University, United States*

## ARTICLE INFO

## ABSTRACT

Referenda are becoming a common tool for public decision-making, and as reliance on direct democracy increases, so does the importance of giving representation to strongly held minority preferences. This paper discusses a very simple scheme that treats everybody symmetrically but gives weight to intense preferences: voters faced with a number of binary proposals are given one regular vote for each proposal plus a single additional bonus vote to cast as desired. Decisions are then taken according to the majority of votes cast. We study the scheme in a number of different models and identify empirically plausible conditions under which ex ante utility increases, relative to simple majority voting.

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## 1. Introduction

In binary decisions – when a proposal can either pass or fail – majority voting has a number of important qualities: it treats all voters symmetrically, it is neutral towards the two alternatives, it reflects accurately changes in preferences in either direction, and it guarantees that voters cannot gain by lying about their preferences. It has, however, one drawback: it fails to account for the intensity of these preferences. Far from being a detail, this one weakness contributes to important practical problems: first of all, the possibility to inflict great harm to the minority; more generally, the blocking of proposals that would increase conventional measures of social welfare, the temptation to recur to log-rolling in committees, the common lack of transparency of political deliberations. In all democratic systems, sophisticated institutions are designed to counter these difficulties. In some cases, however, it may be useful to approach the problem more directly, and ask whether a voting system as simple as majority voting but rewarding intense preferences could be designed for binary decisions.

The functioning of prices in a market offers some inspiration: prices elicit consumers' intensity of preferences by differentiating across goods and functioning in tandem with a budget constraint. The budget constraint plays a central role and suggests an immediate idea: suppose voters were given a stock of votes and asked to allocate them as they see fit over a series of binary proposals, each of which would then be decided on the basis of the majority of votes cast. Would voters be led to cast more votes over those issues to which they attach more importance? And would the final result then be an expected welfare gain, relative to

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simple majority voting, as the probability of winning a vote shifts for each voter from issues of relatively less importance towards issues of relatively more importance? We have proposed a voting system of this type – *storable votes* – in two recent papers that study voting behavior in committees (Casella, 2005; Casella et al., 2006). The simple intuition proves correct: both in theory and in experiments subjects cast more votes when the intensity of their preferences is higher. The efficiency gains are also borne out: both in theory and in the experiments, ex ante utility is typically higher with storable votes (although some counterexamples exist). Hortala-Vallve (2006) has explored a very similar mechanism, independently.

In this paper, we propose to apply this idea to referenda.[1] There are several reasons to do so. First, as tools for policy-making, referenda are becoming both more common and more important, a point made abundantly clear for example by the derailing of the European Union's constitutional treaty in referenda in France and in the Netherlands, and more recently in Ireland.[2] The increased reliance on direct democracy makes the protection of strong preferences, possibly held by minorities, particularly important. Second, referenda are often submitted to voters in bundles—think of the sets of propositions on which voters vote contemporaneously in many US states and European countries.[3] Consider then a voting mechanism where voters are faced with a number of contemporaneous, unrelated referenda, and are asked to cast one vote on each referendum but in addition are given one extra "bonus vote" to cast as desired over one of the different referenda. The value of the bonus vote may but need not be equivalent to that of a regular vote. Each referendum is then decided according to the majority of all votes. Does the simple addition of the bonus vote allow voters to express the intensity of their preferences and increase their ex ante welfare, relative to simple majority voting? This is the question studied in this paper.

We begin by addressing the problem with a simple model where individual valuations are drawn independently from a known distribution, identical across both voters and referenda and symmetrical with respect to the direction of preferences. We find that the answer is positive if the value of the bonus vote is not too large. Intuitively, the bonus vote gives voters the possibility to target the single issue that is most important to them, but at the cost of more uncertainty over the other proposals. The trade-off between the two effects implies that the optimal value of the bonus vote should be related to the expected wedge between the representative voter's highest expected valuation and his mean valuation over all proposals. If such a wedge is small, the value of the bonus vote should be correspondingly small. But the value should not be zero: for all distributions of valuations there is a positive bonus vote value such that ex ante welfare rises, relative to simple majority voting.

After presenting our analysis in the simplest setting, we devote the rest of the paper to relaxing different assumptions and checking the robustness of the first result. We verify that the result continues to hold if the distributions of valuations differ across referenda, as seems plausible. We study whether the result holds when the probability of approval of each referendum is itself a random variable, and find that in this case the conclusion is strengthened: granting a bonus vote always increases ex ante welfare, relative to majority voting, regardless of the bonus vote value.

In all of these cases, we rule out systematic asymmetries between supporters and opponents of each proposal, an assumption that simplifies the analysis greatly and is common in the literature, but limits the role of the bonus vote. Intuitively, the bonus vote improves over majority voting when the preferences of the minority are particularly intense, relative to the majority: its role is exactly to recognize and give weight to possible asymmetries in valuation draws between the two sides of any proposal. When the distributions are assumed to be symmetric, asymmetries can only be occasional sample deviations from the theoretical distributions, bound to disappear in large electorates. Although bonus votes can improve ex ante welfare in all the models discussed above, when the distributions of valuations are assumed to be symmetric, by assumption the per capita quantitative improvement over simple majority voting must become vanishingly small in the limit, as the population approaches infinity. (The same can be said of majority voting over random decision-making).

Recognizing the likely existence of asymmetries in the distributions of valuations is then important, but some restrictions are necessary to keep the model tractable, and their best choice is unclear. In a thorough empirical analysis of more than 800 ballot propositions in California from 1912 through 1989, Matsusaka (1992) identifies an equally split electorate as characteristic of propositions submitted to popular vote (as opposed to being decided by the legislature). Anchoring our model with this observation, we assume that the population is equally split on all proposals, but mean intensity is higher on one side. In this case, the bonus vote is guaranteed to increase ex ante utility if the distribution of valuations on the side with higher mean first-order stochastically dominates the distribution on the opposite side; loosely speaking, if the mass of voters with more intense preferences is larger on the side with higher mean. When this sufficient condition is satisfied, the superiority of the bonus vote over majority voting holds regardless of the exact value of the bonus vote and remains true asymptotically (whereas, with equally split electorates, majority voting again converges to random decision-making). First-order stochastic dominance is a sufficient condition for welfare gains, but our numerical exercises suggest that the result is more general: if the mean intensity of preferences is higher on one side of a proposal, counterexamples where simple majority voting is superior to the bonus vote exist but are not easy to construct.

It is this more general case of asymmetric distributions that better captures the basic intuition for bonus votes. If voters are equally split on a proposal, efficiency demands that the side with the higher intensity of preferences prevails; and if the voters are not equally split, a strongly affected minority should at time prevail over a less affected majority. This is the outcome that bonus

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[1] We use the term "referendum" to indicate any proposition decided by popular majority voting, whether initiated by the government (referendum in the proper sense) or by the people (initiative).

[2] Gerber (1999), Matsusaka (2004), the Initiative and Referendum Institute at www.iandrinstitute.org, and the Direct Democracy Institute at www.c2d.unige.ch provide a wealth of information on the history and practice of direct democracy around the world. Referenda are now used in many democracies (in Switzerland, of course, but also in the U.S., the European Union, Australia, and other countries), and their number is rising (in US states, for example, the number of referenda has increased in every decade since 1970, at an average rate of seventy per cent per decade).

[3] In many European countries, the practice of bundling referenda is less common when the stakes are high - a mistake, according to our analysis.