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Utilitarian Voting - Some Empirical Evidence

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Abstract: This paper investigates various arguments provided for the use of utilitarian voting by Hillinger (2020) using empirical data from an exit poll during the 2019 parliamentary election in the Austrian region of Styria. The data shows that voters are, in general, able to provide more detailed preference information, but are rather uncertain when it comes to using this data in voting rules for political elections. In addition, the paper uses the preference data to determine hypothetical outcomes for utilitarian voting rules and compares those to the outcome under the actually used plurality rule. The results support the view that more detailed preference information may change the outcome and explanations for those differences are provided.

Keywords: utilitarian voting, approval voting, voting rules, empirical, experimental

JEL classification: D71, D72

1. Introduction

In an interesting paper Hillinger (2020) promotes the use of utilitarian voting as an alternative to commonly applied and discussed voting rules.

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He thoroughly investigates and analyzes the advantage of using cardinal preference information over ordinal preference information and concludes that "utilitarian voting is superior to traditional voting rules" (Hillinger (2020)). This is to some extent similar to conclusions in Balinski and Laraki (2011) who considered the traditional voting model problematic in both, theory and practice. Of course, empirical data about utilitarian voting, especially in political elections, are very rare and usually focusing on voting rules based on very simple scales such as approval voting (Brams and Fishburn (1983)) or evaluative voting (Baujard et al. (2018)).

Recently, various experiments have been undertaken along real-world elections. However, the collection of such data is both, difficult and costly, and therefore only a limited number of such studies can be found, e.g., in Baujard et al. (2013, 2014), Roescu (2014), Alòs-Ferrer and Granic (2012) and Darmann et al. (2017, 2019). Those studies came along with the rise of behavioral social choice theory, which emerged in the early 2000s, with first attempts, e.g., by Regenwetter and Tsetlin (2004), Regenwetter et al. (2006), Regenwetter et al. (2007) or Popov et al. (2014). It analyzes the consequences of theoretical results for the practical use of voting rules.

In this paper, we want to look at some of the arguments raised in Hillinger (2020) by using empirical data from the 2019 parliamentary election in the Austrian region of Styria. During the election day voters were asked to respond to various questions concerning their preferences and their voting behavior (in form of an exit poll). This data is used to analyze certain voting aspects in relation to utilitarian voting.

The paper is structured as follows: Section 2 introduces the experimental design. Section 3 provides a general discussion about utilitarian voting and analyzes the perceived difficulties of the voters to provide more elaborate preference information and their willingness to use voting rules based on such information. This is followed by a comparison of the voting outcome under the current voting rule with the hypothetical outcomes under utilitarian voting rules in section 4. Finally, section 5 concludes the paper.

2. Experimental Design and Data

The data for this experimental study has been collected during election day for the 2019 Styrian parliamentary elections (24 November) in which six

parties were running for seats in the regional parliament.[1] We developed a design for the experiments and undertook an exit poll. In front of nine voting stations in the city of Graz, voters were invited to provide information about their preferences. A total of 937 voters participated in the exit poll. In particular, the survey contained questions about the voters' actual votes, their (sincere) rankings of the parties, approval votes, different forms of evaluative voting and various other (statistical) questions. In those nine polling stations we reached about 5.5% of the total voters. Given that the voters participated voluntarily in the experiment, the raw data obviously has a certain participation bias. This can be seen in comparing the actual voting results with the declared votes by the participants. To make the results more comparable to the actual voting outcome, the survey data has been weighted. The weights are determined by dividing the shares for each party in the official result by the share the same party received in the exit poll (see table 1).

Lists	SPÖ	ÖVP	FPÖ	Greens	KPÖ	NEOS
Official results (%)	18.50	23.94	14.62	21.67	13.24	8.04
Declared official votes of the participants (%)	13.76	16.76	5.90	36.07	16.42	11.10
Weights	1.34	1.43	2.48	0.60	0.81	0.72

Table 1: Official results, declared results, and weights

For example, the SPÖ has a weight of 1.34=18.50/13.76. If we compare the calculated weights, we observe that SPÖ, ÖVP and FPÖ have

[1] The parties running in the election were the following: SPÖ (Social Democratic Party), ÖVP (People's Party), FPÖ (Freedom Party), Greens (Green Party), KPÖ (Communist Party), NEOS (New Austrian Party). On a left-right ideological scale, the KPÖ is usually perceived to be left-wing, Greens to be left and the SPÖ to be centre-left. On the other side of the spectrum, NEOS are considered to be in the centre, the ÖVP to be centre-right and the FPÖ to be right-wing. In our study, the participants were asked to position the parties along such a political spectrum and the obtained data confirms this rather common perception.

weights larger than one and are therefore underrepresented. The other parties are overrepresented in the survey.[2]

3. How Voters Think About Using Different Voting Rules

The difference between utilitarian voting and traditional voting rules lies in the type of preference information used in the aggregation process. Whereas the former requires cardinal preference information, the latter rules usually need at most ordinal preference information as input (see, e.g., Brams and Fishburn (2002)). For example, the commonly used voting rule in political elections, plurality rule, only uses information about the top ranked candidate from each voter. This information is then aggregated to determine a voting outcome. In case of plurality rule, this is done by assigning one point to each voter's top ranked candidate, and zero to all other candidates, and order the candidates according to the total number of points they receive. On the other hand, the Borda rule uses the whole preference ranking and assigns predefined points to the candidates based on their ranking position (usually, if there are n candidates, those are $n - 1$ points for the top rank, $n - 2$ points for the second rank, down to zero points for the bottom ranked candidate). Again, the total sums of points determine the social ranking of the candidates. As should be clear, based on the scores assigned to different ranks, a huge number of voting rules can be defined.[3]

In contrast to the fixed scores used in the traditional voting rules, utilitarian voting differs in the sense that voters can freely assign points along a scale to the candidates or candidates can freely be assigned to certain scores along a scale. Hence, as Hillinger (2020) points out, the evaluation of a candidate is independent of the evaluation of other candidates.[4] However, for this statement to hold, one has to clarify whether

[2] Beware that the bias is a problem only insofar that we want to draw conclusions about the actual election. In case we are not concerned with that issue, we could as well use the unweighted data from the exit poll.

[3] Of course, various other ways of aggregating ordinal preference information could be used. Prominent voting rules in the literature are the Condorcet rule, where the social ranking is determined by pairwise majority comparisons, or rules that use scores in a sequential process, such as plurality runoff or single transferable vote.

[4] The utilitarian rules considered here only have a maximum and minimum of points for a voter but no fixed amount. Refer to range voting (Smith (2000)) for

the assignment of points is to be interpreted as coming from relative or absolute differences between the candidates. Let us assume that a voter always assigns the largest number of points to her most preferred candidate and the lowest number of points to her least preferred candidate. In a theoretical sense this is the optimal strategy for a voter. If this is the case, then the interpretation of the differences between the points assigned to the candidates, does have an impact on the outcome. Consider the following example in which there is a voting scale from 0 to +20, and there are four candidates and two voters, presented in table 2 (where higher ranked candidates are more preferred).

V_1		V_2	
a	20	c	20
b	10	b	13
c	5	a	4
d	0	d	0

Table 2: Utilitarian Voting

A utilitarian voting rule, which ranks the candidates according to the sums of points over all voters, ranks *c* (25 points) over *a* (24), *b* (23) and *d* (0). Now assume that candidate *a* drops out. From an ordinal point of view, nothing happens and voter V_1 still considers *b* better than *c*. From a cardinal point of view, it seems plausible that V_1 will reconsider her points assigned and give 20 points to *b*, because, as mentioned before, from a strategic point of view, it cannot harm a voter to assign the maximum number of points to its most-preferred candidate. What happens to *c* is not so clear. If V_1 interpreted the original point difference as *b* being twice as good as *c*, then she would assign 10 points to *c* and, given that V_2 does not change his assigned points to *b* and *c* (because *c* already receives the maximum points), candidate *b* (33 points) would now be socially preferred to *c* (30 points). On the other hand, if V_1 interpreted the scale as indicating absolute differences between candidates, then she will assign 15 points to

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cardinal rules with a fixed amount of points to be distributed among the candidates.

c and hence *c* (35 points) remains socially preferred to *b* (33 points). Both interpretations seem to a certain extent reasonable, but one of them would mean that the evaluation is not independent of the set of candidates available.[5]

One question remains, namely, whether voters do actually behave in a way that they always assign the maximum number of points to their top-ranked candidates. Although in our data the voters did not act in a real election, and therefore did rather not behave strategically, the scores assigned (when looking at our data when we asked voters about their evaluations on the scale [−20,+20]) should give at least some indication. Of the 804 voters that did assign points to all candidates, only 362 did give the maximum score of 20 to at least one of them and 590 the minimum score of −20 to at least one of them. The number of voters that assigned both, maximum and minimum points to candidates, was 287, i.e., roughly one third. This is actually a surprisingly low number and could support the argument given in Hillinger (2020) that under utilitarian voting the voters do evaluate the candidates independently.

As stated in Hillinger (2020), the difference between different utilitarian voting rules usually depends on the scale that can be used by the voters to evaluate the candidates. The simplest utilitarian voting rule is approval voting (Brams and Fishburn (1983)), whose scale consists only of the set {0,1}, i.e., a voter can either approve of a candidate, i.e., choose a value of 1, or disapprove of a candidate, i.e., choose a value of 0. Intuitively speaking, this would mean that a voter can vote for as many candidates she likes. As before, the social outcome is determined by adding up the scores of each candidate over all voters. Obviously, approval voting does not allow for providing fine-grained preferential information about the different candidates, but, from a practical point of view, it seems easily applicable in real-world elections. However, one unsatisfying fact of approval voting, pointed out also in Hillinger (2020), is that candidates which a voter does not know and candidates she does not

[5] However, whatever interpretation we take, we assume that differences between candidates can be measured. Perhaps, if we have goods instead of political parties, one could see this difference in terms of differences in willingness to pay for those goods, but what exactly would it mean to say that candidate *b* is twice as good as candidate *c*? However, this does not mean that the ordinal framework is definitely better, because, although *a* might be better than *b* and *b* better than *c*, a voter might feel much less strongly about the difference between *b* and *c* than about *a* and *b*, something that cannot be expressed in an ordinal setting.

like might both get a score of 0, although a voter, in practice, thinks about them differently. To make this distinction would require a larger scale. But, the larger the scale, the more difficult the task of evaluating different candidates seems to become. Hence, the larger freedom comes at a cost of higher effort (which some of the voters might not be capable or willing to take). This inability has been one criticism against using utilitarian approaches in economics (see also the discussion in Hillinger (2020)).

In addition, what would it actually mean if a voter says, for example, that candidate *a* is three times as good as candidate *b* and therefore assigns three times as many points to *a* than to *b*? But, at least implicitly, any voting rule based on ordinal preference information and a scoring vector does the same thing, only that now it is not the voter who can determine this difference but it is exogenously given. For example, if we have three candidates and use the Borda rule with scoring vector (2,1,0) for the different ranks, then every voter is assumed to consider the top-ranked candidate twice as good as the second ranked candidate (in terms of points assigned). Hillinger (2020) is also aware of this fact and additionally adds that many of the problems that come up in the ordinal framework of voting (see Arrow (1963)), would actually vanish in a cardinal framework.

However, the conclusion in Hillinger (2020) is that utilitarian voting does have an advantage over traditional voting rules based on ordinal preferences. But how do voters feel about the possibility of providing more preference information compared to the scarce information that is asked for under plurality voting? In our exit poll voters were requested to provide more detailed preference information and, in addition, also asked whether it was difficult for them to provide this information (e.g., a complete preference ranking of the candidates). The result was quite surprising. More than 76% of the voters considered providing a complete ranking easy or rather easy and only about 6% considered it to be very difficult. Although ranking the candidates is not exactly the same as providing cardinal information about the candidates, it is, however, a clear indication that voters actually feel competent enough to provide more sophisticated preference information. And for some types of utilitarian voting such as approval voting, it seems that the level of difficulty should be considerably lower than providing a complete ranking.

In some sense it would be interesting to know whether there is a difference (in terms of the perceived difficulty of providing more detailed preference information) among the different age groups. Actually, the data shows that the youngest voters (age 16−19) apparently have the largest

difficulty, with only 66.7% finding it (rather) easy. Least difficulties occur in the age group $30 - 49$ where more than 80% find it (rather) easy to provide extended preference information. A detailed summary of the data can be found in table 3.

age group	easy	rather easy	rather difficult	difficult
16-19	33.33%	33.33%	25.64%	7.69%
20-29	26.44%	48.08%	20.19%	5.29%
30-39	42.55%	37.77%	13.83%	5.85%
40-49	39.69%	41.98%	10.69%	7.63%
50-59	44.36%	33.08%	14.29%	8.27%
60-69	37.35%	37.35%	18.07%	7.23%
70+	42.86%	28.57%	19.05%	9.52%

Table 3: Difficulty of Providing Additional Preference Information

Given those responses, providing more detailed preference information does not seem a very challenging task. However, would the voters actually prefer voting rules, which are based on more elaborated preference information? Interestingly the answer to that question was rather split. About 42% of the voters were in favor of using more extensive preference information, whereas approximately 38% were against such voting rules (with the rest being unable to respond to that question). Of course, there could be various reasons why such a large share of the voters, although they consider stating such extended preferences rather easy, would still prefer not to use this information. One major reason could lie in the uncertainty that comes with such voting rules and the more complicated interpretation of voting results. Instead of having one voter behind any vote for a candidate under plurality rule, a utilitarian voting rule just outputs a vector of scores whose interpretation is definitely more complex and less intuitive (perhaps with the exception of approval voting). However, increased experience with any of those voting rules might rather quickly change that opinion, but this could only be tested in countries that already are using voting rules which require more preference information (such as single transferable vote, which is used in a few countries). An

additional problem might come from the fact that for parliamentary elections, the vote shares for the different political parties are usually transformed into seats in the parliament. There is a huge literature on apportionment (see, e.g., Balinski and Young (2001)), that deals with the fair assignment of seats to vote shares in elections whenever plurality rule or voting rules based on plurality rule are used. Suggestions for apportionments in the case of other voting rules are barely existing. That this is, however, an important point, can be seen in the following example in table 4 with three voters, $\{V_1,V_2,V_3\}$, and three candidates, $\{a,b,c\}$, where higher ranked candidates are more preferred:

V_1	V_2	V_3
a	a	a
b	b	b
c	c	c

Table 4: Preference Profile

Obviously, using plurality rule, the outcome vector for the three candidates $\{a,b,c\}$ is (3,0,0), i.e., candidate a gets three votes whereas b and c receive no votes. If the Borda rule is used, i.e., assigning 2 points to a top-ranked candidate, 1 point to a middle-ranked candidate, and 0 points to the bottom-ranked candidate, the outcome vector would be (6,3,0). Hence, candidate b, although obtaining zero points under plurality rule, would receive half the points of the unanimously top-ranked candidate a when using the Borda rule. How to deal with this situation in parliamentary elections does seem of certain importance.

4. The Performance of Utilitarian Voting

In this section, we want to compare the (hypothetical) outcomes of voting rules which use additional preference information, i.e., utilitarian voting rules and the Borda rule, with the actual outcome based on plurality rule. Let us start by providing some (rather informal) definitions of the considered (and in previous sections already mentioned) voting rules:

Plurality Rule: The plurality rule allows voters to cast one vote for exactly one candidate. The ranking of the candidates is determined by summing up the votes over all voters.

Borda Rule: The Borda rule assigns, in case of n candidates, $n - 1$ points to a voter's top-ranked candidate, $n - 2$ points to a voter's second-ranked candidate, down to zero points to a voter's bottom-ranked candidate. The ranking of the candidates is given by the total sums of points for each candidate over all voters.

Approval Voting: Under approval voting each voter can independently evaluate the candidates and either assign one point (approve) or zero points (disapprove) to as many candidates she wants. Again, the ranking of the candidates is determined by summing up over all voters.

Evaluative Voting: This is an extension of approval voting by adding a third possible evaluation class to which the candidates can be assigned. In our survey, the rule consisted of the three classes "+", "*o*" and "–" corresponding to scores of +1, 0 and −1.

±20 Points Rule: The ±20 points rule allows the voters to independently assign points to the candidates from −20 to +20. The sum of points for each candidate over all voters determines the social ranking.

As stated in Hillinger (2020), approval voting, evaluative voting and the ±20 points rule belong to the class of utilitarian voting. The difference between those rules lies exclusively in the scale on which the voters can evaluate the candidates. Whereas for approval voting this scale is very restricted (only two options, namely 0 and 1, exist), the ±20 points rule allows for considerable freedom to evaluate the candidates and indicate intensities in a voter's preferences over the candidates (actually 41 different evaluations are possible).

We have shown before that providing more detailed preference information (in form of rankings) was considered to be rather easy by a large majority of the voters. Although evaluating candidates along a scale is technically different to ranking candidates, at least for approval voting and evaluative voting the complexity for the voters seems to be rather limited. This might be different for the ±20 points rule, but already the fact that more than 85% of the voters in the exit poll did evaluate every single

party indicates that voters, to a large extent, seem able to provide this information.

Given the different types of preference information in the exit poll, one can determine the (hypothetical) rankings of the candidates for different voting rules.[6] Table 5 summarizes the voting outcomes for the above voting rules based on the obtained (weighted) preference data in the exit poll.

Voting rule	1st	2nd	3rd	4th	5th	6th
Plurality Rule*	ÖVP	Greens	SPÖ	FPÖ	KPÖ	NEOS
vote shares	23.94	21.67	18.50	14.62	13.24	8.04
Plurality Rule**	Greens	ÖVP	SPÖ	FPÖ	KPÖ	NEOS
vote shares	27.80	25.66	16.26	11.50	10.78	8.01
Borda Rule	Greens	ÖVP	SPÖ	NEOS	KPÖ	FPÖ
vote shares	21.04	17.63	17.27	16.97	15.56	6.89
Approval Vote	Greens	NEOS	KPÖ	ÖVP	SPÖ	FPÖ
vote shares	27.01	16.97	16.52	16.00	14.54	8.96
Evaluative Voting	Greens	NEOS	ÖVP	KPÖ	SPÖ	FPÖ
average vote	0.503	0.336	0.200	0.199	0.197	-0.529
±20 points	Greens	NEOS	KPÖ	SPÖ	ÖVP	FPÖ
average vote	8.40	5.59	4.75	3.19	2.24	-9.74

Table 5: Outcomes of Different Voting Rules
*actual results
**sincere voting

[6] Beware that voters had not been informed about the underlying voting rule used to aggregate the stated preferences. Hence, in an actual voting situation, their behavior could be different. Therefore, as there was no real election based on those preferences, the voters' incentives were rather to provide sincere preference information.

As we can see from table 5, the rankings derived from the discussed voting rules are rather different, especially what concerns middle-ranked parties.

One interesting fact is that one party, the Greens, had such a strong support based on the weighted survey data, that it is winning under every of the considered voting rules if sincere voting is assumed. However, it can be seen that the actual voting result has a different winner. Hence, it shows that a rather large number of supporters of the Greens did vote strategically in the actual election. This is of no huge surprise given that some of the other parties, which often received support from the voters of the Greens (such as NEOS or KPÖ), were struggling to pass the threshold to enter the parliament in all of the pre-election polls. Hence, some of the voters, that had the Greens top-ranked in their sincere preferences, did use their vote to support other parties.

What can be seen immediately is, that using more detailed preference information has an impact on the rankings determined by the voting rules. This holds in particular for medium parties (which are mostly ranked in middle positions by the voters) and parties that are very polarizing, i.e., parties that have strong support from a considerable share of the voters and are opposed strongly by a large share of the voters (see Baujard et al. (2014) and Darmann et al. (2017) for a detailed analysis of different types of candidates). The main polarizing party in the election was the rather right-wing FPÖ. It was top-ranked by quite a significant share of the voters, however, many of the other voters strongly opposed this party, as can be seen in the large number of bottom ranks or extremely low evaluations (usually with a "large distance" to the next more preferred party). Hence, any voting rule, such as the Borda rule or any utilitarian voting rule, that uses more detailed preference information, usually harms such a party. The second party that was to some extent polarizing is the ÖVP, which was the actual winner in the election. Especially when a fine-grained cardinal evaluation was possible (as, e.g., in the ±20 points rule), the voters who strongly opposed this party, were able to clearly express that preference (irrespective of how they ranked other parties they opposed).

Whereas polarizing parties usually do well in voting rules that only consider top-ranks (such as plurality rule), a party which is medium-ranked or evaluated in an average way by a large proportion of the voters, usually is harmed by voting rules that focus on top-ranks only, but benefits from voting rules using more preference information. In the 2019 election,

especially two parties, NEOS and the KPÖ, were of that medium type and rather struggling to get enough votes to pass the threshold for seats in the parliament. Many of the voters, however, do consider their political work as important. Under plurality rule, the voters lack the possibility to express this in case they do not want to give up their support of more preferred parties completely. From a certain point of view, voters will quite often run into a conflict between what they actually want and how they actually should vote to receive the best overall "package". Utilitarian voting definitely does reduce this conflict.

The previous discussion is supported by the data. If utilitarian voting is used, and, hence, voters are free to evaluate any of the parties along some pre-defined scale, the voting results significantly change. Already using approval voting, the by far lowest ranked party under plurality rule (NEOS) will be second ranked (although the difference to ranks three and four are rather small). If the scale becomes more fine-grained, the second position of the NEOS becomes much more stable. Also, the other medium party, the KPÖ, improves its position the more preference information is required by the voting rule. On the other hand, the rather polarizing parties (FPÖ, ÖVP) do obviously worse in any of those utilitarian voting rules compared to plurality rule.

A final interesting aspect is to look at those utilitarian voting rules, where voters can explicitly vote against certain parties, i.e., where negative points are available. This, probably, gives some vague idea about the general acceptance of the different parties. If we look at evaluative voting and the ±20 points rule, then we see that all the parties, except the FPÖ, have a clearly positive average score. This could be seen as a sort of support of the voters for them receiving at least some seats in the parliament. A more detailed analysis of how voters use grade scales in utilitarian voting rules can be found in Baujard et al. (2018).

5. Conclusion

In this paper we studied the 2019 Styrian Parliamentary elections based on data from an exit poll right after the actual election and investigated the use of utilitarian voting rules with respect to arguments provided in Hillinger (2020). We showed that, based on this data, the voting outcome is sensitive to the application of utilitarian voting rules, i.e., the election outcome does indeed change if more preference information is used. In particular, utilitarian voting rules support medium type candidates, which

are neither the top choices of voters nor strongly opposed. In addition, providing more preference information seems to be a rather easy task for many voters irrespective of their age. However, less than 50% of the voters do actually want to switch to a voting rule using such preference information. This might be due to the fact that almost no experience of the voters with voting rules other than plurality voting exists. In conclusion, utilitarian voting rules seem to be applicable alternatives to determine social outcomes and do provide additional freedom in evaluating candidates independently of the set of candidates available in the election.

There are still various interesting aspects of utilitarian voting rules that need to be investigated. First, what would be the ideal scale used? Although certain results on those issues do exist (see, e.g., Baujard et al. (2018)), the trade off between increased freedom in announcing preference intensities and the complexity of a voting rule is still not sufficiently analyzed. Second, strategic behavior under utilitarian voting rules is something that is still unclear given the lack of empirical data in situations where such voting rules are actually used in real elections. Third, the use of utilitarian voting rules in parliamentary elections needs adaptations in apportionment theory.

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