

Agendas and Strategic Voting

Charles A. Holt and Lisa R. Anderson*

Southern Economic Journal, January 1999

Abstract: This paper describes a simple classroom experiment in which students decide which projects to fund on the basis of majority voting. Several agendas are used to generate a voting cycle and an inefficiently high level of public spending. Classroom discussion allows students to discover for themselves how to manipulate outcomes through agenda design and strategic voting. The exercise leads naturally to a discussion of political institutions and the size of government.

Use: This experiment can be used in introductory and public economics classes to teach concepts of voting cycles and inefficiencies in public choice.

Time required: twenty minutes for reading instructions and taking votes, and fifteen minutes for discussion.

Materials: You will need a printout of the instructions for each participant, and one deck of ordinary playing cards for each group of seven voters.

JEL codes: A22, C92, D72

1. Introduction

In traditional economics classes, students learn that the independent actions of consumers and producers can lead to efficient market outcomes.¹ In a democracy, however, decisions are often made collectively, and the political process may result in a set of programs with costs that far exceed benefits. Conversely, projects with very high benefits to a minority of voters may go

* Holt: Department of Economics, Rouss Hall, University of Virginia, Charlottesville, VA 22903 USA; E-mail: holt@virginia.edu. Anderson: Department of Economics, College of William and Mary, PO Box 8795, Charlottesville, VA 22903 Williamsburg, VA 23187-8795 USA; E-mail: lrande@malthus.morton.wm.edu. We wish to thank Susan Laury for suggestions. This project was funded in part by the National Science Foundation (SBR-9617784).

¹ See Holt (1996) for a discussion of market efficiency in a classroom experiment. Potential inefficiencies of market allocations could be due to factors such as asymmetric information (Holt and Sherman, 1997). Also, see Holt and Laury (1997) for a classroom exercise that illustrates the potential inefficiencies of the voluntary provision of a public good.

unfunded, in the absence of logrolling. Outcomes can vary widely depending on the institution in place. With majority rule, for example, voters can strategically manipulate the agenda to favor certain outcomes.

This paper provides the setup for a classroom experiment in which several proposals are considered in sequence, and coalitions may approve a set of policies with a net loss to society. Pair-wise votes between alternatives can result in cycling, in which case the order of votes determines the final outcome. As voters become aware of this, attempts to control the agenda may occur. This exercise stimulates discussions of political institutions, strategic voting, and the size of government. The exercise can be used to supplement chapters on the role of government or public choice in introductory or intermediate microeconomics classes. It can also be used in more specialized topics courses, e.g., public economics, or law and economics.

2. Procedures

The exercise can be done with as few as 7 students, and will take from 30 to 45 minutes. You will need one deck of cards for as many as 14 people, and two decks for as many as 35 people. Cards are distributed to voters in a manner described below, and the suit of a card determines the voter's preferences. A voter who receives a Heart has a preference for the "Highway" project, and a voter who receives a Spade has a preference for the "School" project. A Club card has no effect on preferences. Each voter receives two cards, and therefore, some may prefer to see both projects funded, however, no one benefits twice from one project. For each group of seven voters labeled V1 to V7, the cards should be distributed as shown in Table 1. Note that the Club cards are neutral. Voters can be added in multiples of seven by replicating the above allocations. *When the number of students in a class is not an exact multiple of seven, let some students sit together in pairs and act as a single voter.* The numbers on the cards do not matter, and therefore, you can combine two decks to get 26 Spades, which will accommodate five replications of the seven voter profile. Finally, it speeds things up to sort the cards in advance and put them into envelopes.

Table 1. Voters' Card Allocations

Voter 1	Voter 2	Voter 3	Voter 4	Voter 5	Voter 6	Voter 7
Heart	Heart	Heart	Heart	Club	Club	Club
Spade	Spade	Club	Club	Spade	Spade	Spade
Highway	Highway	Highway	Highway	School	School	School
School	School					

The instructions in the appendix explain how payoffs are determined. Each voter pays a tax of \$200 for each project that is funded. The benefit of a school is \$300 for a voter with a Spade and the benefit of a highway is \$300 for a voter with a Heart. For example, if both projects are funded, voters V1 and V2 earn \$600 in benefits minus \$400 in taxes, and all other voters earn \$300 in benefits minus \$400 in taxes. Notice that five voters favor the school, so its aggregate benefit, $5 \times 300 = \$1,500$, exceeds the cost of $7 \times 200 = \$1,400$. Highway, on the other hand, has an aggregate benefit of $4 \times 300 = \$1,200$, which is less than the aggregate cost of \$1,400. Finally, the aggregate benefits of the Highway/School package, \$2,700, are less than the aggregate costs of the package: $\$1,400 \times 2 = \$2,800$.

These payoffs make it possible to observe a voting cycle in which one option beats a second, which beats a third, which in turn beats the first one. In a choice between neither project and highway by itself, highway wins with the support of voters V1 to V4. In a choice between highway by itself and both projects, the two-project package wins. This is because voters V1 and V2 benefit from both projects, and voters V5, V6, and V7 prefer the -\$100 from the two-project package to the -\$200 from the highway only. To complete the cycle, note that funding neither receives more votes than funding both. (The only voters who prefer both to neither are those who receive both a Heart and a Spade.)

Agenda 1 in the instructions appendix is designed to lead students through a cycle. This agenda also shows how each project may be funded when considered one at a time in sequence, even though a majority prefers to fund neither rather than both. The results of Agenda 1 can be

recorded by writing the vote totals on the blackboard: Highway ____ versus No Highway ____; School versus No School ____, Funded Projects ____ versus Neither. Agenda 2 leads the students back through the cycle in pair-wise comparisons of possible options. Agenda 3 is a commonly used setup where voters choose between two challengers in the first stage (primary) and then between the winner and a third option, the *status quo*, in a runoff. This agenda also illustrates the difference between naive and strategic voting, as discussed in the next section. If there is no strategic voting in Agenda 3, you can allow students to discuss strategies before repeating the sequence of votes in Agenda 3 a second time.

Depending on class size and probable attendance, arrange the cards in order so you can give the top two cards to the voter who corresponds to V1, the next two cards to the voter who corresponds to V2, and so forth. You can use rubber bands to separate the groups of 14 cards that go to each set of seven voters. If the number of students present is not a multiple of seven, let some of the excess students work in pairs, *but each pair only has a single vote*.

At the start of class, pass out the instructions, distribute the cards, read the instructions out loud, and answer any questions that arise. Read each agenda as you proceed, and make sure students record their votes and earnings. To facilitate later discussions, keep track of the vote outcomes on the blackboard. People who abstain from voting will not cause a problem in a large class, but abstentions should not be allowed in a small class (7 people) where vote counts are likely to be close. You may increase interest by announcing that one student will be selected at random, *ex post*, to be paid one percent of earnings plus four dollars.²

3. Discussion

Before beginning the discussion, put the seven-voter distribution of cards on the blackboard and explain that the classroom exercise used a multiple of this setup. The discussion of results can be organized around the agendas. Results from a session conducted in a public economics class at American University are presented in Table 2 below. The seven-card setup described above was replicated three times to accommodate 21 students.

² The additional four dollar payment is used to keep earnings positive since losses are possible in each of the four rounds.

Table 2. Results from a Classroom Voting Experiment (Vote counts are in parentheses.)

Agenda 1	Vote 1:	Highway? Yes (13) No (8)
	Vote 2:	School? Yes (16) No (5)
	Vote 3:	Winners of Votes 1 and 2 (9) or Neither (12)
Agenda 2	Vote 1:	Neither (8) or Highway Only (13)
	Vote 2:	Winner of Vote 1 (7) or School Only (14)
	Vote 3:	Winner of Vote 2 (7) or Both (14)
Agenda 3	Vote 1:	School Only (15) or Neither (6)
	Vote 2:	Winner of Vote 1 (9) or Both (12)
Agenda 3 (after discussion)	Vote 1:	School Only (9) or Neither (12)
	Vote 2:	Winner of Vote 1 (14) or Both (7)

In the first vote of Agenda 1, "raise your hand if you want to fund the highway," there were 13 yes votes. The school project was also funded (in Vote 2) with 16 yes votes. The discussion here should focus on how sequential majority voting can lead to a package of projects with a positive net benefit for a minority (6 out of 21). In the final vote of Agenda 1, Neither defeated the package of projects previously approved. This completed the voting cycle. Ask students to think of some realistic examples where sequential voting leads to set of funding decisions that would not survive a referendum on the package as a whole (e.g. spending and tax-reform propositions).

Recall that there were 13 votes in favor of Highway in the first vote of Agenda 1, despite the fact that only 4 of each 7 voters (in this case, 12 of 21) had highway cards. Similarly, someone without a school card voted to fund it in the second vote. You should encourage a discussion of this pattern if it emerges. In this particular class, one person without a highway card voted to fund the highway because he thought it would help many of his classmates. The

comments of other students also suggested altruism or reciprocity, and someone admitted that he made a mistake.

The second agenda is one in which the winner at one stage is matched against a new alternative in the next stage, as shown in table 1. Since Neither beats Both in the final stage of Agenda 1, Agenda 2 started with Neither, which lost to Highway Only, which in turn lost to School Only. Finally, School Only lost to Both, which again illustrates how pair-wise majority voting can result in a package funding decision that only benefits a minority. (Since voters V1 and V2 are indifferent between Highway Only and School Only, it is possible that Highway Only will win in Vote 2.) In any event, Both should prevail in Vote 3. The point here is not that majority voting necessarily results in an inefficiently high level of spending, but that this can happen for particular preferences and agendas.

The order of votes determines the outcome, and to emphasize this, ask students to design an agenda where School Only (or some other outcome) will be selected. They will quickly discover that there are many different ways to obtain each potential outcome. Again, have them think of actual situations where agenda manipulation might arise.³

The third agenda gives students an opportunity to vote strategically, i.e. against their preference in an early stage in order to affect the choices and outcomes in later stages. In contrast, voting strictly in accordance with one's preference in the current stage will be called naive or "sincere" voting. In Vote 1 of Agenda 3, there is a runoff between two challengers, School Only and Neither. The winner is then paired against the *status quo*, which is Both. Notice that naive voting results in School Only winning Vote 1 and Both beating School Only in Vote 2 by a vote of only 4 to 3, so the strategic outcome is less likely in small classes. Only people with both school and highway cards have a net gain from funding Both, so most people would have been better off funding Neither. If enough of these people vote for Neither in Vote

³ Levine and Plott (1977) describe a case of agenda manipulation that students will find interesting. The authors were members of a flying club and were selected to be on the committee that determined the agenda to be used in deciding which types of airplanes to purchase. They conducted a survey of members' preferences and then designed the agenda to achieve the configuration of types of planes that they preferred. The votes in the actual meeting went as they had predicted, and the president of the club tried unsuccessfully to deviate from the agenda during the course of the meeting.

1, then it will win and subsequently beat Both in Vote 2. It is unlikely that students will vote strategically at first.⁴ Notice from table 1 that only the 6 students who benefitted exclusively from the highway voted for Neither in Vote 1 of Agenda 3. We also observed very little strategic voting when Agenda 3 was used with a group of 35 economics professors and graduate students. Only 3 of the 15 voters who should have voted strategically for Neither in Vote 2 actually did so.⁵ Agenda 3 is analogous to a presidential primary, where one may vote against one's preferred candidate in order to help a candidate who is expected to be weak against one's second favorite candidate.

In order to promote strategic thinking, allow some class discussion after Agenda 3 but before Agenda 4, which is a repeat of Agenda 3. In the experiment summarized in table 1, a few students recognized this strategy during the discussion and explained it to the others. Hence, Neither won the first vote in Agenda 4 and proceeded to defeat Both in the second vote. Students with both highway and school cards were very unhappy with the class discussion and made a motion to terminate the discussion and proceed with the vote before doubters could be convinced that voting for Neither in the first round was the best strategy.⁶ Some classes will simply not produce a strategic outcome, especially groups of 7 voters where one mistake can change the vote outcome. The fragility of the result of agenda 3 may be due in part to the fact that School Only increases net surplus, and voters 1 and 2 with both Highway and School preferences may not care much in the second stage vote between School Only (where they lose

⁴ Eckel and Holt (1989) conducted a series of committee voting experiments with two-stage agendas and three alternative outcomes. They report virtually no strategic votes in the first sequence of votes, even when subjects were given each others' preferences in advance.

⁵ This session was conducted at a 1997 conference on Classroom Experiments in Economics at the University of Virginia. The participants came from a number of East Coast colleges and universities. The overall outcomes corresponded to those from the undergraduate class summarized in table 1. The only noticeable difference was that some of the professional economists sold their votes in the discussion period prior to Agenda 4.

⁶ In a public choice class, you can use this setup to evaluate the effects of alternative voting rules, e.g. Borda counts or other rank-based voting rules. Some of these procedures are summarized in Mueller (1989). Fischer (1996) describes a clever classroom experiment involving a rank-order voting scheme where the alternative with the lowest number of top rankings is eliminated until some alternative has a majority of top rankings among the alternatives not eliminated.

\$100) and Neither (where they earn nothing). If monetary incentives are not being used, students may be thinking more in terms of earning more than the others, which is not as likely with negative or zero earnings.

The implications of strategic voting can be addressed by asking students whether the agenda that they designed earlier to achieve a specific outcome would still succeed if voters are strategic. Finally, you should ask what characteristics of a committee or organization might make strategic voting more likely. Ask for examples, such as the case of department meeting with faculty who know a lot about each others' preferences on the basis of a series of votes on similar issues in the past.

4. Further Reading

Much of the public choice literature on voting and resource allocation was stimulated by Buchanan and Tullock's (1962) classic book, *The Calculus of Consent*. Mueller (1989) surveys the literature on voting mechanisms, i.e. majority rule and alternatives. Voting cycles are discussed in Brams (1976). A particularly interesting case of an actual voting cycle is reported in Neufeld, Hausman, and Rapoport (1994).

The first controlled voting experiment with financially motivated subjects is reported in Fiorina and Plott (1978). Levine and Plott (1977) contains a dramatic account of how the authors used an agenda to manipulate the purchase decisions of a private flying club. The prevalence of naive voting in agenda-controlled committee voting experiments is documented in Plott and Levine (1978). Eckel and Holt (1989) report experiments in which strategic voting emerged, but only with sufficient repetition. There are many other types of voting experiments in the economics and political science literatures. See McKelvey and Ordeshook (1990) for a survey of this literature.

Appendix: Instructions

This is a simple exercise to illustrate the effects of different political institutions. At this time we will give each of you two playing cards. These cards will determine whether or not you benefit from a variety of proposals. We will vote to select among the proposals, with majority rule being used at each stage of the voting, and ties will be decided by the flip of a coin. There are two potential projects, "highway" and "school". Each project, if adopted, will cost each of you \$200 in taxes. The benefits to you depend on which cards you have. If one of your cards is a Spade, you are a School person, and will receive a benefit of \$300 if a school is built, so the benefit net of your tax share is $\$300 - \$200 = \$100$. If one of your cards is a Heart, then you are a Highway person and you will receive a benefit of \$300 if the highway is built, again with the benefit net of taxes equal to \$100. If you have both a Heart and a Spade, then your net benefit with both projects is: $\$300 - \$200 + \$300 - \$200 = \$200$. If you do not have a Spade and the group votes only to build a school, then your benefit is $-\$200$, the tax cost. Your net benefit is also $-\$200$ if you do not have a Heart and the group votes only to build a highway. Finally, a Club card has no direct effect on your earnings, so if you have a Club and a Spade, you receive a net benefit of $\$300 - \200 if only school is adopted, and you receive $\$0 - \300 if only highway is adopted. Similarly, if you have a Club and a Heart, you receive a net benefit of $\$300 - \200 if only highway is adopted, and you receive $\$0 - \300 if only school is adopted.

At this time, please look at your cards and write down your net earnings for each of the four possibilities:

Highway only: $\$ \underline{\hspace{1cm}} - \$200 = \underline{\hspace{1cm}}$

School only: $\$ \underline{\hspace{1cm}} - \$200 = \underline{\hspace{1cm}}$

Both Highway and School: $\$ \underline{\hspace{1cm}} - \$400 = \underline{\hspace{1cm}}$

Neither: $\$ \underline{\hspace{1cm}} - \$0 = \underline{\hspace{1cm}}$

Negative earnings may be possible for some voters; losses will be subtracted and gains will be added to determine total earnings. These earnings are hypothetical and are used for purposes of discussion only (except as noted below).

Agenda 1

The first two votes determine which projects will be options on the final vote. The final vote will determine which projects are funded, and therefore, earnings are determined by the final vote.

First, raise your hand if you want to fund the highway.

your vote: yes ____ (fund highway)
 no ____ (not fund highway)

Next, raise your hand if you want to fund the school, whether or not the highway was funded.

your vote: yes ____ (fund school)
 no ____ (not fund school)

At this point, we have agreed to fund the following project(s): _____.
 Finally, we will decide whether to fund this project (or these projects as a package) or to go back to the initial situation of funding neither. First raise your hand if you prefer to fund neither project. Next raise your hand if you want to fund the project(s) approved thus far.

your vote: fund neither ____
 fund package ____

Now record your earnings.

Project(s) funded with Agenda 1. _____

Your earnings for Agenda 1: \$ _____

Agenda 2

We will start over with a new agenda, and your earnings will be calculated in the same way as before, but separately from those of Agenda 1. (Imagine that you have moved to a new town just in time for the voting.) First, you will choose between neither project or just the highway. Raise your hand if you want to fund only the highway; now raise your hand if you want to fund neither.

your vote: fund highway only ____
 fund neither ____

Next, you will choose between _____ (the winner of the previous vote) and to fund the school only. Raise your hand if you want to fund _____ (the winner of the previous vote); now raise your hand if you want to fund the school only.

your vote: fund previous winner ____
 fund school only ____

Finally, you will choose between _____ (the winner of the previous vote) and to fund both projects. Raise your hand if you want to fund _____ (the winner of the previous vote); now raise your hand if you want to fund both projects.

your vote: fund previous winner ____
 fund both projects ____

Now record your earnings.

Project(s) funded with Agenda 2. _____

Your earnings for Agenda 2: \$ _____

Agenda 3

You have moved again, and your new town has tentatively approved both the highway and the school. Two alternatives have been proposed: school only or neither project. The voting in agenda 3 will have two stages. In the first stage, you will choose between the two "challenger" proposals: school only and neither project. The winner in the first stage will be paired against the current status quo (fund both projects).

First stage (school only versus neither): Raise your hand if you prefer school only; now raise your hand if you prefer neither.

your vote: fund school only _____
fund neither _____

Second stage (first-stage winner versus both projects): Raise your hand if you prefer _____ (the first-stage winner); now raise your hand if you prefer both projects.

your vote: fund previous winner _____
fund both projects _____

Now record your earnings.

Project(s) funded with Agenda 3. _____

Your earnings for Agenda 3: \$ _____

Agenda 4

Repeat Agenda 3.

Project(s) funded with Agenda 4. _____

Your earnings for Agenda 4: \$ _____

Optional payment: Add up earnings from all agendas, subtracting losses if necessary, and compute 1% of this amount, which is then added to \$4.00 to determine your total earnings: \$ _____ . Now I will pick one person at random to be paid their earnings in cash.

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