DO VOTING SCHEMES MATTER?

Barbara C. Beliveau
Assistant Professor of Economics
St. Mary's College of Maryland
bcbeliveau@smcm.edu

INTRODUCTION

It's a cliché that when we want to make a group decision, the first option that comes to mind is "Let's take a vote!" It seems intuitive, fair and obvious to settle differences of opinion about which restaurant to go to or what movie to see. The fact that there are a variety of methods of voting and that not all methods produce the same result is often missed. This is an important issue in social choice, especially corporate governance where the voting scheme used to elect a company's board of directors influences its composition and, therefore, the company's responsiveness to shareholder concerns.

THE EXPERIMENT

Students vote to elect 5 members of an Extra Credit Committee. All students are included on the ballot. Three votes are taken:

Approval Voting: voters cast one vote for up to 5 people

Borda Voting: voters to rank all the candidates from first to last with no ties or omissions

Cumulative Voting: voters allocate 5 votes among their preferred candidates in any way they choose

Voting results are confidential. On the test, a question is randomly selected as the extra credit question. One point is added to the score of everyone in the class for each member of the elected committee that answers the question correctly.

After the test results are tabulated, the results of best performing committee on the extra credit question determine the extra credit for the class. The experiment is debriefed by discussing the (usually) different committees selected by the different voting schemes as well as the (usually) different results in terms of extra credit earned and the average test scores of the committees selected by the different voting schemes. The composition of the committees remains anonymous because members are identified only by randomly assigned alphanumeric codes.

PRE-TEST RESULTS

After a lecture and discussion of the pros and cons of each method, students are asked which scheme will select the most effective committee. The results of this survey are below.

APPROVAL	**4**
BORDA	**3**
CUMULATIVE	**5**

RESULTS OF FIRST ELECTION

VOTING SCHEME	COMMITTEE ELECTED	EXTRA CREDIT SCORE	TEST AVERAGE
APPROVAL	**ACDE (GH)**	**3/5**	**85%**
BORDA	**ACDEF**	**3/5**	**90%**
CUMULATIVE	**ABCDE**	**3/5**	**89%**

The schemes elect different committees and those committees perform differently. While both the APPROVAL and CUMULATIVE committees earned the maximum extra credit for the class, the BORDA committee might have been a better choice because that committee had the highest average test score and the extra credit question was randomly selected. It was also noted that a different committee would have generated a 5 extra credit points for the class and that still another committee would have had a higher average test score (95%) which would have increased the chances of earning points with a randomly selected question.

DISCUSSION

After presenting the test results in class, students are surveyed to determine if they would change their vote and, is so how. The results of this survey is presented in the following table. Initially, 4 students preferred APPROVAL voting, 3 preferred BORDA and 5 preferred CUMULATIVE.

After reviewing the experimental results, 2 of the APPROVAL students switched 3 to CUMULATIVE voting as their preferred method; one of the students who initially preferred BORDA switched to CUMULATIVE, and two students who initially preferred CUMULATIVE voting switched, one to APPROVAL and one to BORDA.

COMPARISON OF PRE- AND POST-EXPERIMENT VOTING PREFERENCES

PREFERRED POST-EXPERIMENT	APPROVAL	BORDA	CUMULATIVE	TOTAL
PREFERRED PRE-EXPERIMENT				
APPROVAL	0	0	2	2
BORDA	0	2	1	3
CUMULATIVE	1	1	2	4
TOTAL	1	3	5	9

MULTIPLE ITERATIONS, NO CLEAR WINNERS

This exercise was repeated twice. After the first trial, most students chose Borda as their preferred method. When the results for the committee elected for the second test were similar to those of the first, students again became more diverse in their preferred voting methods.

This provided a jumping off place to discuss Arrows Theorem and the impossibility of making a universally correct choice. Students can then discover that none of the voting schemes always produces the best result.

Borda may require more information than the voters have. Full rankings may not be possible. Cumulative voting allows people to indicate strength of preference.
Approval and Cumulative voting allow voters to use incomplete information, if they don't feel able to evaluate all candidates.

This is a natural segue to an introduction to Arrow's Impossibility Theorem, one of the cornerstones of social choice theory.

ARROW'S THEOREM

There are many ways to formulate Arrow's Theorem. One of the most intuitive states that any voting scheme with 3 or more options that satisfies four basic rationality conditions will contain a cycle. A voting cycle is a situation where option A wins against option B and B wins against C BUT C wins against A. This means that voting produces intransitive results.

Transitivity implies that if A is preferred to B and B is preferred to C then A is preferred to C. The rationality conditions are listed and discussed below.

1. UNIVERSAL ADMISSABILITY: Every voter can have any set of rational preferences. For example, for every 2 options, each voter can determine which is preferred or if they are equally desirable and individual preferences are transitive.
2. UNANIMITY: If every voter prefers A to B, the group prefers A to B.
3. INDEPENDENT OF IRRELEVANT ALTERNATIVES: Suppose every voter prefers option A to option B. If one voter, who had preferred option D to option C, now decides that C is better D, the group will still prefer A.
4. NON-DICTATORIAL: There are no dictators.