## I.  Introduction: Why Majority Rule?

A. Most work in rational choice political science and political economy focuses on simple majority decision making, even though the real institutional settings are generally more complex than simple voting models seem to imply. The use of simple majoritarian processes can be defended on several grounds.

B. First, majority rule may be used because it is an efficient decision rule.

  i.  To see this, suppose that governments engage in a lot of transfers from those out of power to those in power.  In such cases, voters will prefer majority rule to dictatorship if they are risk averse and their is uncertainty about who will be members of government.

  ii.  Suppose that amount W is will be divided up by government. Under dictatorship, this prize is shared by the elite so each person gets W/E where E is the number of persons in the dictator's inner circle.  If there are N persons in the community, the probability of being in the elite is E/N and the expected prize is (W/E)(E/N) = W/N.

  iii.  Under majority rule, the prize from being in the government is shared among the majority, E/(N/2), and the probability of being in the majority coalition is 1/2. The expected value is (1/2)(E/(N/2)) = E/N.

  iv.   In this case a risk neutral person would be indifferent between the two systems.

  v.  However, a risk averse person would prefer majority rule.  Diminishing marginal utility of income implies that U(W/E) (E/N) < U(E/(N/2)) (1/2). A risk-averse person will, thus, prefer majority rule to dictatorship. Buchanan and Tullock (1962) use this sort of reasoning to suggest that the "optimal" decision rule may vary from one man rule to unanimity according to the collective choice setting at issue.

C. Second, periodic majority rule elections are one method of causing the interests of the "representatives" to be aligned with the broad interests of the electorate (as we will see below).

D. Third, majority rule may be a fairly efficient method of aggregating information. And fourth, and perhaps most important for the theorists within public choice circles, majority rule is in many ways the most technically interesting of the three "obvious" pure times of collective choice: dictatorship, majority rule and unanimity.

E. In any case, whether efficient or not,  majority rule is widely used to select policies or representatives who, in turn, use majority rule, to pass laws and choose instituions--one may expect all those decisions to be fundamentally determined by the properties of majoritarian decision making.  Majority rule, consequently, is an important process to understand for the scientific purposes of public choice.

## II.  Majoritarian Democracy

A. There are two widely used models of majoritarian electoral equilibrium: One is based on the non-stochastic rational choice model from economics, the **Median Voter Model.**  The other is based on a stochastic voting, with somewhat weaker rational choice foundations: the **Stochastic Voter model.**

## III. An Illustration: Direct Democracy, Rational Voting and the Median Voter

A. Suppose that three individuals: Al, Bob and Charlie are to make a decision concerning which of three restaurants to eat lunch at.

  i.  Al prefers a restaurant where lunch can be had for $5.00, Bob wants a bit better fare, $10.00 and Charlie wants a more extravagant restaurant where lunch will cost around $20.00.

  ii.   For convenience assume that, given any two options, each will prefer the lunch that is closest to their preferred expenditure. Now consider some vote over alternative restaurants:

| | | | | |
|---|---|---|---|---|
| a. $10 vs. 20$ | A: 10 | B: 10 | C: 20 | 10 MP 20 |
| b. $5 vs. $20 | A: 5 | B: 5 | C: 20 | 5 MP 20 |
| c. $5 vs. $16 | A: 5 | B: 5 | C: 16 | 5 MP 16 |
| d. $10 vs. $5 | A: 5 | B: 10 | C: 10 | 10 MP 5 |

B. *Note that Bob always votes in favor of the outcome that wins the election.*  Note also that exactly the same number of individuals prefer a more expensive dinner as prefer a less expensive dinner than Bob.  *Consequently, Bob is the median voter.*

C. **The Weak Form of the** *median voter theorem* says the median voter always casts his vote for the policy that is adopted.

D. **The Strong Form of the** *median voter theorem* says that the median voter always gets his most preferred policy.

i.   [Note that in the example above $10 will defeat any other policy.]

ii.  [Bob's preferred restaurant, $10, is the **Condorcet winner**.  If there is a median ideal policy, it can beat any other alternative in a pairwise vote.]

## IV. Illustration: Representative Democracy: Electoral Competition and the Median Voter

A. A similar result is associated with representative democracy where the voters choose between two representatives who will subsequently make policies rather than choosing policies directly.

i.  If two candidates can choose policy positions, and voters will vote for the candidate closest to their preferred policy, it turns out that the candidate who is closest to the median voter will win the election.

ii. (This "distance based" model of voter behavior is sometimes called the **spatial voting model**.)

iii. If the candidates may freely choose policy positions, there is a tendency for electoral competition to cause them to select essentially identical policy positions  which maximize the median voter's welfare. In this case, the strong form of the median voter theorem results.

## V.  Proportional Representation and the Median Voter

A. Within electoral systems based on **proportional representation** (PR), the link between electoral competition and the median voter model is somewhat weaker because there the usual outcome of PR systems is a coalition government.

B. However, the weak form of the median voter model will tend to hold if political parties can be placed along an ideological policy dimension.

i.  That is to say, the median voter will have voted for the majority coalition.

ii.  This follows because the most likely coalition partners are parties that are ideologically close to each other. Consequently, every majority coalition will include the median voter.

C. In cases where the coalitions stable left of center and right of center groupings of parties, the "center" of these coalitions are sometimes modeled as Duverger platforms.

i.  These are the platforms that prevent a third party or coalition from entering and winning an election.

ii.  If voter preferences (or ideology) are uniformly distributed in a policy space between  0 and 1, the Duverger platforms are at $1/3$ and $2/3$.

iii.  In the case, the **strong form** of the median voter theorem tends to hold **on average** as control shifts back and forth between these coalitions in closely contested elections.

## VI. Some Implications of the Median Voter Model

A. Policies adopted via majority rule will tend to be moderate, e. g. drawn from the middle part of the political spectrum.

i.  ( The middle can be regarded as "moderate" essentially by definition.)  Most people will be at least partially displeased with the policies chosen insofar as they have different ideal point, even in a perfectly functioning democracy, as long as peoples tastes, circumstances, or expectations differ.

ii.  (Moreover, it is possible that most people are dissatisfied with government policy yet still prefer the use of majoritarian decision rules to any other.)

B. Another implication is that, increases dispersion of the distribution of voter preferences (increased radicalism) tends to have little, if any, effect on public policies unless it affects the median of the distribution of voter ideal points.  *This implies that median voter policies will be more stable than average voter policies.*

C. In the limit, at full equilibrium, government policies will maximize the median voter's expected utility, given his constraints, expectations, and goals.

i.  An implication of the latter is that *any change in circumstance that changes the constraints of the median voter, or the identity of the median voter, is predicted to have systematic effects on the size and composition of government programs.*

## VII. The Median Voter and Public Policy

A. Given these results, which can be generalized within limits, government policy can be modeled as an attempt to maximize the welfare of the median voter (as implied by the strong form of the median voter theorem).

B. As an example, consider the following model of the median voter's preferred level of environmental regulation.

i. Let $U = u(Y, E)$ where Y is material consumption (income) realized by the median voter, and E is the (perceived) level of environmental quality. Suppose that environmental quality is a function of regulatory stringency R and national income, $E = e(R, Y)$.

ii. To simplify a bit, suppose that the median voter gets a constant fraction "a" of national income which is decreasing in regulatory stringency, $Y = y(R)$ and $Ym = aY$.

iii. The constraints and definitions can be substituted into the median voter's utility function:        $U = ( ay(R), e(R, y(R)) )$

iv. This can be differentiated with respect to R to characterize the median voter's ideal stringency of environmental regulation R*. R* will satisfy

$$U_Y\, aY_R\ + U_E\, ( E_R + E_Y Y_R) = 0$$

v. The first time is the median voter's marginal cost and the last is his marginal benefit from more stringent environmental regulation.

C. The implicit function theorem can be used to determine the comparative statics of environmental regulation with respect to parameters of the median voter's optimization problem. The results are (qualitative) predictions about environmental policy. A similar model of the median voter's demand for public goods or transfers to the poor or elderly can be readily developed by changing the utility function and constraints a bit.

D. Notice that, in practice, the median voter model is consistent with, and provides and explanation of, what George Stigler (1970, JLE) has called **Director's Law**.

i. Namely, that "Public expenditures are made for the primary benefit of the middle classes financed with taxes which are borne in considerable part by the poor and rich."

ii. There is considerable empirical support for the median voter model as a model of government policy making, especially within policy areas where voters may be expected to have substantial information about the programs at issue, as with social security, public education, and highway systems.

## VIII. Some Normative Properties of Median Voter Policies

A. Although the median voter model implies that the median voter gets what "he wants," it does not imply that public policies will be efficient in the usual Paretian sense.

i. This can be seen mathematically by comparing the service level in the above model with that which would be Pareto efficient in a society of three individuals with different tastes or wealth.

ii. [ Recall that the Pareto Efficient level can be characterized with a social welfare function, or by maximizing one person's utility while holding the other's constant.]

iii. Alternatively, one can develop a graphical illustration that demonstrates that the median voter will prefer an output (or other policy level) that is Pareto inefficient whenever the median and "average" voter have different ideal points.

B. The median voter model developed to this point has ignored information costs faced by voters that might lead voter's to be less than perfectly informed about their tax burdens or the benefits of public programs.

i. In the case where the median voter's expectations are unbiased, he/she will still on average get what he/she wants.

ii. In cases where **rational ignorance** implies biased expectations about the consequences of policies (as for example when one remains entirely ignorant of some policy detail or implication) then the median voter may not even get what he/she *truly* wants.

C. Information problems open the door to interest groups and the bureaucracy who may manipulate voters by appropriately subsidizing various kinds of information and encouraging malfeasance (agency costs, bribery) on the part of elected and unelected government officials which would be unlikely to be detected by rationally ignorant voters.

i. Indeed, it can be argued that essentially the whole special interest group/rent-seeking literature is predicated on informational problems of these kinds in open democratic societies.

## IX. A Theoretical Weaknesses of the Median Voter Model

A. There is one nearly devastating weakness to the median voter model, namely "the median voter" does not always exist in an analytical sense.

B. Duncan Black is the modern (re) discoverer of the idea of electoral cycles in one-dimensioned policy spaces.

  i.  In some, fairly unlikely, one-dimensional arrays of voter preferences, the majority rule preference ordering may be non-transitive and no median voter would exist.

  ii.  [*Single peaked* preferences are sufficient to guarantee the existence of a median voter in one dimensional issue spaces.  See also Arrow's generalization of this point in his well known Impossibility Theorem.]

C. In 2+ dimensional cases, a median voter exists ONLY in cases where voter tastes are symmetrically arrayed (see Plott, 1969).   In most plausible looking 2D policy space diagrams, cycles are endemic even if voter preferences are single peaked!

  i.  E.G., in most illustrating examples, every policy has a non-empty *win set*.

  ii.  (Def: The win set of policy z  is the set of policies which could beat z in a majority rule election or referendum)

  iii.  Buchanan (JPE, 1954) has argued that "cycling" can, perhaps surprisingly, be a *good property* of majority rule systems insofar as it promotes equity.  With cycling, everyone eventually gets to be a member of the majority coalition at some point and so will not be perpetually exploited.

D. Fortunately for advocates of the median voter model, there is a body of **empirical evidence** that suggests voter preferences over policies are (largely) of the sort which can be mapped into a single issue space while retaining "single peakedness"

  i.  ( See, for example, Poole and Daniels).

  ii.  Moreover, the median voter model has a good empirical track record in Public Finance as a model of government program size across states and through time.

E. Thus in once sense the model is very frail, but in another appears to be (empirically) quite robust.