

## **I. Introduction: Rational Choice, Politics, and Public Policies**

Most of this course is focused on the origins and effects of public policies. For the most part, we'll assume that the effects are those intended by policy makers. That is to say, we'll assume that policy makers make choices that are fundamentally similar to those of consumers, investors, and firm owners. They have interests—both narrow and broad—that they attempt to further through the actions available to them. In the case of policy makers, these include the abilities to choose (or vote for) rules that will change the incentives for essentially all individuals in the territory governed.

The aims of government officials are in one sense similar, in that essentially all of them want to stay in office and advance in their careers. However, how they do so varies with the kind of government in which they serve and the position that they hold in those governments. Governments are normally hierarchical with those holding the “highest” positions having the greatest ability to make policy decisions. In democracies, elected officials and many of their appointees retain their positions in government only if they and/or their parties win the next election. This makes winning elections a primary consideration when such officials choose public policies. Elections matter, not because they very often directly determine public policies, but because they determine the persons that do so and provide reasons for such persons to favor some policies over others—namely those that are most likely to increase their probabilities of retaining their high offices.

Voters do not directly control public policies. They are simply persons who are eligible to vote, which in most cases includes essentially all adults in the territory ruled by their government(s). This has not always been the case, but suffrage laws have become more inclusive during the past century or two, with the result that “universal” adult suffrage is the normal case rather than the odd exception for democracies. Voters have interests—narrow and broad—that they attempt to advance through their choices, including those among parties and persons in elections among candidates for high office, and among laws in cases in which referenda are held.

That the same persons cast votes as shop in grocery stores, choose careers and investments, implies that similar considerations are likely to inform all such choices. However,

in their roles as voters, voters can only indirectly influence choices among new laws and revisions of old laws. They do not fully control the outcomes of elections in the same manner that they control the contents of their grocery carts when shopping, and electoral outcomes do not directly determine many policies, but they still have aims that can be advanced or harmed through such choices. And, the persons elected have reasons to pay attention to voter interests—if they want to retain their positions of authority.

Neoclassical economics emerged in the late nineteenth century and was revised and extended during the twentieth century. The use of rational choice models to characterize how public policies are chosen roughly a century after neoclassical economics first emerged.

After World War II, a field of research emerged which has been called variously “rational choice politics,” the “economics of politics,” “public choice,” or “political economy.” (We’ll mostly use the term public choice in this class.) Public choice attempts to characterize the types of candidates and policies that tend to be selected by voters who are largely—although not entirely—self-interested when they choose among candidates and policies. It is by pleasing a majority such voters, that elected officials rise to and retain their offices.

## **II. Governing Institutions: the Rules of the Political “Game”**

Although a wide variety of decision-making rules are used within democratic governments, we will focus most of our attention on implication of majority rule. (For a more thorough study of rational choice politics, you should take a course or independent study on public choice.)

Examples of other voting rules that are used include: (i) Unanimity or consensus. 100% approval is required to pass a new law. (ii) Super Majority Rule. More than 50% approval is required to pass new laws. This is required for constitutional amendments and impeachment under the U. S. constitution. Such rules are also commonplace in treaty organizations. (iii) Plurality Rule. The policy/rule/candidate with the most votes is adopted. This tends to generate results similar to that of majority rule when there are 2 candidates, but not when there are more than two candidates. (iv) Proportional representation. The nation’s parliament, assemblies, congress, etc., may be selected from party lists in proportion to the votes received by the parties offering slates of candidates for positions in those assemblies.

Contests in such elections are largely between parties rather than individual candidates—who are also assumed to have an interest in obtaining or holding onto policy making authority.

We will also for the most part assume that elected officials determine the policies of interest. In the case in which a single person (a prime minister, chancellor, or president) selects policies, we'll generally assume that he or she does so with the interest of voters in mind. In cases in which a committee or assembly makes policies, we'll assume that the median member of that group plays a pivotal role in the decisions made for reasons developed below.

However, it also bears noting—although we will not spend much time on this—that the internal decision-making procedures of government can be organized in a variety of ways. For example, most governments have a “king” (chief executive, president, or prime minister) and a “council” (parliament, congress, national assembly) who jointly make public policies. The “king” may be elected independently of members of parliament or may be selected by members of parliament. The “king” may have another council of advisor-managers often called a “cabinet,” with each cabinet minister or secretary having the ability to make some rules on his or her own within the domain of their cabinet's authority (usually subject to a formal or informal veto by the “king”).

The government may be organized into or have emerged from a hierarchy of regional and local government, each with some taxing and regulatory authority (federalism or fiscal federalism) that is beyond the direct control of the “central” government. More or less authority may be held by the regional (state, provincial, lander) governments, the policy members of which are elected through separate elections. Federal systems can be more or less decentralized.

The government normally has a bureaucracy—a rule-based organization that is responsible for implementing public policies. Doing so nearly always requires interpreting the laws adopted. Bureaucrats thus have some policy making ability because of the need for interpretation and also because some rule-making authority is delegated to them through legislation adopted by elected officials. Regulatory agencies often have the authority to make a variety of rules without much oversight from elected officials.

There is also often a constitutional court or committee that attempts to make sure that the government (all the above) follows the rules of the constitution. Within democracies this includes holding open and fair elections routinely, not adopting policies that are forbidden by the constitution, and sorting out differences of interpretation of existing laws by lower-level courts and the police. The judicial and policing system may also have a federal character.

To model all these complex relationships is beyond the scope of this course, although we will discuss a few effects of bureaucracy and federalism. Instead, **we'll usually assume that the constitution requires elections and that candidates that win a majority of the votes make all public policies** and the bureaucracy simply implements the rules adopted by elected officials. That is to say, we'll assume for the most part the problem of incentivizing elected officials is achieved through competitive elections and that of the bureaucracy through rules governing bureaucratic behavior, promotion, and dismissal. (Neither is always true, but we do not have time to develop a full-fledged public choice course, although we will cover a nontrivial portion of that literature.)

### III. Rational Choice, Majority Rule, and the Median Voter

Two men are largely responsible for establishing the models of elections used in most applied public choice research: Duncan Black (JPE 1948, 1958 book) and Anthony Downs (JPE 1957, 1957 book, WPol 1960).

Duncan Black determined that when voting independently, rational voters tend to produce outcomes preferred by the median voter (if there is a Condorcet winner) or more or less random outcomes when there are not (which he characterized as preference without a single peak). Kenneth Arrow (1951) showed that Black's "random result" generalized to other decision rules as well. Downs noted that electoral competition between two candidates or two parties for votes tended to induce candidate and/or party platforms to converge to the one most preferred by the median voter. This was not an "average" or "representative" model, but a Nash equilibrium to the game of competing for votes.

Down's model can be thought of as the electoral equivalent of the perfect competition model of economics. It is the simplest clearest characterization of electoral equilibria

possible, and empirically it works quite well as a predictor of both electoral outcomes (close votes) and public policies. The following two sub sections illustrate Black’s result and Down’s result.

A. An Illustration of the Weak and Strong Version of the Median Voter Theorem

Suppose that three individuals: Al, Bob and Cathy are attempting to choose where to eat lunch and will use majority rule to do so. Al prefers a restaurant where lunch can be had for \$5.00, Bob wants a restaurant where lunch costs around \$10.00 and Cathy, a gourmet, prefers a restaurant costing around \$20.00, because of its superior food and ambiance. For convenience, assume that, **given any two options, each voter will prefer the restaurant whose price for lunch is closest to their preferred one.** (This "spatial voting" can be shown to be the result when their marginal benefit and marginal cost curves are straight lines and a useful approximation for many other cases. See your in-class notes for an illustration.)

The following table illustrates how votes will be cast for various “referenda” over various restaurants. The column labelled options are the restaurants voted on, which each is characterized by the average cost of meals—which is used as a proxy for the quality of the food, service, and ambiance. The three columns under “votes cast” shows how Al (A), Bob (B), and Cathy (C) vote given the options “on the ballot.” The last column shows the outcome, which is written in terms of majority preferences: 10 MP 20 means 10 is majority preferred to 20.

	Options	Votes Cast			Outcome
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
e.	\$12 vs. 10	A: 10	B:10	C: 12	10 MP 12

The first three rows illustrate the “weak form” of the median voter theorem. The median voter (here Bob, whose ideal point is the median of the distribution of the three voter’s ideal points) always votes with the majority. The last two rows illustrate the “strong form” of

the median voter. In those cases, Bob not only votes with the majority, but get his (or her) most preferred restaurant. Note that Bob always votes in favor of the outcome that wins the election. (The B column and the Outcome column are EXACTLY the same.)

Note also that exactly the same number of individuals prefer a more expensive dinner as prefer a less expensive dinner than Bob. (This is one way to identify a median ideal point in a distribution of voter preferences (ideal points).) **Bob is the median voter.** He/she is the voter with the *median* ideal point.

Note that the last two rows show why a median voter's ideal point can beat every other possible alternative in pairwise voting. It can beat both an option that is a little or lot larger and a little or a lot smaller, although the coalition that defeats higher options is different from those that defeat smaller ones. (Note that the median voter is a member of both winning coalitions.) Such a pattern of voting is said to have a “Condorcet winner,” a concept named after the Marquis de Condorcet, an intellectual noble who had worked out a voting model similar to that illustrated in the period just before the French Revolution. His work, however, had been lost (forgotten) long before Duncan Black rediscovered it.

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

The **Strong Form** of the *median voter theorem* say the median voter always gets his or her most preferred policy. [In the example above Bob's preferred expenditure level, \$10, will defeat any other policy.]

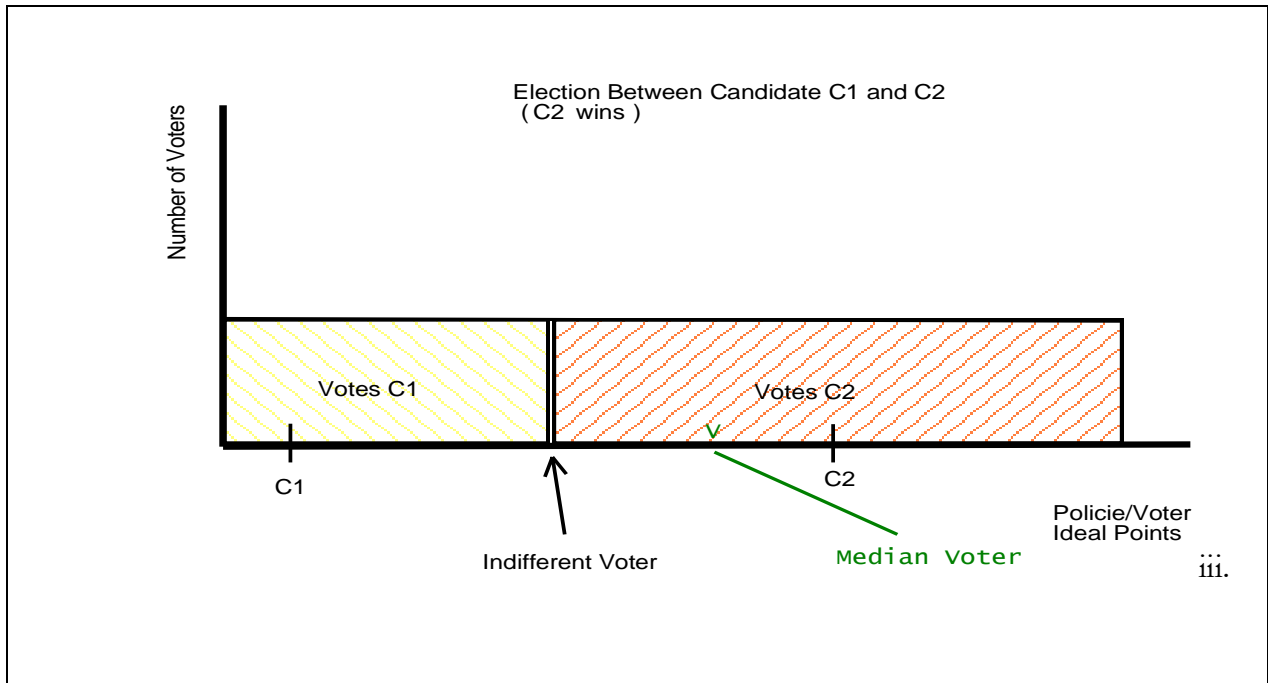
## B. Electoral Competition Between Two Candidates

The previous illustration demonstrates why the median voter determines the electoral outcome in referenda and direct elections. Moreover, it shows that in cases in which the median voter's ideal point is one of the options, it will defeat any other alternative. This tends to make the median voter's ideal point an “attractor” in referenda and direct election. The winning option may not be the median voter's ideal point, but the median voter will have voted in favor of the winner. And, options closer to the median voter's ideal will defeat ones that are farther away from it.

We next consider the case in which the policies voted on are not exogenously determined by emerge from competition for votes. This case was first clearly worked out by Anthony Downs, although there were precursors to it. In the elections modeled by Downs in the late 1950s, there are two pragmatic candidates competing for votes from a large electorate. For convenience, it is assumed that one candidate is always to the right of the other—although this is not necessary for the Downsian result to hold. We again assume that voters always cast their votes for the candidate (or policy) that is "closest" to them in the policy dimension. This is sometimes called sincere or non-strategic voting.

In real elections, voters sometime vote strategically—for example they may not vote for Green or Libertarian candidates even if they take policy positions (adopt platforms) that are closer to their ideal point than the Democratic or Republican candidate for the same office. Strategic voting of this sort tends to shrink the effective number of candidates to two, the number assumed by Downs.

Competition between candidates for government office can be analyzed with the diagram below. It begins with the distribution of voter ideal points. These are the ideal points of the voters that will actually turn out and votes (the ones that stay home do not count and do not influence candidate position). The diagram assumes that voter ideal points are uniformly distributed between some farthest left and farthest right position, but that is simply to make the diagram easier to draw. (In class, I'll use a less smooth and simple distribution to demonstrate that the distributional assumption does not affect the Downsian equilibrium.)



The distribution drawn is the frequency distribution of voter ideal points. Voter ideal points are represented along the horizontal axis (the X or G axis) and the number of voters within a particular range of ideal point is represented by areas under the curve. One can think of the vertical height as the number of voters with a particular ideal point. Although this is not exactly correct, it's a useful approximation and would be true if we assumed a finite number of voters with discrete policy ideals.

We'll continue to assume that voters are all spatial voters and thus vote for the candidate whose platform or announced policy positions are closest to their own ideal point. This implies that voters who are exactly halfway between the two policy alternatives espoused by the two candidates will be **indifferent** between the candidates, and so decide which candidate to vote for by figuratively "tossing a coin." Note that all the voters to the left of the indifferent voters will vote for the candidate on the left, and all those to the right of the indifferent voter will vote for the policy on the right. Not also that almost all voters (all but the indifferent voters) have clear preferences for candidates—although relatively few voters will regard either candidate to be ideal!

The illustration above assumes that candidates 1 and 2 have taken positions and that voters vote for the candidate closest to their ideal point. In the case illustrated, Candidate C1



loses this election. He/she get far fewer than half of the votes. You can easily determine this because the median voter ( $v$ ) votes for candidate 2 and many of the voters to his/her left do so as well. (Remember that half of the voters have ideal points to the left of the median and half have ideal points to the right of the median voter.)

**How could candidate 1 have done better?** Clearly, he or she should have chosen a policy position further to the right, e.g., one that is closer to the median voter. **It turns out that in a two-candidate election, the candidate who is closest to the median voter's ideal point always wins the election, because that candidate will always receive at more than half of the votes.** The weak version of the median voter theorem thus applies to this model as well as the one illustrated above with respect to two restaurants. The median voter always votes with the majority.

This implies that if candidates are free to adjust their policy position to attract votes, they will each try to be closer to the median voter's ideal point than the other candidate. This platform-based competition for votes implies that both candidates will tend to converge toward the median voter's ideal platform as they compete for votes. At the Nash equilibrium, both candidates would take essentially the same position, namely that of the median voter. At that equilibrium, you could imagine each candidate reading the other's speeches without surprising their supporters.

This is the Downsian electoral equilibrium. At this Nash equilibrium of candidate positions, the median voter gets exactly what he or she wants. **That is to say, the strong form of the median voter theorem holds at the Nash equilibrium of the contest between candidates for votes!**

This model can be interpreted as the electoral counterpart to the perfectly competitive equilibrium.

However, don't be surprised if complete convergence does not occur in every policy dimension any more than you are surprised by price differences in real-world markets. The median voter model is best thought of as an "attractor," a tendency that tends to emerge in open competitive elections for the votes of well-informed voters among two candidate who are sufficiently trustworthy to be believed when they make policy promises. There are

certainly cases where full convergence does not occur, but significant convergence is evident for many—arguably most—election contests in which voters know quite a bit about candidate policy positions.

A good subjective test of convergence is whether you can imagine the two main candidates delivering each other's speeches. Of course, the speech would sound a bit different when delivered by the opposing candidate and because of the tone of voice might have somewhat different meanings. But if the result would be to reflect each candidate's position on the issue being addressed in the speech, the two candidates have converged to more or less the same policy position.

As a consequence of convergence induced by candidate competition, it is not surprising that statistical implementations of the median model fit the data in the U. S. and other countries quite well.

#### **IV. The Strong Form of the Median Voter Model and Public Policy**

A number of important insights follow from the median voter model of electoral equilibrium:

**First**, insofar as competitive mass elections determine public policies, the size and types of government programs that exist in democracies reflect **both** the benefit and cost sides of programs **from the point of view of the median voter**.

**Second**, the “pivotal” or median voter is approximately the voter with median characteristics. That is to say, he or she is a voter of approximately with median income, median age, median education, median health, median family size, median political ideas and so forth...The median voter is by definition a “moderate” although the meaning of “moderate” may vary through time as ideas about “ideal policies” change among moderates.

**Third**, the median voter will not ordinarily be the same as the median member of the community because not all persons are equally likely to vote. In the US it turns out that the median voter is a bit older, richer, and better educated than the median member of the group of persons eligible to vote. Poor, young, and less-educated persons vote less frequently than older, richer, and more educated persons.

**Fourth**, most people will be at least partially displeased with the policies chosen

insofar as they have different ideal points, even in a perfectly functioning democracy, as long as people's tastes, circumstances, or expectations differ. In the above election, only the median voter regards the outcome to be ideal. The others regard the outcome to be too far to the left or too far to the right! Thus, it should not be surprising that a majority of people think that the country is heading in the "wrong direction," but they will not generally agree about which direction the country should be headed in.

**Fifth,** anything that changes the median voter's preferred policy will affect government policy. That is to say, an implication of the median voter model of electoral politics is that any change in the constraints of the median voter, the information of the median voter, the tastes of the median voter or in the ideology of the median voter will have systematic effects on the size and composition of government programs. (They may not take effect immediately, but they will over the course of a series of elections.) For example, to the extent that government services are normal goods in the economic sense, government services will tend to increase as the median voter becomes wealthier. They will also increase as their "price," their tax-cost, relative to private services decreases, and as their perceived value to the median voter increases.

**Sixth,** it is only the policy preference of the median (moderate) voters that matters, not the dispersion or symmetry of the distribution. Increases in 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 public policies will be more stable than the "average" voter's preferred policies. (The average is affected by asymmetric shifts in dispersion to the left or right that do not affect the median. To see this, draw a couple of such changes in the "radicalism" of the left or right or both that change the mean of the distribution but not the median.)

**Seventh. Institutions Matter.** The manner in which the median voter theorems should be applied vary with political institutions. For example, in a proportional representation electoral system, different parties represent different parts of the political spectrum and coalition governments are formed. Normally the party that represents the median voter will be part of that coalition, in which case the weak form of the median voter theorem applies—

the median voter votes for the majority coalition. In cases in which a center-left or center-right party is the largest or is pivotal in the coalition, the strong form may also apply. In the United States, where presidents are elected indirectly by state “electors.” The pivotal voters are in the pivotal states rather than in the population of all voters. In those states, the votes are often very close, as predicted, and so the median voter of those states is approximately pivotal or decisive in national elections. It is those median voters that would “get their way” on public policies insofar as presidents are honest and can effectively choose public policies.

**Eighth. Political parties also matter.** In most cases, voters who regard themselves to be “loyal members” of party X, will vote for the candidates recommended by party X without giving others much thought. As long each party’s membership includes less than half of the electorate, competition for “independent” or “swing” voters take place, and one of those voters will be the median or pivotal voter, rather than one of the partisans. Thus, the Downsian logic will affect the positions that candidates take during the election (especially near the end of an election) even when partisan interests matter and are intense.

In cases in which a party has majority support, the median voter model should be applied to that party’s primary campaign and will end to effect candidate position when there are essentially two main candidates for office.

Again, keep in mind that a candidate’s stated policy positions are not the only determinant of a voter’s assessment of a candidate. A rational voter would also take account of the extent to which they can trust what a candidate promises—does he or she really mean “it” or not? Thus a good deal of campaigning involves maligning the opposing candidate to undermine voter trust in one’s opponent—rather than espousing clear policy positions.

## V. The Basic Mathematics of a Median Voter Model of Policy Formation

The strong form of the median voter theorem implies government policies in well-functioning democracies can be modeled as the solution to a single person's political optimization problem—namely, the median voter’s.

Such optimization problems are often very straightforward to characterize and to perform comparative statics on. Consequently, the median voter model is often used to analyze the level and growth of government service levels. (Indeed, it is more widely used than

recognized. If one looks at the variables included in estimates of policy models conceived by persons who are ignorant of the median voter model, one will often observe that the “right” variables are included, although they are interpreted somewhat differently by the authors of such research. Thus, the median voter model is actually more widely used than recognized.)

To illustrate how one might construct a neoclassical median voter model of a public service, consider electoral selection of a public service that is to be funded with a non-distorting "head tax." This tax system is the easiest to model since as a lump sum tax it does not have a deadweight loss. It also generates theoretical results that are largely consistent with neoclassical models of consumer choice. Other tax systems do not necessarily do so, although at the national level they are more common than head taxes or equal cost share tax systems. Equal share cost systems are, of course, commonplace in private clubs and condo associations.

Each voter in his capacity as a “policy maker” is modeled as if he or she is simply a consumer in a grocery store, except that in addition to private budget constraints, he or she also has a “public” budget constraint to take account of. For the purposes of this illustration, we’ll begin with a distribution of voters, rather than simply assume that we know who the median voter is.

Suppose that voters have the same strictly concave utility function defined over private consumption ( $C$ ) and some public service ( $G$ ), but have different amounts of money,  $W_i$ , to allocate between  $C$  and  $G$ . To further simplify, assume that the government faces a balanced budget constraint, that all expenditures are paid for with a head tax,  $T$ , and that there are  $N$  taxpayers in the polity of interest. The public service is assumed to be a “pure public good,” an idea developed by Paul Samuelson in the mid 1950’s. A pure public good is perfectly shareable, whereas a pure private good is not. The latter are the goods used in most micro-economic texts. Governments often produce private services, but we’ll use Samuelson’s pure public good, partly because these are among the types of goods that governments might be tasked with producing, because they are difficult for markets to produce.

Given all these simplifying assumptions, a typical voter’s ideal policy level can be characterized as his or her utility maximizing combination of public services and private

consumption given:

- a.  $U_i = u(C_i, G)$  (his or her objective function)
- b.  $W_i = C_i + T$  (his or her personal budget constraint)
- c.  $g(G) = NT$  (the public sector budget constraint)

Note that the head tax,  $T$ , can be written as  $T = g(G)/N$  and substituted into the private budget constraint to make a single unified budget constraint:

- a.  $W_i = C_i + g(G)/N$
- b. This in turn can be solved for  $C_i$  and substituted into the utility function to create an objective function with one control variable ( $G$ ), but in a form that fully incorporates the effects of the personal and public budget constraints:

$$U = u(W_i - g(G)/N, G)$$

Differentiating with respect to  $G$  yields a first order condition that characterizes the median voter's preferred government service level:

$$-U_C (g_G/N) + U_G = 0 \equiv H \quad \text{or equivalently as} \quad U_C (g_G/N) = U_G$$

Subscripts denote partial derivatives. The right-hand side of the second form of the first order condition is the **subjective marginal benefit** (marginal utility) of the government service, the left-hand term is the subjective marginal opportunity cost of government services in terms of lost private consumption. Note that the **subjective marginal cost** of the service is jointly determined by preferences (marginal utility of the private good  $C$  being sacrificed to obtain good  $G$ ), the objective production or financial considerations of the service of interest,  $g_G$ , and the number of persons sharing its cost,  $N$ .  $(g_G/N)$  is the voter's marginal cost share, or “objective price” for the government service.

The first order condition together with the implicit function theorem implies that each voter's demand for public services can be written as:

$$G_i^* = \gamma(W_i, N)$$

That is to say, each voter's ideal point is a function of his own wealth or income and the population of taxpayers in the polity of interest. The population of taxpayers affects the marginal cost of the public service. The shape of that function is jointly determined by the voter's utility function and the production function for the service of interest.

The implicit function differentiation rule allows one to characterize the comparative statics of how changes in wealth,  $W_i$ , and number of taxpayers,  $N$ , affect a voter's demand for government services.

$$G^*_W = H_W / -H_G \quad \text{and}$$

$$G^*_N = H_N / -H_G \quad \text{where } H \text{ is the first order condition above.}$$

Recall that fully characterizing these derivatives requires using the partial derivative version of the composite function rule and paying close attention to the location of all the variables in the various functions included in  $H$  (the first order condition). Doing the math, we find that:

$$G^*_W = [-U_{CC}(g_G/N) + U_{GW}] / \\ -[U_{CC}(g_G/N)^2 - U_C(g_{GG}/N) - 2U_{CW}(g_G/N) + U_{GG}] > 0$$

and

$$G^*_N = [-U_{CC}(g_G/N)(g(G)/N^2) + U_C(g_G/N^2) + U_{GW}(g(G)/N^2)] / \\ -[U_{CC}(g_G/N)^2 - U_C(g_{GG}/N) - 2U_{CW}(g_G/N) + U_{GG}] > 0$$

Under head-tax finance—a system used by many clubs and condo associations, as mentioned above—each voter's demand for a pure public service rises with their personal wealth and with population.

Since voter demand for the service of interest ( $G$ ) is strictly increasing in  $W$ , it turns out that the median voter is the voter with median income. It is this voter, whose demand for public services lies exactly in the middle of the distribution. The median voter's demand can be found by substituting  $W^v$  into the voter's demand function above,  $G^v_* = \gamma(W^v, N)$ . Given all the assumptions, the logic of rational choice implies that **the voter with median income has a preferred service level  $G^v_*$  that is exactly in the middle of the voter ideal points**. The same number of voters prefer service levels greater than  $G^v_*$  as those who prefer service levels lower than  $G^v_*$ .

The comparative statics of a voter with median income can, in this case, be used to characterize the course of government spending through time, as other variables change. In this model of median voter preferences, there are only two exogenous variables,  $W^v$  and  $N$ ,

and changes in those variables will change public policies. Government services will rise when median wealth increases or when the number of voters increase. (Changes in tastes which affect the shape of the utility function or in technologies that affect the cost of the government service have been left outside the model, but would also affect the course of government policies in this model of government policies.)

It bears noting that **not every median voter model has unambiguous predictions** about the effects of changes in the parameters of the median voter's choice problem on the his or her demand for a given public policy. But even in those cases, useful insights can often be obtained about the relationships between the parameters that ultimately determine public policy formation are often obtained even in those cases. (See for example Batinti and Congleton 2018 [EJPE], for an application of the median voter model to national health care expenditures and research and development subsidies.)

One of the most cited applications of the median voter model was developed by Meltzer and Richard (1981), who provides a lean but sophisticated analysis of how the median voter model can be used to represent the equilibrium size of government in a pure transfer model of government policies.

### **C. Extensions and Limits of the Median Voter Model**

A variety of somewhat richer models can be developed from the above template. Tax systems can be changed, and more complex voter tastes can be developed that account for ideology and informational constraints faced by the median voter. Various degrees of altruism and trust in government can be taken into account. Ideology can be taken into account, and expectation about the future can also be taken into account. The median voter model can also be modified to take account of voter ignorance, biased expectations and the pursuit of normative or expressive goals when voting.

And as mentioned above, most—but not all—statistical models of policy preferences are very similar to those that emerge from the median voter model, even in cases in which the scholars undertaking the study either were ignorant of the median voter model or neglected to mention the connection between their analysis and that model.

Unfortunately, the theory underpinning the model, while clear, relies on a number of



assumptions that not always even approximately met. When a median voter does not exist, there are few plausible models of political equilibria in democracies. Policy choices in such cases resembles a random walk—at best.

The next subsections discuss some of those extension and problems.

## VI. Puzzles and Problems Associated with the Median Vote Model: Rational Ignorance, Fiscal Illusion, and other Sources of Systematic Mistakes

Informational assumptions about candidates and voters, turnout, and electoral institutions also tend to affect the character of an electoral equilibrium. An implication of the median voter theorem(s) is that the median voter gets what she/he wants. However, the median voter's ability to pick the policy that is most in her (or his) interest is limited by the information, theories, and time that she (he) has available for analyzing the alternatives.

Analyzing the relative merits of alternative public policies is just like any other activity--voters will engage in it only up to the point that maximizes expected net benefits. In most cases this occurs at the point where the expected marginal benefits of more information and more analysis equals its expected marginal cost.

An implication of “rational ignorance” (as developed by Downs, 1960, Tullock, 1967, and Congleton 2001) is that voters will **rationaly remain ignorant** of much useful policy information and so the median voter may get what he or she wants, but it may turn out to yield smaller net benefits (or losses) than expected. Voters will use smaller than possible samples of data and ignore types and dimensions of information that are relatively costly to acquire and/or to analyze.

When voters have biased expectations about the benefits and/or cost of public programs they are said to exhibit **Fiscal Illusion**, an idea that is older than rational ignorance, going back at least as far as Puviani (1903). For example, in cases in which the median voter's expected marginal benefit from a public policy is greater than the actual benefit or her (or his) expected marginal cost is lower than the actual cost, the result will be an “over demand” for public services, relative to that which actually maximizes net benefits for the median voter. [Draw a diagram (and/or write down a few equations) that illustrates the collection of information by an expected net benefit maximizing individual.]

A bit of rational ignorance is not a problem for democracy as long as it does not induce "biased median voter expectations" about the benefits and/or costs of public policy. As long as median estimates of the costs and benefits of government policies are **unbiased**, the median voter will not personally make systematic mistakes when the voter for policies or candidates. The Condorcet Jury Theorem implies that median voter outcomes tend to be, in a sense, more informed than any single voter is (Grofman et al 1983, Congleton 2007, McCannon 2016). Mistakes will be made voter by voter because of the noisy (high variance) estimates, but these will tend to average out as long as voter expectations are generally unbiased..

Such unbiased estimates are most likely in areas in which the collection of information is relatively low cost. In such cases, voter will collect reasonably complete data sets in the sense that all relevant details are known. For example, one might collect quite a bit of information about the need for road and sidewalk repairs in Morgantown by walking around town for a few days. (People from other towns would have to make a special trip to do so.) In cases in which reasonably complete information can be accumulated easily, voters will tend to have unbiased estimates--although not perfect ones--and electoral decisions based on those estimates will *on average* advance the interests of the median voter. Much of a voter's interest in information is its private value rather than its value in election, so more of it is accumulated than the early models of Downs and Tullock predict. For example, in a town with lots of potholes some vehicle purchases become impractical and others more so.

As long as voter expectations are unbiased, the Condorcet jury theorem implies that the outcomes of majority rule implicitly "aggregates" the information in the minds of voters (by using the median of their estimates when assessing candidates or policies). See [Congleton 2007](#) for a simulation of the "information aggregating" effect of the jury theorem.)

## **VII. Puzzles and Problems: Ignorance, Agency Problems, and Interest Groups**

It bears noting that both governments and interest groups may attempt to induce biased expectations by "subsidizing" (freely providing) information about the benefits of programs and/or "taxing" (withholding) information about the costs of programs. Such advertising may affect voter expectations and thereby public policies. A good deal of what

**interest groups** do is informational in nature—both in public and in private (Congleton 1986, 1991, 2001).

Nonetheless, it bears noting that **voters collect different kinds and amounts of information** because they are often affected differently by public policies because of their occupation, hobbies, or ideology. Voters typically will not know very much about specialized issues, like the tax treatment of insurance companies, the specific details of farm subsidies, the manner in which public services are produced (by whom, how and where). However, farmers will tend to know more about farm policies than non-farmers; persons in the financial industry will tend to know more about financial regulations than those outside the industry; teachers will tend to know more about school budgets than non-teachers; and so forth.

In such policy areas, it is only the relatively informed voters “that count,” because others are oblivious (ignorant) about the details of policies in those areas and so not influenced by them. As a consequence, political platforms may look like consequences of successful interest group rent seeking (see below) or clientele politics but may simply reflect voting behavior that reflects who knows what about specific policies.

### **Rational Ignorance and Agency Problems**

Candidates may say one thing to get elected and do something else once in office. Moreover, elected representatives may not be able to fully control the bureaucracy. William Niskanen, for example, suggests that **bureaucrats** have incentives to try to **maximize their budgets** for many private reasons. Larger budgets often create new opportunities for advancement, more pleasant office environments, more staff support, and, perhaps, even opportunities for travel. Note that even “public spirited” bureaucrats who want to advance their agency’s “mission” will consistently lobby for larger budgets than the median voter may prefer. Thus, Niskanen argues that lobbying by bureaucrats creates systematic increases in government budgets to the extent that they are successful. (Draw an illustration of bureaucratic bargaining, using all or nothing offers to illustrate an extreme case in which this may happen.)

However, such informational problems are reduced to some extent if one believes that candidates fear “fire alarms” (McCubbins and Schwartz 1984, Hopenhayn and

Lohmann, 1996)). Candidates or bureaucrats that cheat voters may be discovered, and their poor behavior may appear on the evening news or newspapers or blogs. Such scandals may attract more attention from voters than “ordinary” day to day news, and affect their future votes for officials running for reelection, who, in turn, will spend more time policing the bureaucracy and analyzing their proposed budgets.

### **“Non-Rational” Voters?**

It bears noting that special interest politics is not just about economic issues. A good deal of campaigning and lobbying is ideological rather than economic in nature. Voters often appear to vote their “ideological interests” rather than their practical or economic interests. There are several possible explanations for this. One is that it is a method of economizing on information used by voters to figure out which candidates are most likely to advance their practical interests. Others argue that voters have “non instrumental” reasons for voting that leads them to vote in favor of policies because of “expressive” motivations or “identity,” or because, like a lottery ticket, it is a cheap dream. For example, the importance of “expressive voting” and “rational irrationality” in voter behavior is not well understood at this point but is attracting considerable attention. [See for example Brennan and Hamlin 1998, 2000), Caplan (2001, 2002), or Thaler and Sunstein (2007).]

Extended forms of rationality are also gaining some traction as with the explicit consideration of morality, altruism, and ideological dimensions of voter choices. Although the rational politics literature is more than 70 years old, innovations and new insights continue to emerge.

Given all this, a natural direction for extending the median voter model is to include normative as well as pragmatic interests when characterizing a voter’s policy preferences. This was initially done by including “ideology” among the list of variables that characterize the median voter, religious affiliations have also been included. In principle, a finer grained theory and data base for normative interests might improve our ability to understand how voting and in particular the median voter may influence public policies. (Congleton 2020).

### VIII. Puzzles and Problems Associated with the Median Vote Model: Cycling and Dimensionality

Most median voter models assume that the policy choice of interest can be mapped into a single dimension and that voters rank order candidates according to their policy positions. This is done for several reasons, simplicity, the interest of a particular piece of research, and to avoid cycling problems (e.g. to assure that a median voter equilibrium exists, or at least make such an equilibrium more likely).

The existence of a median voter does not require single-issue policy domains but does require a consistent mapping from a multi-dimensional space into a single dimension. For example, by placing a voter on a left-right spectrum a broad range of policy issues can be analyzed. There is quite a bit of evidence that supports that voter preferences over policies can be mapped into a single dimension. For example, Poole and Rosenthal (1991, 1996, 2001, [link](#), [video](#)) have undertaken a series of careful studies of voting within the U. S. Congress. They show that around 80% of all Congressional votes can be predicted by a one-dimensional policy space (and about 90% with a two-dimensional policy space). Thus, for most purposes, one or two dimensions can capture most of what is systematic in voting patterns by the persons elected to Congress.

Although it is easy to show that cycles may be commonplace in 2-dimensional policy spaces, this problem may not be important for U. S. politics according to Poole and Rosenthal's research. Very strong symmetry assumptions are required for the distribution of voter preferences in multidimensional issue spaces to have a pivotal or median voter (Plott, 1967).

**An illustration of a majoritarian cycle.** Consider the following divide the pie game: A pie is to be divided into three pieces (a, b, c) with Al getting piece "a," Bob getting piece "b," and Cathy getting piece "c." Note that there is no unique majority rule choice in this case. Any division of pie can be "beaten" by another. For example (1,1,1) loses to (1.5, 1.5, 0), which loses to (2.5, 0,0.5), which loses to (1,1,1). To avoid this problem, there must be other institution or norms that somehow reduce the number of divisions that can be voted over. It may be the institutions prevent cycling in various ways. Such "institutionally induced equilibria" have been suggested by, for example, Weingast and Shepsle (1981).

Geometrically, this can be shown for voters in a two-dimensional issue space by placing three special voters at the nodes of a triangle (as opposed to being along a straight line). Even with circular indifference curves, there will not be a median voter.

As an explanation for the stability of well-functioning democracy in which a median voter does not exist, Weingast and Shepsle (1981) argue that the micro-institutions of legislative chambers (committees and relationships among committees) tend to eliminate or reduce cycles. Such institutions may or may not have been adopted with their stabilizing properties in mind, but may nonetheless account for the stability of long-standing democracies.

(As an exercise, discuss cases in which cycling seems to exist, or not exist. Can you explain why? How can ideology or internalized norms make democracy work better? How can constitutional constraints, like eminent domain laws or tax norms, reduce the probability of cycles. How might decision making procedures reduce propensities for cycles?)

## IX. Conclusions

The median voter model provides a very convenient way to model electoral outcomes and public policies associated with those outcomes. Unfortunately, the strong form of the median voter theorem requires quite strong (limiting) assumptions for the simplest versions of the model to yield an equilibrium. Nonetheless, that characterization of electoral contests works surprisingly well as a point of departure for both theoretical and empirical research. It arguably works as well in these respects as the perfectly competitive model of neoclassical economics.

Other possible models include the stochastic voting model ([Coughlin 1982](#)), and the clientele model, which views majorities as coalitions of groups with relatively narrow interests. Relatively few efforts have been invested in testing the merits of these alternatives relative to the median vote model, although it seems clear that all three models are plausible characterizations of democratic governments. And, it's quite possible that particular models of electoral equilibria work better for particular governments or particular government services.

Another possibility is that democratic politics are not about elections but rather creates a particular type of “arena” for competition among organized interest groups takes place (Olson 1965, Becker, 1983), Congleton and Hillman (2015). If there is time, we’ll review some of the implications of the rent seeking literature, especially with respect to the details of public policy, after the midterm and also spend a bit more time on the informational limits to democracy.