I. Using Social Net-Benefit Analysis as a Normative Theory

A. The most widely used theory of social welfare in rational choice politics is the Pareto Criteria developed by Vilfredo Pareto in 1906:

i. State X is **Pareto superior** to state Y, if and only if at least one person prefers X to Y and no one prefers Y to X. (In other words, i f at least one person is better off at X than at Y and no one is worse off.)

ii. State Z is **Pareto optimal** if and only if there is no other **feasible** state of the world that is Pareto superior to Z.

iii. This idea is widely used, for example, in economics and game theory to evaluate the merits of alternative outcomes (market failures, social dilemma, etc...) and alternative policy instruments for addressing such problems.

B. In a one dimensional policy space, it is easy to show that a setting that **maximizes social net benefits (SNB) will be Pareto optimal**, and one that does not, cannot be Pareto Optimal.

i. To illustrate how this can be done using the tools that we developed in the first weeks of class, consider the case of a pure public good.

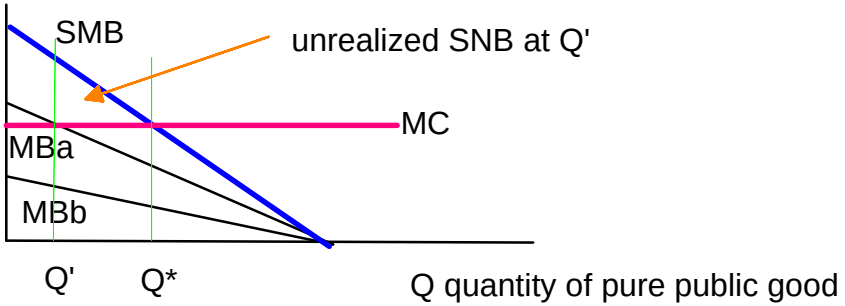
ii. Assume that the marginal cost of the pure public good is C and that there is one high demander (high MB) and one low demander (lower MB) for the good.

iii. The social marginal benefit curve (SMB) can be calculated by adding the MB curves (vertically) to determine who much all the people are willing to jointly pay for additional services.

iv. The social marginal cost curve (SMC) is in this case, simply the original MC curve.

v. The equilibrium service level is that provided by the High Demander, Q'. (The low demanders "free ride" on his or her efforts.).

vi. This is not Pareto Efficient, because it is possible to change the state of the world and make one or both persons better off. There are unrealized net social benefits.



vii. Social Net Benefits are maximized at Q* where social marginal benefits equal social marginal costs.

viii. In principle, both Al and Bernd can be made better off through policies that shifted the outcome from Q' to Q*.

- This is, of course, one rationalization for having public policies for such goods--although not necessarily public provision.
- Similar results can be found for commons problems and activities that produce negative externalities (spillovers) on others.

II. Extensions of the Pareto and Social Net Benefit Maximizing Approaches to Normative Analysis

A. A general individualist social welfare function has the property that social welfare increases in any case where one person gains and no one loses from a change in resource allocation. That is to say, a social welfare function is monotone increasing in the utility level of every individual in the society of interest.

$W = f(U_1, U_2, ...U_N)$

B. Interesting special cases of social welfare function include the utilitarian (Benthamite) social welfare function and the Nash social welfare function.

i. Benthamite: $W = \Sigma Ui$

ii. Nash: $W = \Pi Ui$

iii. (Student puzzle: some people criticize cost benefit analysis as a "crude" form of utilitarianism. Is it? Explain.)

C. All individualistic social welfare functions have the property that constrained maximization yields a Pareto Optimal state. (Why?)

i. For example, if a fixed stock of a pure private good were to be allocated to maximize social welfare, one would maximize W subject to the resource constraint $X = \Sigma Xi$. The result would be a unique social welfare maximum.

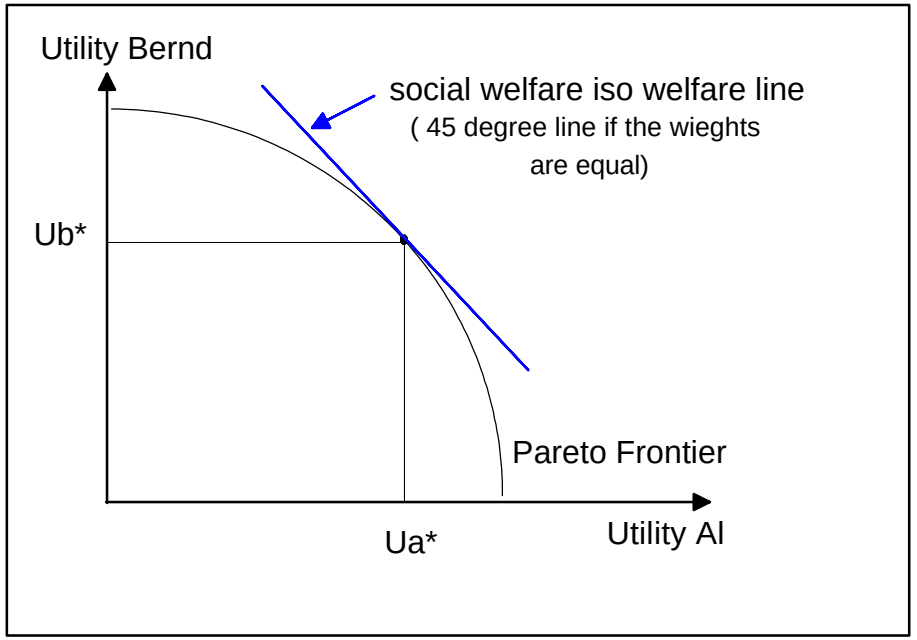
ii. Note that many **other states can also be Pareto optimal**. In fact any distribution of private good X among non-altruists would be Pareto optimal including the one that maximized the social welfare function of interest.

iii. From this illustration, you should be able to see that the weights of the social welfare function (consider the weighted Benthamite social welfare function, $W = \Sigma \alpha iUi$

where $\alpha i > 0$) are very important determinants of the particular conclusions that emerge from maximizing social welfare.

iv. If all individuals had the same utility functions, and all the weights were the same, than this divide the pie problem would have recommended dividing the pie up equally.

v. However other weights would yield different recommendations, that is to say different "social welfare" maximizing policies.



D. One of many problem with the application of social welfare functions, is that utility is very hard to measure.

i. Here it bears noting that there are "happiness" indices, that might potentially be used. But, these too are controversial.

ii. MB curves, although not simple to estimate, are generally easier to estimate than utility an happiness functions, **because in many private transactions everyone sets MB=MC**.

III. On the Normative Properties of (Non Stochastic) Electoral Equilibria

A. We now can use these normative theories to undertake positive and normative analysis of democratic outcomes.

- Does the median voter generally select Pareto optimal (efficient) outcomes?
- (Perhaps surprisingly, this depends on how close the median voter's conditions are to those of the "average" voter.)

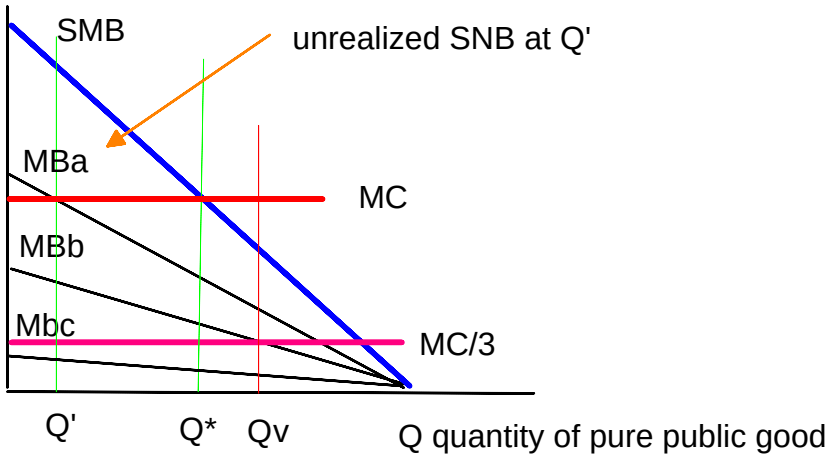
B. We can use a variation of the public goods supply problem analyzed above to show how this can be done.

i. To be able to use the median voter model, we need to assume:

a. an odd number of persons who "share" the public good,

b. and to consider the public purchase of the service, we need to assume that the overall marginal cost of the service is also shared in some way as through a tax system.

c. To simplify the diagram, I will assume that there are three voters (or types of voters) and that the 1/3 of the cost of the public service is paid by each person.



ii. Note that in this case, the median voter demands more than is Pareto optimal of the service.

a. Evidently, the median voter's demand is higher than average.

b. (Recall, that in principle this problem could be fixed by adopting a tax system requiring payments that were closer to marginal benefits as with Lindahl taxes.)

c. On the other hand, it also bears noting that the result is closer to Pareto levels than was the initial circumstance.

d. (Student Puzzle: Is it a Pareto Superior move?)

C. Given this "government failure" result, one might conclude that government should become involved only in public goods, commons problems, etc. that are relatively large--and thus the median voter outcome is likely to be a Pareto improvement, or at least move us closer to a social net benefit maximizing state.

IV. An introduction to stochastic voting models, an alternative to the Median Voter Model

A. There is only one widely used alternative to the median voter model of electoral equilibrium, namely the stochastic voting model.

B. This model uses a stochastic (random) representation of the voter's behavior that is not entirely consistent with the usual rational choice models, because it assumes that voters occasionally vote for the wrong candidate.

C. The stochastic voting model is widely used in the rational politics literature in Political Science and is widely *referred to* by many pieces in public economics that want to model government as maximizing a social welfare function.

D. There are two explanations for this representation of voter behavior: as voter errors (trembling hand) or voter ignorance:

i. The most straightforward interpretation of voting in a stochastic voting model is that voters make mistakes.

► That is to say, voters do not always maximize utility, but rather *more often maximize utility than not*.

ii. The behavior of such "stochastic voters" is represented with a probability function.

a. It is usually assumed that the probability that a particular voter chooses candidate X over candidate Y is simply the ratio of the expected utility generated by candidate X's policies divided by the sum of the expected utilities of both (all) candidates.

$$P(X|Y) = U^e(X)/[U^e(X) + U^e(Y)]$$

b. (This turns out to be a relatively important assumption as far as the model's equilibrium and normative properties are concerned.)

E. Another explanation of the behavior within stochastic voting models is that candidates do not fully know how voters will cast their voters.

i. Candidates do no fully understand the preferences of voters, but try to imagine the consequences of their policies on the welfare of individual voters.

ii. These estimated models of voter behavior are assumed to resemble:

$$P(X|Y) = f(U(X), U(Y)).$$

iii. Note that the non-stochastic voter model developed previously is a special case of this more general representation of the voter's behavior.

$$P(X|Y) = 1 \text{ if } u(X) > u(Y) \text{ and } P(X|Y) = 0 \text{ if } U(X) < u(Y)$$

and $P(X|Y) = 0.5$ if $U(X) = U(Y)$.

iv. In any case, the stochastic voting literature generally assumes that probability function f is continuous and differentiable, which is not true of the non-stochastic voter's behavior.

F. Candidates Choose Policies to Maximize Expected Votes

i. As in the median voter model, candidates choose policies to maximize their prospects for election.

ii. Here they can either maximize expected voters--the usual assumption--or the probability of being elected (which is not always the same as the former, but more difficult to represent.)

V. The Positive Properties of Electoral Equilibrium in a Stochastic Voting Model

A. Given the position of the other candidate, and the probability functions for each voter, the expected voter for candidate X taking policy G^X is

$$V^e = \Sigma\, fi(U_i(G^X), U_i(G^Y))$$

i. Note these candidates take account of the welfare of EVERY voter.

ii. The extent to which a voter's interest is taken account of is a combination of the marginal utility to "voter i" of the policy variable of interest and the extent to which "voter i" will be *more likely* to vote for X as his utility increases.

iii. Another contrast with the median voter model, there is, mathematically, a specific ideal policy position for each policy position a candidate's opponent(s) might take.

B. Note that in cases where the joint (across all voters) probability distribution is symmetric that the median voter outcome can be an electoral equilibrium in this model as well, but more **generally the policy positions taken will reflect a "weighted average" of all voter interests**.

i. The comparative statics of electoral equilibrium reflects changes in the (unmodelled) constraints of voters and/or changes in the technology of delivering government services.

ii. Give the assumptions made, an electoral equilibrium always exists.

► There are no electoral cycles in the *classic* stochastic voting model.

C. Note that the normative properties of the median voter model and the stochastic voter model differ.

i. The median voter model will not generally produce policies that are Pareto optimal.

► One case in which the median voter will prefer the Pareto efficient level of a public good is that in which he or she pays a Lindalh tax.

► (Of course, it is not clear why the median voter would favor a Lindalh tax, although some mildly progressive tax systems and benefit taxes may roughly approximate a Lindalh tax.)

ii. Note that the functions being maximized by candidates in a stochastic voting model *are* somewhat odd special cases of a *social welfare function* where the weights are implicitly determined by voter responsiveness to policy variables.

a. That is to say, each candidate maximizes a social welfare function OVER THE VOTERS participating in the election of interest.

b. Consequently, if every one votes, the electoral policy result in such a model is ALWAYS Pareto optimal.

VI. Normative Controversies Associated with the Stochastic Voter Model.

A. In a stochastic voting model, the electoral result would fail to be Pareto optimal, only if some individual interests were entirely neglected, or possibly given negative weight.

i. Some people may never vote, or may not vote when policy positions of candidates are close to each other or very far from their own ideal policy.

► (For example, some voters may be more likely to support a candidate that promised to punish a subset of the electorate: perhaps racists, specific ethnic groups, or smokers.)

ii. In these cases, the expected vote function is not a social welfare function and the electoral results would be unlikely to be Pareto optimal.

B. Note, however, that the "wieghts" in the stochastic voting "welfare function" are determined by a voter's flexibility--that is to say how much his or her vote is influenced by small changes in policy.

i. Thus, the results may be Pareto efficient, but incompatible with other social norms, such as fairness.

ii. However, it is interesting to see that this particular "social welfare function" has to be estimated by every successful candidate.

iii. And, thus, it can be said to avoid some of the usual conceptual problems of the social welfare functions.

a. For example, the "weights" are determined by an candidate's interest in winning office, rather than philosophical debate.

b. On the other hand, for utilitarians weights other than "1" are unfair or immoral.

c. (Thought question: does it matter whether a normative theory achieve Pareto optimality? Is there always some Pareto efficient result that is consistent with a particular normative theory?)

VII. Other Controversies

A. Another area of controversy involves the cycle free nature of electoral equilibria in stochastic voting models.

i. It turns out that the nature of the probability function describing voter behavior is critical. (See Feldman and Lee (1988)).

ii. A simple illustration may suffice, suppose that voters always voted for the candidate with the more favorable program, but occasionally made errors.

a. Suppose that the errors are not affected by the other candidate's position.

b. In this case, one would have a stochastic voter who behaved in an expected value sense just like the non-stochastic voters of the median voter type model.

► Again cycles could and would tend to be endemic in a 2 or more dimensioned policy space

B. Study Advice: In reviewing the stochastic voting model, it is most important for the purposes of this class that you understand the basic ideas: (1) What a stochastic voting model is, (2) How it differs from the non-stochastic voting model that forms the basis of the median voter model, (3) What its equilibrium is like in general terms.

► Don't spend much time memorizing the equations, rather focus on the ideas.