

## I. Introduction: Politics and Environmental Regulations

A. For the first several lectures we have analyzed environmental problems that rational choice models suggest will arise because private decision makers lack incentives to take full account of spillover costs and benefits associated with their actions.

B. These “environmental problem” lectures were followed by a series of “environmental solution” lectures that showed how various policies could solve environmental problems: (i) privatization, (ii) Coasian contracts, (iii) Pigovian taxes and subsidies, direct regulation (mandates), and emissions markets.

- Most of these solutions require government action, because rights have to be defined; contracts enforced; taxes collected (or subsidies disbursed); regulations set and enforced; or marketable emissions permits adopted, distributed, and trespassers punished.

C. An important implication of the existence of policy solutions to environmental problems is that **the environmental problems we still have are consequences of public policies.**

- That is to say, the world that we see today is not some kind of "Hobbesian Jungle," but rather a world in which governments impose rules on all manner of things.
- The environmental problems that we observe (except perhaps really new problems) exist because “optimal” policies **have not been** adopted.
- The existing pattern of property rights, taxes, and regulations determine the extent of environmental emissions at the margin for a given level of industrialization.
- Environmental quality, such as it is, is thus determined by those rules.
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D. Politics thus plays a central role in explaining emissions levels within towns, states, nations and regions.

- In democracies, current property rights and environmental regulations reflect past decisions by elected representatives and the bureaucracy.

- In dictatorships, the regulations reflect the past decisions of dictators and the bureaucracy.
- However, neither an elected government, nor a dictator, can simply adopt any policy that it wants. All durable governments operate under various institutional constraints.

E. For example, most elected officials wish to win the next election. To do that elected officials have to pick policies that will please a majority of the voters more than policies proposed by its future rivals for office.

- Even dictators require some level of support--often chiefly among top military and police officials--to continue in office.
- Within democracies (and some dictatorships) there are also constitutional constraints on the types of policies that can be put in place.
  - The "takings clause" makes most constitutional government pay for goods and services taken from individual citizens.
  - The "equal protection" laws imply that a law should not treat different groups differently. That is to say, laws have to be based on general principles: all firms with characteristic F are subject to environmental regulation R.

F. The next part of the course focuses on the politics of environmental choice within democracies. We will focus mainly on the electoral constraint faced by representatives.

- Electoral competition plays a very important role in determining policy at the margin.
- One can not simply assume that environmental policy is made by some net-benefit maximizing all knowing environmental agency, as sometimes seems to be implied by environmental economics text books.

## II. Majority Rule and the Median Voter

- A.** From the rational choice perspective, voters, elected representatives, and bureaucrats should all be assumed to be **self-interested** in the same sense that consumers and firms are in the private sector.
- That is to say, given the opportunities before them, individuals in the "political sector" are assumed to maximize their own net advantages (net benefits or utility) given the constraints that they face.
  - Consequently, if one wishes to understand the pattern of existing environmental policies, one has to take account of the interests and incentives faced by voters and by government officials.
- B.** Although a wide variety of decision making procedures are used within democratic governments, we will focus our attention on one that is central to the nature of democratic governance, namely majority rule.
- There are of course many other voting rules besides majority rule:
  - Unanimity (Unanimity requires 100% approval is required to pass a new law. Some laws passed by the EU are adopted via unanimity at the level of government representatives. Under that rule, anyone can veto a new law.)
  - Super Majority (More than 50% approval is required to pass new laws. This is required for constitutional amendments and impeachment under the US constitution. It also seems to be an implicit rule within the US Senate.)
  - One person rule (Commander in Chief, Executive Mandates)
  - (The first analytical examination of which voting rules work best for a given circumstance was undertaken in: *The Calculus of Consent*, 1962, by James M. Buchanan and Gordon Tullock.)
  - (For a more complete treatment of democratic politics, you should take a complete course in public choice.)
- C.** The most widely used model of majoritarian politics is the **median voter model**.
- In a variety of electoral settings, self interested behavior implies that the "median voter" will get his or her way.

- There are, as developed below, strong and weak versions of the median voter model.

- D.** For example, suppose that three individuals: Al, Bob and Cathy are to make a decision about where to eat lunch based on majority rule.
- Al prefers a restaurant where lunch can be had for \$5.00, Bob wants one where lunch costs around \$10.00 and Cathy, a gourmet, prefers one costing around \$20.00.
  - For convenience assume that, given any two options, each will prefer the restaurants whose price for lunch that is closest to their preferred one.
  - (This "spatial voting" model results whenever voter marginal benefit and marginal cost curves are approximately straight lines.)
  - Consider some votes on various alternative spending levels:

Options	Votes Cast			Outcome
• \$10 vs. 20\$	A: 10	B: 10	C: 20	10 MP 20
• \$5 vs. \$20	A: 5	B: 5	C: 20	5 MP 20
• \$5 vs. \$16	A: 5	B: 5	C: 16	5 MP 16
• \$10 vs. \$5	A: 5	B: 10	C: 10	10 MP 5
• \$12 vs. 10	A: 10	B:10	C: 12	10 MP 12

- E.** Note that Bob always votes in favor of the outcome that actually wins the election. (The B column of votes and the Outcome column are EXACTLY the same.)
- F.** Note also that **exactly the same number of individuals prefer a more expensive dinner as prefer a less expensive dinner than Bob**. In this case, one each. (This is the definition of a median ideal point or "preference.")
- Thus, Bob is the median voter.
  - He is the voter with the *median* ideal point, the median policy preference.

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

- The weak form nearly always is true under majority rule voting between two alternatives.
- In the example above, Bob always votes with the majority.
- (Exceptions occur in cases in which issues are multidimensional and voter preferences are not spatial, but such cases are beyond the scope of this course.)

**H.** The **Strong Form** of the *median voter theorem* say the median voter always gets his most preferred policy.

- In the example above Bob's preferred expenditure level, \$10, will defeat any other policy.
- Note that the median voter's ideal point (10 in the example) can beat every other possible alternative in pair-wise voting.

### III. Electoral Competition and The Median Voter

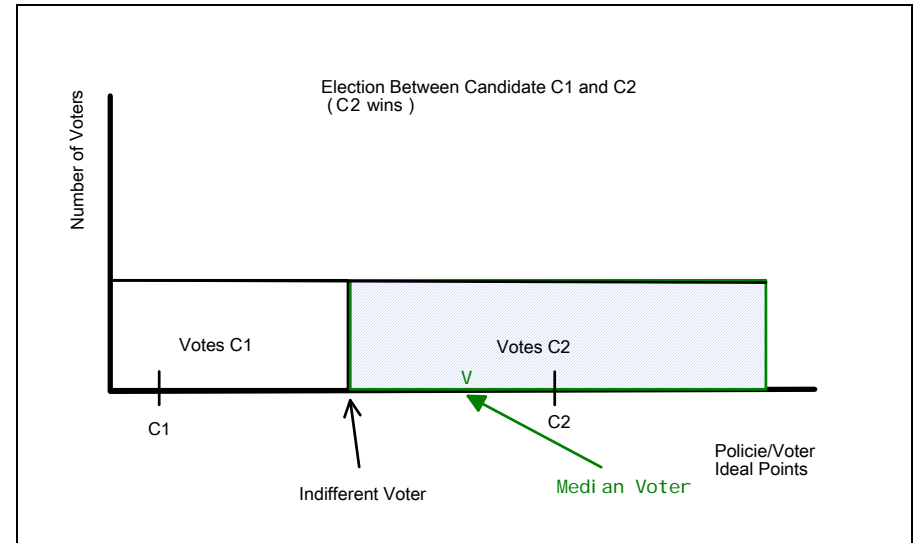
**A.** The previous illustration shows that the median voter determines the electoral outcome in direct elections. We now show that the median voter is also very important in representative democracy.

**B.** To make our analysis of elections more straight forward, we will assume that Voters all vote for the candidate (or policy) that is "closest" to them in the policy dimension.

- Such voters are called “spatial voters.”
- In one dimensional “issue spaces,” this turns out to be an implication of the usual net benefit maximizing representations of preferences, [as shown in class](#).

**C.** This assumption allows competition between candidates for government office to be analyzed with a diagram that shows the distribution of voter ideal points.

- The distribution of voter ideal points can be illustrated in a diagram that has the policy alternatives along the bottom (X) axis and the number of voters with a specific ideal point along the vertical axis.



- The area under the resulting curve gives you the number of voters with a particular range of opinions.
  - (For those who have taken statistics, this is a frequency distribution of voter ideal points.)
- The assumption of spatial voting allows us to determine how all these voters will vote when there are two candidates or two policy options being voted on
- That is to say, every voter will vote in favor of the candidate whose position is closed to their own.
- Note that voter(s) who are exactly half way between the two "alternatives" will be indifferent between them.
- Voters to the left of the indifferent voters will vote for the policy on the left, and those to the right of the indifferent voter will vote for the policy on the right.

**D.** The illustration above assumes that candidates 1 and 2 have taken positions and that voters vote for the candidate closest to their ideal point. The areas represent the number of votes each receives. The candidate with the larger area wins the election, here C2.

- i. The distribution of voter ideal points is assumed to be a "uniform" distribution to simplify the diagram--other distributions are of course possible, **as shown in class**.
  - Given these positions (or platforms), it turns out that Candidate C1 loses this election.
- ii. Puzzles: **How could candidate 1 have done better?**
  - **Check to see if he or she would have chosen a policy position further to the right--one that is closer to the median voter.**

**E.** It turns out that the candidate that is closest to the median voter's ideal point will always win the election, because that voter will always receives AT MORE THAN HALF OF THE VOTES.

- However, 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.
- The Nash equilibrium of this game implies that both candidates take the same position, equal to the median voter's ideal point.

**F.** In **equilibrium**, the competition for votes (via shifting policy positions) implies that both candidates will take essentially the same position, namely that of the median voter.

- i. If candidates take approximately the same position, they will receive approximately the same number of voters.
  - So this election model predicts very close elections.
- ii. At the Nash equilibrium, this electoral model also implies that **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 election game!
  - 
  - (The candidates are assumed to know which voters will turn out and vote. That is, the relevant distribution of voter ideal points and median voter is **for those who actually vote**. The others do not affect public policy or electoral outcomes.)

#### IV. The Median Voter and Environmental Policy

**A.** One important implication of the strong form of the median voter model is **that the benefit and cost** of environmental programs to the median voter ultimately determines a democratic nation's environmental policies.

- Other factors, such as interest groups, may also matter, as discussed later in this lecture.
- However as long as electoral pressures push members of Congress and the President, median voter interests will remain at the top of their minds.

**B.** The median voter is approximately the VOTER with MEDIAN characteristics.

- i. That is to say, he or she is a voter of median age with median income, median education, median family size, median political ideas and so forth.
- ii. Note that the median voter will not ordinarily be 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 person vote less frequently than older, richer, and more educated persons.
  - As a first approximation, the median voter of the U. S. is a middle aged woman with one or two children and a bit of college education (remember the soccer moms).

**C.** To the extent that the Median Voter gets what he or she wants, anything that **changes the median voter's preferred policy will affect government policy--that is it will cause reforms or new policies to be adopted**.

- i. For example if voter income or relative prices change, so will the distribution of ideal points and median voter preference.

- ii. Note that voter beliefs about environmental ideal points are also affected by information about environmental risks and the costs of regulation.
- iii. This prediction requires competition for office to be fairly intense, and assumed that voters know at least a bit about what policies are adopted.
- iv. It also assumes that elections manage to solve (police) possible "agency problems."
  - For example, candidates may say one thing to get elected and do something else once in office.
  - However, candidates that are known to have cheated and done poorly at overseeing the bureaucracy, should be more likely to lose the next election (or primary) than those that have not since the median voter will not have gotten what he or she wants.
  - So the assumption that policies are fundamentally driven by elections is not a crazy assumption.
  - It is a useful approximation of how democratic politics operates in a competitive environment.
  - (It is the political analogue to perfectly competitive economic markets.)

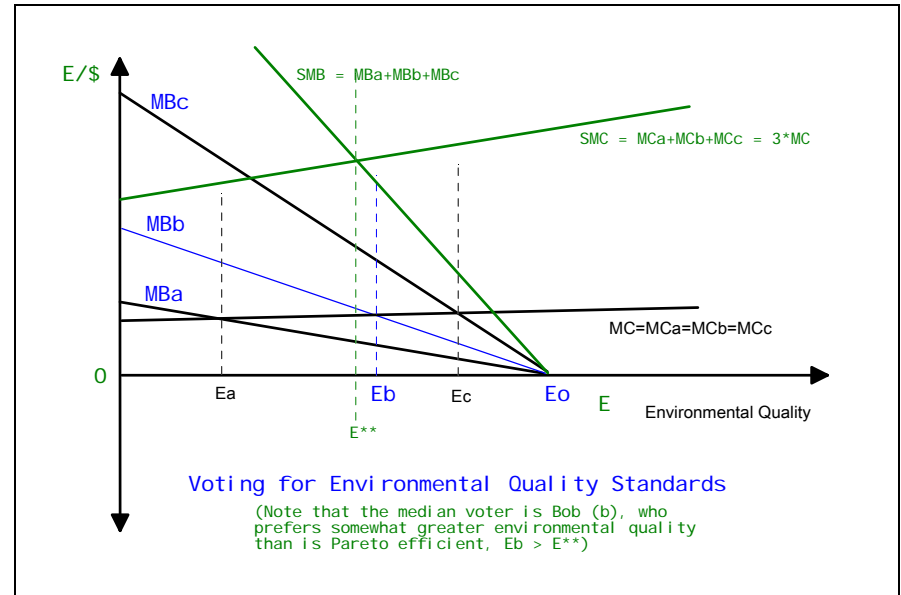
**D.** To the extent that government services are normal goods, Government services will tend to increase as the median voter becomes wealthier, as their tax-cost relative to private services decreases, and as their perceived value increases.

**E. A digression on rational ignorance:** recall that a rational individual will gather and process information only up to the point where his or her marginal expected benefits equals his or her marginal expected costs. This implies that **much will not be known** by a typical voter that might be useful to know about environmental issues. Such rational ignorance may bias his or her choice away from the policies that actually maximize his or her expected net benefits.

- How does rational ignorance affect the normative properties of median voter outcomes?

## V. An Illustration of the Democratic Politics of Environmental Regulation

- A.** In some cases, government policies directly produce environmental quality as with water plants and sewage treatment plants. In such cases, there are economies of scale to providing the service that make collective provision cost effective.
- i. Modeling median voter preferences for such services is fairly straight forward, once you know how the cost of the service will be shared among taxpayer - voters.
  - ii. A convenient assumption (at least for diagrams) is to assume that everyone pays roughly the same price,  $1/N$  of the total MC of providing the service.



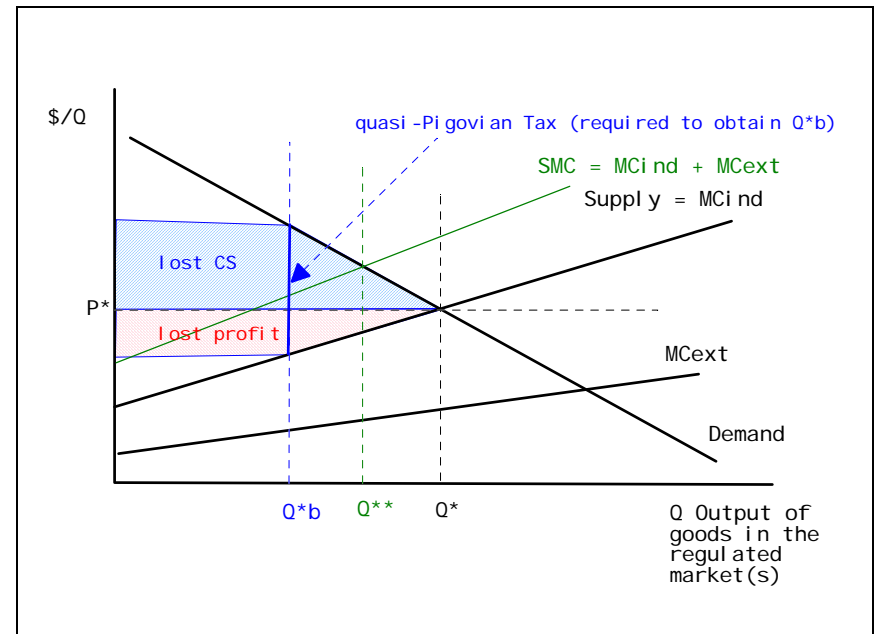
- iii. For example consider the figure above, the costs of providing environmental quality (say water purity) are shared equally, which allows one to figure out each voter's preferred level of environmental quality (or water treatment plant size).

- The median voter is “b” who prefers Eb, given his/her marginal benefits and costs.
  - Note that in the diagram shows that the median voter’s preferred policy is not necessarily Pareto efficient.
- iv. (It turns out that assumptions about how the costs are shared can have significant effects on the predicted median voter outcome.)
- B.** The median voter's optimal degree of regulation is a bit different than that regarding ordinary government services because the cost of regulation is always indirect.
- There is no "direct" tax bill for regulations, rather regulations indirectly increase the cost of other valued goods and services.
  - Instead regulations increase the marginal cost of the regulated goods (and sometimes improves their quality).
  - It is this indirect increase in cost that is the “price” of environmental regulation, where as it is the marginal reduction in environmental damages that is its associated marginal benefit.

- C.** In the case of environmental regulation,
- Most voters receive direct benefits from more stringent environmental regulation: cleaner air, improved health, more pleasant environment, more attractive outdoor life styles and so forth,
  - and most voters also pay a "price" for that clearer air, water, etc. through higher prices for existing services.
  - Consider, for example, the effects of mandated environmental equipment.
    - **Mandated equipment** tends to raise prices and reduce profits, in a manner that is somewhat similar to a Pigovian tax, but without generating any revenue.
    - So for some purposes of analysis, mandates of equipment can be thought of as a “quasi tax.”
    - Mandated equipment includes catalytic converters for cars, scrubbers for coal fired power plants, sewer systems for towns etc.
    - (In the mandate case, it is theoretically appropriate to model the effects by shifting supply to the left, rather as a tax, but using a

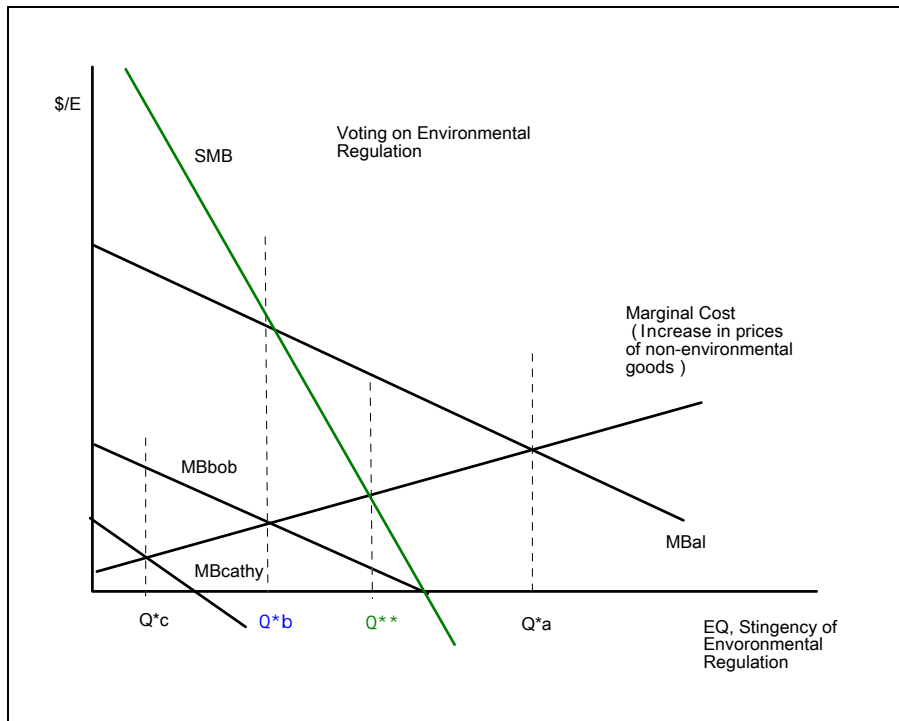
“pseudo-tax” diagram allows you to get a sense of the distribution of burdens and benefits from mandated equipment.)

- In this case the “tax revenue” is money that goes to the producers of “environmentally friendly” equipment.
  - The distribution of benefits and costs will provide incentives to vote in favor or against the mandated equipment (and also for interest groups to lobby in for or against the regulation that mandates the new piece of equipment.
- iv. Similarly, one can analyze incentives to favor a Pigovian tax by using the diagram to think about who “wins” and who “loses” from a particular Pigovian tax solution.
- (Note that both firms and consumers in the taxed industry are made worse off.)



- D.** Many of the effects of environmental regulations are indirect ones that affect the costs of other products that are not directly regulated.

- i. For example, an environmental tax on gasoline and fuel oil, makes products that have to be transported to market relatively more expensive.
  - Pollution control devices and taxes (usually) increase the cost of manufactured goods.
  - In such cases, the marginal cost of increased environmental quality shows up as an increase in the price of manufactured goods and transported goods relative to other less energy-intensive products.
  - (This may favor producers in countries or states with weaker regulations or lower environmental taxes, a topic which we will return to later in the course).
- ii. Once one can estimate the typical marginal cost of an environmental regulation, by estimating implied shifts in supply curves (industry MC curves) for products using the taxed or regulated goods as inputs..



**E. Illustration of voting for environmental regulations** (see the diagram above):

- i. Assume that three voters have different tastes for environmental quality but have similar tastes for non-environmental goods.
  - This allows the figure above to be used to characterize each voter's MC of environmental regulation with a single curve,
  - Each voter's MB from environmental regulation is characterized by their individual estimates of the merits or effects of environmental quality.
  - Note that Bob is the median voter in this diagram. ([Explain why.](#))
- ii. The median voter model, thus, implies that government will adopt policy  $Q^*b$ .
- iii. Notice, however, that the median voter's ideal point is not necessarily the same as the Pareto efficient level of regulation, because Bob has no reason to take account of the benefits and costs imposed on other voters.
  - There are "political" externalities as well as environmental ones.
  - (Remember we assuming self-interested voting.)
- iv. In the illustration above,  $Q^{**}$  differs from  $Q^*b$ .
  - Namely,  $Q^{**} > Q^*b$
  - However, cases also exist in which  $Q^{**} < Q^*b$  (draw such a case).
- v. What does this imply about environmental regulation in a democracy?

**VI. Connecting the Political and Market Analyses**

- A.** The above analysis provides a general framework for thinking about the electoral politics of environmental regulations and taxes.
- i. Differences in voter MB curves may, for example, reflect income differences, different locations, or different personal theories about the extent of environmental health or aesthetic benefits..
  - ii. The assumption that their marginal costs is just a simplifying assumption to make the diagrams a bit easier to use. That can be

dropped without much trouble, once the basic logic of the diagram is understood.

iii. Their **marginal cost of environmental quality is reduced**

**consumer surplus** from the higher prices in the regulated markets caused by taxes, changes in production methods, or charges for producing regulated effluents.

**B.** Note that the environmental quality level demanded by the median voter is often quite close to that which maximizes social net benefits, but tends to be a bit lower or higher depending on how benefits and costs are distributed among voters.

- (However, there are also cases in which the median voter's preferred outcome is quite different from the SNB maximizing outcome. This may occur for example if only a small subset of voters bears most of the cost of the regulation.)

**C.** In cases in which "too much" environmental is demanded (relative to  $E^{**}$ ), this implies that the corresponding Pigovian or quasi-Pigovian tax is greater than that which is ideal.

- If the median voter demands somewhat more stringent regulations than required to maximize social net benefits and the government responds to his or her demands, then regulations will be overly strict relative to those that achieve the Pareto efficient level of environmental quality (because  $Q^*b > Q^{**}$ , in our diagrams).
- Note that if the voters have calculated their marginal costs correctly, that their lost consumer surplus is completely taken account of by each of the voters when choosing their ideal environmental quality levels.
  - Their marginal benefits from increased environmental quality show up in the second diagram as reductions in the marginal external costs.
  - (If rational ignorance is a problem, these costs may be over or under estimated, with the result that the new policy may fail to maximize the median voter's true net benefits. "Environmental Illusion" may occur.)

iv. The assumption that all voters know their benefits and costs implies that the final result (regulatory system,  $T$ ) is exactly what the median voter had in mind.

- Other voters, however, would disagree about the "ideal-ness" of the regulations and taxes adopted.

**D.** Of course, the assumption of the first diagram, that all voters benefit from reduction in the externality and all are consumers of the regulated products is often, but not always true.

- In some cases, the benefits and costs of pollution control are concentrated.
  - That is to say, in some cases, only a small fraction of voter receive all or most of the benefits of regulations.
  - While in others, the cost of paying for the service may be borne by only a small subset of the electorate.
- In other cases in which the benefits or costs of environmental regulation are concentrated among fairly narrow minorities, the median voter may prefer levels of regulation that are quite far from the Pareto efficient level.
- As an exercise, draw a case in which all voters benefit from the regulation, but one voter pays a positive price for environmental regulation and the others pay nothing (because they do not consume the regulated product). Will the median voter prefer too much or too little in this case?*
- Also, consider the case in which all pay for the regulation, because all consume the regulated goods, but only a single voter (minority of voters) benefits from the regulations (because only a minority of voters live down stream or downwind from the factories where this product is produced).*
  - *Will the median voter prefer too much or too little in this case?*
  - *Not every regulation improves efficiency.*
  - *There can be "government failures" as well as "market failures."*



- v. What do these concentrated benefit (or cost) examples imply about the types of pollution that will be regulated in a well-functioning democracy?

## VII. Interest Groups, Persuasion and Environmental Policy

- A. Although we do not have time to do a thorough treatment of the effects of interest groups, this should not be taken to mean that such groups have only very small effects on environmental regulations.
- B. Both "brown" (industrial) and "green" (environmentalist) groups often support persuasive campaigns that attempt to persuade voters that environmental policies are too stringent or too lax.
- The success of Green persuasive campaigns over the past fifty years is obvious, both in policies and in the treatment of environmental issues in newspapers, blogs, and within public schools.
  - The success of "brown" lobbying is often more subtle, but is also not so difficult to see in the manner in which environmental laws are enforced and the (low) fines in place for many of those laws.
- C. In the US, interest groups have three completely legal methods of influencing public policy.
- i. Organized interest groups can make offers of support to candidates (money and/or votes) in exchange for changes in their policy positions.
    - Voters normally suffer from "rational ignorance" and so candidates need money to get their message across to voters.
    - Also, except at the Nash equilibrium, candidate platforms may diverge from median voter interests in various wayw without costing them many votes (partly also because of rational ignorance).
  - ii. Interest groups can also directly lobby Congress and/or the President to attempt to get their way on the details of legislation.
    - They may do so by arguing that such positions will actually improve their chances of electoral success in the next election.
    - Or through implicit promises of support in the next election.

- iii. Interest groups can also subsidize "informational campaigns" that try to persuade voters to support positions that are similar to their own.
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  - iv. In all three cases, the policies adopted will be partly determined by electoral pressures and partly by "behind the scenes" lobbying and contributions by interest groups.
    - (Note that explicit promises of money for policy positions is essentially illegal as is bribery.)
  - v. In general, I would say, that the broad outlines of environmental policies tend to reflect voter assessments of their own interests, but the details reflect negotiations among Congress or the Regulatory bodies (the bureaucracy) and various interest groups.
- D. It also bears noting that **the bureaucracy** often functions as an interest group.
- i. A government bureau may, for example, sponsor a persuasive campaigns designed to influence voters and thereby elected representatives.
  - ii. Bureaucrats also have significant incentives to lobby for higher budgets (**Niskanen model**), which may also influence the kinds of policies that environmental agencies tend to recommend.
    - In particular the Niskanen model implies that bureaucrats have incentives (both private and public interest) in the size of their budgets. As a consequence, he argues that **bureaucrats attempt to maximize their budgets**.
    - In the environmental policy area, this implies that environmental agencies will make proposals and provide information (about benefits, risks, costs, and options) that they believe will increase the size of their budgets.
  - iii. This creates a bias in the kinds of environmental risk assessments that they publish. (They have incentives to emphasize new risks rather than past successes.)
    - It also may cause them to favor environmental policy methods that have relatively high administrative costs associated with them--higher ones than associated with other policy instruments.

- (In Niskanen's model, bureaucrats use their expertise and superior information to bargain with Congress for regulatory authority and larger budgets. Of course, Congress should recognize what is going on and take this into account when assessing what the agency tells them about alternative policies.)

E. (We will return to the effects of interest groups on public policies later in the course if there is time. You are welcome to take this up in your term papers if you are interested.)

### VIII. Regulatory Externalities between Governments: Majority Rule, Federalism, and International Treaties

- A. Some environmental problems are too large for a single elected government to address by itself.
- B. That is to say, there are many real-world cases in which *even if* a "local" government attempted to achieve a Pareto efficient outcome locally, it cannot actually achieve Pareto optimal results, **because part of the problem is generated by persons or companies outside their jurisdiction.**
- In such cases, **regulation itself can be an externality generating activity.**
    - That is to say regulations in one state may impose benefits or costs on resident of other adjacent jurisdictions.
  - Consequently, there may be unrealized gains to trade between governments regarding appropriate regulation.
    - In a median voter model, the median voters of neighboring local governments would have reasons to coordinate their policy choices.
- C. There are basically two common methods for addressing such externality problems.
- First, the affected parties may attempt to negotiate a "Coasian" contract that "internalizes" the regulatory externality. That is to say, the governments may negotiate a treaty in which the countries or states "trade regulations."

- For example, in the various international **environmental treaties**, countries agree to strengthen various environmental regulations to deal with an international externality.
- State and local governments may negotiate with each other and sign agreements to coordinate policies or to create a "special use district" of the same "size" as the externality. (Examples include airport and transit authorities (NY, NJ and CN) and water commissions (US and Canada, Sweden and Denmark) etc.

D. Second, within a country with a federal government or region with existing inter-governmental institutions (such as the EU), the affected states or countries may "ask" higher levels of government to regulate the matter of concern.

- Adjacent counties may ask states to regulate "county externalities."
- States may ask the federal government to regulate "inter state externalities."
- In Europe the regulation of many international externalities is coordinated by the European Community.

E. We will analyze the demand for international treaties and their effectiveness in more detail later in the course.

- [In the meanwhile, consider the following puzzles.](#)
- [Is there a free riding problem among governments?](#)
- [Are their commons problems among governments?](#)
- [The results of international Coasian contracts may well be highly imperfect \(relative to Pareto optimality\) for several reasons. Discuss some of these.](#)
-