Public Economics (ECON 131)
Section #9: Voting, Tiebout Model, and Local Public Finance

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1 Key Concepts

- What is the definition of **Lindahl pricing**?
- What is **majority voting**?
- What are the three conditions that must be satisfied for **the aggregation mechanism to be consistent**?
  - Dominance: If one choice is preferred by all voters, the aggregation mechanism must be such tthat this choice is made by society.
  - Transitivity: If 1 is preferred to 2 and 2 is preferred to 3, then 1 must be preferred to 3.
  - Independence of irrelevant alternatives: If one choice is preferred to another, then the introduction of a third independent choice will not change that ranking.

  Does majority voting satisfy these conditions?
- What is **Arrow's Impossibility Theorem**? No social decision rule that satisfies unrestricted domain (any preference ordering can occur), Pareto principle (if no individual prefers X to Y, then neither will the mechanism), independence of irrelevant alternatives, no dictator, and transitivity
- What is the **Median Voter Theory**?
- What is **fiscal equalization**? Policies by which the national government distributes grants to subnational governments in an effort to equalize differences in wealth.
- What is the **Tiebout Model** about? What are the main assumptions? At least as many city governments as types of people, public good is a public service (non-excludable within city and rival)

- Tools of redistribution: **Matching grants** vs **block grants** vs **conditional block grants**.

2 Practice Problems

2.1 Gruber, Ch.9, Q.12

Carrboro has three equal-sized groups of people: (1) type A people consistently prefer more police protection to less; (2) type B people prefer high levels of police protection to low levels and they prefer low levels to medium levels; (3) type C people prefer medium levels to low levels, which they in turn prefer by a modest amount to high levels.

(a) *Which types of people have single-peaked preferences? Which have multi-peaked preferences?*

Solution:

Types A and C have single-peaked preferences, with peaks at "high" and "medium" respectively. Type B has multiple-peaked preferences, with peaks at "high" and "low" and a dip at "medium."

(b) *Will majority voting generate consistent outcomes in this case? Why or why not?*

Solution:

- Majority voting does not usually generate consistent outcomes when some voters have preferences that fail to be single-peaked. But they do happen to generate consistent outcomes in this case.
- If "high" and "low" are the two options on the ballot, "high" will win, since types A and B will vote for it.
- Similarly "high" wins when "high" and "medium" are the two options on the ballot.
- When "low" and "medium" are on the ballot, "medium" wins, since types A and C will vote for it.
- Finally, when all three are on the ballot, types A and B will both vote for "high," which will therefore win.
- Notice that there are no cycles, so the voting outcomes are, in fact, consistent. The decisions coincide with those that would be made by a society that prefers "high" to "medium" and "medium" to "low."

2.2 Gruber, Ch.10, Q.3

Some have argued that diversity in communities and schools leads to positive externalities. What implications does this view have for the efficiency of a Tiebout equilibrium? What implications does it have for government policy?

Solution:

- As mentioned in lecture, the Tiebout sorting allows households with different preferences for local public goods to "vote with their feet" and choose the community that matches their preferences. This results in competition between cities in levels of public good provision: education, parks, police, and so on.
- However, there are strong assumptions for a Tiebout equilibrium to exist:
    1. Costless moving across cities/towns.
    2. Perfect information on benefits and taxes paid in each town.
    3. A large amount of towns so that individuals can sort into groups with similar preferences.
    4. No externalities or spillovers of public goods across towns.
- In addition, the original model requires lump-sum taxation to achieve the equilibrium outcome, instead of property taxes, which are the primary source of local government expenditures. However, the combination of zoning restrictions and housing prices can play a role in preserving the Tiebout sorting outcome.
- If diversity in communities and schools leads to positive externalities, then the sorting into homogeneous communities implied by the Tiebout model may be inefficient. When considering where to locate, families will fail to take into account the positive externalities they would provide by living in a community where they would enhance diversity. They will therefore have a tendency to locate themselves in overly homogeneous communities.
- If this view is correct, there may be scope for welfare improving government diversity-enhancing interventions. One example of such an intervention could be to offer subsidies for building low-income housing in wealthy communities.

2.3 Local Public Good

Increased use of electronics has led to an increased need to dispose of the electronics properly. Towns have increased their spending on trash collection to deal with disposing of electronics. You are an economic advisor to the Governor who is considering whether to provide low income communities with state funds to increase their trash removal budgets so that they don't have to cut back on other trash collections in the face of electronic trash increases.

(a) *The lobbyist who opposes giving low-income communities state funds to increase trash collection budgets argues that trash collection is a public good financed by local property taxes. The lobbyist goes on to note that everyone knows from public finance class that in the standard Tiebout model, we should not care if trash collection varies across communities. Brief the Governor on two assumptions of the Tiebout model that may fail in this example, creating room for government intervention. [Note: do not simply list two assumptions, explain why they may be violated in this instance.]*

Solution:

The Tiebout model assumes no externalities across communities from the public good (no spillovers). However, there could be externalities associated with trash collection. If trash is not collected as often, germs could fester leading to more disease for the surrounding area. Disease does not know town borders.

The Tiebout model assumes perfect information about public goods available in other communities and the level of public goods provision in one's own community. However, if the public only sees the trash collection budget and isn't aware of the degree of the new electronics related costs, then it will think that the fact that the total trash collection hasn't gone down means that spending on trash collection hasn't gone down.

Another assumption that may fail is that all individuals are alike except in taste for trash collection. Households have very different incomes. In towns with lower income households, spending on trash collection will be lower, even if their taste for it is as high as in a wealthier community.

The Tiebout model also assumes costless moving, an extremely large number of types of communities (so that each person can sort into a community that has exactly the bundle of public goods he/she prefers) and lump sum taxes, among other things.

(b) *The following options are under consideration by the Governor. Assume community preferences over trash removal (T) and all other local public goods (P) are* $U(T, G) = 2T^{\frac{1}{2}} + 4G^{\frac{1}{2}}$ *Trash removal costs \$1 Assume that the price of all other goods is \$1. For each proposal described below graph the budget constraint and solve for the amount of spending on trash collection and other public goods. The budget of each town is \$5 million. Finally, which proposal gives you the most "bang for the buck" (i.e. the biggest increase in trash removal per state dollar spent). Why?*

(i) *The baseline case: No state grant.*

(ii) *A \$1 million grant (i.e. it can be used for anything the community wants)*

(iii) *A \$1 million grant that can only be spent on trash collection.*

(iv) *$1 for $1 matching grant on trash collection (i.e. the state government gives the town $1 for every $1 the town spends on its own).*

Solution:

Each town will maximize its utility given its budget constraint:

$$\max U(T,G) = 2T^{\frac{1}{2}} + 4G^{\frac{1}{2}} \qquad \text{s.t.} \qquad Y = p_T T + p_G G$$

$$\max U(T) = 2T^{\frac{1}{2}} + 4\left(\frac{Y - p_T T}{p_G}\right)^{\frac{1}{2}}$$

FOC:

$$\frac{1}{T^{\frac{1}{2}}} + 2\left(\frac{Y - p_T T}{p_G}\right)^{-\frac{1}{2}}\left(-\frac{p_T}{p_G}\right) = 0$$

$$\frac{1}{T^{\frac{1}{2}}} = 2\left(\frac{p_G}{Y - p_T T}\right)^{\frac{1}{2}}\frac{p_T}{p_G}$$

$$\frac{1}{T} = 4\left(\frac{p_G}{Y - p_T T}\right)\frac{p_T^2}{p_G^2}$$

$$T = \frac{p_G}{4p_T^2}(Y - p_T T)$$

$$4p_T^2 T = p_G Y - p_T p_G T$$

$$T(4p_T^2 + p_T p_G) = p_G Y$$

$$T = \frac{p_G Y}{4p_T^2 + p_T p_G}$$

(i) The baseline case: No state grant.

$$T = \frac{p_G Y}{4p_T^2 + p_T p_G}$$

$$T = \frac{1 * 5}{4 * 1^2 + 1 * 1}$$

$$T = 1$$

(ii) $1 million grant (i.e. it can be used for anything the community wants)

$$Y = 5 + 1$$

$$T = \frac{p_G Y}{4p_T^2 + p_T p_G}$$

$$T = \frac{1 * 6}{4 * 1^2 + 1 * 1}$$

$$T = 1.2$$

The increase here is 0.2 million. The bang for your buck is therefore 0.2.

(iii) $1 million grant that can only be spent on trash collection.
Since the 1.2 million is greater than 1, this is the same as part (ii).

(iv) $1 for $1 matching grant on trash collection (ie the state government gives the town $1 for every $1 the town spends on its own)
This changes the price of the trash collection to $\frac{1}{2}$.

$$T = \frac{p_G Y}{4p_T^2 + p_T p_G}$$
$$T = \frac{1 * 5}{4 * 0.5^2 + 0.5 * 1}$$
$$T = \frac{5}{1.5} = \frac{10}{3}$$

Therefore, spending has increased by 2.3. The government pays 1.66. The bang for the buck here is 1.4.

(c) *The Governor says he can't commit the state to a new financial obligation without public support and that he will put a proposal on the November ballot. However, he doesn't want to confuse the voters with too many options so he directs you to pick the proposal (from the 4 options in part b) that will give the "biggest bang for the buck" and will pass. You are also given the following information about voters and communities in the state:*

- Voters will only vote for a ballot initiative that brings money to the community they live in and there are 50 communities of equal size in the state.

Type	Number of Communities	Each Community's Total Budget
Low Income	25	$5 million
High Income	25	$40 millon

Which policy satisfies the Governor's criteria? How does your "bang for the buck" compare to the one calculated in part (b)? Why?

Solution:

(i) No state grant.

(ii) Given the preference, for any Y, the increase in Y is separable. Therefore, all will increase their budgets by $200,000 with a $1 million grant for all towns. Therefore, "the bang for your buck" is 0.2.

(iii) Given the preference, for any Y, the increase in Y is separable. Therefore, all will increase their budgets by $200,000 with a $1 million grant for all towns. Therefore, "the bang for your buck" is 0.2.

(iv) For all towns, $T = \frac{2Y}{3}$ Therefore, the low income town will increase to 10/3 and the large income town to 80/3. Before the policy, $T = \frac{Y}{5}$. Hence, the increase in spending is

$\Delta T = (\frac{2}{3} - \frac{1}{5})Y$. The government pays $\frac{1}{2}$ of total trash collection with the matching grant, or $\frac{1}{2} \cdot \frac{2}{3}Y$.

$$\frac{(\frac{2}{3} - \frac{1}{5})Y}{\frac{1}{2} \cdot \frac{2}{3}Y} = 1.4$$

This has a "bang for your buck" of 1.4. Therefore, all towns will vote for it and they should put the matching grants on the ballot.

(d) *The Governor likes your ideas, but notes that the state budget is already stretched very thin and he will therefore have to raise the money for your proposal through taxes. He is considering taxing communities 5% of every dollar that they spend above the state average amount of trash collection (assume that there are some wealthy communities with budgets well above $40 million). Explain what is likely to happen to trash collection in the state if the Governor goes forward with this tax plan. Why?*

Solution:

This is the same funding scheme used in school finance equalizations that was discussed in lecture 14. Taxing districts for spending more than the state average makes spending more than the state average more expensive and will lead those spending more than the state average to decrease the amount of trash collection they consume. Thus you could end up decreasing inequality in trash collection by bringing down the top instead of by bring up the bottom.