Lecture 15

Introduction
Tiebout
Buchanan

Introduction

1. In the standard Arrow-Debreu model, the location of economic activities has no fundamental importance.

   What makes the location of production and consumption important in an economic model?

   There are a number of possibilities.

2. The most obvious is that certain amenities or factors of production are only available at a particular place.

   Mountains and beaches provide utility and can not be moved.

   The sunshine and moderate climate in southern California lowers the costs of producing movies relative to what they would be elsewhere.

3. Transportation costs make location important, at least in a relative sense, because the distance between locations then matters.

   Transportation costs play a central role in the urban literature.

4. In local public sector economics, the emphasis is on the *bundling* of consumption. You must consume all goods at the same location. There is a limit to your ability to have a "presence" in multiple locations.

   (a) Some of this bundling comes from transportation costs. You cannot costlessly consume housing in one location, food in another, and local public goods in yet another.

   (b) This is not the only relevant consideration, however. Think about police protection. The only reason to be in a location is to consume, but you also need to be safe in this location. It makes no sense to talk about consuming police protection in one location and goods in another.

   This gives us the concept of *residence*. This is more than just the location where you consume housing. It is the location where you consume *everything* (or most everything).

5. If incomes are endogenous, then there is the additional question of whether you can work and consume in different locations.

   In "metropolitan models" you can work and consume in different locations.

   In "regional models" you must work and consume in the same location.

   Thus, in the metropolitan model, one's wage (net of any source-based taxes) in the community in which one works must be the same or higher than the wage one would obtain in any other community.

   In the regional model this need not hold – a low wage community may also have cheaper housing, and this could cause you to prefer that location.

6. Technical note.

   If the model has a *pure* local public good and people really could work, consume local public good, and consume all other private goods in distinct locations, then a necessary condition for efficiency is that only one location provides local public good.

   If there were two locations with local public good, a planner could take the resources used in the location providing less, convert those back to private good, and send people to the one "public good land" to enjoy local public good.

   Note that people (and capital) might still need to be employed in multiple locations, because of diminishing marginal factor product, and people might still need to reside in multiple locations (even if identical) because of increasing marginal costs (of housing, for example).

   Thus, it really is the impurity of the local public good or the bundling of consumption and production activities that are subject to "congestion" (roughly speaking) that make it necessary for multiple locations to provide local public good.

Tiebout

1. Samuelson had written that no " 'market type' solution" exists to determine the level of expenditures on public goods.[1]

   A " 'market type' solution" is (presumably) a method of provision that is decentralized and leads to an efficient outcome.

2. Tiebout is credited with making the following important point.

   If the public goods are local, meaning the consumer must choose a location in order to consume, then a market type solution may exist, at least "approximately."

3. Personal perspective:

   Tiebout won the battle but lost the war. The profession at large views the statement as true. However, it regards all the important public goods as national, not local. If you don't believe it, start talking about local public goods with your colleagues. See how they react. Everyone is interested in national public goods; the study of local public goods is regarded as a specialty.

   Not all of local public sector economics is regarded as a field for specialists. The literature on fiscal competition has wide interest, especially among people who study globalization.

4. Overall, Tiebout imagines a large number of communities offering different but fixed levels of local public good.

   People move to the communities, thereby revealing their demand for public goods.

   City managers then "do things" to adjust populations so average cost per-person is minimized.

5. Tiebout notes that attaining a truly efficient outcome could well imply having as many communities as consumers.

   This is obviously a problem and implies that he has not really provided a market type solution to providing public goods.

   However, his last point is well taken:

   > "Those who compare the REALITY described by this model with the REALITY of the competitive model...may find that local government represents a sector where the allocation of public goods (as a reflection

[1] This is discussed at length in his first *ReStat* paper, "The Pure Theory of Public Expenditures" (1954). His second one (1955) has a number of very sharp observations about government, the economy, and public sector economics and is still very much worth reading.

of the preferences of the population) need not take a back seat to the private sector."

6. Tiebout is criticized for not being rigorous.

   However, he had enough of a "model" in mind that he addresses most of the relevant issues. He knew all of the things he had to assume (or assume away).

7. Tiebout's Model

   (a) Consumers are heterogeneous and fully mobile and *reside* in the community where their preferences are best satisfied.

      i. "Reside" means "consume" in a model in which location matters.
      As discussed above, in all of these models location matters and there are limits to your ability to be present in multiple locations. At the very least you must consume all goods in a single location. You may also have to work and consume in a single locations.

      ii. Any equilibrium concept in a model with communities will, in one way or another, include the condition that no individual has an *incentive to migrate*. One's utility in the community in which one resides must be the same or higher than the utility one would obtain in any other community.
      The precise meaning of this depends on the model and the equilibrium concept being used.

   (b) Consumers are completely informed.

      i. Tiebout probably had in mind the standard microeconomic assumption.

      ii. However, in multi-community models (especially those with small numbers) the need to be "informed" comes up in a number of ways.
      What does an individual believe his or her utility would be in other communities?
      What does an individual believe would happen to population and other variables in his community if the quantity of local public good changes?

   (c) There are a large number of communities.

      Tiebout's intent here seems to be to allow for a close match between the quantity of local public good each individual wants to consume and the supply.

      However, the number of communities broadly influences the analysis and the equilibrium concept.

      i. In "large number" models, no single community can affect the utility achieved by any agent. If one community enacts a "bad" policy, some

or all residents may leave, but they achieve exactly the same utility they had before.

ii. In "small number" models, the policies in each community have real effects. The migration from a community with bad policies affects the communities that receive the migrants. Utility may be different in the new equilibrium.

(d) All income is from dividends.

So, income is completely exogenous. Tiebout sets aside questions about the sources of income and the effects of migration on income.

i. Exogenous income models still play a big role in this literature.
We will be examining both models in which income is exogenous and models in which it is endogenous and depends on location.

ii. Regarding endogenous incomes.
We always assume that the marginal product of labor is decreasing with labor. So, when workers are mobile and incomes are endogenous, their incomes usually fall if more workers arrive. This does not mean that worker utility necessarily falls, however!
Owner incomes generally increase when more workers are using the same amount of capital or land.

(e) No externalities (spillovers) across communities from public services.

i. Interestingly, some of the current literature shows that spillovers need not be a source of inefficiency. The "right" pattern of ownership, local government objectives and local tax instruments may effectively internalize the externality.

ii. On the other hand, there is a large literature on inefficiencies created by taxes on mobile capital in models with an immobile work force (so, not strictly speaking "Tiebout" models). This is called the "fiscal externality" literature. However, the use of the term "externality" is somewhat misleading.

(f) Tiebout states:

> "For every pattern of community services set by, say, a city manager who follows the preferences of the older residents of the community, there is an optimal community size. This optimum is defined in terms of the number of residents for which this bundle of services can be produced at the lowest average cost."

i. This seems to mean that $\frac{C(\bar{q},n)}{n}$ has a well-defined minimum in n for any $\bar{q}$ (cost per-person, not per-unit).

ii. This raises the question, given a fixed total population, what characterizes the *optimal number of jurisdictions* and their service levels?

These are the questions on which Buchanan focuses in his paper, although the context is somewhat different.
We will go into this in detail.

(g) Communities below the optimum size seek to attract new residents, communities above the optimum size seek to do the opposite.

i. First, this raises the question, what is the *objective function* of local governments?
Does this matter, or does simply having a "large number" of communities assure efficiency?

ii. Second, Tiebout's city managers choose $\bar{q}$ following the preferences of older residents and then "do things" to adjust n.
He seems to have in mind anything from advertising to zoning. What are the *controls* that the local government sets? What methods of finance are available? Do these things matter (to efficiency)?

8. Models with mobile capital and immobile populations are not, strictly speaking, "Tiebout" models.

   However the models have similar structures, require similar methods and are quite symbiotic in the insights they provide.

Buchanan

1. Recall that Tiebout was interested in finding a market type solution to the problem of providing public goods.

   He argued that for local public goods, local governments and consumer migration work as a decentralized mechanism that provides an efficient level of these goods.

2. Buchanan, like Tiebout, is also interested in finding a market type solution to the problem of providing public goods.

   His focus is on goods that are "congestible," so neither purely public nor private.

   However, that is NOT the only distinguishing feature of these goods. Thus, it is not correct to say that Buchanan's club model is strictly more general than Tiebout's local public goods model.

   The debate over the relationship between their two models is lively and ongoing.

3. Let's consider some "descriptive" differences.

   (a) Institutionally, clubs are "business" entities.

   Profit maximization determines how much to produce and how much to charge (in some theories).

   In contrast, local governments are "political" entities.

   Political processes and laws determine how much to produce and how much to charge.

   (b) In some club theory, if excess profits exist in a market, then new clubs can enter the market. This underlies a lot of the efficiency results.

   In contrast, if a local government is making a "profit" or citizens are "dissatisfied," then new governments may not be able to enter the market. This is especially true if the local public good is management of a unique physical space like a beach, a park, a campsite, etc. Then there is a fundamental barrier to entry and the local government is like a monopoly. Citizens may leave the community (just as they may substitute to goods not produced by the monopolist) but this does not lead to an optimum. An optimum would seem to require institutional changes that affect what the local government is doing (politics).

   (c) Individuals can join many clubs. Membership in one club does not (exogenously) restrict other choices.

   In contrast, we generally model choosing a community as a choice of more than just local public goods. It (exogenously) restricts other choices, like where one can live and work.

4. We now formalize Buchanan's model.

   The following distinction is critical:

   (a) The "facilities" framework.
   (Buchanan uses the phrase, "goods available to the ownership unit.")

   (b) The "received services" framework.
   (Buchanan uses the phrase, 'goods available to the individual for consumption.")

   Utility is defined over received services g and private good x:

   $$U(g, x)$$

   A congestion function links received services to facilities z and the number of (identical) club members n:

   $$g = f(z, n), \quad \frac{\partial f}{\partial z} > 0, \quad \frac{\partial f}{\partial n} < 0$$

   For example, f could be:

   $$f(z, n) = \frac{z}{n^{\epsilon}}$$

   The cost function for facilities (which will also depend on factor prices, suppressed here) and the requirement of a balanced budget gives the *total* revenue needed, r, as a function of facilities:

   $$r = C(z), \quad \frac{\partial C}{\partial z} > 0$$

   For example, C could be:

   $$C(z) = cz$$

   Finally, we assume that costs are shared equally among club members (this can be varied).

5. The analysis of necessary conditions for optimal clubs (with identical members) can proceed explicitly in the "facilities" framework or the "received services" framework.

   Buchanan uses the facilities framework.

   We will do both, starting with the received services framework.

6. Received services framework.

   Invert the mapping from (z, n) to g to obtain a mapping from (g, n) to z. Formally, we apply the implicit function to:

   $$f(z, n) - g = 0$$

   to obtain:

   $$z = Z(g, n)$$

   The total revenue needed as a function of (g, n) is then:

   $$r(g, n) \equiv C[Z(g, n)]$$

   We now solve:

   $$\begin{array}{ll} \text{Max} & U(g, x) \\ g, x, n & \\ \text{subject to:} & y = x + \frac{r(g,n)}{n} \end{array}$$

   Lagrangian:

   $$\mathcal{L} = U(g, x) + \lambda \left[y - x - \frac{r(g, n)}{n} \right]$$

   First order conditions:

   $$U_g - \lambda \frac{\partial r / \partial g}{n} = 0$$

   $$U_x - \lambda = 0$$

   $$-\lambda \left[\frac{n(\partial r / \partial n) - r}{n^2} \right] = 0$$

   Using the first two conditions:

   $$n \frac{U_g}{U_x} = \frac{\partial r}{\partial g}$$

   This is the Samuelson condition for received services. Using the last condition:

   $$\frac{\partial r}{\partial n} = \frac{r}{n}$$

This says that at the optimum the marginal cost (of adding another person) equals average cost (per-person cost).

So, if average cost is U-shaped in population, then at the optimum, production is at the MINIMUM of average cost.

This is consistent with Tiebout's requirement that there be a well-defined minimum for average costs and city managers try to achieve it.

7. Facilities framework (Buchanan).

   The club must decide how many facilities to build and how many people to bring into the club.

   We now solve:

$$\begin{array}{ll} \underset{z,x,n}{\text{Max}} & U[f(z,n),x] \\ \text{subject to:} & y = x + \frac{C(z)}{n} \end{array}$$

   Lagrangian:

$$\mathcal{L} = U[f(z,n),x] + \lambda\left(y - x - \frac{C(z)}{n}\right)$$

   The derivative with z:

$$U_g \frac{\partial f}{\partial z} - \lambda \frac{\partial C}{\partial z}\frac{1}{n} = 0$$

   The derivative with x:

$$U_x - \lambda = 0$$

   The derivative with n:

$$U_g \frac{\partial f}{\partial n} + \lambda \frac{C(z)}{n^2} = 0$$

   Using the first-order condition for z:

$$\frac{U_g}{U_x}\frac{\partial f}{\partial z} = \frac{\partial C}{\partial z}\frac{1}{n}$$

   Using the first-order condition for n:

$$\frac{U_g}{U_x}\left(\frac{\partial f}{\partial n}\right) = -\frac{C(z)}{n^2}$$

We can now formalize Buchanan's famous "four curves". Denote the solution to the previous problem:

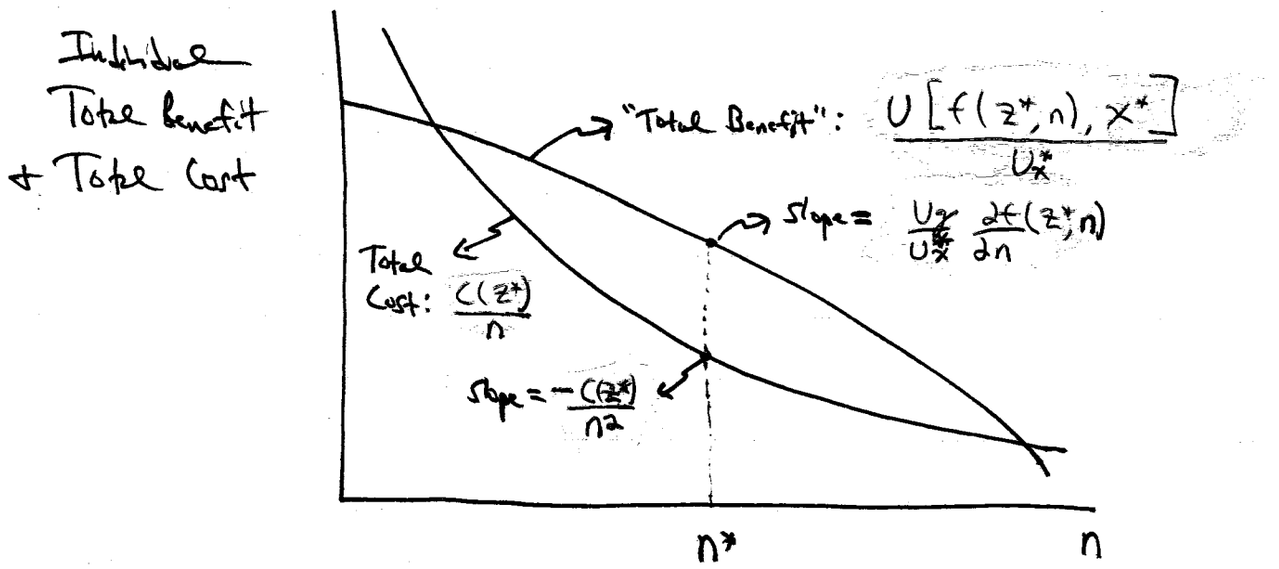
$$(z^*, x^*, n^*)$$

Define:

$$U_x^* = U_x[f(z^*, n^*), x^*]$$

Figure 1

Given $z = z^*$



Given $n = n^*$