Subsidy and equity

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To discuss how transportation subsidies are distributed among travelers and other beneficiaries of the transportation system, it is useful to understand the distinctions between:

- Public goods and private goods
- Fixed and variable costs
- User fees and general taxes
- Horizontal and vertical equity

Public goods and private goods

In everyday speech, we often use the term “public good” to refer to things that are good for the general public. In economics, the term “public good” has a different, specific meeting.

A *public good* is good or service that is both *non-excludable* and *non-rivalrous*.

If something is *excludable*, then the person who owns or controls it can prohibit others from using it or benefitting from it. My car is an *excludable* good. I can lock it and park it in a secure location and thus prevent anyone from using it without my permission. If I wanted to, I could ask people to pay me for access to my car. The sidewalk in front of my house is *non-excludable*. The city I live in owns the sidewalk, but there is nothing they can do to prevent spefic people from using it (without making substantial enough changes that it no longer functions as a sidewalk). This is why sidewalks are not tolled.

If something is *rivalrous*, then one person’s use of it prevents others from fully using or benefitting from it. My car is *rivalrous*. If one person is using it, it isn’t available for anyone else’s use at the same time. Space on a congested highway is also rivalrous. Each additional car on the highway slows down traffic for all the cars that are already there. Transit service is *non-rivalrous* The benefit I get from riding a bus with five other people does not diminish when a sixth person boards.

Public goods (those that are non-rivalrous and non-excludable) are commonly provided to the general public at the public expense because there isn’t really a good way to sell such goods to anyone. If you provide it for one person, you are providing it to everyone. There’s no way to charge people for their consumption. Under uncongested conditions, roads and sidewalk can be classified as public goods.

Private goods are both rivalrous and excludable. As described above, my car would be a private good.

If a good is rivalrous and non-excludable, it is called a *common good*. Congested sidewalks might be described as a common good.

If a good is excludable but non-rivalrous, it is called a *club good*. Satellite radio might be an example of a club good (I can't think of a transportation example).

Fixed and variable costs

Delivering transportation infrastructure involves both *fixed costs* and *variable costs*.

Fixed costs are those that are constant regardless of the number of people that use a good or service (or the intensity of use). This might be the cost of purchasing a vehicle or building a parking lot.

Variable costs are those that vary with the amount or intensity of use. Variable costs might include fuel for vehicles or wages for transit vehicle operators.

The total cost of delivering a transportation service can be characterized as:

$$C = F + Vx$$

Where *C* is the total cost, *F* is the fixed cost, *V* is the average variable cost per unit (e.g. per mile, per passenger, per trip), and *x* is the number of units (e.g. miles, passengers, trips).

Revenue for covering costs

There are two possible ways to recover the cost of providing transportation service. Through *user fees* (generally only possible if the service is *excludable*) and *subsidies* which might come from general taxes or voluntary donations.

User fees include tolls on highways, fares for riding transit vehicles, or payments for using a bikeshare bike. There is a fairness argument for reliance on user fees to fund transportation infrastructure and services. However, it is rare for any transportation system to raise enough funding through user fees to cover the full cost of delivering and operating the system. Almost all transportation systems rely on subsidies.

The practical argument for subsidies is that cities need transportation systems to function and it isn't possible to deliver them without subsidy. A fairness argument is that people benefit from being in a place with a functional transportation system even if they don't use it themselves. In other words, the benefits of the transportation system are *non-excludable* and *non-rivalrous*, so the part of the system that must be subsidized might be classified as a public good.

Distibution of revenue sources

When we discuss the fairness of a system of revenue collection, it is helpful to differentiate between vertical and horizontal equity. These concepts originate in tax law, but can be expanded to apply to user fees.

Vertical equity

Vertical equity refers to a situation in which people with higher incomes pay a higher proportion of their incomes. We would also describe this as a *progressive* tax or pricing structure.

Horizontal equity

Horizontal equity refers to a situation in which all people pay the same proportion of their incomes. We would also describe this as a *proportionate* tax or pricing structure.

Regressivity

Regardless of whether we are aiming for vertical or horizontal equity, a tax or pricing structure in which lower-income people pay a higher share of their income would be described as inequitable. This is referred to as a *regressive* tax or pricing structure.

If all people, regardless of income, pay the same amount for using a transportation system, then lower-income people are paying a higher proportion of their incomes than higher-income people are. This could be an argument for goods and services that are *inelastic with respect to income* to be publicly provided and funded through taxes rather than user fees.