

# Public commodities

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stuff related to chapter 18 in KW

Note that I have use the noun *commodity* rather than the noun *good*, as in *public commodity* rather than *public good*. It is more precise to use the word commodity than the word good when discussing public commodities because many public commodities are goods for some members of society and bads for other members, fighting in Iraq being one such example, Obama being President another.

## 1 Public Commodities defined:

Public commodities possess the property that multiple agents can consume the same unit of the commodity.

That is, the commodity is *noncongestible* in the sense that one agent's consumption of a unit does not preclude or impinge on another agent's consumption of that same unit.<sup>1</sup>

Another term for non-congestible is *non-rivalous* (the term KW use)

Examples of congestible and non-congestible in a bit.

I think most economists would agree that non-congestible is a necessary condition for a commodity to be a public commodity, but most economists would argue it is not a sufficient condition.

Most would add the property of *non-excludable*, non-excludable meaning that once units of the commodity are provided to one agent no other agent can be excluded from consuming those same units. *Excludable* means an individual can be excluded from consuming the commodity.

So most economists would say that non-congestible and non-excludable are necessary for a commodity to be a public commodity. Some economists would the two together are sufficient.

The definition of a public commodity can be further restricted by assuming, in addition to non-congestible and non-excludable, that everyone is forced to consume all units of the public commodity produced - one cannot recuse oneself

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<sup>1</sup>Many commodities are congestible: one person's consumption precludes consumption by another. Most of the goods and resources we have discussed in class, to date, are congestible.

from consuming the commodity. Note that this last condition does not require that all are affected the same, but does imply non-excludibility.

My tendency is to define public commodities as those commodities that are noncongestible and everyone consumes every unit of the commodity that is produced.

Note, commodities are *public* because of their nature, not how economic activity is or is not organized.

## 2 Examples:

### 2.1 pretty good examples

Barak Obama is a public commodity in terms of who he is and what he does for me is who he is and what he does for you—it is the same.<sup>2</sup> Once he is my Commander in Chief, he is yours as well - nothing you can do about it—his Commander-in-Chiefship is the same for us all.

I used to think Santa Claus on Christmas Eve was a public commodity, but now think he is not. His time on Christmas Eve is definitely not congestible, the fact that he makes it to my house, does not preclude him from making it to your house, so he has this property of a public commodity.

But, Santa coming to my house, since I was good, does not imply he makes it to your house—he might skip you because you are Jewish or Muslim. So, my consumption of a Santa visit does not force a Santa visit on you. He also might not come to your house because you were BAAAD.

One can be excluded by Santa.

Global warming could be considered a public commodity, a global public commodity. If we burn a bunch of carbon to heat up the planet for me, it will also be hotter for you - nothing you can do about it. Another degree of global warming for me, is another degree for you.

Polar bears saved from extinction is a public commodity. If a stock of 10,000 is preserved, we all live in a world with a polar bear population, independent of whether you contributed, or not, to the the World Wildlife Foundation.

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<sup>2</sup>We are considering Barak in his role as Commander in Chief not his role as husband and father. What he does with Michelle stays with Michelle, or in Vegas if they do it in Vegas.

## 2.2 Things that are not public commodities

Most things are not public commodities

Goods that are provided by the government are not necessarily public goods. For example, roads and public schools are not public goods in the economics sense of the word. So, we need to distinguish between public goods and goods provided by the government.

The air is not a public good. It is definitely congestible and no two individuals can consume the same unit of air. If air was noncongestible, pollution would not be a problem and everyone could breathe the same liter of air. (If access to the air is uncontrolled it is a scarce common-property resource—remember that CP resources and public goods are different beasts)

Being realistic, there are no pure public good and no pure private goods: consumption always has some effect, often small, on others. Even though my closet has no windows and is soundproof, the neighbor gets upset when I go into my closet and try on Victoria Secret bras (somehow she just knows and is jealous).

### 3 The market is incapable of efficiently allocating public goods.

Their nature makes their efficient allocation by a market impossible

This is the heart of Public Economics. If you become an economics major, take a course in Public Economics.

Why can't the market efficiently allocate public commodities?

The main reason is that a producer of the public good can't make all those who benefit from its availability pay for it--this is called the *free-rider* problem.

The producer does not have the ability to charge each consumer for the amount she consumes: people won't freely pay for something if they can automatically get it for free when someone else pays the cost of production.

In more detail, societal efficiency dictates that all commodities be produced up to the point where the cost to society of the last unit produced (marginal social cost) is just equal to the benefits to society from the last unit produced (the marginal social benefits). For public commodities, marginal social benefits are the **sum** of benefits all members of society get from the last unit produced.<sup>3</sup>

A private firm will produce units of the public commodity up to the point where marginal private cost of production (maybe equal to marginal social costs) equals marginal revenue, but for public commodities marginal revenue will be way less than marginal social benefits: there is no way the firm can get all member of society to pay the amount that they value the last unit produced because once a unit is produced everybody consumes it regardless of whether they pay. The "free rider problem." Only an entity with the power to tax (the government) can produce public commodities in the efficient quantities.

Imagine if ice-cream cones were public commodities; every time you buy and eat a cone I, and everyone else, consumes the same cone. No way am I going to pay you or Hagan Daaz for my enjoyment of your cone, and Hagan Daaz is not going to produce the efficient number of cones from society's perspective. Assuming ice-cream cones are liked by all, the market will grossly under-produce them if they are public goods.

Imagine a society consists of three people where ice-cream cones are magically public goods. George's marginal benefits for cones is

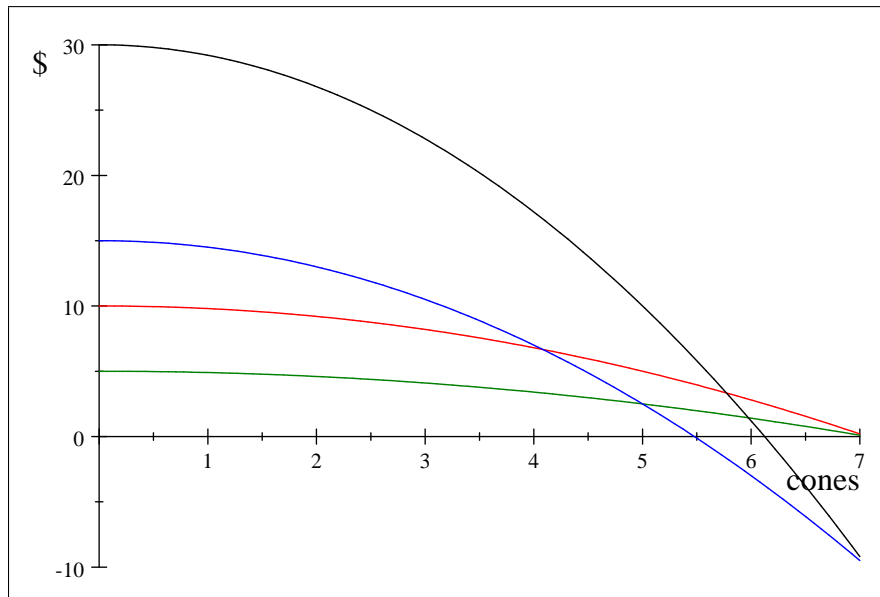
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<sup>3</sup>For a purely private good only one member of society benefits from it, the individual consuming it, not everyone as with a public good.

If the public commodity is a bad for some, their benefits will be negative, and total social benefits will be the sum of positives and negatives.

$MB_G(c) = 10 - .2c^2$ . For Alexa it is  $MB_A(c) = 5 - .1c^2$  and for Fred it is  $MB_F(c) = 15 - .5c^2$

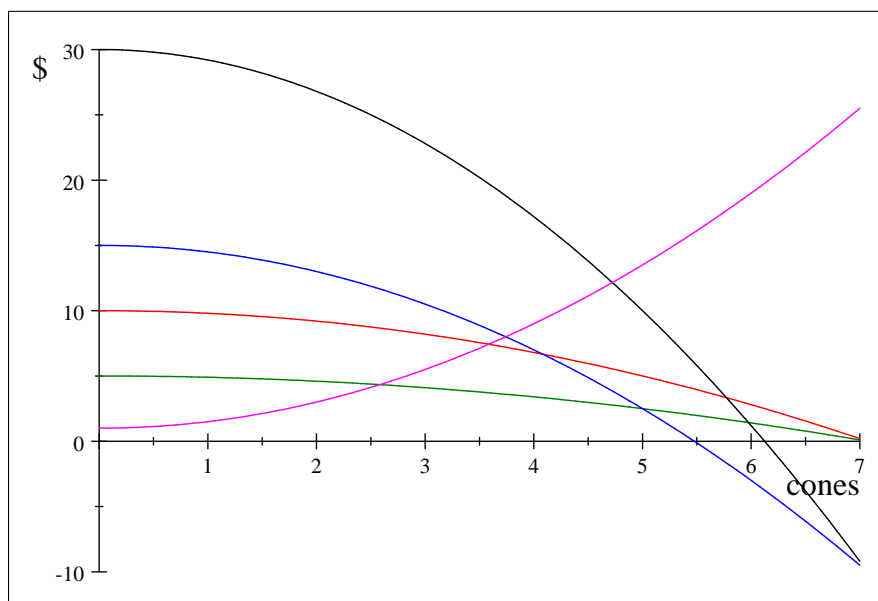
Keep in mind that they are all eating the same cones.



Fred blue, Alexa green, George red

The black line is the marginal benefit to society from each additional cone,  $MB_S(c) = 30 - .8c^2$ . (it is the vertical sum of the three lines). Note how marginal social benefits from cones goes negative at a bit over 6 cones. Why is that?

Now include the marginal cost curve for producing these public-goods cones. Let's make it purple.



Fred blue, Alexa green, George red

The efficient amount of public-goods cones is a bit less than 5 cones (where  $MB_s(c) = MC(c)$ ). If these cones were sold by profit-maximizing firms less than 5 cones would be produced, maybe even zero. To make it profitable to produce the 5 cones, the firm would have to get everyone to pay the firm their marginal benefit from each additional cone, including the 5<sup>th</sup> cones, but this won't happen.

Alexa will want George and Fred to pay so she can eat for free, so is unlikely to pay. George will want Alexa and Fred to pay so he can eat for free so it is unlikely to pay; and Fred will want George and Alexa to pay so he can eat for free—each will want to free ride off the other two.

And once the firm produces a cone for one of them the other two automatically get it for free, so they cannot be compelled to pay.

National defense is the classic example of a public commodity. To achieve the efficient amount the government has to determine the efficient amount and get it produced, forcing everyone to pay for it through taxes. The market fails when it comes to producing national defense and other public commodities.

Reducing global warming is another example, an example of a public bad. So reducing global warming is a public good. If China reduces their  $CO_2$  emissions enough to reduce the increase in global temperature by one degree, everyone else in the world experiences that one-less-degree, and experiences it at a zero cost to them—the rest of us cannot be excluded and, in fact, are forced to experience

the effect.<sup>4</sup> Ditto if the U.S. reduces their  $CO_2$  emissions. The efficient amount of global warming reduction will, likely, not be achieved because everyone will try and free ride on everyone else, a market failure.

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<sup>4</sup>Note that countries like Russia and Canada will likely benefit from global warming.

One might view the consumption of a public commodity as an extreme type of externality. When I consume another unit of national defense, you are forced to as well, whether you like it or not, so there is an external effect

Environmental resources such as animal species and ecological systems can have a public-commodities aspect to them. Consider wolves. If wolves are reintroduced in Colorado, their presence will be felt by all of us. My enjoyment from knowing that wolves roam Colorado does not preclude you from enjoying or hating those same wolves.<sup>5</sup> Reintroducing wolves is like attacking Iraq; one citizen's loving it does not preclude others from loving or hating it, but we all have to live with it.

There are some environmental resources whose existence affects us even if we do not "use" or "consume" them in the traditional senses of these words. I value the wilderness of Alaska even though I have never been there and have no desire to go – too cold and too scary. I feel the same about wetlands - I won't want to swim in a swamp with big snakes.

Different names for these types of values are non-use values, passive-use values and existence values. Such values can be positive or negative – I hate knowing snakes exist or that people in the Sudan are starving. An existence value is a public commodity because my valuing the existence of the resource does not preclude from valuing the existence of the resource, and, its existence is experienced by you whether you like it or not.

Many environmental resources have a public-commodity aspect in that they produce non-use values which need to be summed across individuals to get the social benefit of the resource. My being damaged by an oil spill in Alaska (or by the BP spill in the Gulf) or the destruction of the World Trade Towers does not preclude you from being damaged.

If Exxon were to be sued, they were sued, for the damages from the Exxon Valdez spill, total damage would be the sum of the damages to all of us, even if most of us had never seen the place. Ditto for the BP spill in the Gulf; BP is being sued for the damages done to the American people (the sum of what each of us would have been wtp to not have had the spill happen).

One last thing about public commodities, make sure you understand the distinction between public resources and common property resources. The last lecture was on cp resources.

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<sup>5</sup>The public commodity is the presence of the wolves. That said, if a wolf eats you (or one of your cows), that does not mean he is also eating me, so some aspects of their actions are not public in nature. The big bad wolf can do things that only affect rancher Rob.