Energy Resources, Economics and Environment
Professor Rangan Banerjee
Department of Energy Science and Engineering
Indian Institute of Technology, Bombay
Lecture 13
Public and Private Good/Bads

We have seen the concept of Pareto optimality of market equilibrium and then we saw the concept of consumer surplus, producer surplus and identified the point at which we would get an efficient price. Now, when we look at different kinds of goods and bads and services so for instance, we are looking at buying electricity, we are looking at buying batteries, we are looking at garbage, disposal of garbage, we look at environment in terms of the air quality, you can look at using and getting a benefit from a park.

So, you can see that all goods and services are not of the same type and especially when we trying to understand the impact of energy systems on the environment and we would need to be able to differentiate some of the qualities of these goods and bads that we are talking of and typically in the economic literature, we talk about public and private goods and bads.

So, in this module, we will look at what are the characteristics of goods and bads and based on these characteristics, how do we classify goods as public goods and private goods and when we know that there are public goods or private goods, what does it mean when we want to aggregate and look at the kind of demand curves that we can get. So, this is the sequence in which we will develop this thought.

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So, there are two concepts that we are going to look at, one is excludability and the second is rivalry. So, we will look at what we understand when we say that a good is excludable and what do we understand when we say that a good is a rival good or a non-rival good. So, in both these cases excludable non-excludable.

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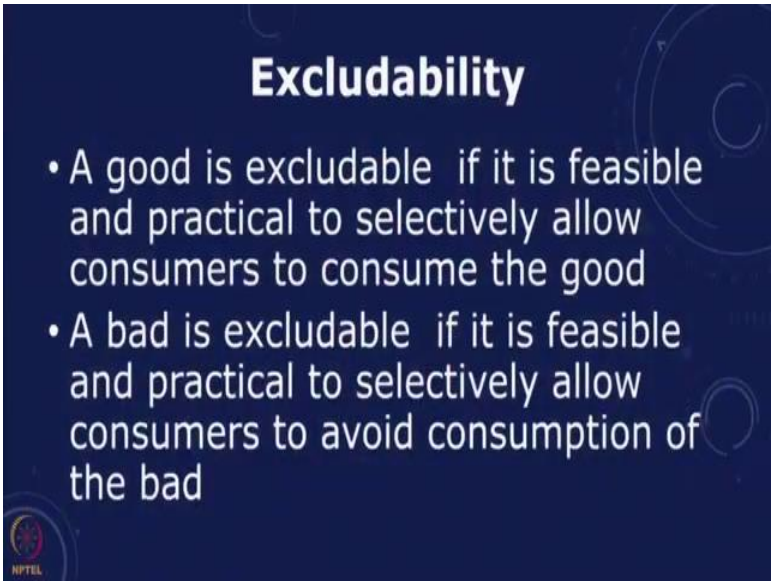

So, a good is excludable if it is feasible and practical to selectively allow consumers to consume the good. So, for instance, if you look at this pen, if I buy this pen and then this

pen belongs to me, then someone else cannot buy the same pen, so that is a sense of saying what we mean by excludable. If you are looking at consumption, we are looking at a certain amount of, you look at an apple, if you consume an apple, then that apple is not there for someone else to consume.

So, when we want to differentiate between private and public goods and bads, we want to look at two characteristics, one is excludability and the second is rivalry. So in the case of excludability, we want to make sure that if I am supplying electricity, those who are paying for the electricity can be provided that electricity and if you don't pay for it, you will not have access to it.

If I am looking at in any market when you buy something, it is possible in the market for you to get access to it only if you make that payment, if you are going, so it is feasible and practical to selectively allow consumers to consume the good. Similarly, in the case of a bad, bad is excludable if it is feasible and practical to selectively allow consumers to avoid consumption of the bad.

For instance, if I am looking at garbage, that is being created in the household and if I have a mechanism by which I can take that garbage and I can pay the municipality a certain amount to be able to dispose of the garbage, then that garbage is excludable. So, when we talk about excludability, it means that we can, we have a mechanism by which we can ensure that good is only available to an individual.

So it is feasible and important is not only that it is feasible but it is practical to selectively allow consumers to consume the good. Once we can do that, then that provides us the basis for creating a price and a mechanism for excluding those who are not paying that price. So, this is a particular characteristic that we are looking at excludability.

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The second concept that we want to understand is the concept of rivalry. And in the case of rivalry we are talking of a good or bad is rival if one persons consumption of a unit of the good or bad diminishes the amount of the good or bad available for others to consume. Which means that if I have a fixed amount of some good, if you have a set of, I have bought a set of pens and if a person it takes 5 of those pens, those are not available for the other person.

So in a sense of, if you are looking at food, if you are looking at bananas or apples, if we, if I consume that banana that is not available for consumption by someone else. On the other hand, there could be a sun, a sunset, and you are enjoying the beauty of the sunset. My enjoying the beauty of the sunset does not affect someone elses ability to enjoy that. So, then it is non-rival. So you understand the difference between rivalry and non-rivalry.

A rival good is where someones consumption of that good diminishes the amount of the goods available for the others to consume. So, these are two important characteristics.

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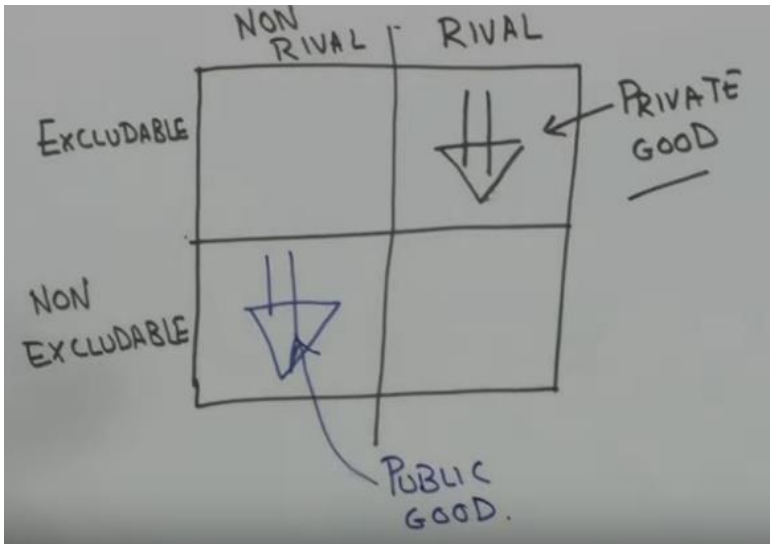

And what we try to do is we create a matrix which says let us have 4 quadrants, let us say that we have excludable and non-excludable and then we have rival and non-rival. So, what we will find is that if we are looking at the good, that is rival and excludable, this good is called a private good, that means that we are saying that this is going to be, we are looking at this quadrant, where goods are rival and excludable these are also called pure private good and this is ideal for a situation where it can be tackled by the market.

At the other extreme, you would have goods which are neither rival, non-excludable. So, this is in this quadrant, this is a pure public good, this is where it is non-rival and non-

excludable and a pure public good and we will see that for pure public goods there are problems with the market trying to provide pure public goods, and we will prove and see what that means.

Okay, so we talked about now the difference between rival, we have talked about characteristics like rivalry and excludability. And then we have used that to characterize goods as pure public goods, pure private goods in a similar fashion, it can be pure public bad, and pure private bad. So, once we have done this, and if you have understood these concepts, now, we should be able to classify different kinds of goods and services.

So, I have a list of different goods and services and let us spend a little bit of time thinking about each of these and characterize them as public and private goods.

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So, let us start with the first one, fairly simple think about it a pizza, is it excludable, is it rival? So pizza is obviously excludable, you order it, you pay for it then only you get it. So it is possible to when it is made it is only given based on the payment. So it is excludable. Is it rival? Yes, once you consume it, it is not available for someone else to consume so, pizza is rival, excludable and hence it is a pure private good.

Let us look at higher education, we will talk about this, think about it and we will come back to this and we will discuss this in more detail. This will depend on the assumptions

that you have and the kind of belief systems it is not a direct calculation, we will talk about both rivalry and excludability. If you look at ice cream, again the same concept just like the pizza, and so it is both rival and excludable and it is a private good.

Now, look at a lighthouse, lighthouse is in the earlier days, this would be provided on the shore and it would provide light for ships in a particular location. So, in this case is it rival, is it excludable, in general, if you have any ship in the vicinity, they would be able to see that light and unless you do some kind of a technological change, basically it is accessible to everyone.

So, it is not excludable, if you had some modification in technology where you could provide that access only based on some fee, then it would have been excludable but as of now it is not excludable, is it rival? It is not rival, in the sense that if one ship sees the light, it does not affect this light being seen by the other ship, it is at a height and so this is non-rival, non-excludable, it is a pure public good.

Let us look at another one, a TV broadcast. Now, this is a little confusing in the sense that if you had when you look at the free to air channels, right, so it is possible if you had free to air channels where anyone buys a TV and has the hardware, they can access it. But now we have the satellite and the dish where you can control, so it is excludable in the sense that when you talk about cable TV only if you pay the fee, you will get the access.

So, technology has permitted the fact that you can get the access so, it can be excludable and what about rival? So, my watching the television does not affect your watching the television, so unless there is congestion, this is something where it is non-rival, but it is excludable and it is more like a private good. It is not a pure private good, but it can be considered as a private group.

Now, if you look at the next case, the radio broadcast, in most cases when we talk about radio and the FM radio it is you need to have a radio, so that is you have to purchase that but the broadcast is free to air and it is not excludable and it is non-rival. So it becomes then a public good, what is the model that then people use, the radio broadcasts actually use advertising and they get revenue from the advertising, which makes this.

It is possible technologically to have a possibility where you need to subscribe to some radio station only then you would be able to, there could be a password protect or something but in most of the cases, what we are looking at is the radio broadcast is a public good. Now let us think in terms of basic research, this is a more tricky question, basic research by its very definition is supposed to be for the good of humankind.

And so, it is supposed to be non-excludable, non-rival. But in practice, what happens is often the basic research if that research is being commercialized and that is being used and could be patented of course, that then goes into application. So, the basic research by very definition is like pure public good. World Wide Web, as per the founders and the start this was meant as a way of free communication.

The access to the web you may have to pay and the bandwidth you may have to pay but the web itself is in general, free, it could subject to congestion, it can be non-rival, non-excludable. Some features of it, websites and others can make it excludable by providing passwords and providing access and asking for a fee, but in general, the web was meant to be free and the public good.

Weather forecast again depending on the depending on the kind of forecasts, if it is and the way in which it is being provided, it could be, you could make it a excludable of course it would be non-rival. And in some cases, if the government is providing this and it is broadcasting it then it could also be a pure public good, but in some cases it can be something which is for a fee or of service.

Newspapers, as you would know that I mean, this is like it is excludable and rival and so it can be newspapers are sold. Let us look at, we would not go through all of these, let us look at a few tricky ones, if you look at a freeway or a highway, so a freeway or a highway subject to the fact that it is not getting congested, then it would be non-rival.

Of course, it could be excludable because you could always have a toll, in the case of a free way since it is designed by society to be free, there is no toll, it is non-excludable and if there is no congestion, it can actually be a pure public good. Metro rail, excludable as well

as, well depends the rivalry depends on if it is not congested it may not be rival but it is more like a private good.

If you look at air pollution typically non-excludable, all people who are there will have that and you are not sort of excluding people from the air pollution and it is non-rival. So it is like a public bad. National Defense is something where everyone, all of us are getting the benefit from it, so it is not excluded for any individual, non-excludable and its non-rival.

And so similarly, one can look at many of these other things, please think about this and so, you get the idea of how we classify goods as public and private goods. And what we will see is that when we talk about how to estimate the demand, based on the characteristics of the good, if it is a private good, the demand aggregation is just done on a very simple market principles.

In the case of the public good we have a problem and we can look at how we can tackle the aggregation of demand. So, let us before we do that, let us talk a little bit about this concept of higher education and whether higher education is a public good. Now, this is of course, a question where there are many differences in opinion.

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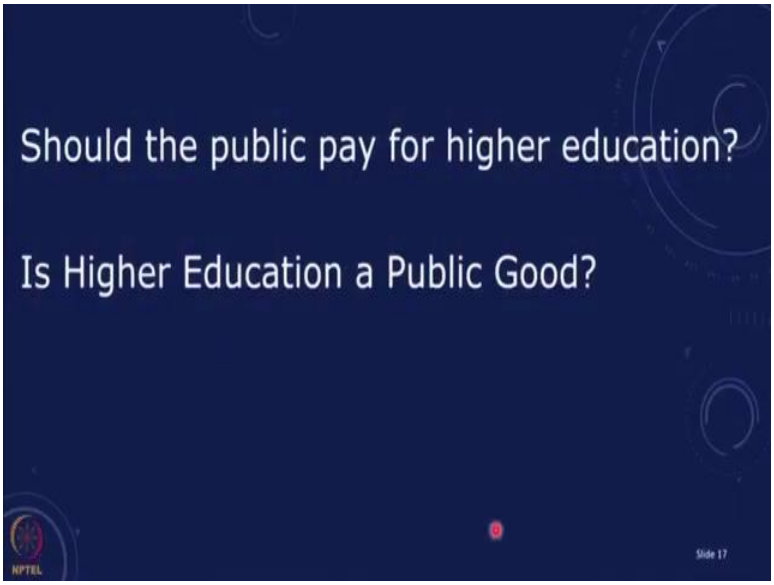

And this is, the question is should the public pay for higher education, is higher education a public good? So, the characteristics that you may want to look at is that, is it excludable?

Is it rival? So, obviously, in a sense, higher education can be excludable because we charge a certain amount of fees. We also make sure we will not admit people unless they have a certain, they get through certain exams, we have the fixed number of seats which we can deliver. So, in that sense it is excludable.

But however, if we look at recording all the lectures and making it available in the public domain, in that sense, it could be converted to something which is non-excludable, where it is non-excludable it is accessible to everyone, in terms of rivalry in general the higher education is non-rival except for the concept of if you have a limited number of seats.

So, in that sense, this is the, and my belief is higher education is essentially a public good, in most countries of the world higher education is a way in which we prepare future generations for society and every individual who goes through higher education adds a lot of value and over the productive years he or she will return to society much more than what was paid for by society.

And this is an on an economic argument basis. It is also in the form of in general, when the individuals who go through higher education also create value, they create knowledge. And in many cases, they also create employment and jobs. And so there is rationale for actually subsidizing or providing for society to provide funds for higher education.

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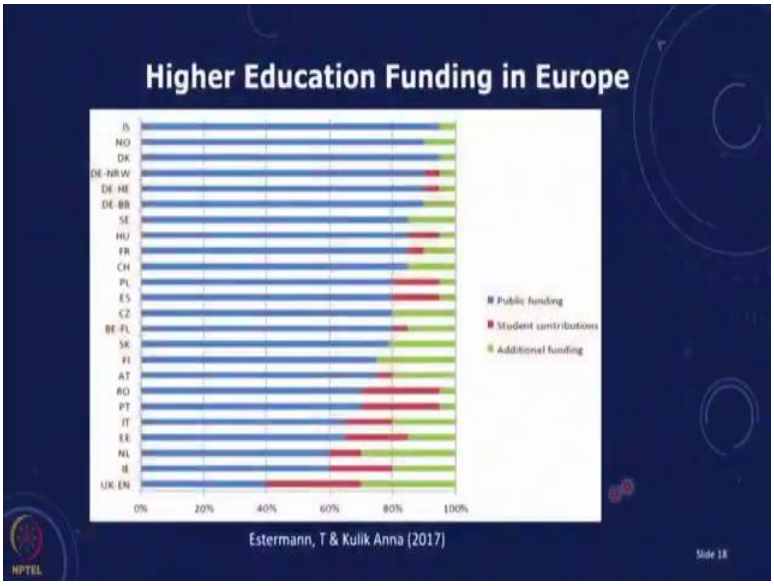

And you can see this in most countries of the world for instance, this shows you the share of higher education, public funding of higher education and you can see that most countries of Europe the bulk of the funding is coming from the government and from society.

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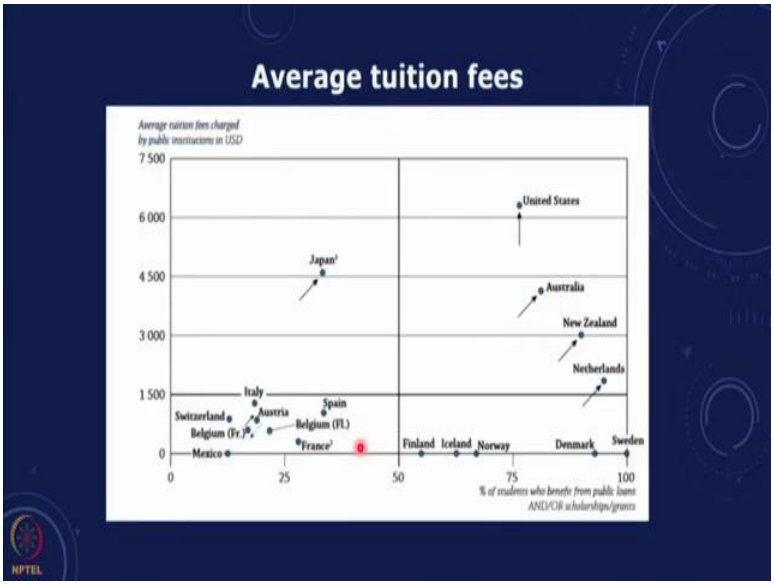

And you can also look at what this is a plot which just shows you the average tuition fees and the percentage of that fee which is provided from percentage of the students who are also benefiting from the public funds and loans. And you can see that most of the countries where we are looking at it, that you have a significant amount of funding either directly from the government or in the form of loans.

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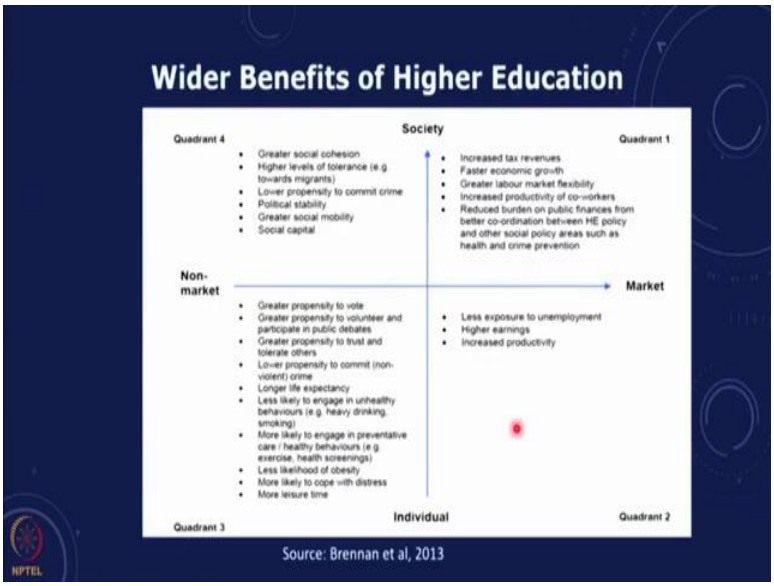

And then you can see that essentially, there are benefits from higher education which go to society directly, the individual benefits in terms of we can look at the total income which is generated by the individual and the knowledge which is generated by the individual, post facto, there is a sort of multiplier effect because that individuals and the families and then the jobs created by the individual.

And so, overall, there have been many studies which clearly show that in the long run any payment on higher education really benefit society. Of course, we are currently in a situation where most, in most places there is a problem in terms of funding. And governments are looking at ways in which the individuals gaining the individual benefit pays a significant proportion of the costs of that education.

And often the cost of that education is in specially in developing countries is high as compared to the average income and this becomes a deterrent, and the solution of course, then is to provide loans and low interest loans. And in countries where this is there this results in very significant amount of indebtedness, and people come out after their higher education with a large amount of loans and it takes 6 to 8 years to repay those loans in the early years.

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And this is, in many countries, this is actually a problem for instance, in the US, the student debt exceeded 1 trillion and yet, about one third of the students who take the loans drop out of the higher education system, and a significant proportion of the loans are in default.

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So just to give you an idea, this is from a report which is there, which talks about the average student loan debt per student and you can see that in the UK in Australia, Sweden significant amount of debt per student.