An Introduction to Microeconomics
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Lecture- 23
Price Elasticity of Demand

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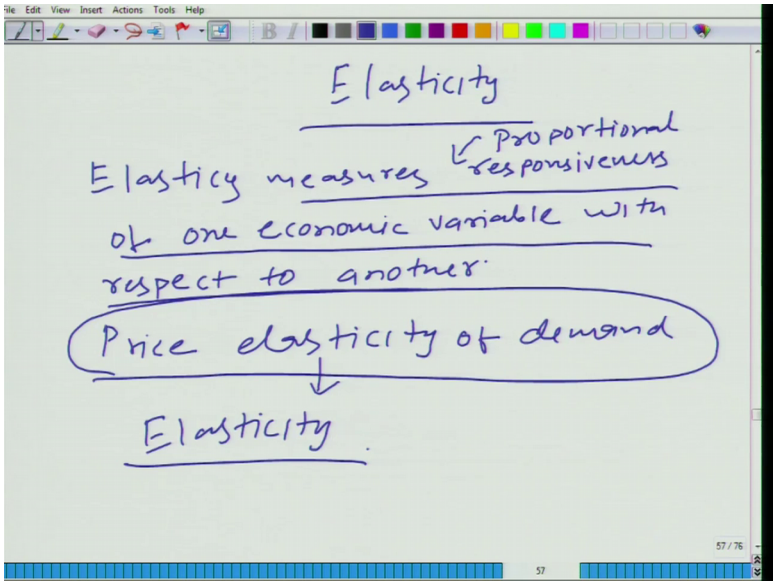

Now, let us start a new sub topic, elasticity. Have we learned about the demand curve? The demand is a.

Student: downward slowing curve.

Downward sloping curve meaning, that when price of a good goes up having everything else constant the quantity demanded for that good.

Student: (Refer Time: 00:37) fall down.

Falls and vice versa, but this is very important this is very important information that price and quantity demanded move in the opposite direction. That is what we have learned, but how quickly how much is the response, let us say if I increase the price by one unit do you think that for all demand function the fall in quantity demanded would be the same?

Student: no sir.

No, it would vary, for some goods you would have huge response in huge change in quantity demanded. While for some other good you will observe almost no change in quantity demanded.

Let us take an example, let us say that price of salt goes up by 100 percent. Do you think the quantity that you demand of salt would come down heavily?

Student: no.

No, it would almost remain the same. It is not going to change much. But now let us say the price of apple goes up by 100 percent, do you think you will demand the same quantity of apple?

Student: no.

No, your quantity demanded for apple would go down substantially. So, we took 2 examples salt and apple and we saw that the price responsiveness of salt is almost 0. Although, we didn't bring any data, but through our experience we have this information while for apple the price responsiveness is quite high.

So now we will study this. We will try to figure out, we will try to measure this price responsiveness of quantity demanded. And that is what we will study in elasticity. So, basically in simple word, if I can say elasticity measures responsiveness of one economic variable with respect to another. So, can you tell me the name of those variables which I discussed when I described the.

Student: (Refer Time: 03:20)

Example of salt and apple?

Student: (Refer Time: 03:23) price and quantity.

Price and quantity. So, we are trying to measure the responsiveness of quantity demanded with respect to.

Student: price.

Price. And this is called price elasticity of demand. But before we go into this particular term price elasticity of demand, let us talk about just elasticity. Forget about the

definition I just the description that I gave you that elasticity measures the responsiveness of one economic variable with respect to another. What do you think when this word comes to your mind elasticity? Let me give you a day today example of rubber when we put when we put little force and this rubber stretches. What do we say? This rubber is.

Student: elastic.

Very elastic. And I put same kind of force on this pen, the length of this pen does not change. What we say this material is,

Student: inelastic.

Inelastic. Although, this example is not perfect in a sense that also we have to think about the range of the force that we are applying and things like that. But you got the picture, that when we apply the force up and we observe a great change in the length. We call that item, we call that material elastic.

So, similarly here we are talking about of course, length and force they are not variables in economics. We do not study these things in economics. But what we study is demand price things like that. So, what we are trying to say here price elasticity of demand if we apply little change in the price, and what we observe is great change in quantity demanded.

Of course, we will call it that price elasticity of demand is very, very elastic. That or in other word that demand is very elastic. And we apply a great change in the price, and we observe very little or almost no change in quantity demanded. We can say that the demand curve is inelastic. One more thing you should also understand in this rubber example, if we put you should know that the unit of force that is newton or dyne. So, if we measure the force in newton and change in length in meter, we will get one value. But what if we change the newton to dyne and keep measuring the length in meter will we observe we will get the same value, no. We will get different value.

So, similarly here in price elasticity of demand, if we measure the change in price in rupees and change in quantity in grams. We will get one value and when we measure the change in price in rupees and change in quantity in kilogram, we will get a different

variable. So, it is good idea to make this definition unit free. So, it is it does not because, you know when you are talking to your friend sometime you do not know whether you are using rupees or dollar or kilogram or gram. Not that much in sense of rupees and dollar, but definitely in sense of kilogram and grams. So, it is good idea to make it unit free.

So, rather than talking about just major of course, it is major of responsiveness. But one thing we can add here is to make it better is elasticity measure the proportional responsiveness. What does it mean? That rather than measuring the change in quantity demanded in absolute term what we measure is percentage change in quantity demanded with respect to percentage change in.

Student: (Refer Time: 07:48)

Percentage change in.

Student: price.

Price. So, let me write it price elasticity of demand is percentage change in quantity of a product with respect to percentage change in price of that product.

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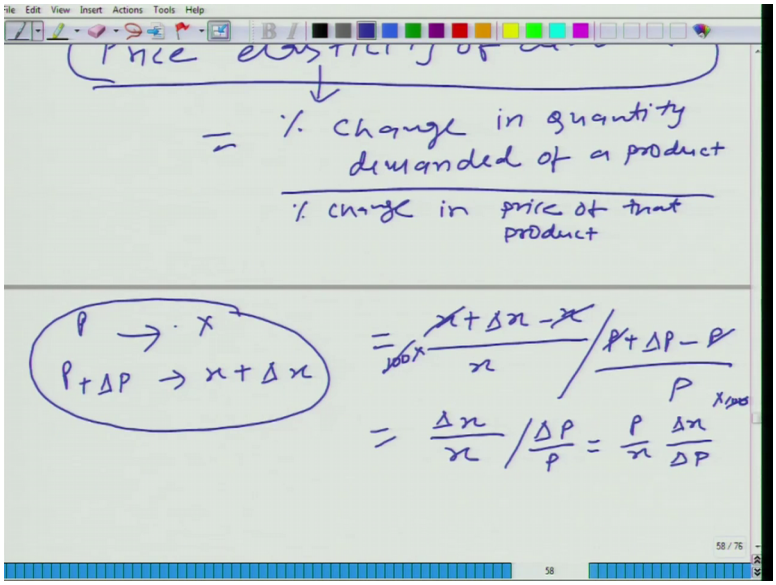

Is it clear? Let us elaborate little it bit more. How can we write this?

Student: delta q.

Let us say let us say I will use calculus, but little later on. But first let us do it without using any calculus. Let us say earlier price was P and quantity demanded was x. Now price is P plus delta P, and quantity demanded is x plus.

Student: delta.

Delta x. Can you tell me what would be the price elasticity using the this information?

Student: delta x by x upon delta P.

So, first we have to calculate percentage change. So, let us write the percentage change in quantity demanded x plus delta x minus x divided by.

Student: x.

X. If you are using the original quantity. And if you are using the final quantity, then it will be denominator will be x plus delta x. And here you will get P plus delta P minus P divided by P. So, basically and to convert it into percentage, you will multiply here with 100 and also here with 100. So, these 2 will get cancelled. So, what you eventually get is this again get cancelled here. So, what you will get delta x by x divided by delta P by P. Or you can write it also P by x.

Student: delta x.

Delta x by delta P.

Student: delta P.

So, for an example, just let us take an example, that we are talking about increase in quantity demanded. Let us say original quantity was 100. And the final quantity is let us say there is 20 percent increase in quantity demanded because of some increase in price. So now, from 100 you have quantity demanded, now new quantity demanded is equal to 120, fine. So, when you move from 100 to 120 you get 20 percent increase. But if you move from 120 to 20, you get.

Student: 20 upon 121 by 6 (Refer Time: 11:21)

Approximately.

Student: 16 percent.

16 percent decrease. So, just to get rid of this sort of problem, some time what people use, and I will eventually give you another formulation then you will not have this kind of confusion; that rather than using x or x plus delta x in the denominator what people do people take average of initial quantity and final quantity and also of initial price and final price.

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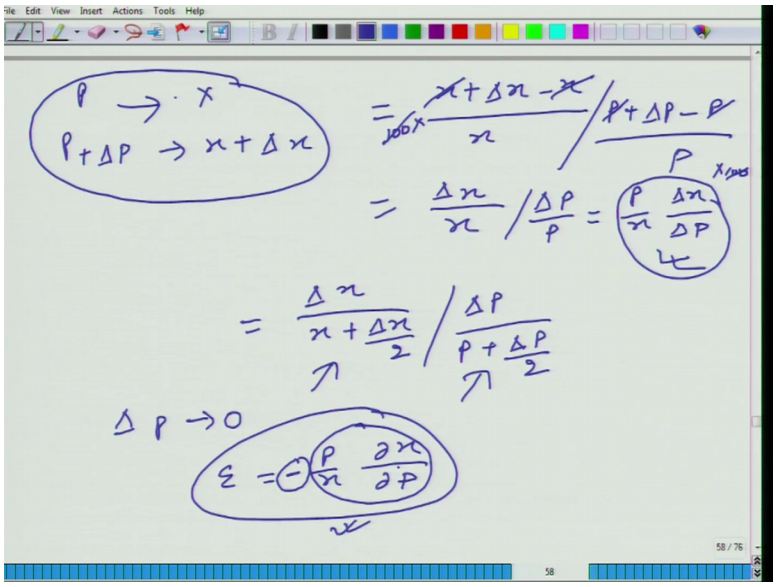

So, what you get again new formula is delta x divided by x plus delta x by 2 divided by delta P, P plus delta P by 2. What I am doing here I have of course, jumped few steps, but what I am doing here that in denominator in the quantity change side also in the price change side, I am using the average of initial quantity and.

Student: final.

Taking final quantity. Similarly, on the price change side we are taking the average of initial price as well as the final price. But this confusion is because now we have 2 formula, because I do not think any one of you would take x plus delta x in the denominator, but at least now we have 2 formulas.

Why we are talking about discreet and big changes? So, one thing that we can do that typically elasticity is measured at a particular point on the demand curve or on the demands due. So, if you have you know the calculus, then what you can do, you can say

that let us say, to measure price elasticity of demand at a particular point what you will see that what is the rate of change in.

Student: quantity.

Not just quantity.

Student: (Refer Time: 13:28)

Rate of change in the;

Proportional or in other word rather than saying it is rate of change in quantity. It is proportional rate of change in quantity with respect to proportional.

Student: change in price.

Change in.

Student: price.

Price. So, in other word what we are doing; that we are taking delta x we are taking a limit that delta x, or not delta x because here we are taking del.

Student: (Refer Time: 13:58)

X as dependent variable. So, delta P moving to 0, what we will get in that case? Elasticity we will get as.

Student: delta dash.

If you look at this formula here P by x.

Student: delta P.

Del P. And this is the mathematical formulation of elasticity using calculus. And this is mathematical formulation of elasticity price elasticity of demand without using calculus.

Now, one more thing what we know is that quantity demanded and price equilibrium price in the market, they move in the opposite direction. We already have this information. So, sometime in most of the books you will see that epsilon is always given

as the positive number. How do we get the positive number? Because if you calculate the price elasticity of demand using this particular function, you will always get as a.

Student: negative.

Negative non-positive number. It can never be positive. But whenever it is described in books it is always given as positive number. So, we just add a minus sign to make it a positive do not get confused about it just to make the price elasticity of demand the number as positive number. So, when someone says that price elasticity of demand for let us say apple is minus 2, you immediately you would know that this minus sign is not being used in the formula. Because if you use this portion you will automatically gave get minus. But someone says that price elasticity of demand is of apple is 2. Then you should immediately understand that person who is saying has put a negative sign, there to make this number a positive number. So, if you idea is clear in your mind you would never get confused about it. Fine, it is clear?