Foundation Course in Managerial Economics
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Lecture - 09
Elasticity of Supply

Welcome back to the discussion on elasticity of demand and supply. In the previous module we ended our discussion on elasticity, price elasticity of demand and we took an example of how to illustrate how a producer decides from elasticity of demand whether to changes his whether to increase or decrease his prices or not or rather to say it is not that the producer decides to change his price or not depending on elasticity it is not that a producer who has varying elastic demand he is never going to increase his price. It is not that or he is never going to reduce his price, it is not that.

The producer's decision on whether to change the price is not solely dependent on elasticity of demand. It is dependent on a lot of things which we are going to discuss later when we talk about cost or we talk about producer theory, cost functions etc. and we are going to see that the producer's decision of how much to produce, how much to charge depends on a lot of other things than solely on the demand that he is facing but nevertheless it is the what is the impact of a price change on revenue is a important information which goes into the decision making process of a producer and this is what we discussed in the previous module and to continue with the discussion today we are going to talk about price elasticity of supply. We are going to talk about price elasticity of supply.

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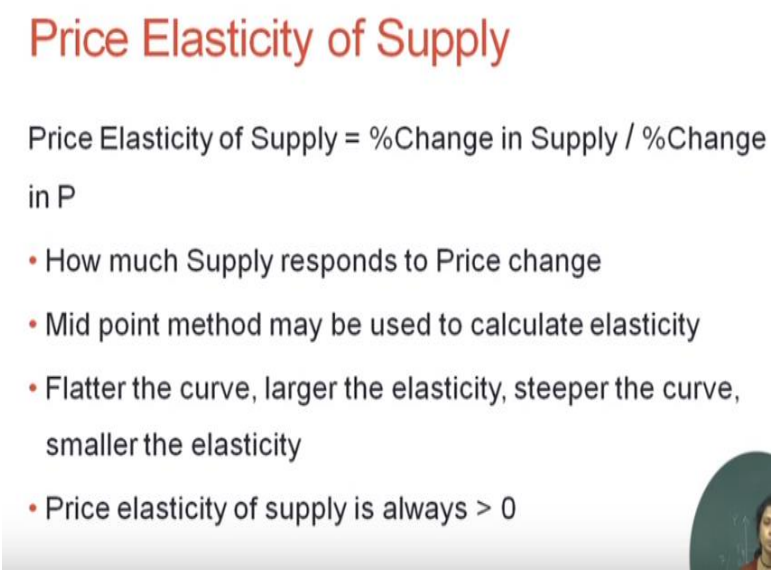

And price elasticity of supply as many of you might must have already figured out would be the percentage change in supply divided by percentage change in price. So this is the percentage change in supply divided by percentage change in price or in other words how much supply responds to any price change, how much supply responds to any price change and is giving us our elasticity price elasticity of supply and like we discussed in the previous in while discussing the elasticity of demand we discussed that we talked about the midpoint method and the same midpoint method can be used to calculate elasticity of supply as well so that, let me illustrate.

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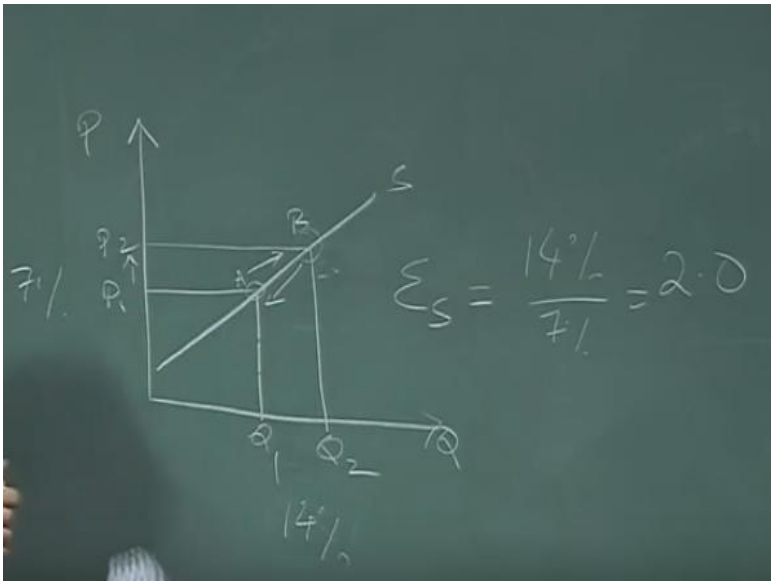

So if this is the supply curve and say this is the initial sorry this is the initial price quantity combination at which the supplier was operating and now the price changes. Now the price

changes or price increases to P 2. Say price increase to P 2 and quantity also increases to Q 2; why, it follows the law of supply. By the law of supply whenever price increases it makes sense for the supplier to increase the amount of output that he can supply in the market.

So when price increases quantity also increases here. Say for example quantity increases by say 14 % when price had increased by say 7 %. So what is the elasticity of supply? So in this case elasticity of supply is equal to 14 % divided by 7 % is equal to 2 and needless to say elasticity of supply is always positive why because the slope of the supply function is positive so elasticity of supply, price elasticity of supply is always positive.

So this is price elasticity of supply and as we discussed in the case of demand also say if you are moving from point A to B or if you are moving from the point B to A if you calculate the elasticity at this point you are going to get a different number and if you calculate the elasticity from this point you are going to get a different number and to resolve that problem what we do is we use the midpoint method where we basically take the change in price divided by the average price of it at the 2 points and on the numerator we take the change in quantity divided by the average of the quantities at the 2 points and that is the midpoint method and that midpoint method is also used in case to calculate the price elasticity of supply.

So again flatter the curve, larger the elasticity; steeper the curve, smaller the elasticity. So similar to the demand the price elasticity of the demand that we have become quite conversant with so the similarly in case of the supply curve also if it is a flat supply curve the price the response of quantity to price is very high and if it is a steep supply curve the response of the quantity response against price is very small.

So that is the so that is so you have a elasticity supply curve if it is very or in other words what is the what is what is the intuition or what do we mean by a flat supply curve. What we mean by a flat supply curve is it is very or a highly elasticity supply curve is basically the it is the suppliers are highly responsive to price changes. If the price increases a little bit the supplier can change the quantity supplied by a big amount and if in case of a inelastic supply curve the supplier is basically not too responsive to price changes.

That could be because of various reasons. We are going to talk about some of them in the later slides. Basically there is a constraint or a rigidity that the supplier faces because of when the price changes a little bit the supplier is unable to change the quantity much and in that case the

supplier faces a or the supplier has a very steep supply curve. And as I already said price elasticity of supply is always positive.

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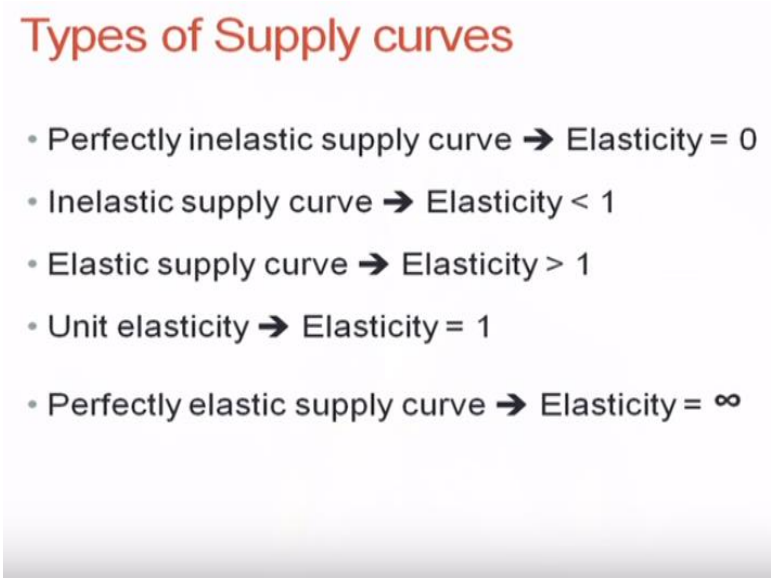

Now similar to the similar to the demand curves you have different types of supply curves also and accordingly with different kinds of supply curves you have different elasticities also elasticities of supply because depending on what the slope of the what kind of slope the supply curve has accordingly the elasticity also changes of the supply curve.

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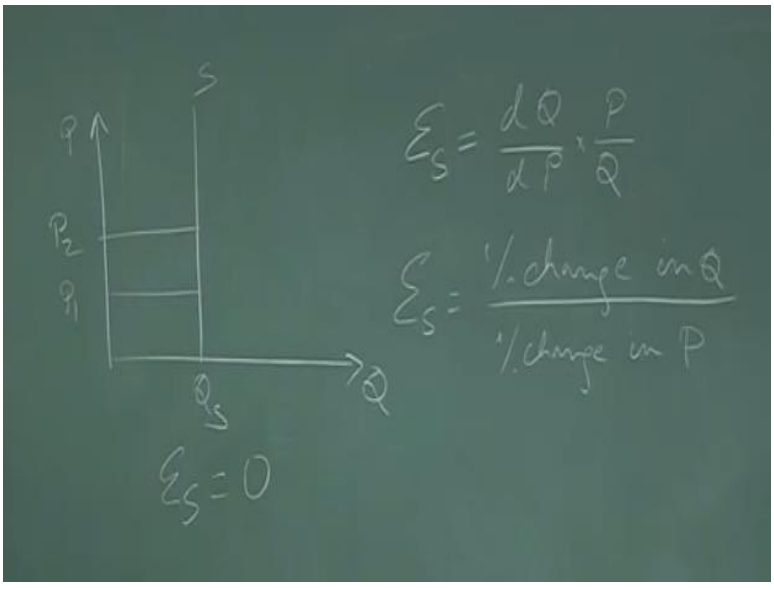

So elasticity of supply is also dQ dP into P by Q. So elasticity of supply is also defined like this or elasticity of supply is percentage change in Q divided by percentage change in P. So and in

case of elasticity of supply this is the slope of the supply curve and this is positive so elasticity of supply is always positive.

Now depending on different types of supply curves you have different kinds of elasticities that will be shown by the supply curve, say perfectly inelastic supply curve. So what do we mean if you may remember we had discussed about perfectly inelastic demand curve and what did the curve look like?

In case of a perfectly inelastic demand curve the curve was a vertical line so which meant that quantity demanded was not changing no matter what the price was. Similarly in this case where it is a perfectly inelastic supply curve elasticity is equal to 0 and I draw it here. So this is the supply curve, this is the quantity supplied and no matter what the price is the quantity supplied there is no change in quantity supplied. So there is no change in quantity supplied. So change in quantity supplied is always 0. So the inelastic supply curve always has a elasticity of elasticity of supply is equal to 0, elasticity of supply is equal to 0.

So you might like to know you might ask that what is a do we have any example of a perfectly inelasticity supply curve? Do we have a any example of perfectly inelastic supply curve where basically we are saying that the supply does not change. Supply is not changing no matter what the price is. So one example that one could think of is say for example I have a very precious rare, say I have a painting of Picasso which I have inherited from somewhere from my great great grandparents and it is there with me and I would like to sell it.

Now I can no matter what the price of that painting is in the market, I cannot change the supply of that painting. There is there is only 1 painting or maybe 2 paintings that I have and no matter what the price is if by due to some strange reason no one is willing to pay anything and the price is 0 or if they pay me the sky then also I cannot change the supply from what I have right now. So that is a perfectly inelastic supply curve.

And so a little more realistic example realistic supply curve that you have is you have the inelastic supply curve where elasticity is less than 1 and you have the elasticity supply curve where elasticity is more than 1. So you will be able to find lot of examples where elasticity is less than 1, where elasticity is more than 1.

So elasticity less than 1 basically means that say for example there is a increase in price, you would like to increase the quantity but you have not been able to increase the quantity as much.

So basically the amount by which you increase the quantity is less than the amount by which price increases and that can happen due to lot of reasons.

Say for example you have some say your supply depends on some natural resources that you use say for example you have a land and you produce say you are already producing rice there and the suddenly there is a increase in demand and you would like to increase and there is a increase in price in the market but you have only that much land and there is only probably if you find a little more squeeze in some more place to sow some more seeds and produce some more grains, probably you will be able to produce a little more.

But you may not be able to produce as much as you would like to given the increase in price. So that is kind of inelastic supply curve and on the other hand you have elasticity supply curve where basically you have a lot of capacity and it is possible to increase when the price increases and you may be you are operating at below capacity earlier and now because of increase in demand the prices have increased in the market and there you have enough capacity to increase your production so that case it is a very elasticity supply curve. You have a it is a elasticity supply curve that you have.

Unit elasticity as I said in case of demand elasticity also it is a very special case where and it is although it kind of looks nice that it is unit elasticity where basically the quantity supplied increases exactly by the amount by which price increases it is actually not so much of interest it is only a special case of elasticity.

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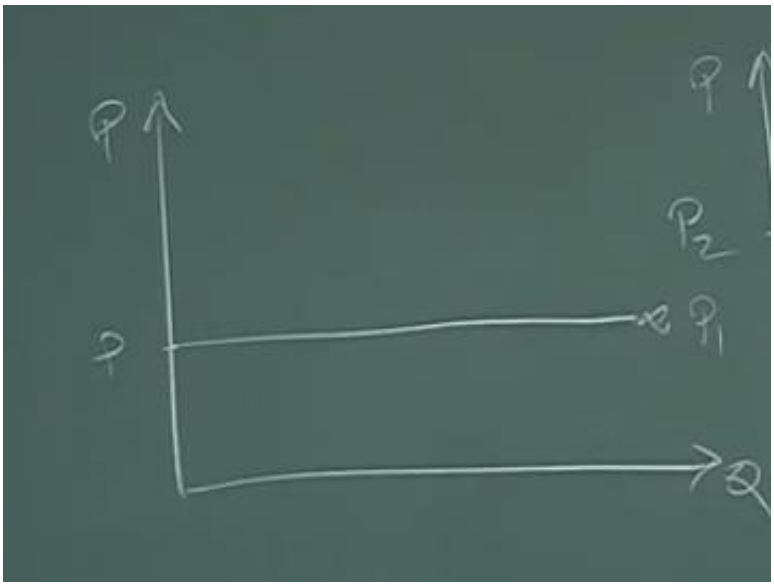

And another extreme is you have perfectly elasticity supply curve that is perfectly elasticity supply curve which again if you may remember perfectly elasticity demand curve perfectly elasticity supply curve also looks similar where you have perfectly elasticity supply curve means if this is the price existing price, at this price supply that there is in the market is infinite. Basically at this price the supply is infinite and if the price changes a little bit the quantity supplied comes to 0. So this is the price at which supply is infinite.

Again example again to like a perfectly inelastic supply curve perfectly inelasticity and perfectly elasticity demand curve perfectly elasticity supply curve also is not very realistic but one might imagine that perfectly elasticity supply curve is what the sellers might have in a perfectly competitive market. Say there is a perfectly competitive market and there are infinite number of sellers like everyone is producing say grains and there is a so if everyone is producing grains the price falls to whatever is the minimum cost of production.

So no one is going to charge a price which is below that because price has is already at minimum cost of production so that is the price that everyone is charging and if anyone tries to reduce the price below that then one the in that case every everyone is going to rush to him so he is going to the consumers are going to rush to him so he has to produce more which is not possible and finally price comes back here but that is beside the point. The point is the price is not going to change from here.

Price is not going to change from here because if the price increases again the infinite amount of supply of the quantity supplied moves to here like there is again a infinite change in supply in the market. Like if the price increases so in the denominator there is a finite increase in price but in the numerator there the response will be a infinite increase in quantity because everyone is going to now whoever were selling earlier at the smaller lower price they all of them are going to now sell at this higher price. So basically at every price the quantity supplied is infinite and that is a perfectly elasticity supply curve and so the elasticity of supply is also infinite here.

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Now similar to the discussion that we had in case of demand we said that there are various factors which tell you how the demand is going to behave or how responsive is demand to price changes. Similarly in case of supply also there are various factors which determine whether supply is going to be elastic or is it going to be inelastic or how responsive the supplier is would depend on a lot of factors. So they are the determinants of supply elasticity.

So responsiveness of supply to price changes varies across commodities, price ranges, and other factors. So what factors determine if price elasticity of supply would be high or low? So similar to the earlier case here also we are going to use some we are going to see a few principles basically guide the supply of elasticity and let us take an example.

Say the example of beachfront properties versus new cars. So this is a market for beachfront properties. You have houses on the beach and it is a market for houses which are available on the beach, people would like to buy houses on the beach and there is a separate market which is for cars.

Now which one do you think has higher supply elasticity or in other words if the price increases in both the markets in both the markets say for example there is a boom in the economy and everyone lot of people are expecting to be rich or already have got richer and they are looking for nice houses in front of the on the sea beach and they are looking for cars.

In which of the 2 markets do you think supply is more elastic or in which of the 2 markets is it more easy to respond to the price change. That is the question that we are asking and as you may have already figured out, on the beachfront properties case there is only a limit to which the

suppliers can increase the supply of beachfront properties because there is only so much of beachfront land available in the market where new property can be or new houses can be built and sold in the market.

On the other hand it is probably easier to just expand or you have built a few more plants few more factories and design a few more cars and produce new cars and sell in the market when the demand for cars go goes up in the market. So beachfront properties is something where the supplier is constrained by one of the resources, very integral or important resource which is beachfront land and but in case of new cars and in case of cars the supplier is not so much constrained by resources. So the more easily the supplier can change the quantity supplied, higher the elasticity.

Take another example which is hybrid cars in the long run versus hybrid cars in the short run. Say the economy has become very environment conscious say everyone has become very conscious and would like to have a cleaner have cleaner air cleaner environment and suddenly the demand for hybrid cars which uses less of fossil fuels the demand for these cars go up in the economy.

In that case the price of the so the demand has gone up so the price of hybrid cars has gone up and the suppliers would like to supply a lot of hybrid cars in the market. So are they able to match demand in the short run as much as they can match the demand in the long run. What do you think? So in the long in the short run the car manufacturers are only are constrained by the amount of capacity they have already created to produce the cars. But in the longer run they can set up more factories, they can expand their capacity take more loans to build new factories.

So they need some time to increase the capacity and increase the amount of cars that the economy is demanding. So they are more flexible in the longer run in production than they are in the short run in production and so their responsiveness to price increase in the short run is much less than their responsive to price increase in the longer run. So firms may need a longer run to expand capacity of production and raise supply. Elasticity of supply is more in the long run than in the short run.

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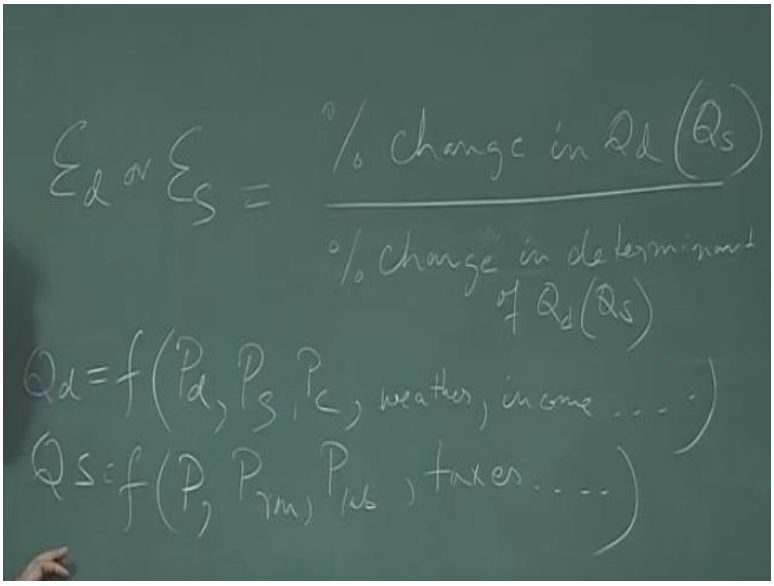

So that was about price elasticity of supply. That was about price elasticity of supply but as I said during the beginning of our lecture on elasticity we said that you can define elasticity of demand or supply as percentage elasticity of demand or elasticity of supply can be defined as percentage change in quantity demanded or quantity supplied divided by percentage change in any determinant of quantity demanded or quantity supplied.

So this is the very general definition of elasticity and this elasticity definition can also be used to find out what happens to or what is the responsiveness of quantity demanded or quantity supplied to change in any of the determinants. If you may remember we had said that quantity demanded depends on a lot of things. It is a function of the price. It is a function of lot of other goods say for example substitute goods or complementary goods or say whether income, lot of things.

Similarly, quantity supplied is a function of price, price of raw materials, price of labour, and say taxes, and lot of other things. So all these determinants any change in any of these determinants can be put in the denominator and the responsiveness can be put in the numerator and the elasticity calculated. So this can be done.

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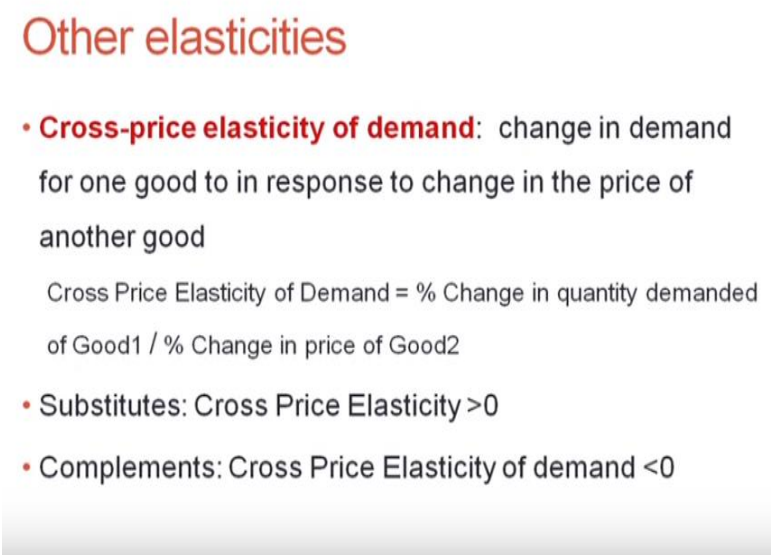

Now so from there we are going to discuss a couple of elasticities which are very important. First is the cross-price elasticity of demand. Now what is cross-price elasticity of demand? Now this is change in demand for one good in response to change in the price of another good. So this is change in demand for one good in response to change in price of another good. So this is called cross-price elasticity of demand which is percentage change in quantity demanded of good 1 divided by percentage change in price of good 2.

So basically we are trying to see here if price of good A changes what is the impact on the quantity demanded of a good B. So how is that relevant, what happens? Why is price of some other good relevant to the quantity demanded of another good? That can happen in 2 situations, in case of substitutes.

So substitutes we have already said substitute is what substitute is basically 2 goods are substitutes when they are kind of replaceable. Say for example tea and coffee. If the price of coffee goes up you are probably going to switch to tea. Say in a railway station everyone the all of a sudden the coffee vendor decides that I am going to increase the price of coffee probably lot of people are going to shift to the tea vendors that are available around.

So there the tea and coffee are substitutes. So the cross-price elasticity or if you have the change in quantity on the numerator and change in price of change in quantity of tea consumed in response to change in price of coffee in the denominator you are going to see that the cross-price elasticity is always greater than 0 since it is a substitute.

So the law of demand behaves in a opposite way that if the price of the substitute good goes down, you are going to reduce the quantity demanded of this particular good. So if the price of coffee goes down you are going to consume less of tea and move to coffee. So the in response to so the price and quantity of substitute goods they move in the same direction. So that is the reason that substitute goods have cross-price elasticity greater than 0.

And another example is the complements. Complement is you cannot use one good without the other. Say for example in case of fountain pens is the pen and the ink, they are complements. You cannot use the pen without the ink and ink is of no use if you do not have the pen, like computers and softwares. They are all complement goods.

So in case of the complement goods if the price of the of one say the price of fountain pen goes up the demand for ink also goes down because when the price of fountain pen goes up the demand for fountain pen goes down and so the demand for ink also goes down. So in case of complements cross-price elasticity of demand is less than 0. The quantity demanded and the price they move in opposite direction just like the case of the price elasticity of demand of a single good.

That ends our discussion on elasticity. We have talked about price elasticity of demand. We have talked supply elasticity of demand. We have looked at different determinants of elasticity and we have looked at different values of elasticity ranging from 0 to infinity and we have taken some example to illustrate and finally we have talked about a more general kind of elasticities other elasticities and we have talked about the cross-price elasticity where basically we have talked about the response of one good in to against the price range in some other good. In the next class we are going to start our discussion on producer theory and cost. Thank you.