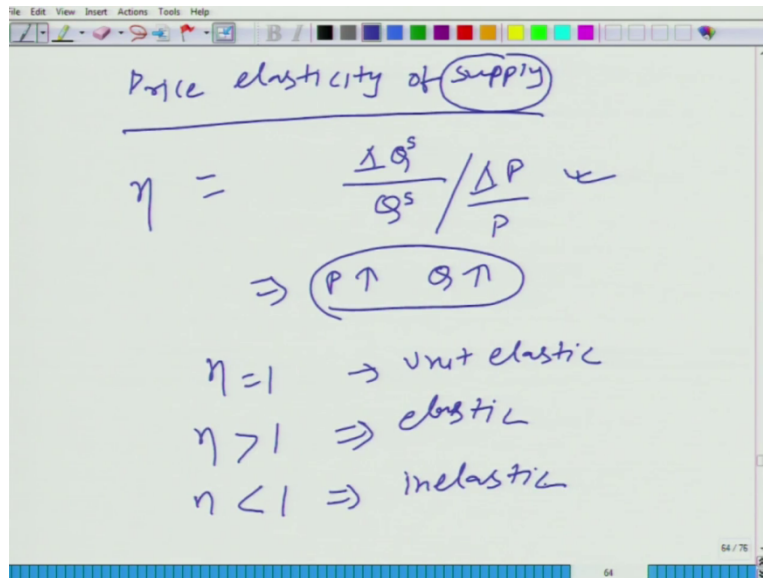


**An Introduction to Microeconomics**  
**Prof. Vimal Kumar**  
**Department of Economic Sciences**  
**Indian Institute of Technology, Kanpur**

**Lecture – 26**  
**More on Elasticity**

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The image shows a whiteboard with handwritten notes. At the top, it says "Price elasticity of supply" with "supply" circled. Below this, the formula is written as  $\eta = \frac{\Delta Q^s}{Q^s} / \frac{\Delta P}{P}$ . Underneath the formula, it says  $\Rightarrow P \uparrow Q \uparrow$  with both terms circled. At the bottom, three conditions are listed:  $\eta = 1 \rightarrow$  unit elastic,  $\eta > 1 \Rightarrow$  elastic, and  $\eta < 1 \Rightarrow$  inelastic.

Now, what we have done is we have studied price elasticity of demand. Similarly, one can study price elasticity of supply. And what is price elasticity of supply again remember what is elasticity basically?

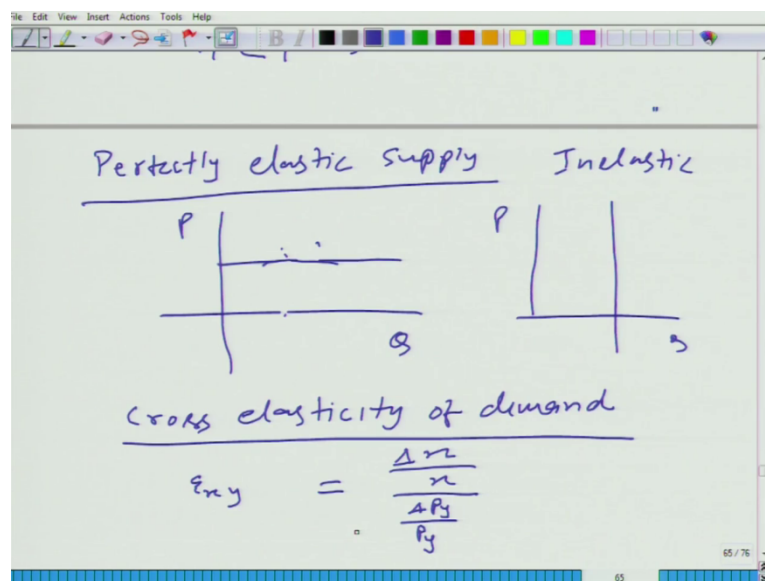
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It measures the proportional responsiveness of one variable with respect to proportional change in the other variable.

So, here now we are talking about price elasticity of supply. So, what we are studying the proportional change in the supply not just supply function. The proportional change in quantity supplied with respect to proportional change in price. So, I can write here this is Q if you want to distinguish this with respect to price elasticity of demand you can use the different notation you can say it is eta. Epsilon is for price elasticity of demand and eta is for price elasticity of supply. This is and here also if you want to distinguish you can put s superscript just to say that we are talking about quantity supplied not quantity demanded.

I am not going to talk about lot more for this price elasticity of supply because mathematically speaking they are the basically the same concept. The 2 difference that you should keep in mind. That 1 that demand function is a downward sloping function while supply function is an upward sloping function. So, you should not put a negative sign there to make it positive it is already positive. And second is also related the same thing just the restatement that P goes up Q goes up that is the natural response of supply. Natural response of a buyer was that P goes up Q comes down. So, qualitatively we establish that pri demand is a downward sloping curve, but we want to also understand the responsiveness the proportional changes. Here P goes up Q goes up. So, eventually you will get it a positive. So, do not put it a negative sign and although again we will not about not talk about new cut offs you should have the same cut offs in the mind. That eta is equal to 1-unit elastic eta greater than 1 elastic this is just a repetition and revision and this is less than 1 inelastic.

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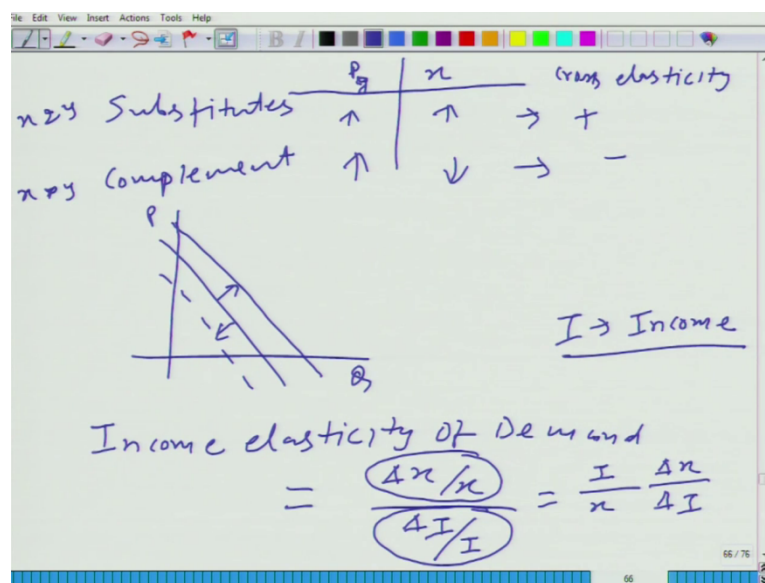


How about here perfectly, perfectly elastic supply? How would it look like? Again, horizontal a perfectly inelastic supply particle. This you will never observe. You know you will never observe this. This is just theoretical construct that you will never ever observe even in approximate manner you will never observe this, now let us talk about now what we have already said that elasticity we are measuring the proportional responsiveness of one variable with respect to proportional change in other variable. So, just talking about demand and supply we can bring more such variables in the picture. So, let us do that.

What we can do? Talk about is something called cross. And now I will not talk in terms of supply only in terms of demand concepts are very similar. The cross elasticity of demand. What we are talking about is the price of that good remain the same, but the price of other good has gone up or price of the other good which are substitutes or complement they have gone up. So, let us say cross elasticity this is denoted by  $\epsilon_{xy}$  why we are putting  $\epsilon_{xy}$  we are talking about change in quantity of good one even by  $x$  proportional change of quantity of good 1 with respect to change in price of  $y$  good 2. And that we have here fine here we will not put minus sign or anything. It can be positive it can be negative. It is possible that price of one good is one good goes up and its response on the other good is that the quantity demanded of other good comes down, when does it happen?

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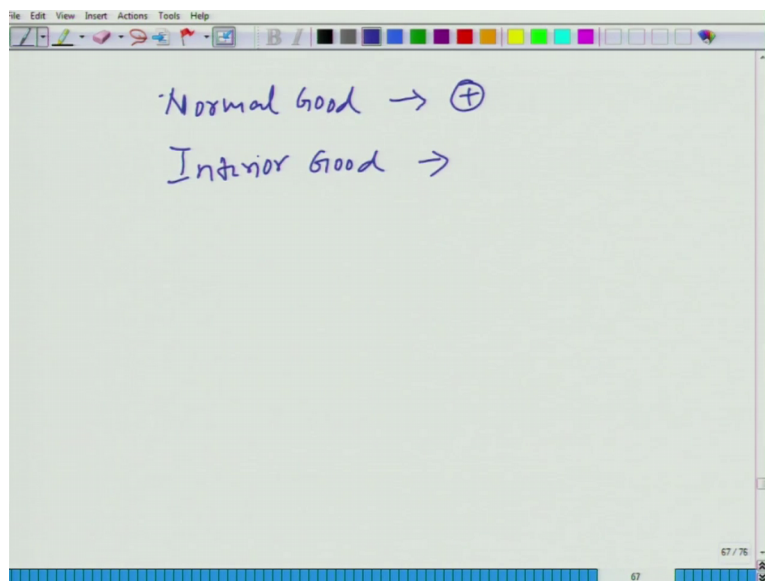
Let us look at it very good let us look at it substitute, substitutes and complement. Let us talk about  $x$  and  $y$  and  $x$  and  $y$  here we have  $P$   $P_y$   $x$ . If they are substitute if  $P_y$  goes up what would happen to the quantity of good one  $P_y$  goes up  $x$  will go up. So, in this case what will be the cross elasticity? Positive, and if when they are complement cross elasticity is going to be negative. One more thing that you should notice here whenever we are talking about cross elasticity of demand we are talking about shift in the demand function. Either in this direction or in this direction. Why there is shift in the demand function? Because we already know that if one of the variable which effect the demand function changes its impact is a change in the

or shift in the demand function. If that variable is other than its own price fine. That is why we are talking about shift here. So, here we will not insist on having a movement along the same demand function is it clear? So, do not get confused between these 2 similarly we can also talk about something called income, income elasticity of demand. Can you tell me what is it equal to?

Student:  $\frac{\Delta x}{x}$ .

$\frac{\Delta x}{x}$  divided by  $\frac{\Delta I}{I}$ , where  $\Delta x$  denotes the change in quantity demanded and  $\frac{\Delta x}{x}$  is proportional change in quantity demanded and what is  $\frac{\Delta I}{I}$ ?  $I$  denotes the income and  $\frac{\Delta I}{I}$  is proportional change in the income fine we can also write it by  $\frac{\Delta I}{I}$  divided by  $\frac{\Delta x}{x}$ .  $\frac{\Delta x}{\Delta I}$  this is income elasticity of demand. So, is it positive or negative can you tell me? Always remember we talked about 2 different kinds of goods normal good inferior good.

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We have not even discussed yet normal good and inferior good for normal good what we will observe.

Student: positive income.

Positive, income goes up you consume more of that particular good again also here when we are talking about income elasticity of demand what we are talking about is shift in the

demand curve. Similarly, for inferior good what do we observe negative income goes up you consume less of that particular item.