

Business Analysis for Engineers
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Lecture -38
Supply vs Demand

Good afternoon. Last class, we were discussing, on the broader issues of, Economics as a subject of study. And then, we just traversed, along the contours of the economic landscape, where I gave you an understanding, at a very broad level, what constitutes a nation's economy, and why that, Economics as a subject of study, is very important. Because, we need to create a balance between, the societies need and wants, and the availability of the resources, which is scarce.

So, it is the challenge, to arrive at a balance between, these scarce resources, and the needs and wants of the society, that makes the subject of study, this subject namely, the Economics, a very interesting one. And, we saw how, a nation's output is measured, by way of what we call, the GDP, which is the aggregate sum, of the monetary value, of all the goods and services, that a nation produces, within its geographical boundary. And, that the GDP of a country, is symbolic of the economic strength of the country.

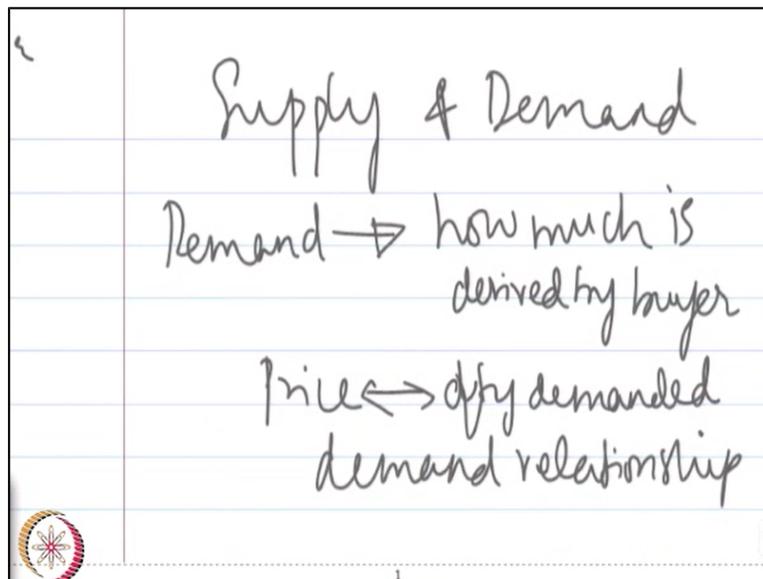
And, countries with high GDP levels, are assumed to be the ones, that have richness in them. At the end of the day, since the GDP represents, the monetary value of the goods and services, we need to understand that, these goods and services, reaches an end user, who uses it for whatever purpose, the end user needs it for. So, when these goods and services get traded, we need a formal mechanism, that provides a platform, for the trade of such goods and services. And, we call this formal platform as the market.

So, a market in which, there is an interaction between, the buyer and seller of these goods and services, will follow certain rules and regulations. And, a market is supposed to be efficient. The efficient market hypothesis, is on the fundamental principle, that everybody has equal access to information, equal access to resources. And, there are various factors, that determine, the Supply and Demand of the goods and services. The interaction between, the buyer and seller of these goods and services, happen in this marketplace.

And, assuming that there are a number of factors, that determine the various market movements, we would like to understand the relationship, of a Supply or Demand of goods and services, vis-à-vis, the Price of those goods and services. The reason, that we are going to restrict our discussion with Price, is because, Price of a product or a service by enlarge, reflects the extent to which, a particular product or service can be supplied, and the extent to which, it can be consumed.

So, it is good to assume, that Price is the key determinant, that determines the way in which, market moves. And, how the Demand or Supply of the goods and services, change with Prices is an interesting subject, that constitutes the theory of Supply and Demand. Now, before we understand these relationships, we must first understand, what is Supply and Demand.

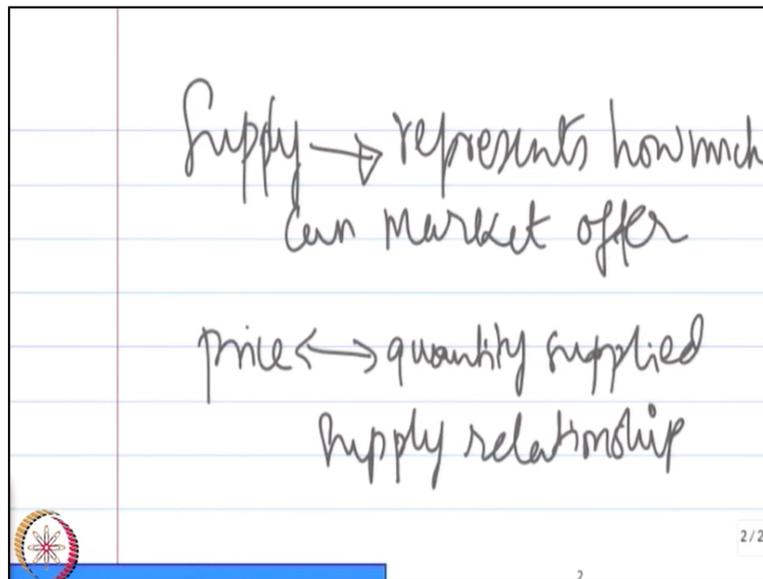
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And, how that, there are certain laws that govern Demand, there are certain laws that govern Supply, and the relationship with Price. And, how that, an effective market in which, there is a fine balance between, Supply and Demand functions, is going to be, the discussion for this class. Now, Demand, to put it in very simple terms, is how much of, how much means, the quantity of a product or service is desired. So, how much is desired by the buyer, is the Demand for a particular product or service.

It means, that the quantity that is demanded, is the amount of a product or service, that a buyer is willing to buy, at a certain Price. And, the relationship between Price and the quantity that is demanded, is known as the Demand relationship. So, it is the Price, and quantity demanded. This relationship, is the Demand relationship. The quantity, that is demanded, at a particular Price. And, how this quantity changes with Price. The relationship between, Price and the quantity demanded, is the Demand relationship.

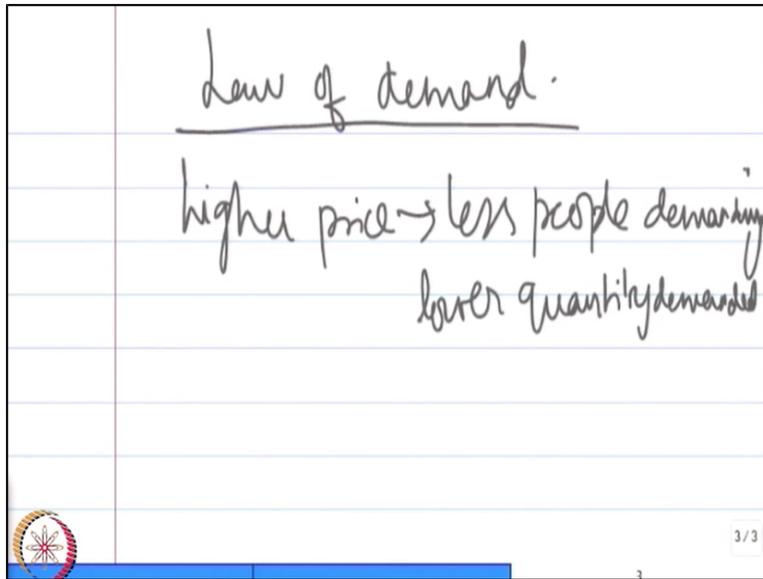
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Likewise, Supply represents, how much can the market offer? How much can market offer, that is the quantity supplied, refers to the amount of certain good or a service, that producers are willing to Supply, at a given Price. Here again, the interlinking factor, is the Price. So, the correlation between Price, and how much of a good or service, is supplied to the market, is known as the Supply relationship.

So, Price to quantity supplied, this relationship is the Supply relationship. So, we need to understand, from the behaviour of Demand and Supply, of products and services, with changes in Price. And, this behaviour, is the fundamental, for the allocation of resources, in a market. And this, we will do by understanding, independently, the Law of Demand, the Law of Supply. And then, try to understand, how Supply and Demand within a given market, is interlinked.

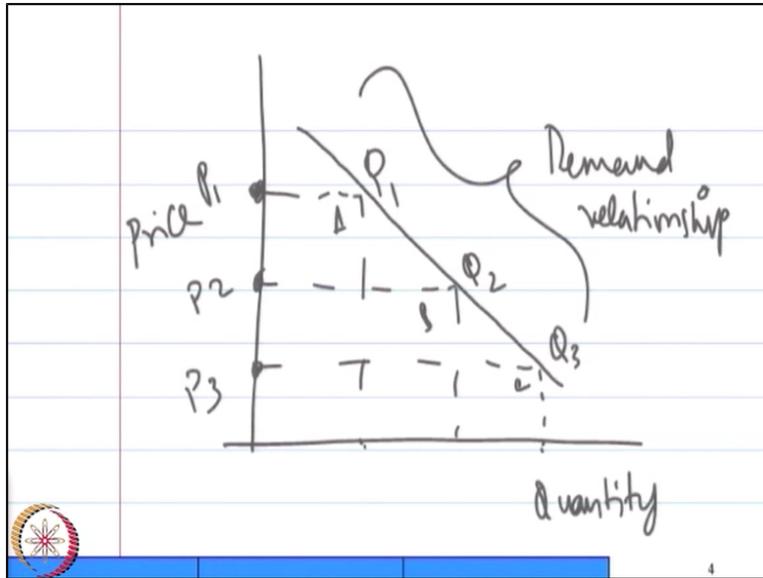
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Let us begin with, the Law of Demand. The Law of Demand very clearly states that, if all other factors remain equal, all things being equal, the higher the Price of a good or a service, the less people will Demand that good. Higher Price, less people demanding. In other words, the higher the Price, lower is the quantity demanded. So, the amount of a good that, the buyers purchase, at a higher Price is less, as the Price of the good keeps on going up, so does the opportunity cost, of buying that particular good.

So, as the Price keeps going, the opportunity cost of buying the good, also keeps increasing. As a result, people will naturally avoid, buying a product. Because, that will force them to forego, the consumption of something else, that they value more. So, as the Price increases, so does the opportunity cost of buying that, also increases. As a result of which, higher the Price, lower will be the quantity, that is demanded. Now, this can be represented, by a downward slope, because of the inverse relationship, very simply.

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The Demand relationship, is represented by, let us say, this is the quantity demanded, and Price. It just is a, downward slope. So, at three Price levels, we can see at these points, A, B, or C, are points on the Demand curve, with each of them representing, the quantity that is demanded, at different Prices. And, you would see, at higher Prices, the quantity that is demanded, is lower. Now, this is the Demand relationship between, the quantity demanded, and the Price.

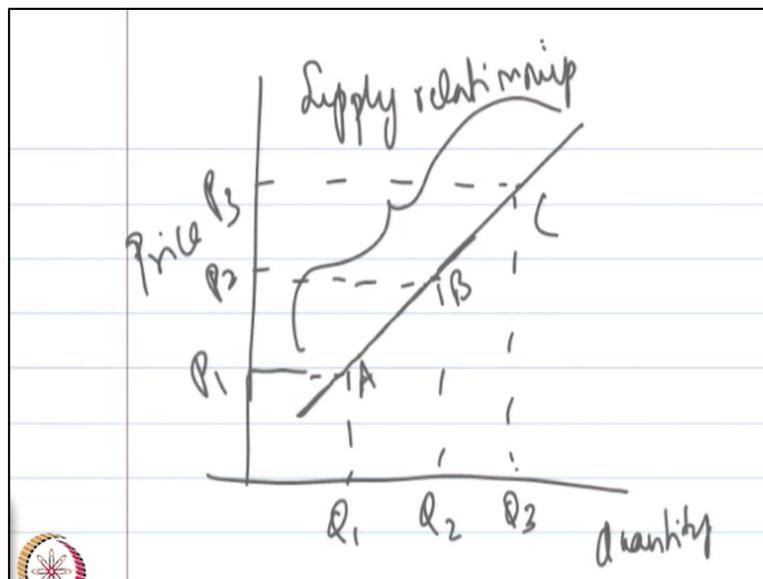
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Supply relationship.
 higher price → higher quantity supplied

Likewise, the Supply relationship, is also pretty straight forward. Except that, it is just opposite to the Demand relationship. The Law of Supply demonstrates, the quantities that will be sold, at a certain Price. Unlike, the Law of Demand, the Supply relationship is an upward sloping one.

Which means that, higher the Price, higher the quantity that is being supplied. Higher Price, higher quantity Supply. What is the rational. Opportunity cost, was the rational, for Law of Demand

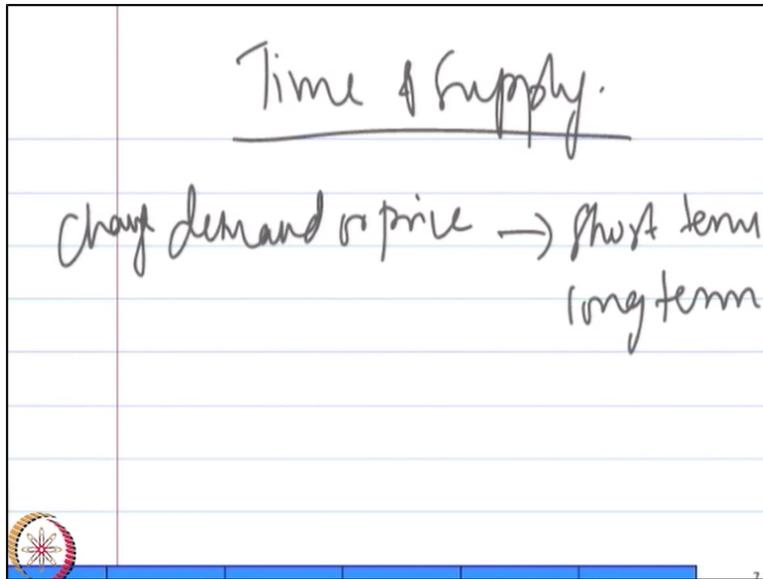
In this case, producers will Supply more, at a higher Price because, from a producer's perspective, selling at a higher quantity means, higher revenues. So, from a seller's perspective, if you sell more at higher Prices, it means more revenues. As a result of which, the Supply relationship, is an upward slope. Which means, that higher the Price, higher is the quantity, that is being supplied.



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So, if we try to plot the relationship graphically, it is just an upward slope. Quantity, Price, at three different Price levels, P_1 , P_2 , P_3 . So, A, B, C, are points on the Supply curve. Each point on the curve reflects, a direct correlation between, the quantity supplied, and Price of the quantity. So, in this, we notice, the upward slope, which governs the relationship between, the quantity supplied and Price. And, this relationship is the, Supply relationship. There is another intervening variable, that we need to understand properly is, how Supply is related to time.

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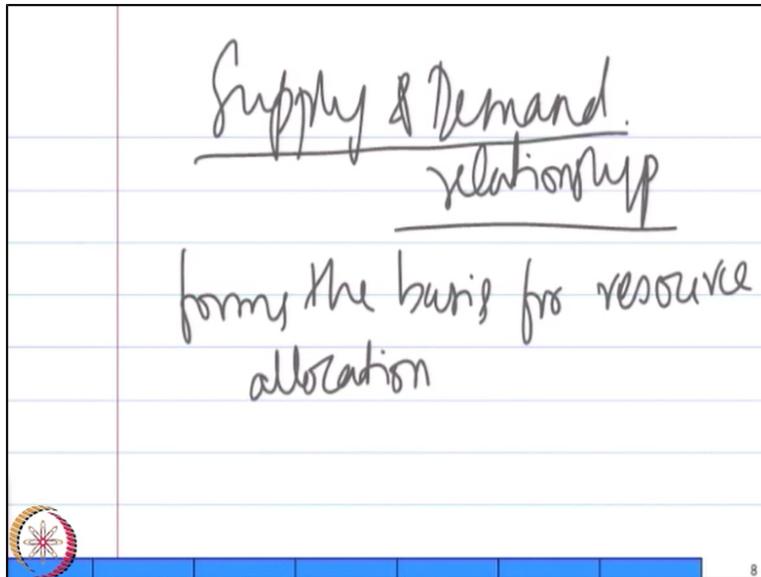


Time and Supply. Unlike, the Demand relationship, Supply relationship is also a factor of time. Now, time is very important because, for Suppliers especially, is because, the Suppliers must, though they cannot always, react quickly to a change in Demand or Price. Now, if you look at, whether the change in Demand or a Price, is short-term or long-term. Change in Demand or Price, is short-term or long-term, is important from a Supplier's perspective.

Because, let us say, for example, if there is a sudden increase in the Demand, and Price for umbrellas due to, a sudden rainy season. Now, from a Suppliers' perspective, I can meet this sudden increase, by just trying to use, the existing resources available, more optimally, intensify the usage of such resources, to meet the sudden increase in Demand of umbrellas. As against, let us say, we are going to experience, a longer duration of rainy season.

Then, using the existing resources to accommodate, a longer period of such high Demand and Prices, becomes impossible, from a Supplier's perspective. So, Suppliers will have to change, their production facilities, get additional resources, to meet the long-term levels of Demand. So, we need to understand that, unlike the Demand relationship, the Supply relationship, is a factor of time as well.

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Now, we understand from, the fundamental Law of Demand and Supply, that Demand is also related to Price, and Supply is also related to Price. As a result of which, the common variable, here is Price. And, both Supply and Demand, are related to Price. Which means, Supply and Demand, the relationship between Demand and Supply, is very interesting to study. The reason is because, this is the relationship, that underlie the forces, behind the allocation of resources.

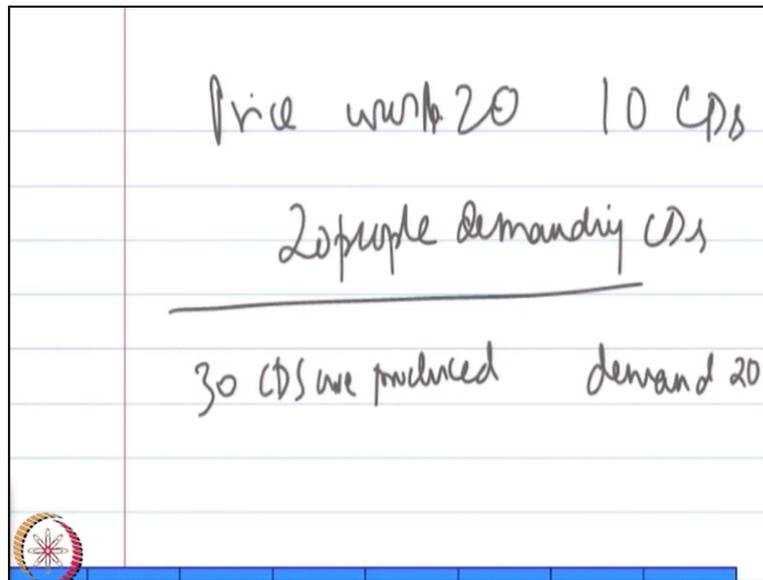
Now, this Supply and Demand relationship, forms the basis for, resource allocation. So, in Market Economics, the Demand and Supply theory, will allocate resources, in the most efficient possible way. And, hence it is very essential to understand, the Supply and Demand relationship. Now, since Price is the common variable, understanding the Supply and Demand relationship, becomes easier.

I will just give you a small example, for you to understand, how Supply and Demand affect Price. Now, let us for example, take that, there is going to be a special edition, an Audio CD of A R Rahman's favourite songs. And, this is going to be released for, let us say, Rupees 20 per CD. And, HMV is the audio company, that is going to release the CD. Now, historically the experience of HMV has been that, Consumers will not Demand, CD's at a Price higher than 20.

And, if the Price of the CD is 20, then there going to be only, you know, 10 CD's that are required, because only 10 Consumers, can buy the CD for 20. So, the sustainable level is 10.

Because, the opportunity cost is, too high for Suppliers, to produce more. Now, if this is the, base case scenario. And, there are 10 CD's. But, if there are 20 people demanding, now, let us see, how the Price varies.

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Now, originally, the Price was 20, and 10 CD's. Now, we have 20 people, demanding CD's. Now, this 10 CD's are demanded by 20 people, the Price will subsequently rise, because now, it is according to the Demand relationship, the competition is between these 20, for only a limited number of 10 CD's. Which means, only 10 people can be given this CD's. And, only Prices higher than 20 can support, this 10 number. Because, that is how, the Demand Price relationship, works

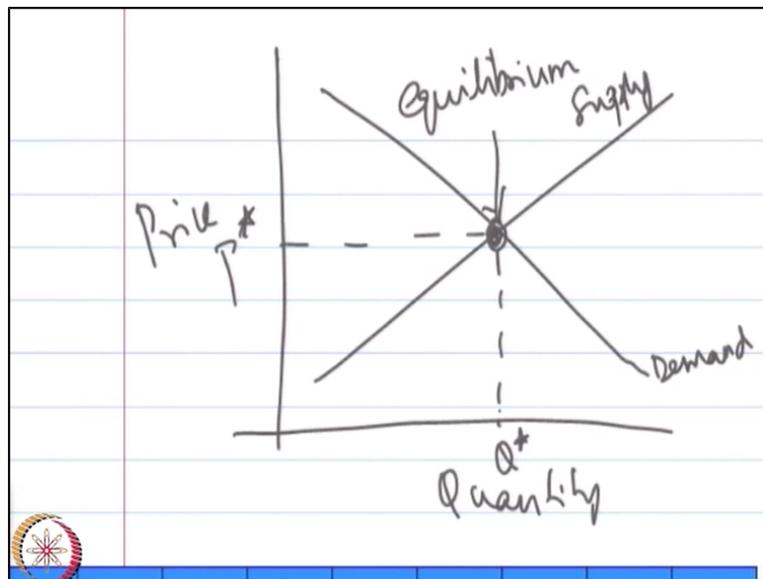
So consequently, the rise in Price, as a result of this limitation, will encourage more Supply because, an increase in Price should result, in a prompt increase in the Supply of CD's. Now, that explains how, when the Price increases, there will be a natural tendency to increase, the Supply of CD's because, that is how, the Supply Price relationship is governing. So, at higher Price, more will be the Supply. Now, if however, let us assume that, there are 30 CD's, that are produced.

And, let us not change the Demand. The Demand still remains, at 20. Now, here is a different case, where 30 CD's are produced, and Demand is still at 20. The Price will not be pushed up, in

this case because, the existing Supply, more than accommodates, the Demand. In fact, after the 20 Consumers have been satisfied, at the existing Price level of 20, the Price of the leftover CD's will actually drop. Because, the CD producers will attempt to sell, the remaining 10 CD's.

As a result of which, the Price gets lowered, and the CD's become available to people, who previously decided that, the original cost of CD which was 20, that opportunity cost of buying was too high, now when the Price gets lowered, people start buying. So, this is one example, for you to understand how, the Supply and Demand affect Price. Now, let us see, graphically what it means. How does Supply and Demand, attain a stage of equilibrium.

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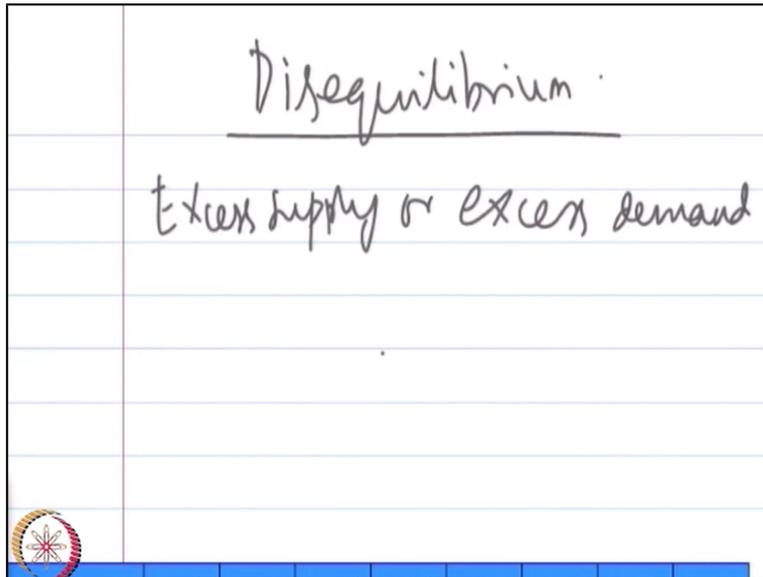


The Supply and Demand, are assumed to be equal, when the Supply function, and the Demand function, let us represent it graphically, intersect at that point of intersection. Let us for example take, as usual, Quantity, Price. We know that, this is the Supply, this is the Demand relationship. Now, the economy is said to be at a stage of equilibrium, when the Supply function and the Demand function, intersect. At this point, the allocation of the goods is, at its most efficient because, the amount of good that is being supplied, at a given Price, is exactly the same, as the amount of good, that is demanded, at the same Price.

As a result of which, every firm, every individual, or the nation as a whole, is satisfied, with this stage of equilibrium. Which means, at that given Price, the Suppliers are selling all their goods,

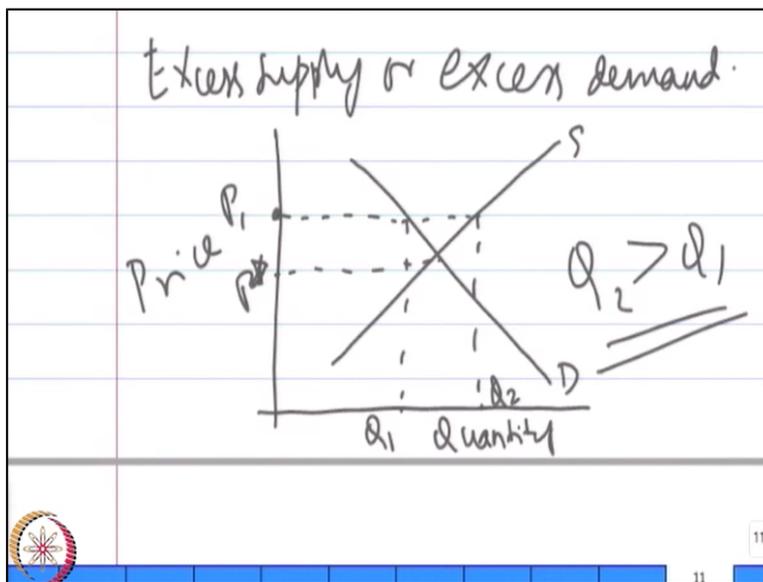
that they have produced. And, at the same Price, the Consumers are getting all the goods, that they are demanding. So, this represents, the stage of equilibrium. So, this is the equilibrium Price, and this is the equilibrium quantity. But, Market Economics do not operate, as simple as this graphical illustration is. More often than not, we have, stages of disequilibrium.

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What does it mean? Which means, the prevailing Price or Quantity is not equal to, the equilibrium Price or equilibrium quantity. Now, disequilibrium will occur, if there is excess Supply, or excess Demand. Excess Supply, or excess Demand, what do I mean by this?

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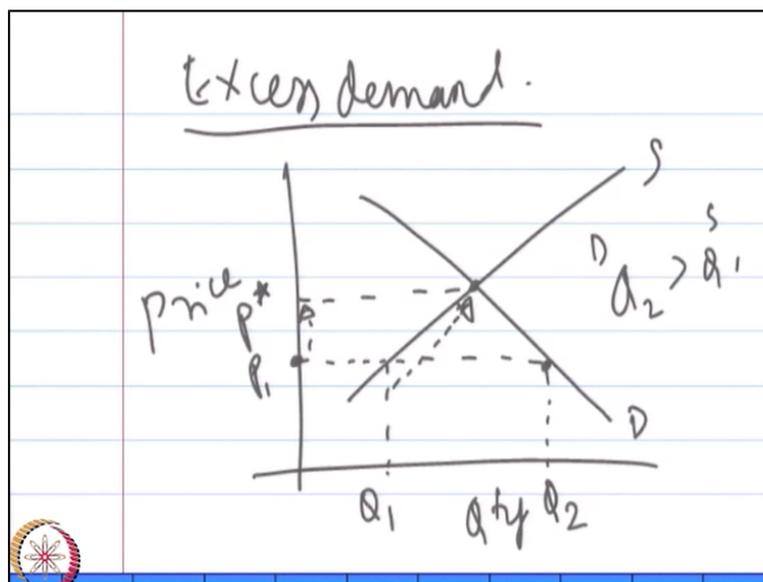


It means, let us first take, excess Supply as an example. Quantity, Price. If the Price is set too

high, excess Supply will be created, within the economy, and there will be allocative inefficiency. Now, how will the graph look, in such a case. Now, let us say, this is Demand, this is Supply, and this is the equilibrium Price. Now, if the Price level is higher than, the equilibrium Price. So, at this new Price of P_1 , the quantity of goods that the producer wishes to Supply, is indicated by Q_2 , because that is the point of intersection, with the Supply curve.

But, at P_1 however, the quantity that the Consumers would want to consume, is Q_1 because, that is the point of intersection, with the Demand curve. Now, here we see that Q_2 , is greater than Q_1 . Which means, too much of goods is being produced, and too little is being consumed. The Suppliers are trying to produce, too much goods because, there is more incentive to produce goods at higher Prices. But, those consuming the goods, will find the product less attractive, and purchase less because, the Price is very much above, the equilibrium Price. Now, this is the excess case, of an excess Supply. Disequilibrium, due to excess supply.

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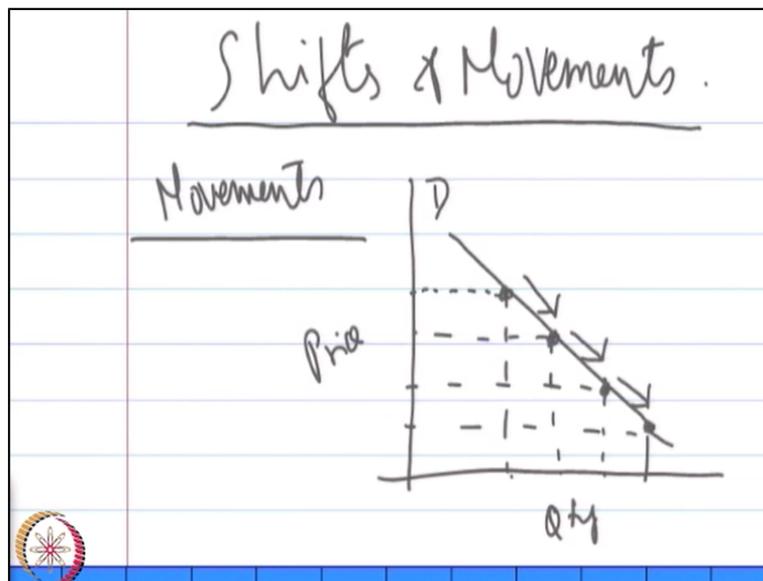
Now, the same disequilibrium can happen, if there is an excess Demand. Now, when will excess Demand happen. Same example, Quantity, Price, Demand, Supply. This is the equilibrium Price. So, an excess Demand will happen if, when the said Price is below the equilibrium Price. If this is the condition, then Q_1 , Q_2 . Now, the quantity of the goods demanded by Consumers, at the new set Price, which is lower than the equilibrium Price, is Q_2 because, that is the point of intersection, with the Demand curve. While, the quantity that Suppliers are willing to produce, at

this lower Price, is Q_1 .

And, in this case, Q_2 is greater than Q_1 . In this case, Q_2 is the Demand, and Q_1 is the Supply. So, it is just the opposite case, of the excess Supply. In this case, there are too few goods, that are being produced. On the other hand, more number of Consumers, who compete amongst themselves, to get these few goods. Now, when more number of Consumers compete to get these few goods, the Demand will push the Price up, making Suppliers to again, want to Supply more, because of this increasing Price. As a result of which, the Prices move towards, the equilibrium.

So, it is this push, from the Demand side, that moves the Prices towards, the equilibrium Price. And, this relationship, actually governs, the Demand Supply relationship, that always tries to push the market, towards the equilibrium stage, so that the Prices, settle at the equilibrium Price, and the quantity that is demanded and supplied, settles at the equilibrium quantity. But, this is an, ideal case scenario.

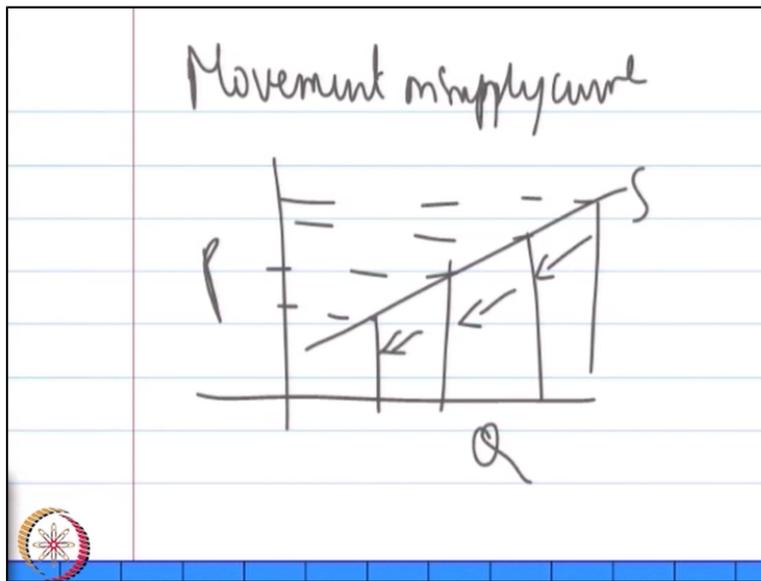
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There are also shifts and movements, in the market. The movements and shifts, in relation to Supply and Demand curve's, they represent different market phenomena. Let us first begin with, movements. Now, the movement occurs, when a change in the quantity demanded or supplied, is caused only by a change in Price, and vice versa. What do I mean by that? It means that, if I take the movement, along the Demand curve, as an example, quantity, Price.

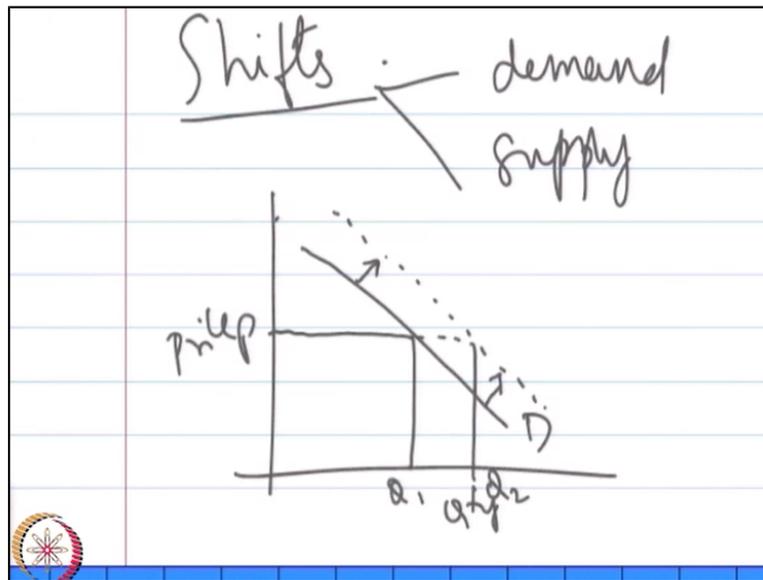
So, a movement refers to a change, along the curve. And, in this case, it is the Demand curve. It demonstrates, the consistent relationship between, Demand and Price. And, if this change is only because, of the Price, then it is along this curve. Which means, it keeps moving, it follows this relationship, whereas the Price keeps changing, the quantity demanded also lies, on the same curve.

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Likewise, the movement on the Supply curve, will also be identical. Movement on Supply curve, is also identical. At different Prices, the movement will be, this is Supply. So, this movement along the Supply curve, will follow this curve. Because, when a change in quantity supplied, is caused only by, a change in Price, then to demonstrate the consistency of the relationship, that moment will be only along, the Supply curve. But, shifts, on the Supply and Demand curve, is a little different, from movements.

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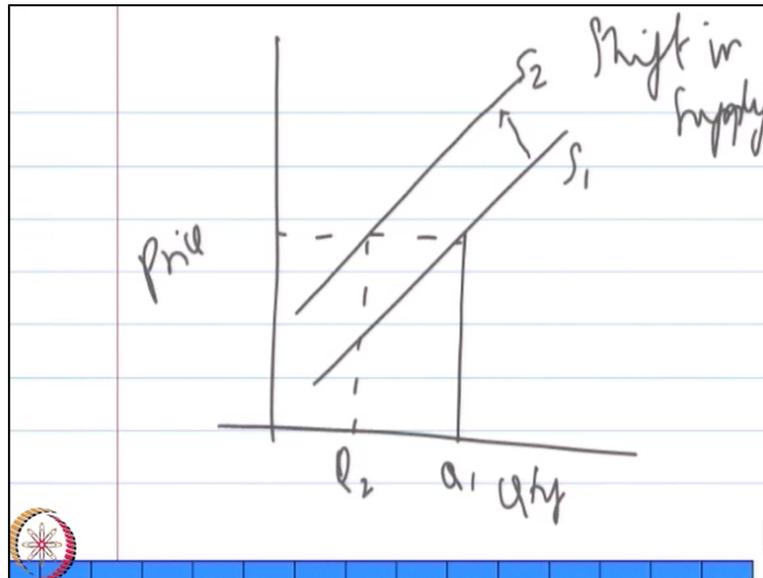


A shift, is different from a movement because, in shift, a shift in Demand or a Supply, shift can happen in both, Demand as well as Supply. It occurs when, a goods quantity demanded or Supplied, changes even when, the Price remains the same. For example, if I need to just graphically illustrate this, let us take for example, the shift in the Demand curve. Quantity, Price. This was the original Demand. At this Price, this is the quantity.

Now, if the Demand curve itself shifts, here is a case where, Price remaining same, the Demand shifts to a new curve. For example, if let us say, the Price of a Lemonade was, two Rupees. And, the quantity of Lemonade Demand increased from, Q_1 to Q_2 , then there would be a shift in the Demand for, this Lemonade. This is the shift. Now, why does this happen? This happens because, the quantity that is demanded, is affected by a factor, which is other than the Price.

That explains why, even if Price is same, there is a shift in the Demand. And, in this case, as we took, the example of a Lemonade, it just means that, Lemonade if suddenly that became the only type of juice, available for consumption. And, there is no other juice, that is available for consumption, then a factor other than Price, could cause the shift in the Demand for Lemonade.

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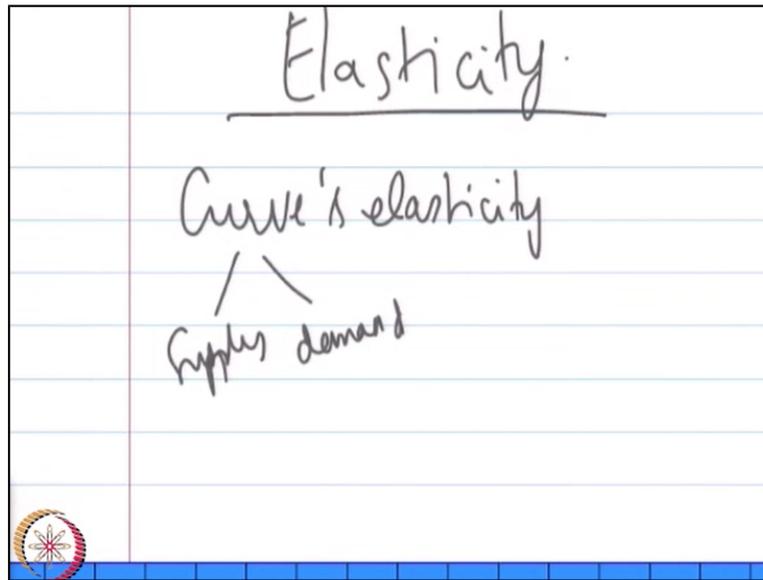
If you take the Supply side, shift in supplies, likewise the factor other than the Price, could cause a shift of the Supply curve itself, for the same Price. For example, quantity, Price. This was the first Supply curve. Let us say, this has shifted to new ones. So, this becomes, the new quantity. Now, let us take, the same example of a Lemonade. Let us assume, that there is a natural disaster, as a result of which, the Supply of Lemons itself, is severely affected. Now, this will explain, the shift in the Supply curve, for the Lemonade.

Because, Lemonade manufacturers would be forced to Supply, less Lemonade, for the same Price. And, that explains, why? At the same Price, the shift in the Supply curve, explains why, there will be less quantity of Lemonade, that is being supplied, at the same Price. So, movements and shifts, are a little different. Because, in shift, factors other than the Price, will cause a change in the Supply, or the Demand curve. As a result of which, at the same Price, you will have two different quantities, that are demanded or supplied.

Now, this Law of Demand, Law of Supply, and how Supply and Demand, tries to achieve a state

of equilibrium, forms the very fundamental, that establishes a relationship between, Price and Demand, and Price and Supply. But, there are cases where, the degree to which, a particular good or a service is demanded, changes with Price. Now, that can be understood, by the term, Elasticity.

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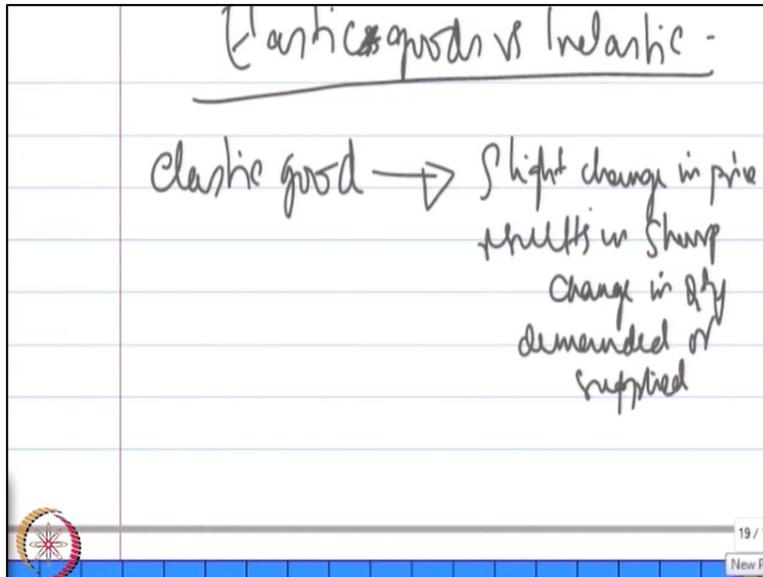
The degree to which, a Demand or Supply curve reacts, to a change in Price, is the curve's Elasticity. So, curve's Elasticity, whether it is Supply or Demand, is determined by understanding the extent to which, it changes with Price. Now, Elasticity varies, across the products. Because, some products are, very essential to a Consumer, while some products are, not that essential. So, the sensitivity of the quantity, that is supplied or demanded, with Price, is based on how critical, that particular product or service is, to the Consumer.

Now, products that are necessities, are very critical, would be more insensitive to changes in Price, when compared to products, that are not so critical. Which means, they are not indispensable, which will change, the quantity of that product supplied, or the quantity that is demanded, if it is not a critical necessity, then they are more sensitive, to changes in Price. Because, the Price increase of a good or a service, that is considered less of a necessity, will deter more Consumers, because to either Demand them, or produce them. Because, opportunity cost of buying the product, will become too high.

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Elastic goods vs Inelastic -

elastic good → Slight change in price results in sharp change in Qty demanded or supplied

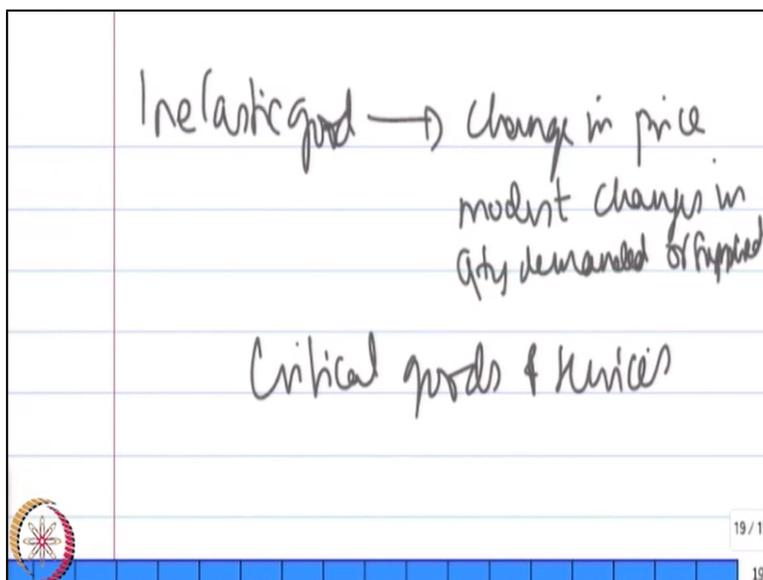


Now, let us understand this, by understanding two new terminologies, that explains the difference between, Elastic goods versus Inelastic ones. A good or a service, is highly elastic. Elastic good means, if a slight change in Price, leads to a sharp increase, not necessarily increase, leads to a sharp change, in the quantity demanded or supplied, then such a good, is an Elastic good. Slight change in Price, results in, sharp change in quantity demanded or supplied.

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Inelastic good → Change in price modest changes in Qty demanded or supplied

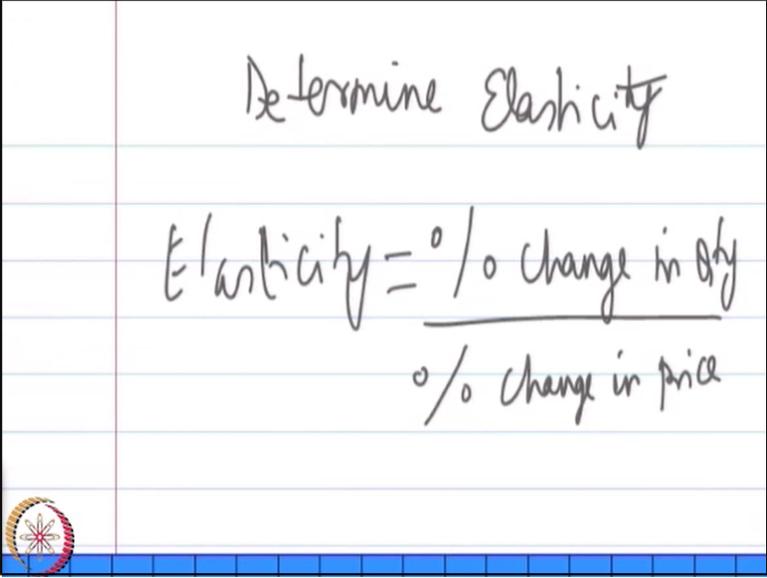
Critical goods & services



On the other hand, an Inelastic good is, just the converse. The change in Price, will witness modest changes in the, quantity demanded or supplied. Now, classically these goods tend to be the things, that are more a necessity to the Consumer, in his or her daily life. So, these are all,

critical goods and services.

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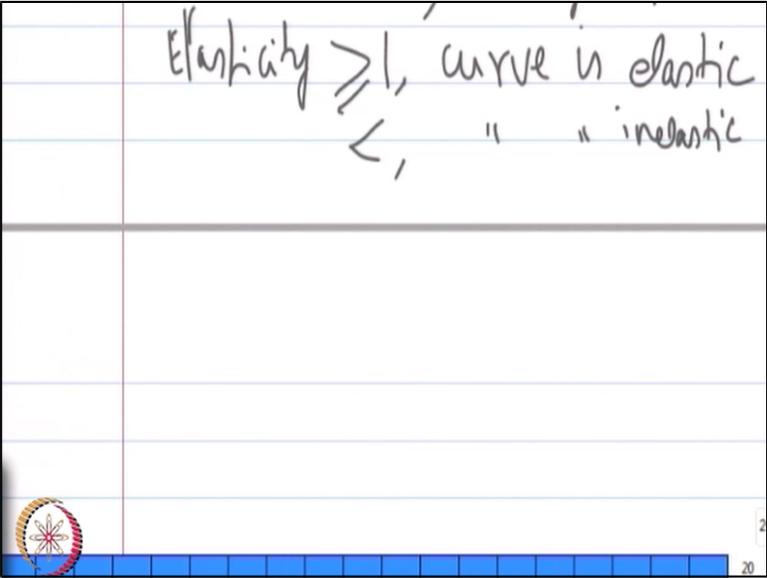


Determine Elasticity

$$\text{Elasticity} = \frac{\% \text{ change in Qty}}{\% \text{ change in price}}$$

Now, how do we determine, Elasticity. This is a small equation. Because, we are trying to measure, how much proportional change happens, in the quantity that is demanded or supplied, when a change in Price happens. So, the percentage change in quantity, to a percentage change in Price. And, that is Elasticity. So, Elasticity will be, percentage change in quantity, to percentage change in Price.

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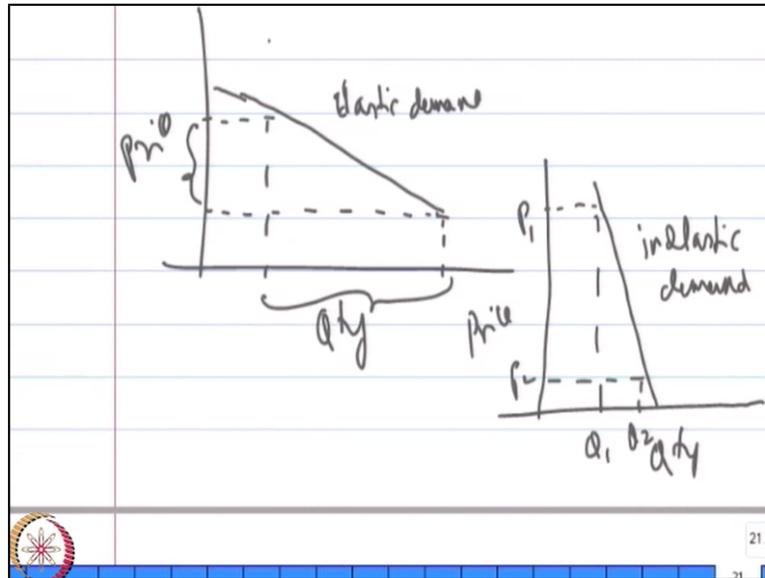


Elasticity ≥ 1 , curve is elastic
 $<$, " " inelastic

Now, since this is a ratio, if Elasticity is greater than one, or equal to one, the curve is considered

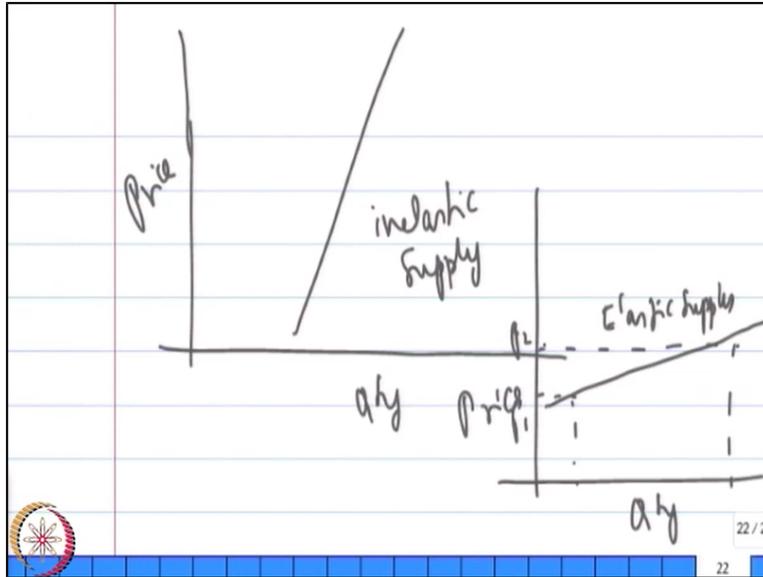
to be elastic. If it is less than one, curve is inelastic. So, how will the curve look like, in Elastic Demand.

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Let us say, we are talking at the Demand curve, to see how a Demand curve is. Quantity, Price. The proportionate change in the quantity, that is demanded, vis-à-vis, the small dip in the Price, makes this Demand curve, elastic. As against, an Inelastic Demand where, if this is the quantity and Price, for huge changes in Price, the quantity is not that sharply affected. There is only a modest change. This explains the, Inelasticity of the Demand.

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Likewise, inelastic Supply curve, will look this way. And, inelastic Supply, will look this way. So, Elasticity curve, measures the extent to which, a particular good or a service, reacts to changes in Price. And, based on what type of goods and services, that we are talking about, we will understand, whether that particular good or service, is an elastic or an inelastic relationship. Critical services are, insensitive to Price. And hence, goods and services which are of critical use, are Inelastic goods.

Conversely, those that are very sensitive, to Price changes. Which means, that have a number of other substitutes, and hence not that critical, are elastic because, a small change in Price, causes huge differences, in the quantity that is demanded or supplied. So, what we will try to do next class is, we will try to understand, the factors. Now, actually the Elasticity curve, that I mention assumes, that the income level is constant. Assuming that, there is no change in the disposable income, that is available, at the hands of the end user.

And, let us understand, what are the different factors, that affect this Demand Elasticity. And, whether the Elasticity behaviour, changes with, changes in income levels in hand. Here, we assume that, the income level is same. If the income, that is available in hand, increases, then is there, a change in the Elasticity characteristics, whether it is Supply or Demand curve. Whether, there is change in the, elastic behaviour of the Demand or Supply curve, with changes in income, that is available, is something that will see, in next class. Thank you.