Business Analysis for Engineers
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Lecture -39
Price & Income Elasticity and Utility

In the previous class, we were discussing about, the fundamental laws of Demand and Supply. And, how that, in a market, the equilibrium that is achieved between Demand and Supply, is the best way to allocate the resources. And, we saw how, a particular quantity is demanded or supplied, changes with Price. And, the extent to which, certain goods and services, are sensitive to changes in prices, is measured by the Elasticity. And, we saw some goods, which are very critical, are inelastic. Which means, they are insensitive, to changes in Price. While goods that have substitutes, are more sensitive to, changes in price.

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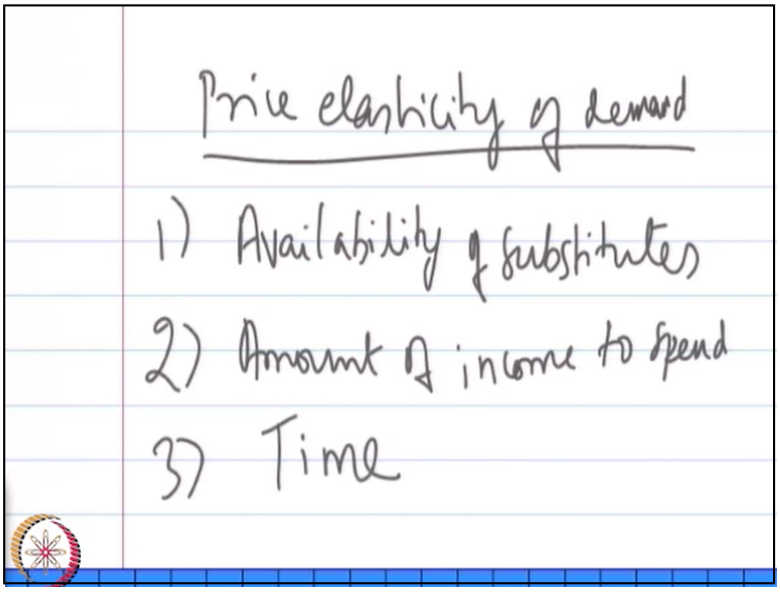

And, that explains the Price Elasticity of Demand, which is the changes in Demand, with changes in Price. And, we assumed, that the Income is constant. And, we saw different relationships, of Demand and Supply, with changes in Price, how there is an Elastic Demand, Inelastic Demand, and an Elastic Supply, and Inelastic Supply. But, the Price Elasticity of Demand, is mainly affected, by 3 factors. One is the, availability of substitutes. This is probably the most important factor, that influences the Elasticity of a good or a service.

In general, if there are more substitutes, then more elastic will the Demand be. Because, there are more number of substitutes. For example, if the Price of, let us say, a cup of coffee, went up by 5 Rupees. Then, we have an alternate beverage, for an early morning, which is tea. As a result of which, since the Price of coffee has increased, we will naturally see, a shift from consumers, who are willing to replace, their morning cup of coffee, with tea.

And, this means that, coffee is an elastic good. Because, an increase in the Price of coffee, has caused, a decrease in the Demand for coffee. Because, consumers have shifted from coffee to tea. Because, tea is a good substitute for coffee. So, you can understand how, availability of substitutes, will make a particular product, elastic or inelastic. In this case, coffee is more elastic because, there is an alternate substitute, that is available.

Now, in the same example, if the Price of caffeine, which is a critical input to coffee, were to go up as a whole. Then, we would probably see, very little changes, in the consumption of coffee or tea. Because, there are very few substitutes to caffeine. And, let us assume that, consumers are not willing to give up, their caffeine intake, no matter what, the price is. Then, if the prices of caffeine went up. And, consumers are not willing to give up, their intake of caffeine in the morning.

Then, caffeine becomes, an inelastic product, because of its lack of substitutes. There is no substitute, to caffeine intake in coffee. So, you will understand that, while a product within an industry, in this case coffee, within the hot beverages industry, is elastic, due to the fact that, that particular product has more number of substitutes, the industry itself tends to be inelastic. Because, caffeine's price increase, hardly affects the industry because, caffeine has no substitute.

Usually, unique goods, for example, let us say, diamonds are inelastic. Because, they have very few substitutes. So, availability of substitutes, is one important factor, that determines, the Elasticity of a particular product or service. The second factor, that affects the Price Elasticity of Demand, is the amount of Income that is available, to be spent. Amount of Income, to spend. This factor affecting the Demand Elasticity refers to the total, that a person can spend on a particular good or service.

Let us for example say, the Price of a can of Coke is Rupees 5. And that, every month I had allocated 20 Rupees, or every day I had allocated 20 Rupees, so that I could buy 4 cans of Coke every day. Now, if there is a sudden increase in the Price of Coke, from 5 Rupees to 10, it means that, with this 20 Rupees, I can just have 2 cans of Coke, as against the initial 4, that I used to have every day. So, if there is an increase in Price, and that there is no change in the amount of Income, that is available to spend on this particular good, there will be an elastic reaction in Demand.

And, it is this elastic reaction, this makes this Demand, more sensitive because, a change in Price, in this case, is not supported by, a change in equal amount of Income, that is available on hand, so that the amount that is consumed, is also the same. So, this explains, in the absence of any increase, in the disposable Income, that is available for consumption of a particular good or service, a change in Price of a particular product or service, makes the Demand, more elastic.

The third factor, is time. Now, time is also an influential factor, when we talk about the Price Elasticity of Demand. Now, let us say, if the Price of a train ticket. Let us say, I am a regular train commuter. And, the Price of the train tickets went up, by 5 Rupees a trip. Since, I am a daily train commuter, and there are very few substitutes that are available for me. I can probably afford to absorb this increase in the train fare, so that, for at least in the short-term, I start using the train, even at these increased prices.

Now, for this short-term, it is inelastic. But, that does not mean that, it is inelastic for ever. Now, if I find that over a period of time, that I cannot afford to spend this additional 5 Rupees every day, then I would shift to an alternate transport mechanism, probably I would use a bicycle for my daily commute. So, the Price Elasticity of the train travel, to me becomes elastic, over a period of time. So, time is again a third important factor, that determines the Price Elasticity of Demand.

If the length of time, is beyond my affordable limits, then the Demand for that particular product or service, becomes elastic. What we saw before was, the Price Elasticity of Demand, or Price

Elasticity of Supply. We just measured the change, in the quantity demanded or supplied, with the degree of change, in the quantity that is Demand or supplied, with changes in price.

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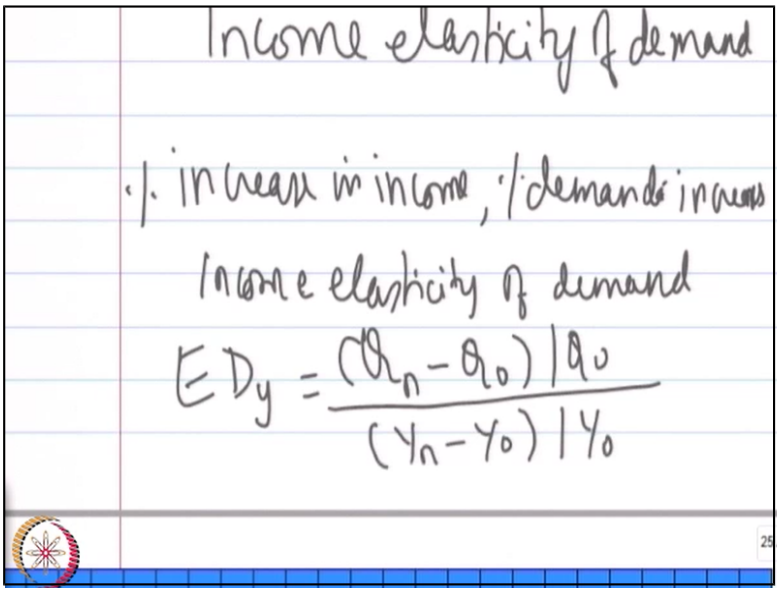

The next thing, that we would like to see now is, Income Elasticity of Demand. What we saw before was, if Price increases, and Income remains the same, then the Demand will decrease. This is for the non-critical goods. Then, it also follows that, if there is an increase in Income, Demand tends to increase, as well. Demand also increases, with increases in Income.

The degree to which, an increase in Income will cause, an increase in Demand, is called the Income Elasticity of Demand. So, the percentage increase in Income, percentage Demand increase. The degree to which, a particular product or service is demanded, with increases in Income, is the Income Elasticity of Demand. Just as we had, a ratio to measure, the Price Elasticity, the Income Elasticity of Demand can be measured, this way. It can be the, Income Elasticity of Demand.

Let us say, I call it, EDy, will be the quantity demanded new, **minus**, the old quantity at previous income levels, **divided by**, the old quantity, **minus**, my new income, the incremental income, and my old income. So, if I need to express, Income Elasticity of Demand, I am just trying to see how much, of the increase in quantity, that is demanded. How much it has increased, as a proportion, to the increase in Income, that I have received.

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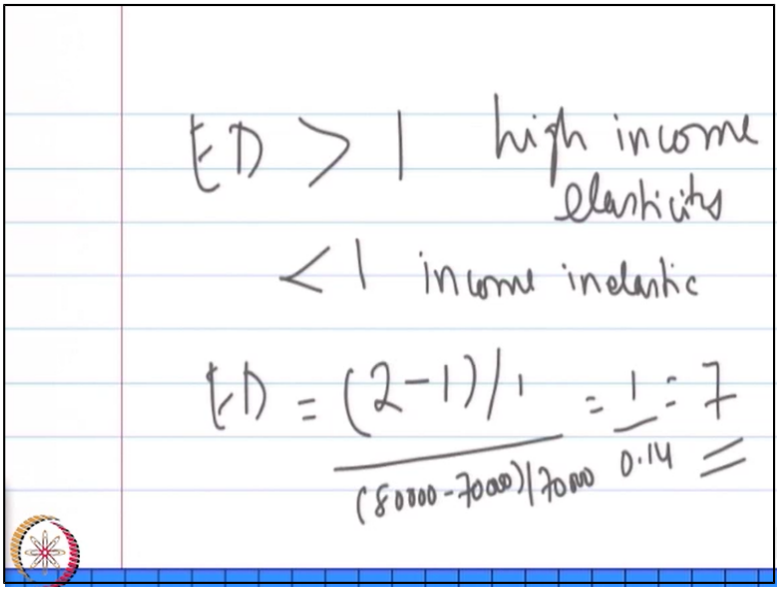

Now, if Income Elasticity of Demand, is greater than 1, then the Demand for the item is considered to have, a high Income Elasticity. And, if it is less than 1, the Demand is considered to be, Income Inelastic. So, if Income Elasticity of Demand is less than 1, then it is Income Elastic. Luxury items usually have, a higher Income. Because, the moment the Income increases, we do not have to really forefeet, a luxury requirement, because our Income also has increased.

So, typically you will find that, you know, luxury items are having, high Income Elasticity. For example, if I just received a pay hike. And, with my initial pay, I could just afford 1 air trip, to visit my parents, every month. And, because of this new pay increase, let us say, the pay increase is Rupees 10,000, and my original pay was, let us say, 80,000 Rupees a month.

And, this hike of 10,000, has made it possible for me to make, 2 trips to visit my parents. And, we can measure the Income Elasticity of Demand, and we will find that, it is greater than 1 because, there is an increase in the Income, which has resulted in, increase in the Demand, for an air travel that I make. Now, my new quantity in this case, the number of trips that I can make is 2, as against the 1, that I used to do.

My new Income is 80,000 per month. My old Income is 70,000. So, in this case, the Income Elasticity, is greater than 1, and which is very highly Income elastic. Now, there is also another

question, are there chances where, despite increase in Income, will Demand decrease. Because, Income Elasticity means, it assumes that, an increase in Income, will cause an increase, in the Demand for a particular product.

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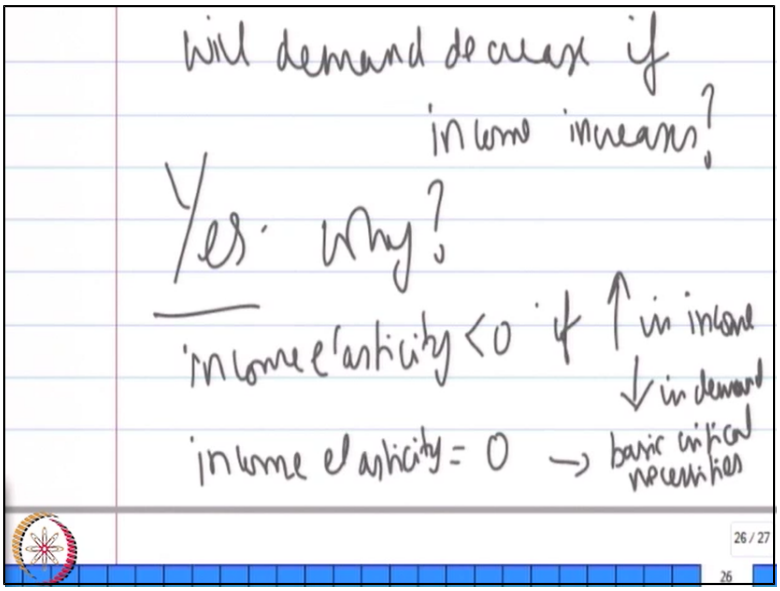

But, will Demand decrease, if Income increases. Yes. Why? Because, let us for example take, the case of inferior goods. Not necessarily, inferior. Let us say, I buy DVD's, regularly. And, when my Income level was X, I used to buy a regular DVD. And now, if my Income has increased to, let us say, X + Delta X. And, because of this increase in Income, it does not mean that, I can buy 2 DVD's. But instead, if I decide to migrate from, a regular DVD, to a Blu-ray DVD, let us for example take.

Then, here is a case where, despite increase in the Income that is available on hand, there is a reduction in the Demand for the regular DVD's. That I usually buy. Now, products for which the Demand decreases, as Income increases, will hence have, an Income Elasticity, less than zero. So, Income Elasticity will be less than zero, if increase in Income, results in decrease in Demand. Now, Income Elasticity will be zero, for basic critical necessities.

It means that, there is no change in Demand, despite increase in Income. And, for such products, you will have an Income Elasticity, zero. What we saw just now was, as I said, the fundamental Law of Demand and Supply. And, how the Demand and Supply of products and services, change

with Price. And, the behaviour of consumers, with respect to changes in Price.

And, how that causes, a change in the quantity, that is demanded by a consumer. And, we measured that by, trying to measure the sensitivity, of the Demand curve or the Supply curve with prices, to see whether a particular good or a service, is elastic or inelastic, both from changes in Price perspective, as well as, changes in Income perspective.

So, this in essence, captures, the relationship between, a quantity demanded and Price, between the quantity supplied and Price. And, how that in a market economy, that the Supply and Demand always works together, in achieving an equilibrium state, where there is an equilibrium Price, and an equilibrium quantity. Now, we need to understand, another broad concept of utility.

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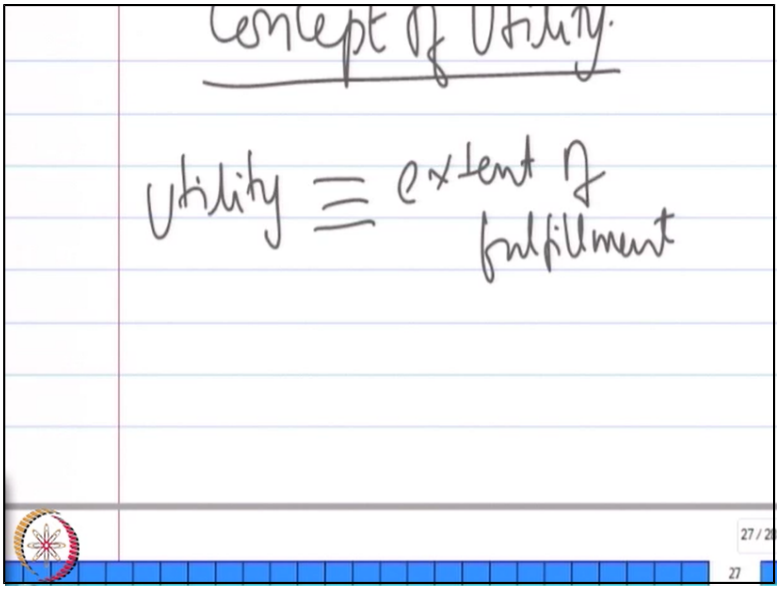

Concept of utility. The focus of Economics as a subject of study, as I said before, is to understand the problem of scarcity, and the problem of fulfilling, the unlimited wants of humankind, with limited and scarce resources, that are available. Now, because of scarcity, economies need to allocate, the limited resources that are available, very efficiently.

The very fundamental principle, that underlies the Law of Demand and Supply, is the concept of utility, which reflects, or which represents, the advantage, or the fulfilment a person receives, from consuming a particular good, or experiencing a particular service. So, at a very broad level,

utility means, it tries to measure, the extent of fulfilment, a consumer has, in consuming a product, or experiencing a service.

How individuals and economies, aim to gain optimal satisfaction, in dealing with scarcity, is what utility is all about. Utility tries to explain, how individuals, societies, and economies, try to gain that optimal fulfilment, or that optimal satisfaction, in dealing with resources, that are very scarce. Since, we are talking about fulfilment and satisfaction, it becomes very relative.

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As a result of which, utility is kind of an abstract concept. It is not very concrete, or an observable quantity. It cannot be quantified. The units to which, we assign utility, is very arbitrary. Because, it is very relative. It has a relative value. But, one thing that we need to understand is, the total utility, is the aggregate sum, of the satisfaction, the fulfilment or the benefit, that an individual gain, from consuming a given amount of goods or services, in an economy.

It is that aggregate sum, which constitutes the total utility. So, the amount of a person's total utility, hence corresponds to the person's level of consumption. Total utility, hence corresponds to the person's level of consumption. Which means, the more a person consumes, the larger is his or her total utility. So, more consumption, more total utility. And, in this case, total utility means, the satisfaction level.

While marginal utility, is a little different from, total utility. Marginal utility represents, the additional satisfaction, or the amount of utility that is gained, from each extra unit of consumption. So, marginal utility is that delta satisfaction, with an extra unit of consumption. Although, total utility usually increases, as we consume more and more of a particular good, or experience more and more of a particular service. The marginal utility usually decreases, with each additional unit of consumption.

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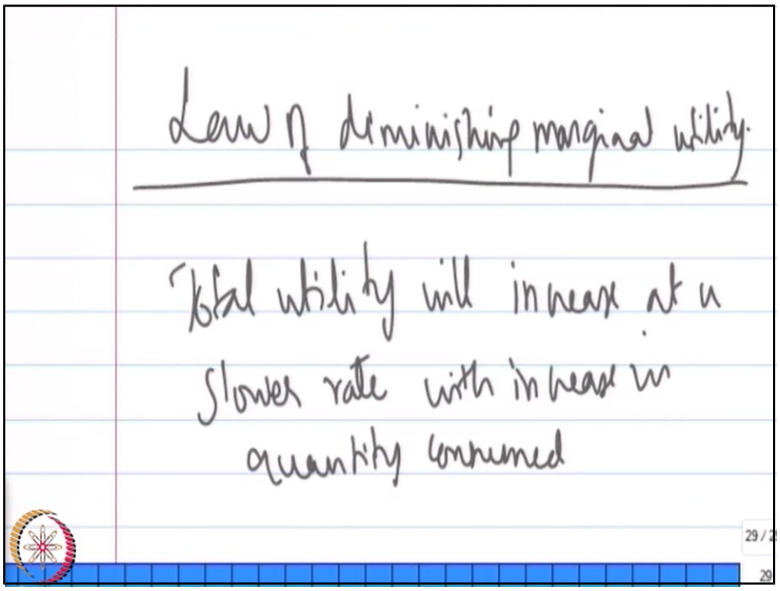

Now, this explains, the law of diminishing marginal utility. This is because, although total utility usually increases with more and more of consumption, the marginal utility decreases, with each additional consumption. Because, there is a certain threshold for satisfaction. As a result of which, a consumer, will no longer receive the same amount of pleasure, from consuming the same product, once the consumer has crossed the threshold. In other words, the total utility will increase, at a rate which is slower in pace, as an individual increase, the quantity consumed.

So, you keep increasing the quantity, that you are consuming, the rate at which the total utility increases, keeps decreasing. This explains, the law of diminishing marginal utility. Which means, total utility will increase at a slower rate, with increase in quantity consumed. I will just give you a small example, for you to understand. Let us take a chocolate, as an example. And, that I am able to attach some quantifiable variable, just to give you the total utility, that can be quantified.

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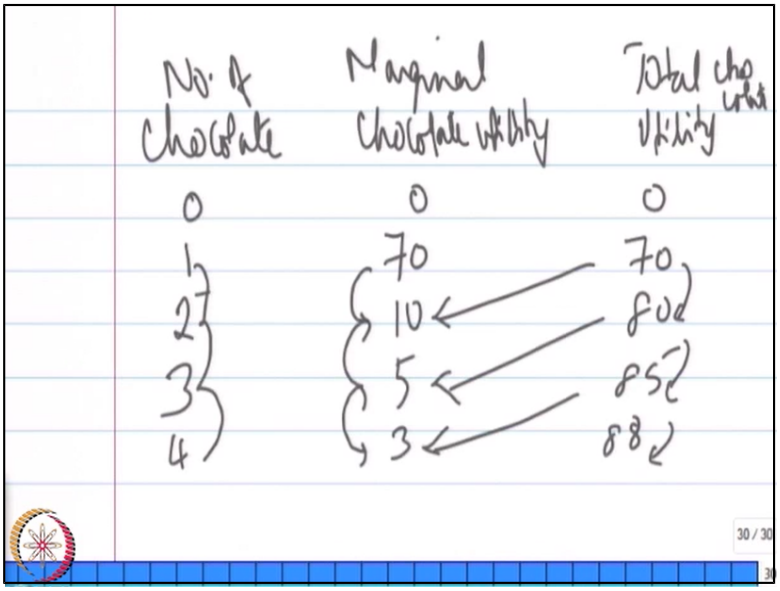

Now, the number of chocolates, marginal chocolate utility, total chocolate utility. Every product, every service, has its own utility. So, in this case, we are talking about, the chocolate utility. Now, let us say, I did not consume, any chocolate. The marginal chocolate utility is zero. The total chocolate utility is also zero. Let us say, I had one chocolate. And, if I need to express, the utility in numbers, let us say, one chocolate means, 70 in terms of its marginal utility, 70.

The total utility that I have gained, by consuming one chocolate is also 70, 0 + 70. Let us say, I decide to have, one more. And, I have already had 1 chocolate. Now, I have decided to have, one more. The marginal utility will not be the, same 70. Let us say, it is 10. While the total utility is, 70 + 10. I decide to take, one more chocolate. The marginal utility is 5. Your total utility is 85. I decide to have, one more. Marginal utility is 3. The total utility is 88. Now, why is this happening?

The pleasure of each additional chocolate bar, will be less than the pleasure that I would have received, from eating the one before. Probably because, I have a sense of feeling full, or I have eaten too many sweets, for that particular day, beyond the threshold. So, this table shows, that the total utility will increase, at increasing levels of consumption. But, you will find that, this increase in this example, is at a rate slower, than the previous consumption levels.

So, I had from, 1 to 2, 2 to 3, 2 to 4, the total utility keeps increasing, but at a slower rate. Why? Because, the marginal utility, keeps dropping down. Because, it was 70, but the next 3 chocolate bars put together, the aggregate marginal utility is, 18. The law of diminishing marginal utility in this case, helps Economists, to understand the Law of Demand, and the negative sloping Demand curve.

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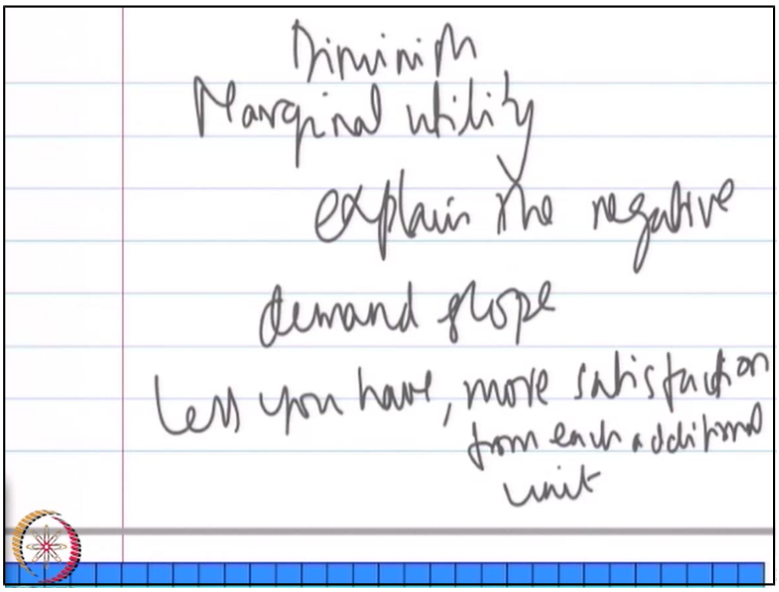

Actually, the diminishing marginal utility explains, the negative Demand slope. Why because, the less of something you have, the more satisfaction you gain, from each additional unit you consume. The marginal utility you will gain, from that product is therefore, higher. And, it is because of this higher marginal utility, you are willing to pay more. It gives you a higher willingness, to pay more, for a particular product.

And, that is why, you find that, prices are lower, at a higher quantity demanded. Because, your additional satisfaction diminishes, as you Demand more. So, this explains, the negative slope, of a Demand curve. The reason, is because the less of something you have, the more satisfaction. The less you have something, more is the satisfaction, you gain from each additional unit, you consume. More satisfaction from, each additional unit.

And, it is because of this higher marginal utility, you are willing to pay more. And, this explains the negative slope, in the Demand curve. In order to determine, what a customer's, or a

consumer's utility, and total utility are. In fact, that is a very challenging subject. Economists, turned to Consumer Behaviour. Which means, a Consumer Demand Theory, which studies, Consumer Behaviour and Satisfaction.

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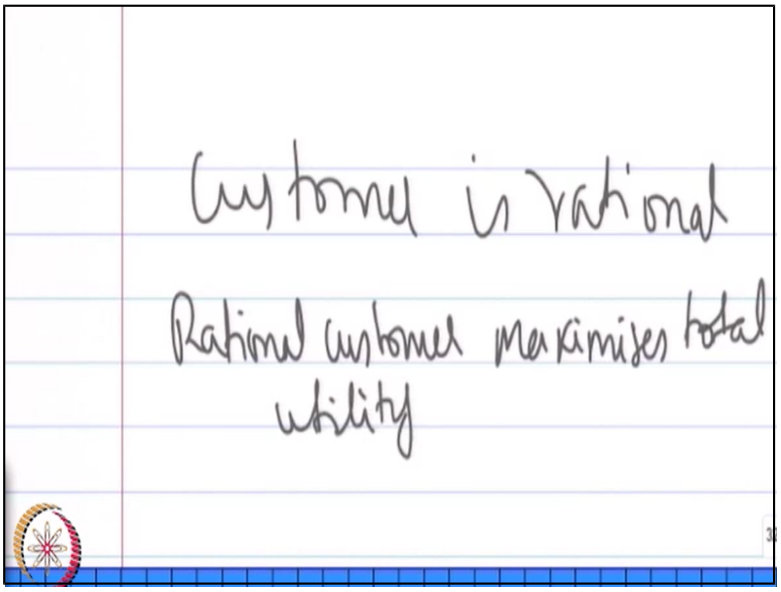

It is always, say, a customer or a consumer, is assumed to be a rational thinker. So, a customer is a rational thinker. And, Economists assume, since the consumer is rational, he will try to maximise, his or her total utility. So, rational customer, maximises, total utility. Now, what do I mean by this. Since, a sensible customer is assumed to be rational, Economists assume that, he or she will always try to maximise, total utility. And, it is this rational thinking, that influences Economists, decision-making.

Now, why is that, every consumer, tries to maximise total utility. The example that we took, the example of chocolate, instead of spending all my money, on 3 chocolate bars, which we saw, gave me a total utility of 85. If, I had just purchased 1 chocolate bar, which gave me a total utility of 70, and perhaps a glass of milk, that gives me a total utility of 50. This combination, 70 from chocolate, and 50 from a glass of milk, gives me an aggregate utility of 120, at the same cost of purchasing 3 chocolate bars, which gave me an aggregate value of 85.

This explains, the rational behaviour of customer, who tries to always maximise, the total utility. And, it is this behaviour of customers, and their constant endeavour, to maximise the total utility,

that influences economic decision-making. It always tries to maximise, the end user's total utility. And, that governs, consumer behaviour, and economic decision-making. And, that is the reason why, markets behave differently, for different types of products, different types of services, and different types of consumers.

So far, I have given you, a very brief overview on, the principles of Supply and Demand, and the relationship with Price. Elasticity of Supply and Demand, both, Price Elasticity, as well as Income Elasticity. And, how a concept of utility, forms the fundamental of economic decisions, to handle the complex issue of allocating scarce resources, to a diverse set of needs of the end user. And, all of this happens, in a given market space. An additional dimension, that can be brought into this is, the type of market in which, all of this happens.

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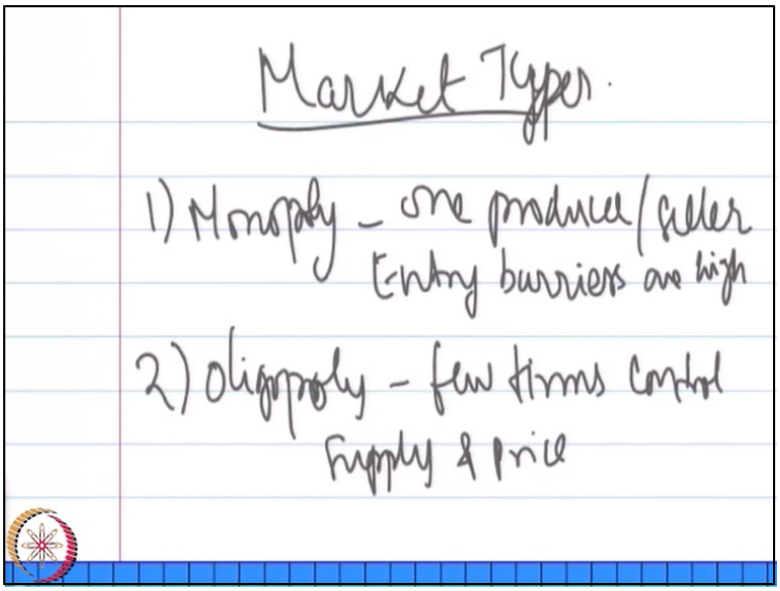

So, the last topic for this class would be, to understand, different types of markets. The first one would be, a Monopoly. As the name, very clearly suggests, it means that, there is only one producer. One producer, or one seller. And typically, a monopolistic market is characterised by, high entry barriers. Entry barriers are very high. And, monopolistic market, could be for different reasons, could be economic, or political, or social.

If the Government decides that, it needs to control critical services, then it would decide that, it is going to be the only producer, or the only seller of such critical services. And that, you will see in

services like, power, electricity, which is by enlarge, controlled by the Government. Or, for example, in Saudi Arabia, the entire oil industry, is controlled by the Government. Because, for them, oil is critical to their economy.

So, a monopolistic market is one, in which, there is only one player. As a result of which, it is that producer or seller, who will control the prices. And typically, it is the Government, which invariably is that one seller. Because, it would like to control, the critical services in a nation. The next type of market is, an Oligopoly, in which, few firms, a handful of firms, control Supply. And, by controlling Supply, it also controls, the Price of the product. There would be no change, there would be no differences, in the products.

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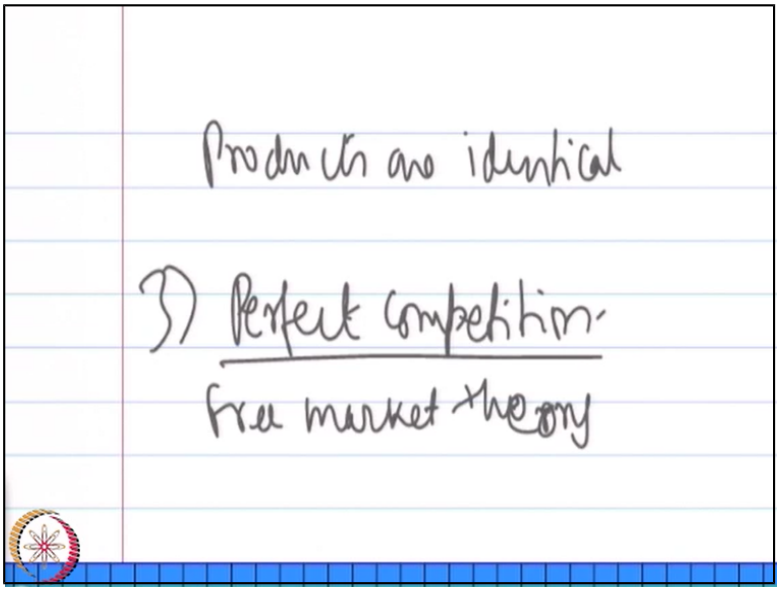

In Oligopoly, you would find that, the products are almost identical. And, there is a lot of interdependence, between the players in the Oligopolistic market. A classic example could be, the Cement industry. There is hardly any difference, in the end product. But, we will find that, the cement industry, in our country, is oligopolistic, which is just controlled by, a very few players. And, we usually call this as, cartelisation of the industry. So, what will happen if, let us say, there are only 3 Cement manufacturers. And, one decides to reduce the Price, to gain market share.

There is very limited option, for others to differentiate because, the products are identical, they

also will reduce the prices. So, a reduction in Price by one player, in the oligopolistic market will force, the other players to also, reduce their prices. On the other hand, there is also, the downside to it. Where, such cartels also engage in collusion, where they consciously take a decision, to increase the Price. And, we saw very recently, in the cement industry, how this cartel actually increased, they colluded together, and increased the Price of the cement.

And, an industry also will undergo, consolidation. And, if an industry undergoes consolidation, then it is moving towards, an oligopolistic market. Where, the more and more, different firms and industry gets consolidated, the more and more, it is approaching an oligopolistic market. Because, from a stage where, there are more number of firms in the market, it gets reduced to, just a handful of firms. So, an oligopolistic market is just characterised by, very few firms. And, typically you would see this, in products and services, that are very identical.

It has, both, advantages, as well as disadvantages. The third type of market is, perfect competition. Perfect competition embraces, free-market theory. Many buyers and sellers. And typically, the entry barriers, are not that high. So, more number of buyers can get into, a perfect perfectly competitive market. Where, the Law of Demand and Supply operates, theoretically, freely. Because, there is a number of choice for the seller. Because, in a perfect competition, in a perfect market, the presence of substitutes, is also high.

Substitutes meaning, the presence of an alternate supplier, is very high. And typically, you see a perfect competition, in the Mobile Telephony, or in the FMCG, is the fast moving consumer goods, or Air Travel, very recently in the busy routes. So, there is more choice, in a perfect competition, where the free-market theory ensures that, the end user has more choice. And, a perfect market is something, that allows choice for customers, make sure that the Law of Demand and Supply, operates freely.

So, you have, 3 different types of market. Each of them, having their own advantages and disadvantages and, if you take a nation's economy, usually you will have, all these 3 types of markets. But, usually you will find, either a market to be monopolistic, or perfect competition. Very rarely, you would find, more number of markets, that are of oligopolistic in nature. So, what

we have seen, in the last few classes, is to understand, a country's economic landscape. And, how the national output of a country is measured, by way of its GDP.

And, how behaviour of consumers, with respect to the quantity that, a particular consumer or a group of consumer demand, or suppliers supply. And, how that changes with Price, as we saw, the Law of Demand, and Law of Supply. And, how the fundamental to all of this, comes from the concept of utility, which characterises, the economic principle of a rational customer, who wants to maximise the total utility, based on which, resources are allocated. And, all of this happens, in markets, which are of 3 different types. This constitutes, the economic landscape.

Now, while all of this happens within, a given market space, we also need to understand, that there are factors outside the market, that are very important, that shapes the way in which, markets perform. Now, what we saw before was, various internal dynamics of a market, that determines at what Price a particular quantity is supplied, what Price a particular quantity is demanded. And, these are all, invariably inter-linked, within the market space.

When we go beyond the market space, we need to understand, there are some external factors, that will also in equal force, change the way in which, markets operate. As a result of which, prices can go up and down. Now, what are these external forces. These external forces, some of the examples are, could be the availability of money itself. Money available in market. Interest rates, or exchange rate. Or, how the availability of money, changes interest rates. Or, the availability of money, how does it impact inflation.

So, we need to understand that, these external factors, are equally important, when it comes to shaping, the way in which, a market performs. And, these external factors, are controlled by policymakers. How they are controlled? Could be, either in fiscal policy-making, or in monetary policy-making. There are two main policy-making tools, fiscal policy, monetary policy. So, in next class. We will understand, what fiscal policy is all about, what monetary policy is all about. And, what are the different tools, that monetary policy makers use.

And, how in fiscal policy, the Government is the one, that actually is responsible for stimulating

Demand. So, next class, we will understand, fiscal policy, monetary policy. And, how these important variables that I mentioned before, the flow of money, interest rate, inflation, exchange rate, how all of these, are interlinked. And, in the process, all of this will change the way in which, the market as a whole, performs. So, we will see this, in next class. Thank you.