Microeconomics: Theory & Applications
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Lecture – 13
Consumer Equilibrium

Hello, welcome back to the lecture series on Microeconomics. Let us continue with the discussion on various shapes of Indifference Curves and then, we are going to start a first discussion on optimal consumption choice.

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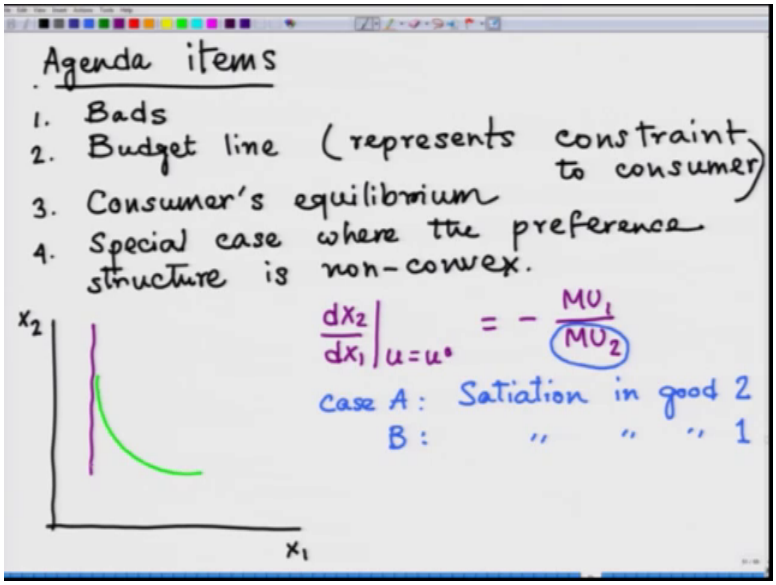

First, we are going to talk about what shape the Indifference curves we will take if we are dealing with Bads; but not goods. Then, second we are going to introduce the concept of Budget line and that is a representation of constraint in the case of utility maximization.

Then, we are going to talk about how to find consumers equilibrium and finally, we are going to see some special cases, where the preference structure is non convex. So, now, let us start with the discussion with bads. But before we draw an indifference curve for a bad, let us also talk about violation of very important axiom non satiation. So, far we have assumed that the axiom of non satiation holds if indeed there is a saturation point, then let us see how that is going to impact the shape of the indifference curve and after that we are going to discuss the case of bads.

What is the saturation point; what is the satiation point? If we say that after consuming some units of a commodity, the consumer finds the marginal utility from that commodity is 0; then we can say that the consumer has reached a saturation point and we cans also say in other words that the consumer is satiated in that particular commodity. So, the condition first satiation would be marginal utility from that commodity has to be equal to 0. Let us now explain the case of satiation in terms of a graph.

Let us assume 2 simple goods and you know let us assume that for some range, they are going to give us positive marginal utilities. But after some point of time, the consumer we will reach saturation point and after that point or after that you need the commodity is going to generate negative marginal utility. So, let us now look at this graph. So, if the preference is convex or if we assume that the consumer is not satiated with any of the commodities the indifference curve, we will take a convex to the origin shape that we all know and the slope of the indifference curve will be given by the ratio of negative sign of course; and then, the marginal utility from commodity 1 over the marginal utility of commodity 2.

Now, let us assume that the consumer after some point, after some units of consumption become satiated with commodity 2. So, we are going to discuss 2 different cases. Case A: Satiation in good 2 and then, Case B: Satiation in good 1. So, let us first talk about Case A. So, in Case A, we can see that after some units the commodity 2 does not offer any positive marginal utility. So, at some point of time marginal utility will become 0. So, if in MU 2 become 0, then the slope of the indifference curve will become infinite.

So, we are basically talking about point on this indifference curve; at that point the tangent to the indifference curve will be parallel to the X 2 axis.

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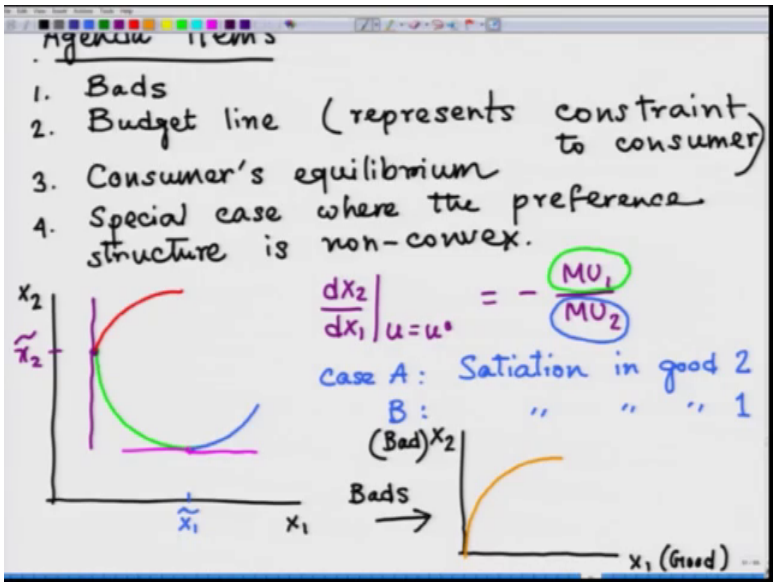

So, that line has infinite slope. After that point say we are talking about this level of consumption say X 2 tilde, after X 2 tilde unit of consumption, the commodity 2 offers negative marginal utility. So, in that case MU 2 will become negative. The marginal utility will become negative and hence, the slope of the indifference curve will turn to be a positive one after this point and we can have the extension of the indifference curve of this sort.

Now, let us now consider the case of satiation in commodity 1. So, again if the consumer becomes satiated in commodity 1, then the marginal utility from that commodity 1 will be 0 and in this case the slope of the indifference curve will become 0. So, in that case we are actually talking about a point on the indifference curve, a tangent to this point will become parallel to the X 1 axis. And that point, we will basically give the satiation point.

So, after the satiation point, what will happen? The marginal utility from commodity 1 will become negative. So, you are going to see a positively sloped indifference curve after a consumption of say X 1 tilde, we are going to observe a positively sloped indifference curve.

So, if the consumer is satiated in both the commodities, then we get shape of indifference curve which looks like a horse shoe. Now, we are going to talk about the case of bads as a special case of this satiation concept. Let us talk about you know an example. Bads are some things which are disliked by the consumer. One can take very simple example say

pollution. Now, suppose there is a friend and you want to take that friend to a particular place, but that particular place is very much polluted and the friend does not like you know that much of dust or noise; but you want to you know take your friend to that place for some reason.

So, you have to bribe you know him or her right. So, you have to find out how can you compensate him or her so that although he or she has to face the pollution. But the utility level must not fall. So, in that case you have to find out a commodity which he or she likes and you have to offer him or her some more units of that commodity so that the friends feels in different between being there and having some pollution as he or she is going to enjoy some good also. So, the question is that what type of indifference curve we will represent these tradeoff between a good and the bad that your friend faces. Let us have a diagram to see what happens in this case. So, in the case of bad, the satiation point will be 0; nobody wants pollution.

So, pollution has 0 tolerance right. So, in this case if I measure pollution along Y axis, then the indifference curve shall start from the origin. Let us have a look at the diagram and here I am going to draw this graph for bads. So, in this case the indifference curve, we will take this kind of concave shape and you can see what is happening that as the friend has to choose between the good and the bad for each unit of bad, for each extra unit of bad or pollution the friend will demand for higher and higher units of the good. So, that that extra units of good consumption compensates the negative utility that he derives from pollution.

So, that concludes our discussion on various types of indifference curve. Now we are going to discuss the case of optimal consumption choice or it can also be called consumers equilibrium. So, as we all know that a consumer wants to consume more and more of all the commodities around him or her; but unfortunately, he or she has limited resources to purchase these commodities. So, if resource is represented by income, we can say that the consumer has a fixed level of income and there is a budget constraint that the consumer faces.

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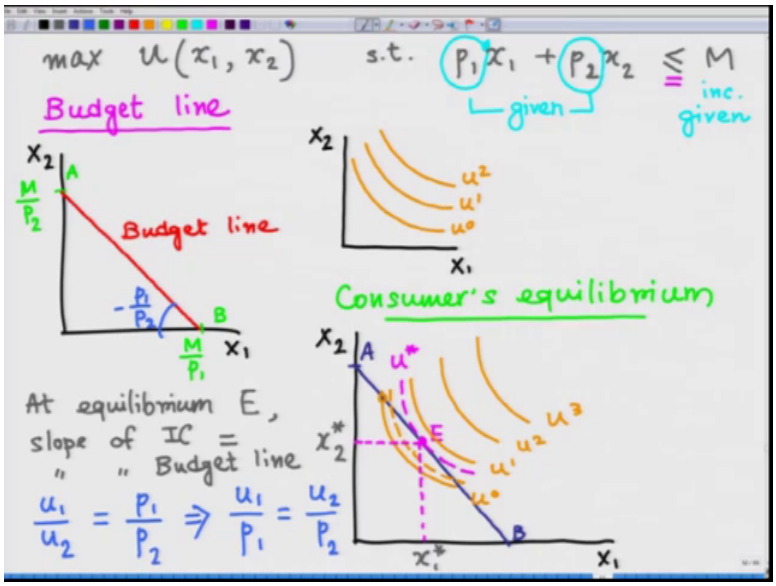

So, if you remember sometime back, we have written the consumer's utility maximization exercise, a constrained optimization problem.

Now, for the sake of simplicity, we are assuming 2 good world. It can certainly be generalized 2 n good world. So, P 1 x 1 plus P 2 x 2 is basically the expenditure that the consumer mix on purchase of both these commodities and there is this money income which the consumer has. So, now, you can see I can write a less than or equal to sign if I write that, then I mean that consumer may not spend the entire money income on these commodities; he or she can say something. But if I assume that we are working with 1 single period model and there is no future. So, in that case, there is no point of saving some money right. Because there is no tomorrow, there will be no future consumption. Then, I replace this or you know I can replace this less than or equal to sign by a strict equality sign.

Now, if I do so, then I get this concept called Budget line. So, this budget line in the language of Optimization Theory is a binding constant. So, now, let us have look at budget line in a diagrammatic manner. So, we will again start with a consumption plane and this consumption plane has X 1 and X 2 goods and this P 1 and P 2 are the market prices; per unit market prices for 1 unit of goods; 1 and 2 respectively. Note that here; we are not talking about anything bad. Now these prices are given to an economist or consumer. Money income is also given. So, these 3 are the parameters in the model

which are given ok. So, if this is given, then let us see with this M amount of money income, how many units of X 2 the consumer can purchase at maximum. So of course, if there is no purchase from the commodity 1 of commodity 1; so the inter money will be spent on commodity 2. So, it will be M over P 2.

So, this M over P 2 will give the intercept term along the x axis. Following similar logic if the consumer does not purchase anything of X 2 and you know spends entire money to consume only commodity 1; maximum he can purchase and consume will be M over P 1. So, now, this point here says I can name it B. Let me name that point A. So, if I join these points A and B, I get what is called a Budget line. So, Budget line is basically a locus of all feasible consumption bundles that a consumer can potentially purchase and consume. So, an indifference map can be drawn, like in this diagram I am going to draw.

Suppose, this is the indifference curve we start with and this gives and utility u naught. Then, we are interested in getting another indifference curve which represents a higher level of utility say u 1. So, that second indifference curve will lie above the previous indifference curve. Similarly, we are interested for another indifference curve which represents and utility levels u 2 and u 2 is again greater than u 1. So, the indifference curve will again lie above the previous indifference curve. If I continue like this, I get an indifference map. So, when I am talking about consumers equilibrium, I need to take these 2 things together in one diagram and lets have such a diagram.

So, here the consumer's preference structure is represented by his or her indifference map, like this. So, we can call this u naught u 1 u 2 u 3 right. So, this is the consumption or commodities plane over which the consumer has to maximize the utility subject to a constant and the constant is represented by the budget line. So, now, we need to superimpose the budget line on this indifference map and then let us see what happens. Suppose, I draw the budget line here with this intercept A and B; so, A B denotes the budget line. So, note if I or the consumer chooses a point say this, the intersection point between the budget line and the indifference curve; the consumer is not maximizing the utility.

Why? Because consumer can very easily move to a higher indifference curve and increase the utility. But still meeting the budget constraint and some money will be still left with him or her. So, the consumer we will not stop. Finally, the consumer we will

move up and up and finally, reach an indifference curve which is tangential to the budget line and if I pick the tangency point, then you can very well see that beyond this point consumer cannot increase his or her consumption of X 1 and X 2 because if he or she does. So, then he or she will fall short of budget.

So, additional con purchase and consumption of X and XX 1 and X 2 is not permitted by his or her money income. So, let us denote this intermediate utility iso utility curve or indifference curve by u esthetics or u star. Now, this tangency point I name that tangency point E and I will say that this point E is a consumer's equilibrium. So, a consumer maximizes his or her utility by purchasing commodities subject to the constraint of money income and he or she we will purchase x 2 star units of commodity 2 and x 1 star unit of commodity 1 and this will be the consumers equilibrium point. Now let us see how can we find some economic interpretation of this consumer's equilibrium or how can we guarantee that we indeed reached equilibrium?

Note at equilibrium point E, the slope of indifference curve is equal to the slope of the budget line. Both of them have negative slope. So, we can get rid of the negative sign and if we do so, we can write the following thing. The absolute value of the slope of the indifference curve is first partial with of utility function with respect to the commodity 1 and the slope is given by a ratio of marginal utility of commodity 1 and marginal utility of commodity 2. So, this is the slope of the indifference curve and as P 1 and P 2 are given in the case of budget line, the slope of the budget line can be given as P 1 over P 2 right.

So, the slope here is going to be minus P 1 over P 2. So, if we have this, then alternatively one can also write the marginal utility from commodity 1 over price of commodity 1 equals ratio of marginal utility from commodity 2 and the price of commodity 2. Let us see how can we interpret this expression that we derived at last? So, if we have 1 rupee of income, then we can purchase 1 over P 1 units of commodity 1 with that extra unit of money and if we consume, we derive some marginal utility out of that consumption. So, the utility gain from 1 rupee expense on commodity 1 will be given by u 1 over P 1.

Similarly, u 2 over P 2 has the same interpretation. It gives the increase in utility from 1 unit of money if that unit of money is spent on commodity 2. So, at equilibrium we can

see that it does not matter if you get 1 rupee of 1 rupee or you know additional income, if you spend it on commodity 1 or you spend it on comedy 2, you will get the same utility and surprisingly, this is very similar that we have seen in the case of Marshallian Consumer Theory. So, this is basically Law of Equi-Marginal Principle.

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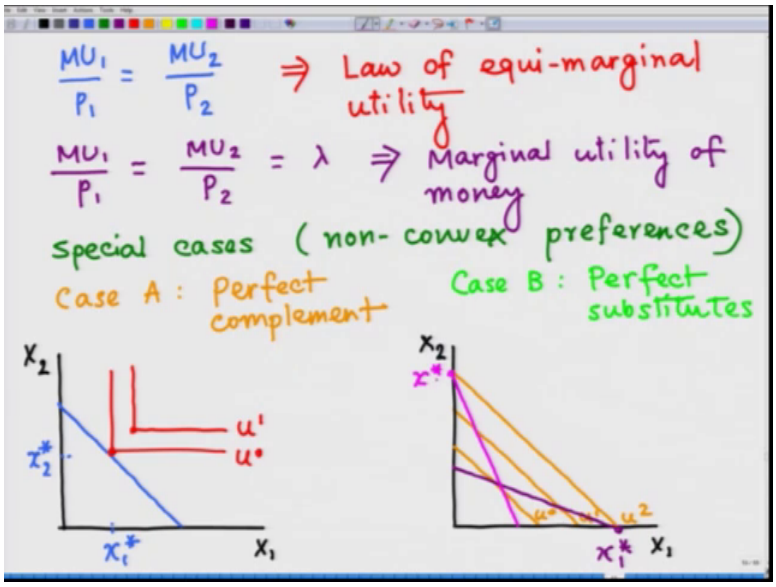

So, this expression gives us law of Law of Equi-Marginal Utility. Now, this can also be written as and this lambda as the interpretation of marginal utility of money.

So, now let us look at some special cases, where we have non-convex preferences and again, we are going to deal with 2 such cases. Case A will be Perfect complements. So, in the case of perfect complement, lets draw a diagram and with the aid of that diagram, we are going to find consumer's equilibrium. So, in the case of perfect complement, 2 goods are consumed in fixed proportion right. So, we get indifference curves which are right angled or L shaped and there will be series of indifference curves. A curve which lies above the other gives higher utility than the other. So, u 1 is definitely greater than u naught.

So, in this kind of indifference map, the consumer equilibrium has to be found and the equilibrium will be found at the tangency point between the budget line and the kink of this indifference curve. So, the consumer will purchase x one star units of commodity 1 and x 2 star units of commodity 2. Now, let us going to draw the case for perfect substitutes. So, in this case as you remember the indifference curve, we will take a

straight line shape. So, the indifference map will be a series of straight lines like this and each straight line which is lying above the other represents higher utility.

So, in this case you know it all depends on the slope of the budget line and slope of the indifference curve. If slope of the indifference curve is steeper or if the indifference curve is steeper than the budget line, then, the consumer will purchase only commodity X.

So, I am talking about a situation where the budget line is flatter compared to the indifference curve and in that case only x one star unit of commodity 1 will be purchased; no commodity, no units of commodity 2 will be purchased. But there can be other sort of case also where we have a budget line which is steeper compared to the indifference curve like this. In this case the consumer consumes only commodity 2 and no commodity 1. So, 0 units of commodity 1 will be purchased and x 2 star units of commodity 2 will be purchased.

So, we will continue this discussion in the next lecture.