**Microeconomics: Theory & Applications**
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**Lecture – 7**
**Marshallian Consumer Theory (Contd…)**

As the components of Marshallian model have been laid out, let us look at the model building exercise, and we will derive the demand function from this mathematical model.

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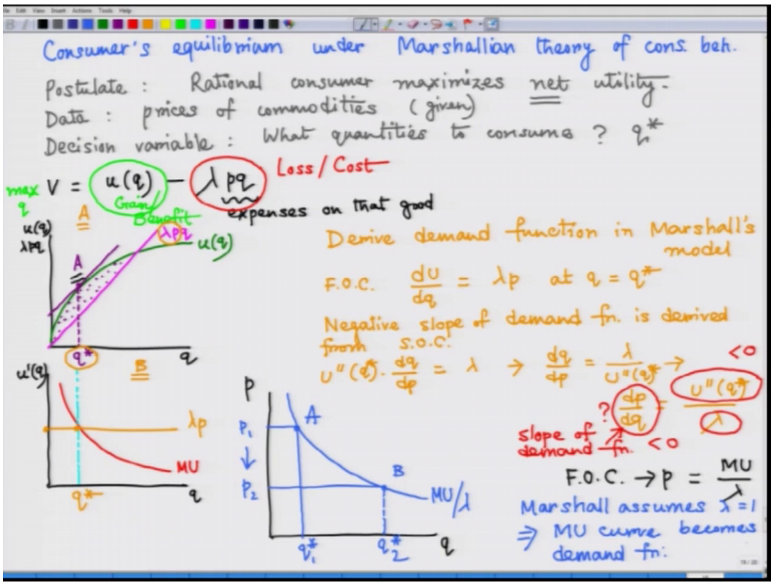


So, first we will start with the net utility function. Let us define net utility function as v, and that is basically the benefit or the utility which one derives out of the consumption minus, there is a loss because as this person is consuming q units of the quantity, pq is the total expense that he incurs he or she incurs on that good.

So, this amount of money is forgone to consume the good q. Now this amount of money could have been used somewhere else to buy some other commodity maybe, then there is some marginal utility of money that we need to apply here in front of this expenses on that good, they need to be multiplied. And together this lambda pq you will talk about the loss or cost of consumer. Now there is a benefit portion here in front. So, this is the gain or benefit and we needs to be maximized with the decision variable.

So, the net utility function v has to be maximized with respect to the decision variable q. Now let us have a quick graph to see the situation. So, here we have units of commodity consumed q, and we are plotting the u q and lambda pq both. So, of course, concave to origin and cost curve we will take the shape of a straight line, like this because lambda is constant, p is constant.

So, it will be a straight line with slope lambda p q. So, of course, these gap between these 2 curves aiming to maximize the net utility. And that could be done when the gap between these 2 curves is maximum. So, basically we are going to have a parallel straight line with the same slope at this point, where it makes the tangency to the total utility function or u q we find the consumers equilibrium.

Because it is add that point say denoted by point A, we find a q star such that the utility sorry the net utility v is maximize. Now we can represent the consumer's equilibrium A in a different manner as well. So, this alternative graphical representation we will be in terms of the marginal utility function. So, in the upper panel we have already plotted total utility function, and we have seen the consumers equilibrium denoted by the consumption level q star. Now, let us going to have an alternative graphical representation of consumer equilibrium under Marshallian assumptions through marginal utility curve. So, for that let us now look at panel b diagram. So, let us call this panel b in the above one is the previous 1 is panel A.

So now in the case of panel b diagram we have plotted a downward slopping marginal utility curve. This time we have drawn it as convex it does not matter, it may have been a straight line also. Now these horizontal line horizontal to q axis is basically the constant that we have used in the cost line. So, that is the slope of that coastline lambda p here we are going to plot that. So, this is a fixed number of course, because you know we are talking about a particular straight line from origins. So, of course, in only one slop possible.

So, where this lambda p horizontal straight line intersects the marginal utility curve, that is where we get our optimal consumption bundle q star for the consumer. Why? Because we have already seen that at the consumer equilibrium q start as we observed in panel A. At that point the slope of the total utility function which is the marginal utility function equals the slope of the coastline which is lambda p; so, this is an alternative representation.

Now with this let us also look at how one can derive demand function in Marshalls model. Now we will start with the mathematical first order condition from this optimization exercise. So, we have already spoken about the equality of the slope of the total utility function and the loss function. So, that means, we are talking about this first order condition using calculus, right.

So, the negative slope of demand function is derived from the second order condition. So, for the second order condition what do? We need to do we need to differentiate again. So, here we differentiate, then we can rewrite or we can also inform from this particular expression dp dq equals q double prime U divided by lambda. And note that this is all at the optimal level of consumption q star. So, you have to put a q star here, and a q star there, and a q star here. So now, note this assumption law diminishing marginal utility gives the sign of this particular second order derivative, and the sign would be negative. Because the margin utility is a downward sloping function whereas, the lambda is a non-negative number. So, together with we can say that the slope dp dq has to be negative.

Now what is this entity? This is the slope of the demand function, right? So now, we have established that demand function has to be a downward sloping curve. Now we are not commenting on the curvature whether it straight line or it is convex or concave it has to be a downward slopping curve.

Now, from the Marshallian analysis can we derive the demand function? Now note that from the first order condition that we have earlier we can write; so, from the first order condition we can write p equal to marginal utility divided by lambda. Now of course, marginal utility is a downward slopping curve, it can be even a straight line lambda is a constant number non negative. So, of course, we can draw something like this a curve marginal utility divided by lambda. And hence in this diagram, now we can change the value of p. Suppose we start with the high value of p and the corresponding level of demand is this much q 1.

So, if we now lower the price of the commodity to p 2, say p 2 here, we can get another point along this curve which will give me the consumers equilibrium. At a lower level of price, we see we obtain another point b as the consumer's equilibrium on the m u over lambda curve. Let me denote the first position of equilibrium as point B. So, as per point B we can see that as price has fallen the consumer has demanded for a higher level of q q 2 start so that he or she maximizes is are utility or net utility.

So, Marshall assumes lambda equal to 1. So, if that is the case, then the marginal utility curve becomes demand function. Now note that this is a very interesting result. So, what we see? So, in a single good Marshallian model the consumer as to spend the entire money on that particular commodity only. So, the p times q has to always equal to m the money income. So, what we can see here is that this pq combinations along that the convicts origin marginal utility curve will always give a fixed level of expenditure or money expenditure. That is why in a Marshallian word we can say that the demand function is a rectangular hyperbolum. So, with this we have concluded our discussion on one good Marshallian theory of consumer behavior. Now we are going to discuss other things in the next lecture.