Behavioral and Personal Finance
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Module - 01
Behavioral Economics and Finance
Lecture – 04
Economics of Decision Making (Cond.)

Hi there. Welcome back, continuing from the previous session where we discussed the basic framework of Economic Decision Making in the context of utility theory. Let me try to highlight certain issues which actually explains the utility theory in a better framework known as vNM approach. So, utility theory is basically a normative theory, it suggests that people or economic agents should behave in a certain way.

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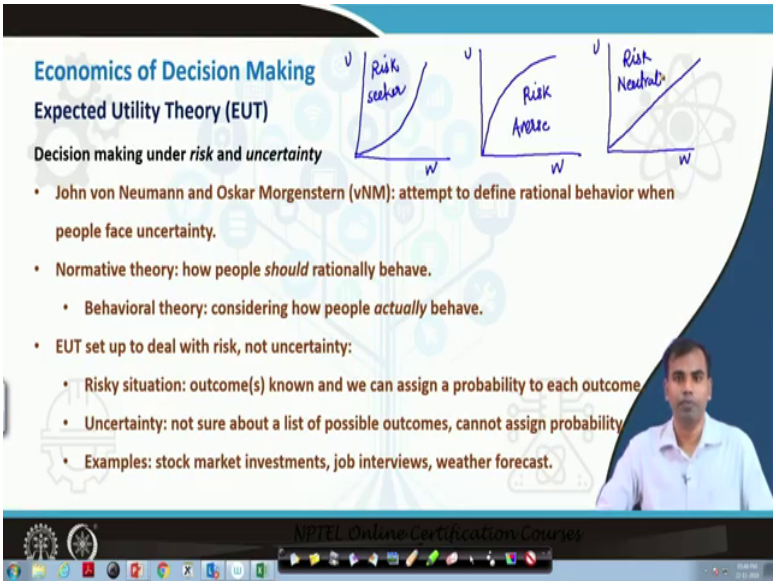

Basically, utility theory indicates that people should have rational constant preferences, they should try to find the utility and maximize it in all circumstances. And, also they try to rank their choices and they should go for the choice that gives them the highest utility. So, in that context basically utility theory is a normative theory which suggests how people should behave.

But, when it comes to vNM approach that was given by John von Neumann and Morgenstern two economists, the behavioral theory given by vNM framework essentially explains how people actually behave. Let me try to explain this with the help of an example. Suppose, you have to make a decision to invest in the share of a company.

You have got some money and you want to invest in share market. Now, the ideal approach is you have a list of stocks or shares that you want to invest in, go for their analysis which means you have to calculate all the numbers pertaining to their risk and return. Rank all the stocks in a particular fashion on the basis of either risk or return and then go for the choice that fits the best in your framework.

Now, that is what utility theory suggests. It always indicates that options or outcomes should be ranked in preferential order and then the outcome with the highest utility should be taken up. But, if you observe about the behavior of people trading or buying and selling shares in stock market you would understand that majority of them do not follow this normative approach.

They do not do the entire set of analysis and they mostly go by heuristics. Even if you consider yourself as one of the stock market traders probably you would not have sufficient amount of time, resources and energy to do all this analysis, rather you go by the heuristics or certain other indicators.

Probably, you can also go by a thumb rule which will indicate that the stocks whose name begins with that later that matches with the later of your name and probably your investment would be doing wonders in future. So, you know less lighter note I want to indicate here that

the behavioral theory given by vNM is essentially more to realistic and it explains the expected utility theory in a better way, in order to make a better economic decision.

Now, when you talk about vNM framework of expected utility theory essentially it is a theory of decision making under risk and uncertainty. Now, these are two terms risk and uncertainty. There is a subtle difference between the two, although these two are used simultaneously. However, there is a subtle difference between risk and uncertainty. Now, when we talk about risky situations we know what the outcomes are and we can assign certain probability to those outcomes.

For example: if you want to invest in stock market you know there could be two possibilities either the stock price would go up or it could go down. In worst case probably it may remain at where it is, but these are the only three possibilities and you also can understand or try to infer the possibilities in terms of probability of these three outcomes.

So, this kind of situation is known as risky situation. But, imagine a situation where you are not aware of the outcomes, you do not know what outcomes this particular path or this particular decision would lead to and therefore, you cannot assign probability as well. These situations are known as uncertain situations for example, weather forecasts you do not know whether tomorrow is it going to be sunny or rainy or foggy or cloudy.

So, that is particularly a situation which can be said to be uncertain. Now, vNM framework of expected utility theory is essentially a theory of decision making under risk not uncertainty which means you have to have certain possible outcomes and you should be able to assign probabilities to those outcomes in order to make a decision. Let me try to explain this particular expected utility theory in the context of vNM framework with the help of a simple example.

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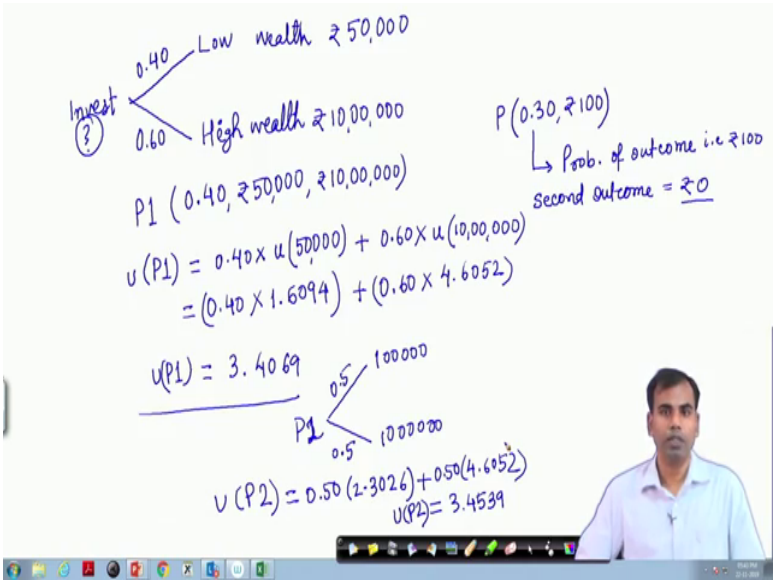

Suppose, you have to take a decision and that decision will take you two different states which means if you have to invest right now it could either take you to a low wealth state in future or a high wealth state in future which means if you invest right now you can either get let us say 50,000 in worse case or 10,00,000 in best case.

And, if you are smart enough and you believe in probabilities you can assign certain probabilities to these two outcomes. And, if you are very optimistic about the future you would probably assign higher probability to high wealth state and lower probability to low wealth state. So, let us assume that there is a 60 percent chance of high wealth state being there and remaining 40 percent chance to low wealth state being in future.

If I want to express this particular situation in a prospect way, let us say I have a prospect 1 indicated as P 1 which is basically a 40 percent probability of getting 50,000 in future out of

this decision and remaining probability is getting 10,00,000 out of this decision. So, the first term basically is the probability of the first outcome and second outcome is given and remaining probability would be give attached to the second outcome.

For example, if I state something like P that is prospect of 30 percent getting 100 rupees and I close the bracket; it means that this is the probability of first outcome that is 100 rupees. And, the second outcome here is essentially 0 which means there is a 30 percent chance of getting 100 rupees and remaining 70 percent chance of getting 0.

Similarly so, coming back to the P 1 that is prospect 1, if you want to use the utility theory framework to explain what should be the utility derived from this choice, we can refer to the same approach where utility of prospect 1 will be 40 percent into utility of 50,000 plus 60 percent probability of utility of 10,00,000.

Now, if we refer to the table which we had just calculated with the help of logarithmic function we can express this in terms of the probability assigned to each of the outcomes which is 50,000 here. So, going by the previous assumption which we had seen in the table of logarithmic utility function we can see that the utility of 50,000 can be written as 1.6094 whereas, the utility of 10,00,000 can be written as 4.6052.

So, effectively the utility of prospect 1 that is 40 percent chance of getting 50,000 and 60 percent chance of getting 10,00,000. The utility of this particular state of outcomes can be 3.4069. Now, this is what the utility theory suggests. Simply, if you have an alternative state of outcome let us say you have a choice where you can invest the same amount of money and there are two outcomes given as let us say low wealth situation as 100,000 and high wealth situation as 10,00,000.

And, this time the probability is equal between these two outcomes. So, if this is your prospect 2, where you if you invest the same amount of money you can get either 1,00,000 rupee or 10,00,000 rupee. And, the possibility of these two situations is given by the equal probabilities of 50-50. If you calculate the utility in the same approach which we have just

discussed, the utility of prospect 2 can be calculated as 50 percent of first outcome which is the utility as 2.3026.

I am taking the numbers from the table that we had seen earlier and 50 percent probability of the second outcome which is 10,00,000 rupees and that utility is 4.6052. And, the total utility is therefore, can be given as utility of prospect 2 is 3.4539. So, imagine a situation where you have these two prospects which means these two decision choices prospect 1 which is 40 percent chance of getting 50,000 and 60 percent chance of getting 10,00,000.

And, prospect 2 where you have 50 percent chance of getting 1,00,000 and 50 percent chance of getting 10,00,000. Going by the utility theory framework we calculated the utility as utility of prospect 1 to be 3.4069 and utility of prospect 2 as 3.4539. If you follow logarithmic utility function and you have constant preference, you should always go for the second prospect because it has higher utility.

This is how we can calculate utilities associated with the decision choices that we have particularly, the decisions where we have some economic values attached. And, we can rank these situations on the basis of their utility and make our decisions to find the highest utility choices. And, accordingly we will find the alternative which yields the highest utility. Now, there are certain constraint.

This particular approach of utility theory is based on the assumption that individuals have preference for higher utility, it does not talk about the risk. We all know that given a choice most of us do not want to take any risk which means we do not want to go for risky situations. At the same time, if for some reason we are willing to assume some risk we would like to be compensated for it which means if we take higher risk we should also be paid of higher return.

Given that most of the economic agents are risk averse and for any additional risk that they take assume they would like to be compensated for it. We understand that in general we would like to prefer the prospect or the expectation of the prospect itself rather than the expectation of the chances of different prospects which means if we have two scenarios,

where we would have a certain gain of an amount x and another scenario where we have two choices or two probabilities 50 percent probability of getting 1,00,000 and 50 percent probability of getting 10,00,000 as shown in the previous example.

As risk averse individual we would want to go for the first choice which gives us the sure short gain of 1,00,000 instead of going for a chance which has two probabilities of 50-50 over two different outcomes. This particular nature of individual economic agents is known as risk aversion. A typical risk averse investor will have a utility function as a concave curve whereas, if you want to take a higher risk and would like to be compensated for it, the utility function will be shown as a convex curve.

And, if you are indifferent between risk, if you are indifferent between the choices with higher risk and the lower risk then you are basically a risk neutral individual. So, the curve of a risk neutral individual would be shown as a straight line. Just to showcase how does the utility functions of three different type of individuals would look like let me try to explain here.

If you are a risk seeker basically you want to be compensated for the risk that you are assuming then your utility function would be a curve something like this where you have wealth and then you have utility. So, your curve would look something like this. In case you are an individual who does not want to assume risk which means you are risk averse, the utility function that you will carry should look like a curve something like this where your utility function would be increasing in the beginning and then stabilizing.

And, if you are a risk neutral individual which means you do not differentiate between high risk choices and low risk prices, then utility curve should look like this for you. So, this basically is risk seeker, this is risk averse and this is risk neutral.

So, far we have understood what expected utility theory improvises over and above the basic assumption of utility theory given by the new classical economics. We have also understood what should be the implication of different risk attitudes of individual economic agents. We

understand here that based on this vNM framework of expected utility individual financial decision making processes can be improved and that we will learn in next session.

Thank you.