Environmental and Resource Economics
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Economic Valuation of Environmental Goods and Services – Different Valuation Approaches Part – 9

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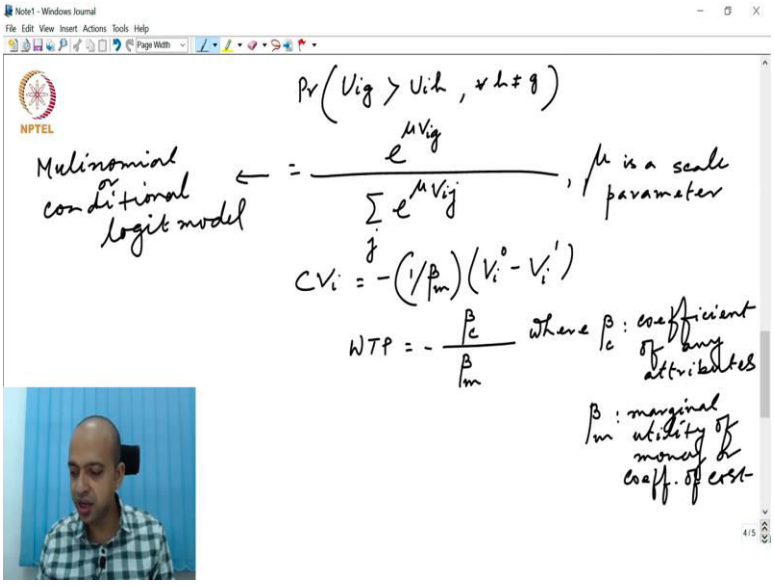

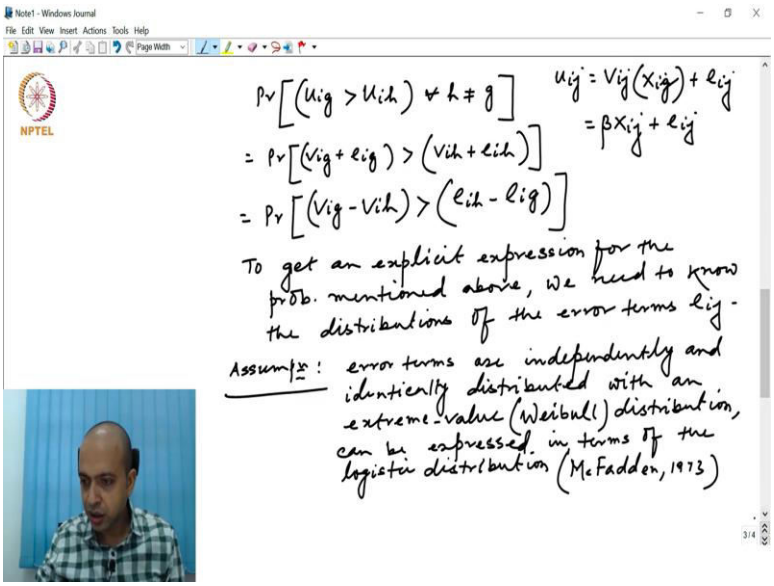

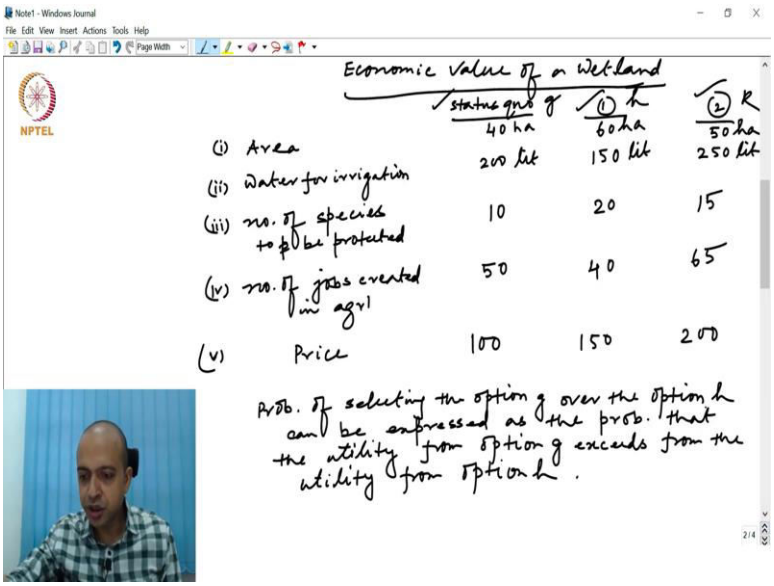

So, that means what we can say that probability that uig is actually greater than uih for all h not equals to g is basically equals to e to the power mu into vig divided by summation e to the power mu into vij where mu is a scale parameter. Now this expression this particular expression in econometric literature is known as multinomial or conditional logic model, multinomial or conditional logic model.

Through this framework the compensating variation of, compensating demand of the ith individual for this product which can be expressed as cvi equals to minus 1 by beta m, beta m into value of the individual from the status quo, from value of the individual at scenario 1.

So, when the individual moves from scenario 1 to scenario 2, the value the individual derives changes from vi0 from vi1 and more specifically the willingness to pay which we are interested in is basically minus of beta c divided by beta m where beta c is the coefficient of cost, sorry, coefficient of any attributes and beta m is marginal utility of money or coefficient of cost.

Now, how this beta c and beta m is coming? See here if you go back and see the utility uij is defined as beta xij. And in our scenario, these are the different scenarios that means these are the different attributes and this is the price that means money. So, when we estimate the model when we estimate the model since utility is linearly expressed as beta xij where beta is x is different attributes. So, that means what we will get beta 1 xi1, beta 1 xi2 like that so

that means we will get, we will get coefficients for each and every attributes, coefficient of each and every attributes along with the money.

That is why, that is why here what we are saying that beta c is the coefficient of any attribute and beta m is the coefficient of cost so that means herein the scenario we have several attributes, several attributes along with the price or money this we can say that money.

So, using this conditional or multinomial logit model we will be able to estimate coefficients of each of these attributes and this along with this money. This is basically denoted as beta m so this is beta m and all these area, water for irrigation, number of species they are all known as beta c coefficient of any attributes.

The way we specify the utility is a linear function of all these attributes plus the random error term. So, when we apply this econometric model either multinomial or conditional we will get estimates of beta c, estimates of beta m and when you get estimates you will get beta c hat and beta m hat if you take a ratio of this and negative of this is actually willingness to pay. Why this is negative? Because this coefficient of this will turn out to be, this will turn out to be negative because more is the price, more is the price less is, less the respondents is probably to take that option.

So, selecting probability of selecting a particular option is inversely proportional to the price tag attached with this, price tag attached with this that is why negative. So, ultimately it will turn out to be positive. Now how to estimate this I will separately discuss about this multinomial and conditional logit model so that you can understand the econometric estimation I will also share with you a particular data set. Now at this point of time you need to understand only one thing when it is called multinomial when it is called conditional.

Now, we go back once again to the scenarios, here if we believe that whether the respondents will select status quo scenario 1 or scenario 2, that basically depends on only the characteristics. That means only the choices then this model is called conditional logit model so whether I will select this that depend only on the level of the attributes, it has nothing to do with the respondent socioeconomic and demographic characteristics.

So, in my econometric model I am not at all considering what is the income of the individual, what is the age of the individual, what is the education level of the individual, so on and so forth. So, no individual specific characteristics are added here only choice specific characteristics. So, if we take scenario 1 that means jth option then I will get this, this, this, whether it is 40, 200, 10, 50 or 100. That will determine whether I will go for scenario or status quo, scenario of 1 or not.

When the individual is thinking about the option 1 that means option h, individual will select based on what is the area, what is the, what are the supply of water, what is the number of species so on and so forth, similarly for scenario 2. So, that means this is a choice specific data, purely choice specific data.

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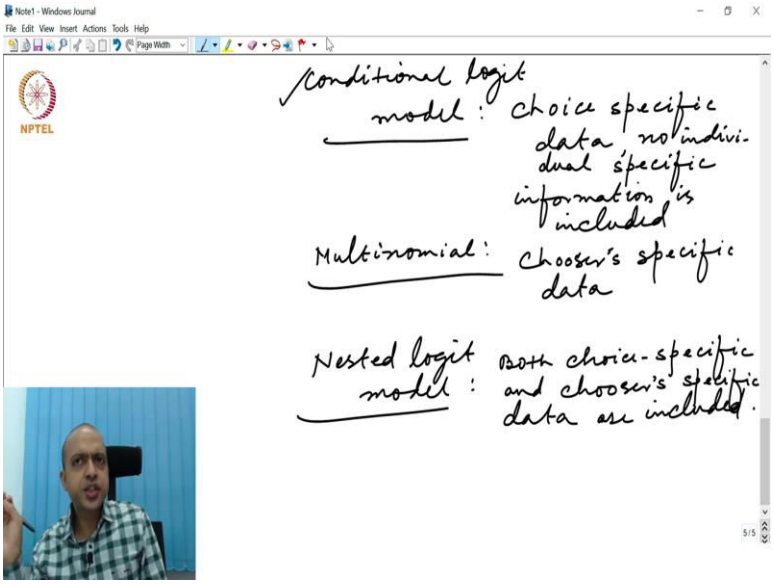

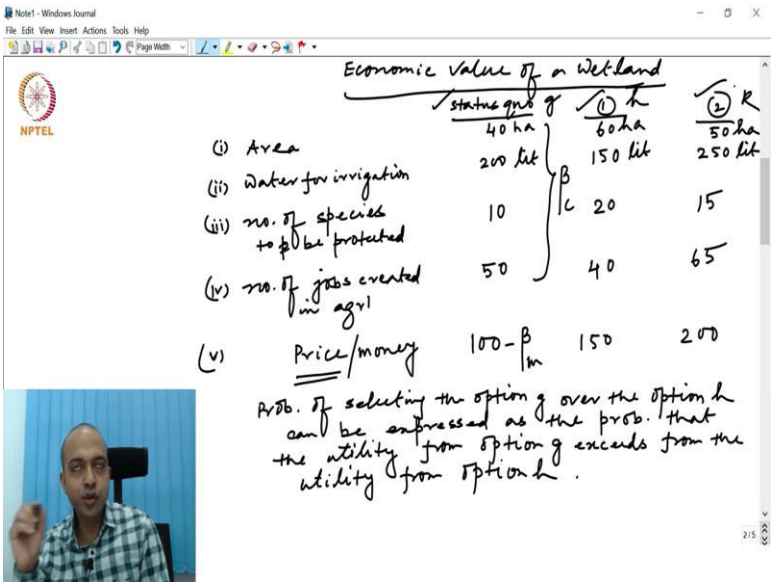

So, I will say that conditional, conditional logit model means choice specific data, no individual specific information is included. If it is multinomial this is called chooser specific data that means whether the individual will select scenario 1 or 2 or 3. Whether the individual will select status quo or scenario 1 or scenario 2 that purely depends on the individual or the chooser's specific information like age of the respondent, income of the respondent, education of the respondent, gender of the respondent, so on and so forth.

So, this is called multinomial logit model but it is more appropriate actually, it is more appropriate to include both the choice specific data and chooser specific data in the model for econometric estimation. Because it is very simple also to understand whether the individual will select for status quo or scenario 1 or 2 that depends on the attributes as well as individual specific feature, individual specific information. So, that is called a nested logit model, so both choice specific and chooser's specific data are included.

But many a times researchers they do estimate this type of model using only conditional logit model that means they feel that whether the individual will select model 1, model, scenario 1, 2 or 3 purely depending on the choice specific features. Anyway I will give you a separate lecture on these three econometric models so that you can understand the estimation purpose also. So, this is all about choice experiment, now the question is, we started our discussion saying that choice experiment was initially designed to overcome the major problems of contingent valuation method.

The question is now then how the choice experiment is able to overcome the problem. See if you recall, we discussed in the context of contingent valuation method that contingent valuation methods main problem, problems are two, one is the hypothetical bias and other one is the different type of biases that means the strategic bias, strategic bias. So, the hypothetical bias is purely related to the creation of hypothetical market in the context of contingent valuation method, we are describing the, we are trying to create a market in which we may or may not be able to create it efficiently.

Now, I would not say that in choice experiment we can fully overcome the hypothetical bias because here also, here also we are creating the hypothetical bias, sorry here also we are getting hypothetical market. But this market is way better than the market what way described in the contingent evaluation method.

Why? For two reasons, firstly, here we have a status quo situation that means the respondents they know already there is some existing product and the other scenarios are based on, are thought of an improvement over the status quo. Also, we have specifically mentioned the level for each and every attribute.

So, creation of market in choice experiment is much more convincing than the creation of market in contingent valuation method. That way we can say the severity of hypothetical bias is much lower, much less in choice experiment as compared to the contingent valuation method.

Secondly, what was the second problem of contingent valuation method? Second problem was strategic bias that means the warm glow effect or free dieting. Since in contingent valuation method we are giving the respondent the freedom to quote their willingness to pay they can overbid or underbid. They can over bid to have a warm glow effect so that means they can impress the interviewer by quoting a high value. Similarly, they can underbid also fearing from actual payment and then they try to free ride.

So, these type of problems arise in the context of contingent valuation method because we are asking the respondents to quote their price. But here in the context of choice experiment we are not asking the respondents to quote their price. Rather price is always attached and they have to select only the scenario, scenario 1, 2 or 3. So, that means we are not giving the

respondents the freedom to overbid or underbid because the bid or the price is already attached with the scenarios.

That way we can overcome the strategic bias that means the warm glow effect and the free riding problem to a large extent in the context of choice experiment. So, that is how, that is how we say that economists they say that choice experiment is much better than the contingent valuation method. But in the world, nothing comes as a purely beneficial, so that means when we try to overcome the problems of contingent valuation method by designing a choice experiment, choice experiment model also comes with a major limitation, what is that?

Contingent valuation method the way we created the market it was very easy for the respondent to understand but here I am describing the product in terms of different attributes. And then it is very challenging for the researcher how many attributes are you going to use to describe the product. There is no guide, no one is going to help you, you have to carefully think about optimal number of attributes. Similarly, no one is going to tell you what would be the level for each and every attributes so that means optimality should be there in terms of number of attributes in terms of the level what you attach with each and every attribute.

If you provide too many attributes then what will happen? The respondents will get confused because the respondents while selecting option 1, 2, 3, what they are doing? They are making a tradeoff, tradeoff between money versus one additional quantity for one attribute.

Now do you think it is really very easy for us to make such trade off? For example, I can quote one example from our real-life situation, many a time we book hotel rooms for making a trip and using several of the websites like Make My Trip, Yatra, Go Ibbo, Booking.com, so on and so forth.

There if you click, what you will see a room, a hotel room is basically defined as several attributes. That means whether it is a deluxe room, whether it has attached balcony, whether it has, whether the price is inclusive of breakfast, whether it has a garden view, whether it is

a lake view, whether it has no view at all and then each of this scenario is attached with a price.

Now, when there are too many options it is really hard for us to make such tradeoffs. So, when you have given too many options then individuals will go for a heuristics. So, that means as an individual we have limited capacity to process information. That means our rationality is bounded, when rationality is bounded individual stake help of heuristics.

And when the individuals are selecting based on some kind of rule of thumb or heuristics obviously that is not a reliable measure of willingness to be. So, this is the challenge of choice experiment that means we need to specifically use optimum number of attributes, if you use two less attributes then the good is not properly defined. For example, if I say the wetland is only defined as area and water of irrigation how much water you can supply then that is not a proper characterization of an wetland.

Because the respondents will think that wetland it has many attributes, why there are the, why the researcher is not asking about the species to be protected, how many jobs will be created, what is the price, so on and so forth. So, if two less of attributes are used then the product is not fully defined, if too many attributes are used then the respondents will get confused, they cannot make a proper tradeoff between money and any of the attributes. So, that means this is the challenge in choice experiment that in the process of overcoming the problems of contingent valuation method, yes, we understand that contingent valuation method suffers from hypothetical bias and strategic bias.

But it is very simple for the respondents particularly if you go for that closed ended referendum, we are simply asking we are defining a scenario and we are asking the respondent would you like to pay 50, 100 or 150 which is very simple for the respondent to understand and they will say yes or no. But it suffers from hypothetical bias we may not be able to create the market efficiently, it suffers from strategic bias in the form of warm glow or free dieting. That means the respondents may over bid to impress the interviewer, they may under bid to enjoy the free ride.

Now, these two problems, these problems are solved to a larger extent because as you can see very well the creation of market is much more convincing because it is more specific the

product is defined in terms of several attributes. And then for each and every attribute we have several values and based on that we have created several scenarios. So, hypothetical bias I would not say totally reduce but reduce to a larger extent. Then secondly, the problem of that strategic bias is reduced to a large extent.

Because we are not giving the freedom to the respondent to quote their price that means to go for overbid or underbid because price is already attached here. So, that is how choice experiment can actually solve the problems of this and econometric estimation basically requires whether you include only the choice specific data that means what is the area, what is the water for irrigation, what is the number of species so on and so forth or you include the individual specific data also in the model.

And I will give you a special lecture on the econometrics of the choice experiment particularly the conditional and multinomial logit model so that you can understand the estimation also, of course that example what I will be discussing are not exactly in the context of wetland, valuation of wetland that is a different context, but it does not matter if we understand how to apply and estimate a model using a data then you can apply the technique in elsewhere that is absolute, there is absolutely no problem in that.

So, with this we are closing our discussion on stated preference approach. Firstly, we discussed about contingent valuation method, its problems and then we have also discussed with the difference between explain the reasons for huge difference between willingness to pay and accept. And then today we discussed about the choice experiment how it has overcome the problem with an example and we have also discussed the econometrics of this.

In our next lecture we will move on from stated preference approach to the reveal preference approach. That means instead of creating the market hypothetically we will try to estimate the individual's preferences for environment through a related market. And if you recall there are two such methods under reveal preference approach hedonic pricing and travel cost method. So, we will discuss those two methods in our next session, thank you.