# Fixed and random effects models

## Transcript video 3

Full resource: https://www.ncrm.ac.uk/resources/online/all/?id=20842

Hello, folks. In this final presentation here I’m just going to talk through a .do file that has been created to compare a set of models and to enable us to compare fixed and random effects models. So, you can see here we’ve got a fully annotated syntax file, and this syntax file produces a set of models that relate to the document that I produced for this NCRM resource on fixed and random effects models. So, this file produces all of the models and tables that are available in that written resource that you can read alongside the presentations.

So, we can see at the top of the file here, we have this instruction stop. Now, that isn’t a command, this is just a failsafe in case I accidentally hit the wrong command and tell Stata to run the whole file, well this will prevent that. So, that’s not a command and it won’t run. So, the first thing I’m going to do here is clear the memory in Stata. Then I’m going to open up the data that we use for the analysis, so this just opens straight from the web, so I’ll run that file command and the data should be open now so we can take a look and see if there’s any data there and we can see that there’s a variable bipace matrix that’s been populated with the set of data that we will take a look at. So, that’s good news. Now, this example is an expansion of an example that was presented in Rabe-Hesketh and Skrondal 2008, and in that book and in their example they were looking at some interesting age, pay rate and cohort effects. So, these first commands just reproduce the variables that were included in their analysis, so I will run those commands to produce those variables. Now, although they were interested in age, pay rate and cohort effects, we are not really interested in this resource, in disentangling age, pay and cohort effects; we’re more interested in comparing fixed and random effects models. So, we’re not really particularly interested in the results for those variables and how they compare between fixed and random effects models.

So, this next line of command, we’ll just keep the variables that we’re going to analyse, so just run that to keep those variables and get rid of all of the rest of the variables in the data. So, we can take a look at the data that we have for analysis, and if I run this codebook command, this produces table three from the document resource, and this is a table that I popped through in the previous presentation. I’m going to also use some of the XT suite of commands to take a look at the panel data structure of these data. So, there are 545 individual cases in this data and they are measured at 4360 different occasions, and we can see from this that each of the individuals have been measured on eight occasions, so there was a balanced panel. Every individual has been measured at each occasion when they were observed, so some of them, in some data, might be missing. Not everyone might be measured at every single occasion, but in this case all the cases are measured on eight different occasions.

So, next we go on to estimate a set of models, and these models appear in table four of the written document. So, it begins, we begin here by estimating a standard regression model with our variables of interest. The next model is a regression model with clustered standard errors. And the next model is a fixed effects model, followed by a random effects model, and their Hausman test. And we saw this example in the previous presentation and I talked through it at that point. We also estimate here the Mundlak model that we saw in the presentation, and there are a couple of ways where we can specify the Mundlak, so we can ask for the full Mundlak model or a restricted Mundlak output. There’s often a number of ways that we can visualise and take a look at outputs on Stata, so here's just an example of that with this Mundlak model.

And then this command will usefully put all the models side by side so we can take a look at things so we can compare effect sizes and standard errors between, for example, the fixed effect and Mundlak model and between the standard OLS models with the fixed and random effects models. And again, as we saw in the previous presentation, a number of the time-invariant covariates have been omitted by the fixed effect model so it cannot estimate these, and we can see the fixed and random effect model gives different effect sizes, but the Mundlak model appears to give effect sizes that are consistent with the fixed effect models we’ve got. We’ve got these comparisons here that we can make if we were invested in doing these analyses. And we can also here compare the results to the fixed and random effects models with the OLS models. And you can read more about this in the document that was produced for this resource.

In addition to these models and also in the document, we have an example of Allison’s 2009 hybrid model, and again there’s a couple of ways we can use Stata to specify this model and produce the output and estimate the model, so we can use a Mundlak command in asking for a hybrid, so if I run that it will give us a hybrid model. And we can also use the hybrid command if we install the hybrid package, so if you have not got the hybrid package installed in your version of Stata then you might want to run the code here. It says C install XT hybrid, and that will enable you to run the XT hybrid model. I’ll go ahead and do that. This one takes a little bit longer to run sometimes, and we’ll wait for that, but we can see it should be giving us the same results as the Mundlak command to run the hybrid model, so we can see the effect size is negative 0.1414 for the covariate black, and we can see for the Mundlak version the estimate and effect size is exactly the same.

So, this produces a set of random effects and fixed effect models that we can compare with one another, and we can also compare these to more standard regression model approaches. In the final part of the syntax file here, this code produces the same models again except it also reads all of the models out to a Word document. If you want to take a look at them in a Word document you can do so. And it uses the asdoc command to do this, so if you have not installed asdoc on your Stata system, you might want to run the command SSC install asdoc to do so, and then you can run this code to produce this set of model results in a Word document, which is a nice place to look at it, so it makes it simpler to take a look at the results.

So, the first bit of code here makes a directory. Now, you might want to set this up differently so these commands all read out to a specific place on your computer system. But if you run this command here, it will make a directory in your C drive called FE RE models, so it will put that onto your computer system. The next commands will all read out the models that we’ve just produced, and it will read them out to your C drive into that FE RE models directory and it will produce an output in there in a Word document with all of the model results.

So, it will estimate all of the models one after the other. And then I’ll quit on the command, and we can see we’ve produced a nice set of model results. And this, again, is a table that’s in the document that you can read that is included in this resource.

So, that is everything. I hope that you’ve found this resource useful, and thank you for listening.

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