TIØ4317 – Exercise 7

Deadline: Monday March 24th, 2025, 23:59. Grading: Passed/Failed.

Question 1.

A researcher is trying to explain the determinants of wage and she has estimated the two models below. The total number of observations is 1,031, the total number of individuals is 140 and the time span of the data includes 9 years.

Look at the estimation output and answer all the questions below.

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R-squared:                              Obs per group:
    Within  = 0.9528                                  min =          7
    Between = 0.9644                                  avg =        7.4
    Overall = 0.9594                                  max =          9

                                        Wald chi2(3)     =    1509.31
corr(u_i, X) = 0 (assumed)              Prob > chi2      =     0.0000

                            (Std. err. adjusted for 140 clusters in id)
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		Robust				
wage	Coefficient	std. err.	z	P>|z|	[95% conf. interval]	
n	.0865404	.2281361	0.38	0.704	-.3605981	.533679
w	23.52673	.7524255	31.27	0.000	22.052	25.00145
k	-.0601108	.1904882	-0.32	0.752	-.4334607	.3132391
_cons	-50.17282	2.459789	-20.40	0.000	-54.99392	-45.35172
sigma_u	.94067359					
sigma_e	.48249842					
rho	.7917056	(fraction of variance due to u_i)				

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R-squared:                                      Obs per group:
     Within  = 0.9531                                      min =          7
     Between = 0.9622                                      avg =        7.4
     Overall = 0.9574                                      max =          9

                                                F(3, 888)        =    6008.90
corr(u_i, Xb) = -0.6300                         Prob > F         =     0.0000
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wage	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
n	.3303436	.1178772	2.80	0.005	.0989932	.561694
w	24.40926	.1889365	129.19	0.000	24.03845	24.78008
k	-.183804	.1034857	-1.78	0.076	-.3869092	.0193011
_cons	-53.22923	.6443444	-82.61	0.000	-54.49384	-51.96461
sigma_u	1.3191123					
sigma_e	.48249842					
rho	.88199645	(fraction of variance due to u_i)				

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F test that all u_i=0: F(139, 888) = 32.74                Prob > F = 0.0000
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1- Discuss whether the models are statistically significant and explain the difference between the reported measures of the R squared in the regression outputs.

2- Write down the equations for both models being estimated, their assumptions and highlight the main difference between the two approaches considered. Make sure to write down the formula for the estimators being used.

3- If you were to choose a model, which one would you prefer? Make sure that you justify your statement.

4- Explain what the sigma_u and the sigma_e and the rho reported in the regression output are. Explain what the F test reported at the end of the second regression output is telling us and what we can conclude.

5- Comment on the standard errors being used by the researcher and suggest any correction you deem appropriate, making sure to explain your reasoning.

6- How can we test whether a Fixed Effect or a Random Effect model is appropriate? Give both the test statistics and the intuition.