Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

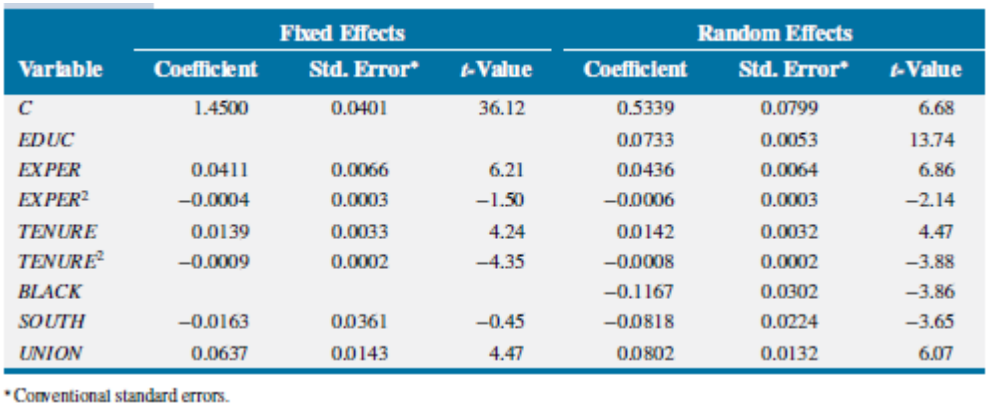
UNIVERSITY OF PETROLEUM & ENERGY STUDIES
DEHRADUN
End-Semester Examination 2022

Program/course	**: MA Economics**	**Semester**	**: IV**
Subject	**: Panel Data Econometrics**	**Max. Marks**	**: 100**
Code	**: ECON8016P**	**Duration**	**: 3 Hrs**
No. of page/s	**: 4**		

SECTION A

Q1	Answer all the questions. Each Question will carry 2 Marks	10Qx2 M=20 Marks	CO
i.	What is the primary advantage of using panel data rather than a large cross- section data set collected over time? a. It allows you to control for individual heterogeneity. b. It allows the effects of legislation to be estimated. c. It gives you more degrees of freedom. d. It allows coefficients to vary over time.	[2]	CO1
ii.	If N is the number of individuals observed in each of T time periods, what is generally true of a "short, wide" panel? a. $T > N$ b. $N > T$ c. $N = T$ d. $N^{1/2} < T^2$	[2]	CO1
iii.	If N is the number of individuals observed in each of T time periods, what is generally true of a "long, narrow" panel? a. $T > N$ b. $N > T$ c. $N = T$ d. $N^{1/2} < T^2$	[2]	CO1
iv.	What is the difference between balanced and unbalanced panels? a. Unbalanced panels have some observations missing, balanced do not. b. Balanced panels are demographically representative of the population being studied, unbalanced are not.	[2]	CO1

	c. Balanced panels have an equal number of observations above and below the mean of the dependent variable, unbalanced panels are skewed. d. A balanced panel has T = N, an unbalanced panel has N>T or N<T.		
v.	Unobserved, individual specific, time-invariant random errors are called _____. a) idiosyncratic errors b) random effects c) fixed effects d) unobserved heterogeneity	[2]	CO1
vi.	When a regression error has two components, one for the individual and one for the regression, it is called a (an) _____ model. a. error components b. pooled c. fixed effects d. random effects		CO1
vii.	Suppose a simple panel data regression model: $y_{it} = \beta_1 + \beta_2 x_{2it} + \alpha_1 w_{1i} + (u_i + e_{it})$, where $i = 1, \ldots, N$ and $t = 1, 2$. If the average is taken between the two time periods, the OLS estimator of β_2 is called the _____ estimator. a. difference b. within c. fixed effect d. random effect	[2]	CO1
viii.	The terminology _____ estimator is used because we are treating individual differences as parameters that can be estimated. a. fixed effect b. random effect c. difference d. within	[2]	CO1
ix.	The appropriate test to use to test for unobserved heterogeneity in a fixed effect model is a _____. a. t- b. F- c. χ^2 d. Chow	[2]	CO1
x.	Which of these assumptions indicates homoskedasticity? a. $E(e_{it}) = 0$ b. $var(e_{it}) = E(e^2_{it}) = \sigma^2$ c. $cov(e_{it}, e_{js}) = E(e_{it}, e_{js}) = 0$ for $i \neq j$ or $t \neq s$ d. $cov(e_{it}, x_{2it}) = 0$	[2]	CO1

	Section B Attempt all the questions. Each question carries equal marks.	4Qx5 M= 20 Marks	CO
Q2	How do you test for endogenous regressors, or correlation between the error term and any regressor in a random effects model?	[5]	CO2
Q3	When should the Hausman-Taylor estimator be used?	[5]	CO2
Q4	What do you mean by unbalanced panel? Examine with example.	[5]	CO2
Q5	Compare panel data models with OLS model.	[5]	CO2
	Section C Attempt all the questions. Each question carries equal marks.	3Qx10 M=30 Marks	
Q7	Interpret the result from the following panel data models. Give the model specification of the following results. 	[10]	CO3
Q8.	Interpret the following results.	[10]	CO3

Variable	Fixed Effects			Random Effects		
	Coefficient	Std. Error*	*t*-Value	Coefficient	Std. Error*	*t*-Value
C	1.4500	0.0401	36.12	0.5339	0.0799	6.68
EDUC				0.0733	0.0053	13.74
EXPER	0.0411	0.0066	6.21	0.0436	0.0064	6.86
$EXPER^2$	−0.0004	0.0003	−1.50	−0.0006	0.0003	−2.14
TENURE	0.0139	0.0033	4.24	0.0142	0.0032	4.47
$TENURE^2$	−0.0009	0.0002	−4.35	−0.0008	0.0002	−3.88
BLACK				−0.1167	0.0302	−3.86
SOUTH	−0.0163	0.0361	−0.45	−0.0818	0.0224	−3.65
UNION	0.0637	0.0143	4.47	0.0802	0.0132	6.07

*Conventional standard errors.

WwIsIsi

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Between regression (regression on group means)  Number of obs     =         53
Group variable: State                           Number of groups  =          9

R-squared:                                      Obs per group:
     Within  = 0.0798                                         min =          5
     Between = 0.7394                                         avg =        5.9
     Overall = 0.0035                                         max =          6

                                                F(5,3)            =       1.70
sd(u_i + avg(e_i.)) = .8215822                  Prob > F          =     0.3508
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lagfdi	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
lagsdp	-.1994666	.1680491	-1.19	0.321	-.7342737	.3353405
lagEC	.0223336	.0129449	1.73	0.183	-.0188629	.0635301
lagITC	.0427817	.2994203	0.14	0.895	-.9101073	.9956706
lagRPO	-1.096438	.7791355	-1.41	0.254	-3.575995	1.383119
lagFiT	-.8592733	.5719459	-1.50	0.230	-2.679461	.9609139
_cons	15.71445	10.41782	1.51	0.229	-17.4397	48.86859

Q9	Explain and illustrate the panel regression model when all coefficients vary across individuals	[10]	CO3
	Section D Answer all questions. Each Question carries 15 Marks.	2Qx15 M= 30 Marks	CO
Q12	What do you mean by fixed effect model? Examine various steps to estimate fixed effect model.	[15]	CO4

Q13.		[15]	CO4

	(1) OLS 1987	(2) OLS 1988	(3) FE	(4) FE Robust	(5) RE
C	0.9348	0.8993	1.5468	1.5468	1.1497
	(0.2010)	(0.2407)	(0.2522)	(0.2688)	(0.1597)
EXPER	0.1270	0.1265	0.0575	0.0575	0.0986
	(0.0295)	(0.0323)	(0.0330)	(0.0328)	(0.0220)
$EXPER^2$	–0.0033	–0.0031	–0.0012	–0.0012	–0.0023
	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0007)
SOUTH	–0.2128	–0.2384	–0.3261	–0.3261	–0.2326
	(0.0338)	(0.0344)	(0.1258)	(0.2495)	(0.0317)
UNION	0.1445	0.1102	0.0822	0.0822	0.1027
	(0.0382)	(0.0387)	(0.0312)	(0.0367)	(0.0245)
N	716	716	1432	1432	1432

(standard errors in parentheses)

a. The OLS estimates of the ln(*WAGE*) model for each of the years 1987 and 1988 are reported in columns (1) and (2). How do the results compare? For these individual year estimations, what are you assuming about the regression parameter values across individuals (heterogeneity)?

b. The ln(*WAGE*) equation specified as a panel data regression model is

$$\ln(WAGE_{it}) = \beta_1 + \beta_2 EXPER_{it} + \beta_3 EXPER_{it}^2 + \beta_4 SOUTH_{it} + \beta_5 UNION_{it} + (u_i + e_{it}) \quad \text{(XR15.6)}$$

Explain any differences in assumptions between this model and the models in part (a).

c. Column (3) contains the estimated fixed effects model specified in part (b). Compare these estimates with the OLS estimates. Which coefficients, apart from the intercepts, show the most difference?

d. The *F*-statistic for the null hypothesis that there are no individual differences, equation (15.20), is 11.68. What are the degrees of freedom of the *F*-distribution if the null hypothesis (15.19) is true? What is the 1% level of significance critical value for the test? What do you conclude about the null hypothesis.

e. Column (4) contains the fixed effects estimates with cluster-robust standard errors. In the context of this sample, explain the different assumptions you are making when you estimate with and without cluster-robust standard errors. Compare the standard errors with those in column (3). Which ones are substantially different? Are the robust ones larger or smaller?

f. Column (5) contains the random effects estimates. Which coefficients, apart from the intercepts, show the most difference from the fixed effects estimates? Use the Hausman test statistic (15.36) to test whether there are significant differences between the random effects estimates and the fixed effects estimates in column (3) (Why that one?). Based on the test results, is random effects estimation in this model appropriate?