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PGDM- FS IV; Trim 2018-20
Econometrics
(End- Trimester Examination)

Max marks 50 Duration: 3 Hrs Date : 17/09/2019

Note: All questions carry equal marks. Restrict each of your answers to around 40 lines.

Answer **any five** questions (5*10)

Q1.To study the relationship between investment rate (investment expenditure as a ratio of GDP) and Saving rate (savings as a ratio of GDP), the following linear and log-linear models were estimated. Answer the following questions based on the below mentioned regression results:

Dependent Variable: INVRATE
Method: Least Squares
Sample: 1 21
Included observations: 21

Variable	Coefficient		Std. Error	t-Statistic	Prob.
SAVRATE	0.846756	0.069280	12.22221	0.0000	
C	0.043519	0.017630	2.468526	0.0232	

R-squared	0.887162	Mean dependent var	0.255571
Adjusted R-squared	0.881223	S.D. dependent var	0.041614
S.E. of regression	0.014342	Akaike info criterion	-5.560854
Sum squared resid	0.003908	Schwarz criterion	-5.461375
Log likelihood	60.38897	Hannan-Quinn criter.	-5.539264
F-statistic	149.3823	Durbin-Watson stat	1.901239
Prob(F-statistic)	0.000000		

a) How would you interpret the slope coefficient in liner and log-linear model? Is there any difference in the interpretation of the coefficients?
b) How would you interpret the intercepts in the two models? Is there any difference in your interpretation?
c) Would you compare the two r2 coefficients?
d) Given the above results which model would you prefer and why?

Q2. Based on the UK consumer expenditure and advertisement data for 29 product categories, the following three models, Linear, Lin-Log and reciprocal are estimated. Interpret the results. Exp01 refers to consumption expenditure on products, Adexp refers to advertisement expenditure and 1_ adexp is the reciprocal of advertisement expenditure.

Linear Model

Dependent Variable: EXP01
Method: Least Squares
Sample: 1 29
Included observations: 29

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ADEXP	0.044602	0.007099	6.282742	0.0000
C	1057.362	595.8780	1.774460	0.0873

R-squared	0.593819	Mean dependent var	2621.862
Adjusted R-squared	0.578775	S.D. dependent var	4491.814
S.E. of regression	2915.269	Akaike info criterion	18.85978
Sum squared resid	2.29E+08	Schwarz criterion	18.95408
Log likelihood	-271.4669	Hannan-Quinn criter.	18.88932
F-statistic	39.47285	Durbin-Watson stat	0.731119
Prob(F-statistic)	0.000001		

Lin-Log Model

Dependent Variable: EXP01
Method: Least Squares
Sample: 1 29
Included observations: 29

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LN_ADEXP	1626.643	462.6587	3.515859	0.0016
C	-12585.01	4382.063	-2.871938	0.0078

R-squared	0.314046	Mean dependent var	2621.862
Adjusted R-squared	0.288641	S.D. dependent var	4491.814
S.E. of regression	3788.491	Akaike info criterion	19.38380
Sum squared resid	3.88E+08	Schwarz criterion	19.47809
Log likelihood	-279.0650	Hannan-Quinn criter.	19.41333

F-statistic	12.36127	Durbin-Watson stat	1.780134
Prob(F-statistic)	0.001568		

Reciprocal Model

Dependent Variable: EXP01
Method: Least Squares
Sample: 1 29
Included observations: 29

Variable	Coefficient	Std. Error	t-Statistic	Prob.
_1_ADEXP	-1642108.	1436926.	-1.142793	0.2632
C	3077.256	920.3331	3.343633	0.0024

R-squared	0.046138	Mean dependent var	2621.862
Adjusted R-squared	0.010810	S.D. dependent var	4491.814
S.E. of regression	4467.471	Akaike info criterion	19.71350
Sum squared resid	5.39E+08	Schwarz criterion	19.80780
Log likelihood	-283.8458	Hannan-Quinn criter.	19.74304
F-statistic	1.305975	Durbin-Watson stat	1.790198
Prob(F-statistic)	0.263157		

Q3. Below mentioned are the estimated models of salary and spending with two dummy variables. Prepare a table of the results of the four models and draw inferences. Dummy variables refer to three regions.

a) Model 1

Dependent Variable: SALARY
Method: Least Squares
Sample: 1 51
Included observations: 51

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SPENDING	2.172919	0.335702	6.472763	0.0000
C	27989.04	3179.460	8.803079	0.0000

R-squared	0.460926	Mean dependent var	48068.51
Adjusted R-squared	0.449925	S.D. dependent var	6710.126
S.E. of regression	4976.703	Akaike info criterion	19.90135
Sum squared resid	1.21E+09	Schwarz criterion	19.97711
Log likelihood	-505.4844	Hannan-Quinn criter.	19.93030
F-statistic	41.89666	Durbin-Watson stat	1.753156
Prob(F-statistic)	0.000000		

b) Model2

Dependent Variable: SALARY
Method: Least Squares
Sample: 1 51
Included observations: 51

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SPENDING	2.268351	0.363825	6.234728	0.0000
D2	-1076.912	1534.601	-0.701754	0.4862
C	27550.61	3256.547	8.460066	0.0000

R-squared	0.466401	Mean dependent var	48068.51
Adjusted R-squared	0.444167	S.D. dependent var	6710.126
S.E. of regression	5002.679	Akaike info criterion	19.93036
Sum squared resid	1.20E+09	Schwarz criterion	20.04399
Log likelihood	-505.2241	Hannan-Quinn criter.	19.97378
F-statistic	20.97758	Durbin-Watson stat	1.753785
Prob(F-statistic)	0.000000		

c) Model 3

Dependent Variable: SALARY
Method: Least Squares
Sample: 1 51
Included observations: 51

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SPENDING	2.130174	0.339100	6.281855	0.0000
D3	-1411.093	1493.263	-0.944973	0.3494
C	28854.39	3312.052	8.711939	0.0000

R-squared	0.470772	Mean dependent var	48068.51
Adjusted R-squared	0.448721	S.D. dependent var	6710.126
S.E. of regression	4982.147	Akaike info criterion	19.92213
Sum squared resid	1.19E+09	Schwarz criterion	20.03577
Log likelihood	-505.0144	Hannan-Quinn criter.	19.96556
F-statistic	21.34906	Durbin-Watson stat	1.767126
Prob(F-statistic)	0.000000		

d) Model 4

Dependent Variable: SALARY
Method: Least Squares
Sample: 1 51
Included observations: 51

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SPENDING	2.340429	0.359225	6.515217	0.0000
D2	-2954.127	1862.576	-1.586044	0.1194
D3	-3112.195	1819.873	-1.710117	0.0938
C	28694.92	3262.521	8.795320	0.0000

R-squared	0.497658	Mean dependent var	48068.51
Adjusted R-squared	0.465594	S.D. dependent var	6710.126
S.E. of regression	4905.309	Akaike info criterion	19.90921
Sum squared resid	1.13E+09	Schwarz criterion	20.06072
Log likelihood	-503.6848	Hannan-Quinn criter.	19.96711
F-statistic	15.52060	Durbin-Watson stat	1.787288
Prob(F-statistic)	0.000000		

Q4. Interpret the concept of seasonality using dummy variables. Draw inferences from the estimated model of sales of refrigerators in four seasons.

Dependent Variable: FRIG
Method: Least Squares
Sample: 1 32
Included observations: 32

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D4	-62.12500	84.83926	-0.732267	0.4701
D3	347.6250	84.83926	4.097454	0.0003
D2	245.3750	84.83926	2.892234	0.0073
C	1222.125	59.99041	20.37200	0.0000

R-squared	0.531797	Mean dependent var	1354.844
Adjusted R-squared	0.481632	S.D. dependent var	235.6719
S.E. of regression	169.6785	Akaike info criterion	13.22216
Sum squared resid	806142.4	Schwarz criterion	13.40537
Log likelihood	-207.5545	Hannan-Quinn criter.	13.28289
F-statistic	10.60102	Durbin-Watson stat	0.392512
Prob(F-statistic)	0.000079		

Q5. Based on the available data on US president elections, the following model was estimated. Interpret the results.
Y year
V incumbent share of the two-party presidential vote
W indicator variable (1 for elections of 1920,1944, and 1948, and 0 otherwise
D Indicator variable (1 if a Democratic incumbent is running for election, -1 if a Republican incumbent is running for election, and 0 otherwise)
G growth rate of real per capita GDP in the first quarter of election year
I indicator variable (1 if there is a Democratic incumbent at the time of election, and -1 if there is Republican incumbent)\N= number of quarters in the first 15 quarters of administration in which the growth rate of per capita GDP is greater than 3.2%
P Absolute value of the growth rate of the GDP deflator in the first 15 quarters of the administration

Dependent Variable: V
Method: Least Squares
Sample: 1 23
Included observations: 23

Variable	Coefficient	Std. Error	t-Statistic	Prob.
I	-0.009832	0.013156	-0.747352	0.4657
D01	0.042640	0.016057	2.655569	0.0173
W	0.009592	0.040796	0.235129	0.8171
GI	0.009468	0.001698	5.575301	0.0000

P	-0.001181	0.003800	-0.310882	0.7599
N	-0.004205	0.003506	-1.199373	0.2478
C	0.509175	0.029691	17.14936	0.0000

R-squared	0.774591	Mean dependent var	0.492151
Adjusted R-squared	0.690062	S.D. dependent var	0.071750
S.E. of regression	0.039945	Akaike info criterion	-3.356843
Sum squared resid	0.025529	Schwarz criterion	-3.011258
Log likelihood	45.60370	Hannan-Quinn criter.	-3.269930
F-statistic	9.163664	Durbin-Watson stat	2.138282
Prob(F-statistic)	0.000192		

Q6. Below is the estimated distributed lag model of Investment in Fixed Plant and Equipment in Manufacturing and Manufacturing Sales, United States, 1970-1991. Interpret the results in terms of short and long-run elasticity.

YEAR = Year
Y = Plant Expenditure, Seasonally Adjusted, Billions of $
X2 = Manufacturing Sales, Seasonally Adjusted, Billions of $

a) Model 1

Dependent Variable: Y
Method: Least Squares
Sample: 1970 1991
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X2	0.838079	0.025472	32.90241	0.0000
C	-18.80199	4.097403	-4.588758	0.0002

R-squared	0.981861	Mean dependent var	105.9336
Adjusted R-squared	0.980954	S.D. dependent var	52.83141
S.E. of regression	7.291201	Akaike info criterion	6.897722
Sum squared resid	1063.232	Schwarz criterion	6.996907
Log likelihood	-73.87494	Hannan-Quinn criter.	6.921087
F-statistic	1082.569	Durbin-Watson stat	1.031687
Prob(F-statistic)	0.000000		

B) Model 2

Dependent Variable: Y
Method: Least Squares
Sample (adjusted): 1971 1991
Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-15.10403	4.729450	-3.193613	0.0050
X2	0.629273	0.097819	6.433031	0.0000
Y(-1)	0.271676	0.114858	2.365315	0.0294

R-squared	0.987125	Mean dependent var	109.2167
Adjusted R-squared	0.985695	S.D. dependent var	51.78550
S.E. of regression	6.193728	Akaike info criterion	6.616515
Sum squared resid	690.5208	Schwarz criterion	6.765733
Log likelihood	-66.47341	Hannan-Quinn criter.	6.648899
F-statistic	690.0561	Durbin-Watson stat	1.518595
Prob(F-statistic)	0.000000		

Q7. Estimated model relating to the determinants of hourly compensation is given below. Independent variables are productivity and unemployment rate. Interpret the results of below mentioned three models.

a) Model 1

Dependent Variable: COMPENS
Method: Least Squares
Sample: 1960 1999
Included observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PRODUC	0.690719	0.020783	33.23410	0.0000
UNRATE	0.668011	0.246925	2.705323	0.0103
C	26.78343	2.084825	12.84684	0.0000

R-squared	0.969406	Mean dependent var	86.77250

Adjusted R-squared	0.967752	S.D. dependent var	12.56528
S.E. of regression	2.256429	Akaike info criterion	4.537483
Sum squared resid	188.3845	Schwarz criterion	4.664149
Log likelihood	-87.74965	Hannan-Quinn criter.	4.583281
F-statistic	586.1934	Durbin-Watson stat	0.242704
Prob(F-statistic)	0.000000		

b) Model 2

Dependent Variable: COMPENS
Method: Least Squares
Sample (adjusted): 1961 1999
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PRODUC	-0.203733	0.314075	-0.648676	0.5207
PRODUC(-1)	0.894877	0.314752	2.843117	0.0073
C	32.36982	1.767933	18.30942	0.0000

R-squared	0.969011	Mean dependent var	87.45897
Adjusted R-squared	0.967289	S.D. dependent var	11.94551
S.E. of regression	2.160481	Akaike info criterion	4.452342
Sum squared resid	168.0364	Schwarz criterion	4.580309
Log likelihood	-83.82068	Hannan-Quinn criter.	4.498256
F-statistic	562.8470	Durbin-Watson stat	0.452254
Prob(F-statistic)	0.000000		

c) **Model 3**
Dependent Variable: COMPENS
Method: Least Squares
Sample (adjusted): 1961 1999
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UNRATE(-1)	2.377808	1.274555	1.865598	0.0700
C	73.07628	7.929055	9.216267	0.0000

R-squared	0.085979	Mean dependent var	87.45897
Adjusted R-squared	0.061275	S.D. dependent var	11.94551
S.E. of regression	11.57374	Akaike info criterion	7.785275
Sum squared resid	4956.202	Schwarz criterion	7.870585
Log likelihood	-149.8129	Hannan-Quinn criter.	7.815883
F-statistic	3.480455	Durbin-Watson stat	0.056694
Prob(F-statistic)	0.070042		

Q8. Based on the data on real private consumption expenditure (PC), real private disposable income (PDI), gross investments (GI), long-term interest rates (LTI), below mentioned two equations on Greek macroeconomic model were estimated. Interpret the results.

a) Model 1

Dependent Variable: LNPC
Method: Least Squares
Sample: 1960 1995
Included observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNPDI	0.855923	0.014819	57.75899	0.0000
LTI	0.004883	0.000916	5.332454	0.0000
C	1.551913	0.175579	8.838807	0.0000

R-squared	0.997495	Mean dependent var	12.46542
Adjusted R-squared	0.997344	S.D. dependent var	0.430762
S.E. of regression	0.022201	Akaike info criterion	-4.697689
Sum squared resid	0.016265	Schwarz criterion	-4.565729
Log likelihood	87.55840	Hannan-Quinn criter.	-4.651632
F-statistic	6571.625	Durbin-Watson stat	1.186245
Prob(F-statistic)	0.000000		

b) Model 2

Dependent Variable: LNPC
Method: Least Squares
Sample: 1960 1995
Included observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LTI	0.049285	0.004954	9.948413	0.0000
C	11.68062	0.087063	134.1628	0.0000

R-squared	0.744305	Mean dependent var	12.46542
Adjusted R-squared	0.736785	S.D. dependent var	0.430762
S.E. of regression	0.221000	Akaike info criterion	-0.127351
Sum squared resid	1.660601	Schwarz criterion	-0.039378
Log likelihood	4.292317	Hannan-Quinn criter.	-0.096646
F-statistic	98.97092	Durbin-Watson stat	0.158584
Prob(F-statistic)	0.000000		

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