

ANSWER ALL QUESTIONS: 50 MARKS IN TOTAL

Econometrics Practice Final Exam

Question 1 (30 MARKS)

A research has estimated the following multiple regression model for cinema gross box office:

$$GBO = \beta_0 + \beta_1 NOA + \beta_2 NFS + \beta_3 TPC$$

Where GBO is the gross box office, NOA is the number of admissions, NFS is the number of films screened and TPC is the top price of cinema ticket.

An (incomplete) regression output is shown as follow:

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.984698
R Square	0.969631
Adjusted R Square	0.964272
Standard Error	48.06609
Observations	21

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	3	1254015	418004.9	180.9272	4.27E-13
Residual	17	39275.93	2310.349		
Total	20	1293290			

	<i>Coefficien ts</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	-279.29	108.9081	-2.56445	0.020103	-509.066	-49.5137
NOA	8.673796	1.174789	7.383281	1.07E-06	6.195208	11.15238
NFS	-0.10242	0.515111				
TPC	21.59475	13.0633	1.653085	0.11666	-5.96641	49.1559

(a) Perform a one-sided significance test for the coefficient for **NFS**. Use a 5% significance level. It might be useful to note that " $=T.INV.2T(0.05,17)$ " = 2.11, " $=T.INV.2T(0.5,17)$ " = 0.69 and " $=T.INV.2T(0.1,17)$ " = 1.74.

(5 Marks)

(b) Interpret the estimated coefficients for **NOA** and **NFS**. Do they make sense or have the sign that you would expect? Explain

(5 Marks)

(c) Construct a 95% confidence interval for **NFS**. Interpret this interval.
 Once again, it might be useful to note that “=T.INV.2T(0.05,17)” = 2.11,
 “=T.INV.2T(0.5,17)” = 0.69 and “=T.INV.2T(0.1,17)” = 1.74.
(5 Marks)

(d) What are the F-statistic and corresponding p-value testing in the above regression? Sketch (roughly) the F distribution, and indicate the relative locations of the F-stat, F-crit (which is, in this case, 3.01), and the rejection region for an F-test on this model. What would your conclusion be?
(5 Marks)

(e) The researcher has also estimated a quadratic relationship between the number of admissions and the gross box office. Where the regression output is shown as follow. What are the major differences you have found from the previous model? Can you think of any reasons to these differences?
(10 Marks)

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.998288
R Square	0.996579
Adjusted R Square	0.995723
Standard Error	16.62989
Observations	21

ANOVA

	df	SS	MS	F	Significance F
Regression	4	1288866	322216.4	1165.115	1.68E-19
Residual	16	4424.853	276.5533		
Total	20	1293290			

	Coefficient	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	26.01854	46.46992	0.559901	0.583302	-72.4933	124.5304
No. of admissions (millions)	-8.10597	1.549022	-5.23296	8.21E-05	-11.3898	-4.82219
No. of admissions (millions)^2	0.124897	0.011126	11.22584	5.37E-09	0.101311	0.148483
No of films screened	-0.10448	0.178218	-0.58626	0.56588	-0.48229	0.273323
Top price of cinema ticket (\$)	38.03865	4.751088	8.006303	5.49E-07	27.96679	48.11051

Question 2 (20 MARKS)

(a) What is the rationale behind the OLS estimation method?

(5 Marks)

(b) Explain why the parameters of a Simple Regression model have a sampling distribution. Feel free to use a diagram to help you.

(5 Marks)

(c) Under what circumstances would we consider using dummy variables, and how would we enter these into our Excel regression?

(5 Marks)

(d) Under what circumstances would we consider using interaction effects, and how would we enter these into our Excel regression?

(5 Marks)

****** End of Examination ******