B.E. International Program

Faculty of Economics, Thammasat University

Semester: 1/2013
EE325 Introductory Econometrics
Homework#2 (Due on 19 September)

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1. Although we can simply study about Y (regressand) by using its mean value to explain, we also have to concern regression analysis, why? Explain.

2. Phillip's Curve shows inverse relationship between unemployment and inflation rate, $\pi_t = a - bU_t$. There is an argument that Phillip's Curve is not true because some points (π_t, U_t) in scatter diagram are not on the curve. Unemployment level and price level could go in the same direction sometimes. Therefore, we can conclude that unemployment rate is not a function of inflation. Provide some comments on the above argument. Do you agree or disagree?

3. Consider whether each of the following properties violate the assumptions of classical linear regression model.

   3.1 $E(u_i) = 0$ for all i

   3.2 $\text{var}(u_i) \neq \text{var}(u_j)$ for some $i \neq j$

4. Show that:

   4.1 $\sum (X_i - \bar{X})^2 = \sum X_i^2 - n\bar{X}^2$

   4.2 $\sum (X_i - \bar{X})(Y_i - \bar{Y}) = \sum X_i Y_i - n\bar{X}\bar{Y}$

5. Answer question 5.1 to 5.8 from this table

X_i	Y_i	$X_i - \bar{X}$	$(X_i - \bar{X})^2$	$Y_i - \bar{Y}$	$(X_i - \bar{X})(Y_i - \bar{Y})$
0	6				
1	5				
2	3				
3	1				
4	0				
$\sum X_i =$	$\sum Y_i =$	$\Sigma(X_i - \bar{X}) =$	$\Sigma(X_i - \bar{X})^2 =$	$\Sigma(Y_i - \bar{Y}) =$	$\Sigma(X_i - \bar{X})(Y_i - \bar{Y}) =$

5.1 Fill in the table above

5.2 Consider the two-variable model: $Y_i = \beta_1 + \beta_2 X_i + u_i,\ \ u_i \sim NIID(0, \sigma^2)$.

Use ordinary least squares(OLS) method to find estimators of β_1 and β_2.

Interpret the meaning.

5.3 Predict value of Y using the estimators from (5.2) and fill in the following table.

X_i	Y_i	$(Y_i - \bar{Y})^2$	$\hat{Y}_i$	$\hat{u}_i$	$\hat{u}_i^2$	$X_i \hat{u}_i$
0	6					
1	5					
2	3					
3	1					
4	0					
		$\Sigma(Y_i - \bar{Y})^2 =$	$\sum \hat{Y}_i =$	$\sum \hat{u}_i =$	$\sum \hat{u}_i^2 =$	$\sum X_i \hat{u}_i =$

5.4 Plot graph and draw regression line. Does the line pass $(\bar{X}, \bar{Y})$?

5.5 Find $\hat{\sigma}^2$ and $\widehat{Var(\hat{\beta}_2)}$.

5.6 Find value of R^2 and interpret.

5.7 Test the hypothesis that X is statistically significant variable.

5.8 Establish a 95 percent confidence interval for β_2.

6.

6.1 Given $\sum_{i=1}^{10}(Y_i - \bar{Y})^2 = 600$ and $\sum_{i=1}^{10} \hat{u}_i^2 = 180$. Find R^2.

6.2 Given $n = 20$, $\sum_{i=1}^{20} Y_i^2 = 6000$, $\bar{Y} = 16$ and Explained Sum of Squares (ESS) is 680. Find R^2.

6.3 Given $R^2 = 0.7911$, Total Sum of Squares (TSS) = 552 and $n = 20$, find $\hat{\sigma}^2$.

7. Suppose an Indifferent Curve equation for consumption of goodX and goodY is

$$\ln(X_i Y_i) = \beta_1 + \ln(\beta_2 X_i^{\beta_3})$$

Transform above model to be linear regression model and use data in the following table to estimate parameters in linear regresion model, interpret the meaning, and test hypothesis for estimators at 0.05 level of significance.

Consumption of X	1	2	3	4	5
Consumption of Y	4	3.5	2.8	1.9	0.8

8. Consider the following regression:

$$\hat{Y}_i = (a) + 0.5091 X_i$$
$$se \quad 6.4138 \quad (b)$$
$$t \quad 3.8128 \quad 14.2605$$

Y_i = Household consumption expenditure per week

X_i = Household income per week

N = 200

8.1 Find an estimator of the intercept coefficient and standard error of slope coefficient.

8.2 Interpret the meaning of slope coeffient. Does it show the expected sign ?

8.3 Establish 99%, 95% and 90% confidence interval for slope coefficient.

8.4 Test the hypothesis that slope coeffiecient = 0.2.

9. Consider the regression result:

$$\hat{Y} = 0.8345 + 1.9123X \qquad R^2 = 0.564$$
$$se \quad 3.233 \quad 0.1417$$

If X or Y or both were divided by k, where k was a constant, how would the regression result change? Show method and explain.