

ETW1001 Introduction to Statistical Analysis S1 2022

Assignment 2 – Inferential Statistics | Due: 16 May before 5.00 PM MYT

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Total Mark: 50

Corruption is one of the most destructive phenomena plaguing public governance worldwide. A corrupt act implies the abuse of entrusted power for private gain. Classic examples include bribery, clientelism, embezzlement, lobbying and patronage.

A major predictor of corruption - the Human Development Index (HDI) - is an index that measures key dimensions of human development. The three key dimensions are:

- A long and healthy life – measured by life expectancy.
- Access to Education – measured by expected years of schooling of children at school-entry age and mean years of schooling of the adult population.
- A decent standard of living – measured by Gross National Income per capita adjusted for the price level of the country.

In this assignment, you are asked to empirically investigate whether the HDI and its components are significant predictors of corruption.

Data/variables:

- CORRUPT – Corruption Perception Index - Transparency International (2018)
- HDI – Human Development Index (UNDP)
- LIFE – Life expectancy
- EDU – Education, Average Total Years of Schooling for Adult Population
(Lee-Lee (2016), Barro-Lee (2018) and UNDP (2018))
- GNI – Gross National Income (GNI) per capita, PPP (constant 2017 international \$ '000)

Question 1 [Total 20 marks]

- a) Construct an appropriate chart to illustrate the relationship between Corruption Perception Index and the Human Development Index (HDI) for all countries in the sample. **[3 marks]**
- b) Describe the relationship suggested by the chart in Q1(a). **[2 marks]**
- c) Run a simple linear regression with Corruption Perception Index as the dependent variable and the Human Development Index (HDI) as the independent variable. **[2 marks]**
- d) Interpret the estimated coefficient of the Human Development Index (HDI) in question 1 (c). **[2 marks]**
- e) Interpret the estimated coefficient of the intercept in question 1 (c). **[2 marks]**
- f) Comment if the interpretation of the intercept in question 1 (e) is interesting and whether it makes sense. **[2 marks]**
- g) Test the null hypothesis that HDI is not a significant predictor of Corruption at a 5% level of significance against the alternative that it has a significant positive effect. Use the critical value approach. Carefully show all steps. **[5 marks]**
- h) Construct a 99% Confidence Interval (CI) for the estimated coefficient of HDI. You are required to show your workings. **[2 marks]**

Question 2 [Total 30 marks]

- a) Run a multiple linear regression with Corruption Perception Index as the dependent variable, a constant and Life Expectancy, Education and Gross National Income (GNI) as the independent variables. **[3 marks]**

- b) Carefully interpret the estimated coefficients of Life Expectancy, Education and Gross National Income (GNI) in Q2(a), respectively. **[3 marks]**

- c) What is the value of the coefficient of determination? Interpret this value. **[3 marks]**

- d) Test (using the p-value) whether there is a significant positive linear relationship between Corruption Perception Index and Life expectancy at the 5% level of significance. **[3 marks]**

- e) Test the null hypothesis that Education is not a significant predictor of Corruption at a 5% level of significance against an alternative that it is. Use the confidence interval as the test statistics. Carefully show all steps. **[4 marks]**

- f) Can we conclude at a 5% level that there is a significant relationship between the Corruption Perception Index and the entire set of independent variables included in the model specified in question 2 (a)? Perform an appropriate test to support your answer.

[4 marks]

- g) Calculate the predicted value of Corruption for Malaysia. Compare your prediction to the observed value of Corruption for Malaysia. Comment on the accuracy of your prediction.

[4 marks]

- h) A researcher wants to investigate the differences in the Corruption Perception Index level for different continents. Generate dummy variables for each continent, and re-run the regression by including the appropriate dummy variables. **[2 marks]**

- i) Test at a 5% level of significance that the continents are jointly significant in explaining the variation in the Corruption Perception Index. **[4 marks]**