**Basic Econometrics**

**Individual Assignment**

This is an individual **assignment** where you must work alone. You must submit an **electronic copy** of your assignment in Canvas in pdf, doc or docx format. Hard copies will not be accepted. **Show your calculations (if any)** as well as answering the questions in clear full sentences. Log referrers to **natural logarithm!**

**QUESTION 1)**

Let’s assume a hedonic price model for housing in Yellowland. Prices are a function of the square meters of the land on which the house stands, the number of rooms, and CO2 emissions. Prices are expressed in **yellowies (currency of Yellowland**). The model is estimated as follows:

Log(price) = 9.5 + 0.6 \* log (sqm\_land) + 0.17 \* rooms - 0.04 \* log (CO2)

N=900

R2 = 0.52

1. Interpret the intercept.

**2 marks**

1. Interpret the coefficient on the square meter variable.

**2 marks**

1. Interpret the coefficient on the rooms variable.

**2 marks**

1. Assume a CO2 level of 3, and a land area of 400 square meters. How much is the price of the house going to increase if we extend it from 2 to 3 rooms?

**6 marks**

1. Calculate the degrees of freedom associated with these estimates. Is this high enough for standard normal critical values to be applied?

**2 marks**

1. Interpret the R2.

**2 marks**

**Don’t forget:** Log referrers to **natural logarithm!**

**Total: 16 marks**

**QUESTION 2**

We want model energy use as follows:

Lntpes\_pc =

The variables are defined as follows:

Lntpes\_pc = log of total primary energy consumption per capita (ktoe)

Lnypcpenn =log of GDP per capita (USD)

Lnypcpenn2 = square of log of GDP per capita (USD)

Ln\_gasprice = log of pump price for gasoline (USD/liter)

LnAnnualprecip= log of annual precipitation (mm)

Temp\_coldest = average temperature for the coldest month in a year (in C)

Temp\_warmest= average temperature for the warmest month in a year (in C)

ffrents = Fossil Fuel Rents (% of GDP)

Ln\_Pop = log of population (in millions)

Ln\_Land = log of land area (in km2)

I\_Incomegroup = refers to income groups “1” , “2” and “3”, low, mid and high income countries.

\*”Log” always refers to natural logs or “ln” here.



1. Interpret the constant and its p-value.
2. Interpret the coefficient on gas price and carry out a t-test to determine the significance of the coefficient.
3. Interpret the coefficient on temp-coldest and its p-value.
4. Interpret the coefficient on lnland and its p-value.

**(3x4 marks)= 12 marks**

1. The above model belongs to the class of nonlinear equations. Calculate the turning point of the nonlinear relationship.

**3 marks**

1. Is this a U-shaped or inverted U-shaped relationship?

**1 marks**

1. Describe when is it better to use nonlinear models than linear models, and what types of relationships are best modelled with this. Apart from quadratic models, what type of nonlinear models do you know? Describe with a few sentences.

**3 marks**

1. Please describe if MLR 4 is likely to hold or not?

**2 marks**

1. Please describe if MLR 5 is likely to hold or not?

**3 marks**

**(Total: 24 marks)**

**Assignment TOTAL :40 MARKS**

FORMULA SHEET

Critical values for the standard normal distribution (z)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Confidence level  (1-α) | Level of Significance  (α) | Two–Sided Critical Value  cα/2 | One-Sided, Upper-Tail  Critical Value  cα | One-Sided, Lower-Tail  Critical Value  -cα |
| 90% | 10% | 1.645 | 1.28 | -1.28 |
| 95% | 5% | 1.96 | 1.645 | -1.645 |
| 99% | 1% | 2.58 | 2.33 | -2.33 |

Formula for a t-statistic

Formula for a (1-α)% confidence interval

Logarithmic/Quadratic/Interaction specifications

For the model , the exact effect of a change in explanatory variable x2 is:

For a quadratic specification of the form:

The turning point (maximum/minimum) is given by:

The approximation of the marginal effect of x on y is given by:

For a interaction specification of the form:

The approximation of the marginal effect of x1 on y is given by: