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POS 604: Quantitative Methods

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Transformations

**Question 1.**

**Table 1. Political instability model with lagged democracy, gdplag and cold war as predictors.**

|  |  |  |
| --- | --- | --- |
|  | **Political Instability** | |
| *Predictors* | *Estimates* | *CI* |
| (Intercept) | 0.125 \*\*\* | 0.05 – 0.20 |
| Lagged Democracy | 0.001 | -0.00 – 0.001 |
| gdplag | -0.023 \*\*\* | -0.028 – -0.018 |
| Cold War Year | -0.069 \*\* | -0.14 – -0.001 |
| Observations | 4296 | |
| R2 / R2 adjusted | 0.021 / 0.020 | |
| *\* p<0.1   \*\* p<0.05   \*\*\* p<0.01* | | |

The coefficient for the previous year's democracy is 0.001, which depicts a unit change in the prior year's democracy increases political instability by 0.001, holding other independent variables constant. The relationship between political instability and lagged democracy is positive, but the change is less significant.

**Question 1 b**

**Graph 1**

**Chart, line chart

Description automatically generated**

The graph shows a positive relationship between Political instability and lagged democracy. A unit change in the democracy level in the prior year leads to an increase in political instability.

**Question 1c**

**Graph 2**

**Chart, line chart

Description automatically generated**

From the graph, political instability has a negative relationship with lagged GDP. A unit change in the prior year’s GDP leads to a decrease in political instability.

**Question 2 a.**

**Graph 3. Histogram of lag GDP**

**Chart, histogram

Description automatically generated**

**Question 2b.**

**Graph 4. Histogram of the natural log of lagged GDP.**

**Chart, histogram

Description automatically generated**

The lag GDP graph (3) has the data skewed to the left from the two histograms, but the natural log graph (4) provides a set of data closer to a normal distribution. The natural log histogram has more centered data because taking the natural log of the lag GDP data removed the skewness in the original data and provided more centered data. The natural log of lag GDP transforms the data to its normal distribution as possible.

**Question 3**

**Table 2. Political instability model with lagged democracy, log gdplag, and cold war as predictors.**

|  |  |  |
| --- | --- | --- |
|  | **Political Instability** | |
| *Predictors* | *Estimates* | *CI* |
| (Intercept) | 0.16 \*\*\* | 0.08 – 0.24 |
| Lagged Democracy | 0.00 \*\* | 0.00 – 0.00 |
| log(gdplag) | -0.15 \*\*\* | -0.18 – -0.12 |
| Cold War Year | -0.06 | -0.12 – 0.01 |
| Observations | 4296 | |
| R2 / R2 adjusted | 0.022 / 0.021 | |
| *\* p<0.1   \*\* p<0.05   \*\*\* p<0.01* | | |

The coefficient for the lagged GDP is -0.02 (Table 1/question 1), and that of the logged GDP lag is -0.15 (Table 2/question 2) are different. One in terms of absolute values and two in terms of interpretation. For the lag GDP, the coefficient predicts change in Political instability in units, whiles the log GDP lag predicts Political Instability in percentages. For the lagged GDP coefficient, an increase in GDP per capita leads to a decrease in political instability by 0.02 units holding other independent variables constant at a 95 percent confidence interval. And for the logged GDP lag, an increase in the prior year’s GDP decreases political instability by 15 percent.

**Question 4**

**Graph 5. Regression line of political instability model with GDP.**

**Chart, line chart

Description automatically generated**

**Comparing the two graphs**

**A (graph 2) B (graph 5)**

**Chart, line chart

Description automatically generatedChart, line chart

Description automatically generated**

From the two graphs, graph B predicts more spread between numbers in the data set than graph A. For example, from 10 to 20 units of the gdp lag, graph A does not provide variation, unlike graph B. The difference in variation can be seen from the confidence interval of their prediction. The confidence interval for graph A in terms of gdp lad is between -0.03 to -0.02 while that graph B is between -0.18 to -0.12. The confidence interval for graph A is narrower compared with graph B. For that reason, graph B provides more variation in the data than graph A.

**Question 5a**

**Table 3. Quadratic model of political instability with democracy, GDP, and cold war.**

|  |  |  |
| --- | --- | --- |
|  | **Political Instability** | |
| *Predictors* | *Estimates* | *CI* |
| (Intercept) | -0.18 \*\*\* | -0.28 – -0.08 |
| Lagged Democracy | 0.02 \*\*\* | 0.02 – 0.02 |
| I(democracy^2) | -0.00 \*\*\* | -0.00 – -0.00 |
| gdplag | -0.01 \*\*\* | -0.02 – -0.01 |
| Cold War Year | -0.03 | -0.09 – 0.04 |
| Observations | 4296 | |
| R2 / R2 adjusted | 0.039 / 0.038 | |
| *\* p<0.1   \*\* p<0.05   \*\*\* p<0.01* | | |

**Question 5b.**

**Chart, line chart

Description automatically generated**

From the graph, at the beginning level of democracy, there is a positive relationship between political instability and democracy. Initially, as the level of democracy increases, political instability increases. The positive relationship is from 0 to about 50 levels of democracy. And as the democracy level increases from 50 to 100, the political instability falls. When the democracy level increases from 50 to 100, there is a negative relationship between political instability and the level of democracy. Additionally, the democracy variables in the model are not significant at a 95 percent confidence level. Thus, we can reject the hypothesis that highly democratic countries see more instability because of their freedoms while highly autocratic countries also see more instability because of a lack of freedom.