

Q2

$$\widehat{Development} = \widehat{\beta}_0 + \widehat{\beta}_1 \times Corruption + \epsilon$$

Q3

$$\widehat{\beta}_0: 52.2362$$

$$\widehat{\beta}_1: 0.6813$$

$$\text{Standard error of } \widehat{\beta}_1: 0.0320$$

The association between Corruption and Development is statistically significant. The p-value for $\widehat{\beta}_1$ is $< 2e-16$, which suggests there is no reason for a null hypothesis. Additionally, the t-value for $\widehat{\beta}_1$ is 21.29, which suggests that the coefficient is significantly different from zero.

Q4

Intercept: 52.236

- When Corruption is zero, the expected development level is ~52.236%

Slope: 0.681

- For every one-unit increase in Corruption, Development is expected to increase by 0.681%

Significance:

- The p-values for both the intercept and slope are very small. Null hypothesis is rejected.

Goodness of Fit:

- The R^2 value is 0.225, which suggests that 22.5% of the variance in Development can be explained by Corruption.

$$\text{Estimated Model: } \widehat{Development} = 52.236 + 0.681 \times Corruption$$

Q6

$$\widehat{Development} = \beta_0 + \beta_1 \times Corruption + \beta_2 \times Democracy + \epsilon$$

$$\widehat{Development} = 52.003 + 0.601 \times Corruption + 6.380 \times Democracy$$

Q7

We add the control variable when it (a) influences both the explanatory and response variable at the same time, and (b) is not the primary focus of our research. In our case, adding Democracy as a control variable is reasonable because it can influence both Corruption and Development. By controlling for democracy, we can more accurately isolate the relationship between corruption and development.

A one unit increase in Corruption variable is associated with a ~0.601 unit increase in the Development variable. Their relationship is statistically significant at the 0.1% level.

The β_1 value for Corruption in Q1 is 0.681 whereas Q5 is 0.601. The β_1 value is smaller when we add Democracy as a control variable. This change suggests that some of the original effect of Corruption on Development was due to Democracy. When Democracy is being controlled, the effect of Corruption on Development increased, though it remains significant. This shows how

Democracy has some explanatory power in the model, and it is important to control for it to better understand the influence of Corruption on Development.