1. **Level-Level equation**:

\[ y = \beta_0 + \beta_1 x + u \]

**Interpretation of \( \beta_1 \)**

\[ \Delta y = \beta_1 \Delta x \]

2. **Level-Log equation**:

\[ y = \beta_0 + \beta_1 \log(x) + u \]

**Interpretation of \( \beta_1 \)**

\[ \Delta y = \left( \frac{\beta_1}{100} \right) \times 100 \Delta x \]

3. **Log-Level equation**:

\[ \log(y) = \beta_0 + \beta_1 x + u \]

**Interpretation of \( \beta_1 \)**

\[ 90 \Delta y = 100 \beta_1 \Delta x \]

(log = \log base e (natural log))
4. Log-log equation:

\[ \log(y) = \beta_0 + \beta_1 \log(x) + u \]

**Interpretation of \( \beta_1 \):**

\[ \gamma_0 \Delta y = \beta_1 \cdot \gamma_0 \Delta x \]

**Examples:**

A. \( \hat{y} = 10 + 5 - x \), \( \hat{\beta}_1 = 5 \), \( \hat{\beta}_0 = 10 \)

For every one unit increase (decrease) in \( x \), you have a 5-unit increase (decrease) in \( y \).

B. \( \hat{y} = 10 + 200 \log(x) \)

For every one percent increase (decrease) in \( x \), you have a \( \frac{200}{100} = 2 \) unit increase (decrease) in \( y \).
C. \( \hat{\log}(y) = 10 + 0.05x \)

For every one unit increase (decrease) in \( x \), you have a \( (0.05) \times 100 = 5\% \) increase (decrease) in \( y \).

D. \( \hat{\log}(y) = 10 + 0.80 \log(x) \)

For every one percent increase (decrease) in \( x \), you have a \( 0.80 \) of one percent increase (decrease) in \( y \).

See Table 2.3 in Wooldridge.

It is helpful to know that:

\[
100 \cdot \left[ \log(y_2) - \log(y_1) \right] = \frac{y_2 - y_1}{y_1} \cdot 100 = \% \text{ change in } y \text{ going from } y_1 \text{ to } y_2
\]
Homoskedasticity vs. Heteroskedasticity

in the errors
of a regression equation

Homoskedasticity: \( \text{Var}(u | X) = \sigma^2 \) for all \( X \).
See Figure 2.8 in your textbook.

Heteroskedasticity: \( \text{Var}(u | X) \neq \sigma^2 \) for all \( X \).
See Figure 2.9 in your textbook.

Ordinary Least Squares is the appropriate method for estimating \( \beta_0 \) and \( \beta_1 \) when there is homoskedasticity in the errors of your regression model. However, OLS is not the appropriate estimation method when the errors are heteroskedastic. Instead, weighted least squares (sometimes called generalized least squares) should be used.