Chapter 5: Regression Analysis

# Assumptions of the Regression Analysis

## Corresponding reading: Chapter 5, Page 3

### Purpose: Investigating assumptions of the regression analysis in a real-world dataset.

1. Remember that the first and second assumptions of the regression analysis implies that residuals (or errors) must have constant variance for different values of the explanatory variable. The below figure shows three behaviors of residuals. Notice that although residuals have a mean of zero in all three cases, only the third one shows a constant variance for residuals. The first and second cases show a varying constant for residuals. This situation is referred to as *heteroscedasticity*.

Chart, scatter chart

Description automatically generated

1. Search the internet to find a *real-world* dataset that shows *heteroscedasticity*. Show the corresponding scatter diagram to visualize the varying variance for the residuals. Your scatter diagram showing the relationship between the dependent and explanatory variable should look like the following (in case of an increasing trend for variance of residuals). Note how observations of the variable get wider and wider around the regression line for larger values of .

A computer screen capture

Description automatically generated with low confidence

1. Why do you think the dataset that you found shows a heteroscedasticity behavior? You need to justify this behavior based on your understanding of the data.
2. Search the internet to find out what issues heteroscedasticity causes in a regression analysis. *Make sure you use your own words in your response.*
3. Propose at least three ways to deal with heteroscedasticity and resolve it. *Make sure you use your own words in your response.*

**Note**: Here is a nice tutorial on heteroscedasticity:

<https://statisticsbyjim.com/regression/heteroscedasticity-regression/#:~:text=Heteroscedasticity%20is%20a%20problem%20because,should%20have%20a%20constant%20variance>.

***Note:*** *Understanding the case and what you need to do is PART OF THE CASE. If you do not understand a specific part, or are not sure what you should do, you need to review the corresponding reading section in the text before asking for help. You might also need to do some search on the internet. That is all part of the case and your learning process.*