Figure 9.1: Homoscedasticity

Borrowed from Aj. Wasin's note
Please insert between p.95-96

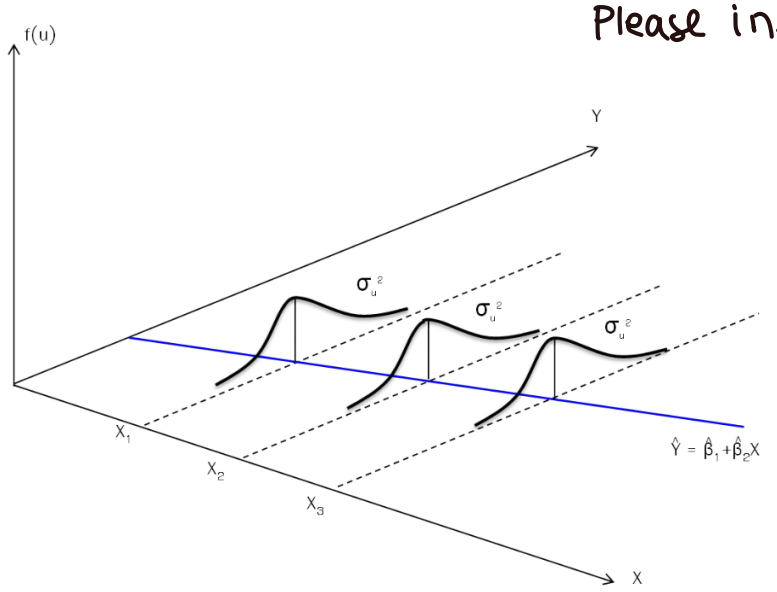
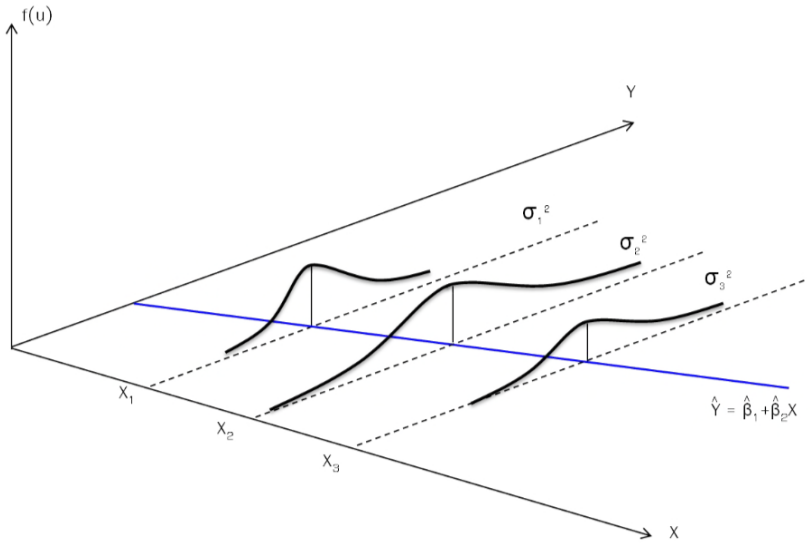


Figure 9.2: Heteroscedasticity



Generally, there is a variety of causes for the existence heteroscedasticity problem in the regression model studied by most economists. Yet, only 6 main sources are discussed here.

1. Normally, error learning is the nature of human. At the initial stage of their work, people probably commit a large number of mistakes. As they carry on working and become more specialized, the amount of errors would be reduced. In this case, it seems that the variance at the initial stage will be high but would decrease as people learn from their errors.

2. Considering the relationship between independent variable X and dependent variable Y, there seems to be possible that as the value of independent variable increase, the variance of the value of dependent one will increases. The feasible reason is the characteristics of those variables such as the relationship between the profit of the company (independent variable) and dividend (dependent variable). As the profit rises, the board of director may have a variety of dividend policies. Some companies may pay a small amount of dividend in order to keep the profit for further development. Some may pay a large amount of dividend to satisfy the shareholders. On the contrary, if the profit is low, the dividend policy will not diverge across the companies since the companies seem to be at the growth stage and decide to keep their profit as retained earnings.

3. The collection of data is another source. As the collection technique employed by the researcher is improved, the collection error would be lower. Contrarily, with the poor collection technique, the data obtained to construct the regression model would probably incur more and more errors, causing the condition variance of disturbance term to vary.

4. The existence of outliers in the independent and dependent variables may make the conditional variance of disturbance term on independent variables volatile. Mostly, if the researchers collect too small amount of data, that set of data tends to include the outliers and undermine the regression analysis. As the amount of data increases, those outliers may become normal relative to other observations.

5. The misspecification of the model could result in the heteroscedasticity problem as well. In some cases, econometricians drop some important and necessary independent variable from the regression model. The disturbance term, then, will incorporate the characteristics of the missing variables, resulting in heteroscedasticity problem. For example, suppose the researchers want to establish the model to explain the relationship of price and quantity of good X, as suggested by the theory of demand. However, if it turns out that good Y is the substitute for good X. This mistake of failing to include price of good Y, which has the explanatory power over the demand for good X, will result in misspecification error. The disturbance term will have the characteristics of good Y, which, in turn, leads to heteroscedasticity.

6. Heteroscedasticity problem usually happens in the model that applies the **cross-sectional data** which tends to be highly diverse because the data is collected in the same time period. To illustrate, the census acquired from numerous provincial areas may cover the wide range of value and results in the stated problem. On the other hand, for the **time series data**, it is prone to be the collection of the same sample for different period of time. With the same sample, the range of the value covered seems to be narrow. Hence, the stated problem, generally, does not occur with this kind of data.