CH-8
Heteroskedasticity

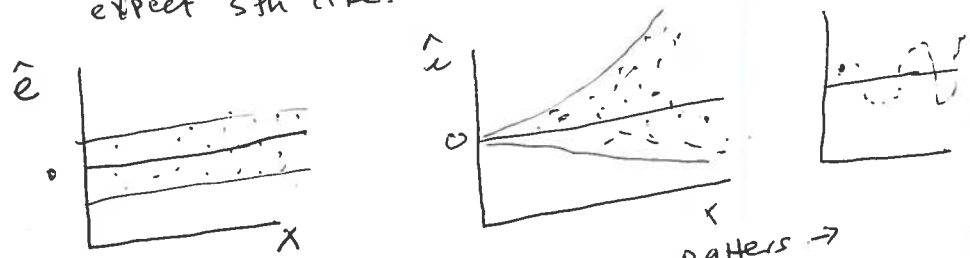
(1) What do we mean by heteroskedasticity or homoskedasticity?

In fact we mean heteroskedasticity of errors, i.e.,

$$Var(e_i|X) = \sigma^2 - \text{Constant}$$

→ If we plot the errors / residuals from a model,

If the case of homoskedastic error, we expect sth like:



In this context, homo - means the errors are the same/equal, while

hetero - means the errors are different.

(2) What is the consequence of heteroskedasticity for the properties of least square estimators?

⇒ why do we care about heteroskedasticity error?

Ans well, homoskedasticity is one ~~assumption~~ of the Gauss-markov assumptions.

If, violated, it means that our least square estimators are no longer BLUE

In particular, they are no longer best, → they are LUE

There are other linear unbiased estimators, which have a lower sampling variance.

→ The SE for the least squares estimator are incorrect.

CI & Hypothesis tests that use these SE may be misleading.

(3) How do we detect the existence of heteroskedasticity?

informal ~~test~~ → residual plots

Formal (statistical) test

↳ → create two samples & test hetero

- Goldfeld - Quandt test
- B-P or LM test (The Lagrange multiplier) Breusch-Pagan test
- white test

(4) What solutions do we have to fix heteroskedasticity

→ Quick & simple soln.

- use Robust Standard errors (The White heteroskedasticity - consistent estimator (HCE)) → also called

→ Use better estimation technique other than OLS

→ GLS / WLS