Linear Regression: Heteroskedasticity

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Textbook:

James H. Stock and Mark W. Watson, *Introduction to Econometrics*, 4th Edition, Pearson.

Other references:

Joshua D. Angrist and Jörn-Steffen Pischke, *Mostly Harmless Econometrics: An Empiricist's Companion*, 1st Edition, Princeton University Press.

Jeffrey M. Wooldridge, *Introductory Econometrics: A Modern Approach*, 7th Edition, Cengage Learning.

The textbook comes with online resources and study guides. Other references will be given from time to time.

Problems and Applications

Define homoskedasticity and heteroskedasticity. Provide a hypothetical empirical example in which you think the errors would be heteroskedastic, and explain your reasoning.

The error term u_i is homoskedastic if $\text{var}(u_i|X_i)$ is (approximately) constant for all i; otherwise, it is heteroskedastic. A well-known example is the regression of wages on education:

$$\text{wage}_i = \beta_0 + \beta_1 \text{education}_i + u_i$$

It is well documented that there is greater variability of wage rates at higher levels of education. The more highly educated have access to professions with more wage growth potential, where the effects of education, experience, and workplace innovation compound, whereas the uneducated face fewer such opportunities. To a large extent, this is because the best paid jobs involve ongoing deepening of skills and knowledge and education is precisely "learning how to learn."