**Chapter 5 Summary**

In this chapter we considered one of the violations of the classical linear regression model, namely, heteroscedasticity, which is generally found in cross-sectional data. Although heteroscedasticity does not destroy the unbiasedness and consistency properties of OLS estimators, the estimators are less effi cient, making statistical inference less reliable if we do not correct the usual OLS standard errors.

Before we solve the problem of heteroscedasticity, we need to find out if we have the problem in any specific application. For this purpose we can examine the squared residuals from the original model or use some formal tests of heteroscedasticity, such as the Breusch–Pagan and White’s tests. If one or more of these tests show that we have the heteroscedasticity problem, we can then proceed to remediation of the problem.

The problem of heteroscedasticity can be solved if we know the heteroscedastic variances, $σ\_{i}^{2}$, for in that case we can transform the original model (5.1) by dividing it through by $σ\_{i}$ and estimate the transformed model by OLS, which will produce estimators that are BLUE. This method of estimation is known as weighted least squares (WLS). Unfortunately, we rarely, if ever, know the true error variances. Therefore we need to find the second best solution.

Using some educated guesses of the likely nature of $σ\_{i}^{2}$ we transform the originalmodel, estimate it, and subject it to heteroscedasticity tests. If these tests suggest thatthere is no heteroscedasticity problem in the transformed model, we may not rejectthe transformed model. If, however, the transformed model shows that the problemof heteroscedasticity still persists, we can look for another transformation and repeatthe cycle again.

However, all this labor can be avoided if we have a sufficiently large sample, because in that case we can obtain heteroscedasticity-corrected standard errors, using the procedure suggested by White. The corrected standard errors are known as **robust standard errors**. Nowadays there are several micro data sets that are produced by several agencies that have a large number of observations, which makes it possible to use the robust standard errors in regression models suspected of the heteroscedasticity problem.