**Chapter 11 Summary**

In this chapter we discussed the nature of censored regression models. The key here is the concept of a *latent variable*, a variable which, although intrinsically important, may not always be observable. This results in a censored sample in which data on the regressand is not available for several observations, although the data on the explanatory variables is available for all the observations.

In situations like this OLS estimators are biased as well as inconsistent. Assuming that the error term follows the normal distribution with zero mean and constant variance, we can estimate censored regression models by the method of maximum likelihood (ML). The estimators thus obtained are consistent. A prime example of this is the Tobit model. An alternative to the Tobit model is the Heckit model, which also provides consistent estimators of the parameters. But the Heckit estimators are not as efficient as the ML estimators.

The slope coefficients estimated by ML need to be interpreted carefully. Although we can interpret the slope coefficient as giving the marginal impact of a variable on the mean value of the *latent* variable, holding other variables constant, we cannot interpret it so with respect to the *observed value* of the latent variable. Here we have to multiply the slope coefficient by the probability of observing the latent variable. And this probability depends on all the explanatory variables and their coefficients.

However, modern statistical software packages do this relatively easily.

One major caveat is that the ML estimators are consistent only if the assumptions about the error term are valid. In cases of heteroscedasticity and non-normal error term, the ML estimators are inconsistent. Alternative methods need to be devised in such situations. Some solutions are available in the literature. We can, however, compute robust standard errors, as illustrated by a concrete example.

The truncated regression model diff ers from the censored regression model in that in the former we observe values of the regressors only if we have data on the regressand. In the censored regression model, we have data on the regressors for all the values of the regressand including those values of the regressand that are not observed or set to zero or some such limit.

In practice, censored regression models may be preferable to the truncated regression models because in the former we include all the observations in the sample, whereas in the latter we only include observations in the truncated sample.

Finally, the fact that we have software to estimate censored regression models does not mean that Tobit-type models are appropriate in all situations. Some of the situations where such models many not be applicable are discussed in the references cited in this chapter.