**Chapter 14 Summary**

In this chapter we first examined the phenomenon of spurious regression which arises if we regress a nonstationary time series on another nonstationary time series.

After citing several examples of spurious regression, we conducted a Monte Carlo simulation study by artificially creating two random walk series, which are I(1), or nonstationary, by nature. When we regressed one of these series on the other, we obtained a “meaningful” relationship between the two, but we know *a priori* that there should not be any relationship between the two series to begin with.

There is a unique case where a regression of a nonstationary series on another nonstationary series does not result in spurious regression. This is the situation of cointegration. If two time series have stochastic trends (i.e. they are nonstationary), a regression of one on the other may cancel out the stochastic trends, which may suggest that there is a long-run, or equilibrium, relationship, between them, even though individually the two series are nonstationary.

We discussed the tests of cointegration, which are modifications of the Dickey– Fuller (DF) and augmented Dickey–Fuller (ADF) tests and known as Engle–Granger (EG) and augmented Engle–Granger (AEG) tests.

We illustrated cointegration by considering two examples. In the first, we considered the relationship between personal consumption expenditure (PCE) and personal disposable income (PDI), both expressed in real terms. We showed that individually the two economic time series are stationary around deterministic trends. We also showed that the two series are cointegrated.

Keep in mind that unit root and nonstationarity are not synonymous. A stochastic process with a deterministic trend is nonstationary but not unit root.

The second example we discussed in this chapter relates to the relationship between 3-month and 6-month US Treasury Bills. Using monthly data from January 1981 to January 2010 we showed that the two series are stationary around a quadratic trend. We also showed that the two series are cointegrated, that is, there is a stable relationship between the two.

In this chapter we also discussed some of the shortcomings of the EG methodology and noted that once we go beyond two time series, we will have to use Johansen methodology to test for cointegrating relationships among multiple variables.