CHAPTER 9

OVERVIEW OF VOLATILITY MODELING

1. **Using real, daily data, for several stocks, plot a time series of volatility using several models.**
   (a) Divide the data into yearly intervals and estimate volatility during each year
   (b) Use a fixed-length, moving window
   (c) Use an exponentially weighted estimate

   With the fixed-length window you will see that volatility tends to plateau after large moves in the price of the underlying. Then later the volatility will drop back to normal levels. This is a totally spurious effect of the methodology. With the exponentially weighted volatility this won't happen. The volatility estimate will decay back to normal more gradually. (But you could still say that this gradual, exponential, decay is also spurious. However, it looks more reasonable!)

   If you are feeling adventurous you should see how good your volatility measurement is at forecasting future volatility.

2. **Collect real option data from the *Wall Street Journal*, the *Financial Times* or elsewhere, calculate implied volatilities and plot them against expiration, against strike, and, in a three-dimensional plot, against strike and expiration.**

   This will demonstrate the skews and smiles seen in practice, and that cannot be explained by a simple constant-volatility Black–Scholes model.

   Again, if you are feeling adventurous you should compare implied and actually volatility to see how good implied volatility is at forecasting the future.