4.1 INTRODUCTION

As described in Chapter 3, firms are required to self assess the amount of capital that they believe is needed to cover the risks they are running. There are many ways in which this self assessment may be carried out and it will certainly vary across firms.

In this book, we will achieve the self assessment by subjecting the realistic balance sheet of a firm’s businesses to deterministic stresses or stochastic stresses. The amount of capital that is required for this realistic balance sheet to remain solvent, following a range of stresses, then represents the firm’s self assessed risk capital amount. This is described in more detail in Chapter 5, which deals with economic capital.

Note that, throughout this book, we use this self assessed risk capital amount as our key measure of risk.

In this chapter, we now define and discuss both deterministic and stochastic stress testing and compare their relative merits. We first describe what we mean by a deterministic stress.

4.2 DETERMINISTIC STRESSES

Under a deterministic stress of a firm’s realistic balance sheet, the behavior of the balance sheet is examined when one, or more, of the firm’s risk variables are assigned specific extreme values. Although a probability is sometimes assigned to a deterministic stress, giving a half way house between deterministic and stochastic stress testing, this tends to be the exception rather than the norm.
Take a retail mortgage bank, for example. The risk capital of the bank’s mortgage book depends on the future interest rate margin that the bank may earn on its mortgages. This is the rate of interest earned by the firm on its mortgages, less the cost of funding these mortgages. The bank may believe that its average interest rate margin over the lifetime of its existing in force business is 0.012 p.a.

If everything goes by plan, the bank should earn a margin close to 0.012. If not, it will earn a margin less than 0.012 and capital will be required to absorb this loss. If the bank does better than planned, its margin will exceed 0.012 and capital will be released.

The extent to which the margin might be either more, or less, than 0.012 will depend on the specific circumstances of the bank, for example its funding mix and how stable this is likely to be going forward. The cost of the bank’s funding will not be known with certainty and will vary according to both internal influences, for example the bank’s credit rating, and external influences, for example the credit cycle.

Substantial judgment will, therefore, be required in choosing the deterministic stresses to be used. Stresses plus, or minus, 25 basis points, or 0.0025, may be appropriate for one bank, but may be too extreme for another bank’s management.

Once a full range of deterministic stresses has been designed and agreed, the realistic balance sheet of the bank’s business is subjected to each stress and the amount of capital that is required to back the risks that define each of the deterministic stresses can be calculated.

4.3 STOCHASTIC STRESSES

Most, although not all, of the risks that firms collect can be modeled as random variables, in the formal mathematical statistical sense. Some examples are given below.

Retail mortgage bank example

As we discussed in Section 4.2, a bank’s margin will usually not be known with absolute certainty. Modeling this future margin as a stochastic process allows this uncertainty to be quantified, so assisting the firm in controlling and managing it. For example, treating the margin as a stochastic process allows us to quantify how extreme the margin can be in the tails of its distribution.

Examining the percentiles of the firm’s observed monthly interest rate margin over a specified period of time will allow the firm to understand