END OF CHAPTER EXERCISES

Chapter 25: Credit Risk

Financial Engineering : Derivatives And Risk Management

(Keith Cuthbertson, Dirk Nitzsche)

1.   Explain the basic rationale behind the Basle (1988) risk adjusted capital adequacy ratio.

2.   Why should a bank that has given a bank loan to company-X have to hold more capital, when its bond moves from A-rated to B-rated, even though there has been no <u>actual</u> loss on the bank loan to company-X?

3.   What are the key strengths of the Credit Metrics approach?

4.   Company-X with a credit rating of 'A', has issued a 3-year coupon paying bond. The only possible 'states' for the bond at the end of the year is to remain at A, move to a B-rating or move to a default (D) rating. What are the practical problems in measuring the credit risk of company-X's bond?

5.   You hold an initial A-rated bond with current value $112 and an initial B-rated bond valued at $108. Each bond can be in 3 possible states at the end of the year namely, A-rated, B-rated or D-rated (i.e. in default). The value of both bonds in the default state is $51. If the A-rated bond moves to B-rated, its value at the end of the year is $109. If the B-rated bond moves to A-rated its value rises to $110. For simplicity assume that if either bond stays in its current rating, its value is unchanged at end year. The transition probabilities for the initial-A and B-rated bonds are:

$$P_a = [0.92, 0.07, 0.01] \quad \text{and} \quad P_b = [0.03, 0.90, 0.07]$$

Calculate:
  (i.)   the mean value of the 2 bonds
  (ii.) the standard deviation in value, for each of the bonds taken separately
  (iii.) the value of the 'two-bond' portfolio in each future state and the migration probability matrix, assuming independence between the movements of bonds A and B.
  (iv.) the mean and standard deviation of the 'two-bond' portfolio
  (v.)   the marginal risk of adding bond-B to bond-A

6.   Company-Y, with a credit rating of B, has issued a 3-year coupon paying bond. Company-X with credit rating of A issued bonds with 10 year to maturity. Either bond can be in one of the credit states B, A or D (= default) at the end of the year. Carefully explain how in (J.P.Morgan's) CreditMetrics we can measure the credit-VaR for a bank which holds one bond of each of X and Y.

7.   Bank-Z holds a well-diversified portfolio of bank loans. How can it seek to hedge or reduce the credit risk of these loans?