Hand-In Assignment #2
Probability and Credit Risk

Fall 2001
B6014: Managerial Statistics

Due: Monday, September 10.

These exercises accompany the reading titled Probability Models of Credit Risk. The exercises require the tables from the reading; the tables are included in the spreadsheet credit_calc.xls. Please use this spreadsheet! If you try to type the values from the reading yourself, you will not get the correct answers because of rounding errors.

1. Probability questions. Use the ratings transition matrix to find the probabilities of the following events

(a) An initially A-rated firm is BBB-rated at the end of one year.
(b) An initially A-rated firm is BBB-rated at the end of two years.
(c) An initially A-rate firm is BBB-rated at the end of year 1 and at the end of year 2.
(d) A AAA firm is downgraded at the end of one year.
(e) Two AAA firms are downgraded at the end of one year. (Assume the ratings of the two firms are independent of each other.)
(f) Find the probability that a CCC firm defaults in one year, given that it changes rating.
(g) Consider the following question: Given that a firm defaults at the end of one year, find the probability it was initially rated CCC. Explain why it is not possible to answer this question from the information in the table.

2. Credit risk in a single bond. For the following, assume that you hold the 5% coupon A-rated bond used for illustration in the reading. Use the tables in the reading (in the form given in the spreadsheet credit_calc.xls) to answer the questions below. You may also want to consult the spreadsheet for ideas on how to approach these problems.
(a) Find the expected value of the bond at the end of one year.
(b) Find the standard deviation of the bond’s value at the end of one year.

3. Credit risk in a bond portfolio. Now suppose you hold one A-rated bond and one BBB-rated bond, as in the reading. The questions below should be answered using the tables from the reading in the form given in credit_calc.xls.

(a) Find the expected value and standard deviation of the value of the portfolio at the end of one year, assuming the ratings of the two bonds move independently.
(b) Repeat part (a) using the probabilities in Table 8 of the reading (which assumes the assets of the two bond issuers are correlated). To avoid problems resulting from rounding, use the same expected values to calculate the standard deviations in (a) and (b).
(c) Comment on the relation between your answers to (a) and (b). Also comment on the relation between the portfolio standard deviation and the individual bond standard deviations.