Hwk 5 Finance

Due in class on Wednesday 2/11.

(The assignment is currently incomplete. I may add more problems later.) You may work in groups of up to 3 people.

1) Suppose you own some GM bonds. Each bond will pay $2.50 at the end of every quarter for 1 year (4 quarters). At the end of 1 year, each bond will also pay back the principal of $100.

a) What is the coupon rate of this bond?

b) What is the NPV of such a bond if the yield is 5%, 10%, or 20%?

c) GM has a high probability of going bankrupt. Suppose that the bond yield is r and that the probability GM defaults in a particular quarter (and can't make its payments) is p. If $r = 10\%$ and $p = 0.1$, then what is the E[NPV] of the bond?

d) If E[NPV]=$50 and $r = 4\%$, then what is p?

2) Let the random variable r_i be the return of stock i. Assume these stocks all have the same risk, $\sigma[r_i] = s$, and are correlated, $\text{corr}(r_i, r_j) = c$ for all $i \neq j$. Now we construct a diversified portfolio of n of these stocks by investing an equal amount in each, $r_p = \sum_i (1/n) r_i$. Calculate $\sigma[r_p]$. Does the risk of the portfolio go to zero if the number of stocks in the portfolio increases? Make a one sentence analogy to the market model.

3) This is a portfolio allocation problem. Download the historical prices from 1/1/2004 to 12/31/2007 for the Vanguard Total Stock Market ETF (a proxy for the US stock market) and the Vanguard Total Bond Market Index Fund (a proxy for the US bond market). I suggest going to Yahoo finance, entering the abbreviations for these funds (VTI and VBMFX, respectively), and clicking on historical prices.

a) Calculate the annual returns. To get an annual return compare the value in the "Adj Close" column (the last column) to the value a year earlier. The Adj column is the right column to use as it assumes dividends get reinvested. What are the average, standard deviations, and correlations of the annual returns?

b) Similar to the 2-stock portfolio spreadsheet, plot the possible allocations on an expected return, standard deviation graph.