FE-312: Homework 1

1 Risk, Risk Aversion and Asset Allocation

1. You bought 100 shares of ABC Inc. common stock at $100 per share today at the opening of the market. ABC Inc. just announced a dividend of $2.00 per share payable in exactly one year from today. It is widely believed in the market that in one year from now the economy will either be in a 'recession', a state of 'normal growth', or a 'boom' with probabilities of 30%, 40%, and 30% respectively. After analyzing ABC Inc. you are convinced that the price of ABC stock a year from now in these various states of the economy will be:

State of Economy	Price of ABC ShareB
Recession	$80
Normal Growth	$110
Boom	$130

   What are your estimated expected return and volatility over the next year to your investment in ABC stock?

2. ABC mutual fund invests 25% of their assets in IBM stock, 50% in GE stock, and 25% in T-Bills. You invested 50% of your wealth in ABC mutual fund and rest in the T-Bills. What % of your wealth is invested in each stock and in the T-Bills?

3. Based on your examination of the historic records, you calculate that the expected return on the S&P-500 index over the next year is 6% over the risk-free T-bills with a standard deviation of 15%. Currently a T-bill with one year to maturity and face value of $10,000 is selling for $9,615. You have $1 million to invest and you will put all of your money in some combination of the S&P-500 index and 1-year T-bills. Calculate

the expected return and standard deviation of that return (that is, volatility) for the following 3 different portfolios:

(a) 'Portfolio-1' is invested in 100% in the S&P-500 index.

(b) 'Portfolio-2' is invested 50% in S&P-500 index.

(c) 'Portfolio-3' is invested 10% in the S&P-500 index.

4. You are considering investing in two stocks. There are two possible states for the economy over the next year: 'Good' and 'Bad'. Each state is equally likely (that is, probability for each state is 50%). Their return in each possible state is estimated as follows:

State	Return to stock A	Return to stock B
Good	30%	5%
Bad	10%	10%

(a) What are the expected return and volatility of each stock return?

(b) What are the covariance and correlation between the two stock returns?

(c) Suppose that a riskfree investment of 5% is also available. Does this present a profit opportunity to you? Why or why not? Explain.

(d) Draw a diagram to illustrate the tradeoff between risk and return (that is available portfolios or funds) by investing in these two stocks (assume no short selling).

5. Consider a risky portfolio that offers a rate of return of 15% per year with a standard deviation of 20% per year. Suppose an investor is indifferent between investing in the risky portfolio and investing in a risk free asset earning 8% per year.

a) What is the investor's risk aversion coefficient?

b) If allowed to invest in a combination of the risky portfolio and the risk free asset, what proportion would the investor hold in the risky portfolio?

c) What is the expected rate of return and the standard deviation of the rate of return on the optimally chosen combination?

d) What would be the investor's certainty equivalent return for the optimally chosen combination?

6. Consider an investor who has an asset allocation of 50% in equities and the rest in T-Bills. Suppose the expected rate of return on equities is 10%/year and the standard deviation of the return on equities is 15%/year. T-Bills earn 6%/year.

   a) What is the implied risk aversion coefficient of the investor?

   b) Plot the CAL along with a couple of indifference curves for the investor type identified above.

   c) Use Excel's solver to maximize the investor's utility and confirm that you get a 50% allocation in stocks.

7. You can invest in a risky asset with an expected rate of return of 20% per year and a standard deviation of 40% per year or a risk free asset earning 5% per year or a combination of the two. The borrowing rate is 6% per year.

   a) Draw the Capital Allocation Line. Indicate the points corresponding to (a) 50% in the risk-less asset and 50% in the risky asset; and (b) -50% in the riskless asset and 150% in the risky asset.

   b) Compute the expected rate of return and standard deviation for (a) and (b).

   c) Suppose you have a target risk level of 50% per year. How would you construct a portfolio of the risky and the riskless asset to attain this target level of risk? What is the expected rate of return on the portfolio so constructed?