**Corporate Risk Management**

**Homework 1**

1. (15 pts) A non-dividend paying stock is currently priced at $30 per share. You figure that one year from now, the price of the stock will have either gone up to $45 per share or down to $25 per share. The risk-free, continuously compounded interest rate is 4 percent.

Use the Two-State (Binomial) Option Pricing Model to determine the price of a call with a strike of $30 and an expiration date one year from now.

Use your answer above and the principle of put-call parity to determine the price of a put with a strike price of $30 and an expiration date one year from now.

1. (15 pts) Suppose you wrote a 180-day call option on General Motors stock with an exercise price of $50, and also bought a put with an exercise price of $45 on the same stock with the same expiration date. Both are European options. Draw the payoff diagram with the stock price on the X-axis and the *total* payoff (from both options) on the expiration date on the Y-axis. What must be your expectations about General Motors stock that would cause you to pursue the above strategy? Draw the payoff diagram below. **Be sure to place the correct dollar amount at every important point on the diagram**. Briefly describe your expectations for GM right below the diagram.
2. (10 pts) A stock is currently priced at $80 per share. The continuously compounded annual risk-free rate of interest is 2 percent. You observe calls with an expiration date six months from now and a strike price of $70 being sold for $15. What is the implied volatility of this stock over the next six months?
3. (10 pts) The same stock has put options being sold at a price of $7.80 with the same exercise price and the same risk-free rate, but they expire in one year. What is the implied volatility of the stock over the next six months? How do you interpret your answer with respect to the results of #3 above?
4. (20 pts) You work for an American retailer that purchased a large quantity of Scotch Whisky from its producer. You have to pay for the whisky in 30 days. Payment must be made in pounds sterling. You can either convert your dollars to pounds in 30 days at the spot rate in effect at that time, or hedge your position.

Based on a thorough analysis, your best guess is that one pound will be worth 1.30 dollars in 30 days. If it ends up being slightly different from that, you will be ok, but if the pound ends up costing more than 1.35 dollars, you will be in a bit of trouble. You have decided that it will be best to hedge your position if there is at least a 5% chance the pound will be worth more than 1.35 dollars in one month based on VaR.

As we did in class, go to <http://www.usforex.com/forex-tools/historical-rate-tools/monthly-average-rates> and find the monthly averages for the exchange rate that you need to calculate. Find the end-of-month values for the past 61 months. Use September 2013 as the first month and September 2018 as the last month. Use those 61 exchange rates to find 60 percentage changes in the rate using continuous compounding. Calculate the standard deviation (for a sample) of those changes and determine what are the exchange rates that are one standard deviation above the 1.30 dollars you expect and one standard deviation below the 1.30 dollars you expect. Then (as we did in class), determine the probability that the value of the pound will be greater than 1.35 dollars. Based on your answer to this, will you decide to hedge this risk, or not? Your answers to this question should be fully supported by your work in Excel.

Exchange Rate one standard deviation greater than 1.30 $/£ \_\_\_\_\_\_\_\_\_\_\_\_\_

Exchange Rate one standard deviation less than 1.30 $/£ \_\_\_\_\_\_\_\_\_\_\_\_\_

Probability that the pound will be worth more than $1.35 in one month\_\_\_\_\_\_\_\_\_\_\_\_\_

Do you recommend that your company hedge, or not? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. (10 pts) Go to the following website: <https://breesefine7110.tulane.edu/am-i-diversified/> and follow the instructions to students for “Am I Diversified?”
   1. Be sure to print out each graph so that it appears on one page
   2. You do not need to print out anything from the spreadsheet other than the graphs
   3. Be sure to answer each of the questions in the assignment
   4. The student who is able to build a 30-stock with the lowest standard deviation will earn an additional 5 points on this assignment.
2. (20 pts) For many years, General Electric Co. (GE) had business segments that included aircraft engines, insurance, consumer products, and other areas. Each segment had its own WACC that it used to evaluate its capital budgeting projects. Let’s go back in time a few years and imagine that you work in GE’s consumer products division and are responsible for calculating the NPV for a proposed new line of washing machines. The initial investment in production requires $10 million with sales of the washing machines being expected to generate a positive cash flow of $1.2 million (after taxes) per year in perpetuity. Using Whirlpool as an appropriate comparison firm for GE’s consumer products division, determine the discount rate (WACC) your division should use – then calculate the NPV of the proposed project.

Remember that the asset beta gives us strictly the business risk of the stock and the equity beta gives us both the business risk and the financial risk of the stock

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* The beta of G.E.’s stock is 1.2 (based on five years of monthly data)
* The risk-free rate is currently 3.0%
* The market risk-premium is estimated to be 5.7%
* GE has $200 billion of debt (YTM of 7%), 10 billion shares of common stock outstanding, and its stock price is $30 per share
* Each of GE’s business segments has the same capital structure (that of the entire company)
* Whirlpool Corp, a key competitor of GE in the washing machine business, and a company that does nothing other than manufacture and sell consumer products, has a beta of 0.9 for its stock.
* Whirlpool has $500 million of debt (YTM of 10%), 80 million shares of common stock outstanding, and its stock price is $20 per share
* Neither GE nor Whirlpool have any preferred stock
* Both GE and Whirlpool have excellent ratings on their bonds, so the betas of their debt can be considered to be zero.
* Both GE and Whirlpool are in the 35% marginal tax bracket.
* All the above data has been reasonably stable over the past 5 years and you expect it to remain so for the foreseeable future