**Am I Diversified?**

**Instructions for Students**

The purpose of adding additional stocks to a portfolio is to diversify – to reduce risk. The extent to which risk (as measured by standard deviation) is reduced is determined by the stocks’ covariances (correlations) with each other and their individual standard deviations.

In this exercise, you will select 30 stocks that will be used to construct 30 equally-weighted portfolios – with each portfolio having a different number of stocks in it. Your first portfolio will have one stock in it, the second will have two stocks in it, the third will have three, etc. Only the last portfolio will have all 30 stocks in it. In each case, the portfolios will be formed based on an equal amount of money being invested into each stock.

The stocks you select need to have been publicly traded for the past five years so that their monthly adjusted closing prices can be found on Yahoo! Finance. You will need to know (or find) the ticker symbol for each stock. You will need to be connected to the internet when you run the spreadsheet.

On the “Inputs” worksheet of the Excel Spreadsheet “Am I Diversified”, you will need to enter the ticker symbols for your 30 stocks in the shaded cells. Place them in any order you want. When you click on the “Download” button, Excel will look up adjusted (adjusted for dividends, stock splits, etc.) closing monthly prices for the most recent 61 months on Yahoo! Finance, and will record them, along with the corresponding monthly closing values for the S&P 500 on the “price data” workpage. From there, the “Returns and Stand Dev” workpage is set up to calculate the monthly continuously compounded returns for each stock and its sample monthly standard deviation of returns. The “Corr. Matrix” page constructs a 30 x 30 correlation matrix and the “Var-Cov Matrix” page constructs a 30x30 variance/covariance matrix. Below the variance/covariance matrix, Excel calculates the standard deviation of each of the 30 equally-weighted portfolios by taking the square root of the sum of the cells in a weighted variance/covariance matrix. The “Graph” page of the spreadsheet plots a graph of the relationship between the size of the portfolio (1-30) and its standard deviation. The solid black line on the graph is the standard deviation of the S&P 500.

It is not necessary for you to understand exactly how the standard deviation of a portfolio is calculated. However, I do expect that you understand that standard deviation is a measurement of volatility and is (generally) how we measure risk in finance. So portfolios (and stocks) with a higher standard deviation will be considered to be riskier to investors.

After your graph fills out, print out the last worksheet which includes the graph. Next, re-order your stocks so that the one with the highest standard deviation is in the first cell and the one with the lowest standard deviation is in the last cell. You can do this by clicking the “Sort Tickers by Sigma” button. Click “Download” again. Print out this graph as well.

Look at your two graphs, the data to the right of each graph, and answer the following questions:

* Why did you select the 30 stocks you chose?
* Which of your two graphs looks the most like the “classic” graph that we discussed in class?
* Other than the one-stock portfolio, the standard deviation of each portfolio is less than the average standard deviation of the stocks that comprise the portfolio. Why is that?
* Replace some of the stocks you chose with a group of stocks that are all in the same industry (or similar industries) and click “Download” again. Print this out as your **third graph**. What do you observe about this graph as you compare it to your prior graphs?
* Do you believe it is possible to put together an equally-weighted 30-stock portfolio that has a lower standard deviation than the S&P 500? If so, what attributes would you look for in each of the 30 stocks? If not, why not?
* Change your choice of stocks for as many of the 30 stocks as you want. This time, try to construct a 30-stock portfolio that will have the lowest possible standard deviation you can obtain. Consider this to be a competition with your classmates to see “how low can you go?” There will be a prize for the winner!