**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.

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.

Take some time to analyze the Excel spreadsheet and understand why, after the prices are downloaded, the correlation and variance/covariance matrices fill in for you and how we are using Excel to create the 30 different equally-weighted portfolios.

After your graph fills out, print out the last worksheet which includes the graph. Next, re-order your stocks in alphabetical order by clicking the “Sort Tickers from A to Z” button. Now click the “Download” button again. Your completed graph should look somewhat different from the first one. Print this one out before reversing the order of the stocks by clicking the “Sort Tickers from Z to A” button. After doing this, click “Download” for the third time. Again, print out the graph. Finally, re-order your 30 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” one more time before printing out your fourth graph.

Look at your four 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 four graphs looks the most like the “classic” graph that can be found in your textbook? Why?
* Does the ordering of the stocks affect the portfolio standard deviation for the 30-stock portfolio? Why or why not?
* 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?
* In any of your graphs, does the standard deviation of the portfolio ever go up when you add a stock to it? If so, why?
* 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. What do you observe about the 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 portfolios that will have the lowest possible standard deviations you can arrange. Consider this to be a competition with your classmates to see “how low can you go?”
* What do you observe about the relationship between the average standard deviation of the stocks in each portfolio (column R on the last worksheet) and the corresponding portfolio standard deviation (column S)? Why is this relationship as you observe it?
* Column Q on the last worksheet calculates the average correlation of each stock with the other 29. When you changed the stocks in your portfolio so that many of them were in the same industry, how did it affect these values? If you want to lower the standard deviation of your portfolio, are the values in this column important to note? Why or why not?