Finance 100   A. Craig MacKinlay
Fall 2015

RISK-RETURN COMPUTER ASSIGNMENT

Due Date: Thursday, November 19, 2015.

Instructions:

The data for this assignment is available as an Excel file. The assignment can be completed using Excel or by exporting the data to another statistical package. Use the regression option under Data>Data Analysis>Regression if using Excel. The name of the file is **f100-data-2015**. This file can be accessed directly from the course web page.

You are allowed to work with classmates to solve this assignment but each student must turn in her/his own solution. Your answers should be typed or clearly written. The cover page provided on the course web page must be used. It is not necessary to provide copies of your programs or output. Keep your answers short.

Data Description:

The data set consists of monthly returns for the S&P500 Index, a short-term US Treasury Bill, four stocks, and an exchange traded fund (SPDR S&P Retail Exchange Traded Fund).
Information for the S&P Retail ETF is available at:
https://www.spdrs.com/product/fund.seam?ticker=XRT.
The data is for the 5-year period from October 2010 to September 2015. The data format is as follows:

Column	Description
1	Month-end Date
2	S&P500 (total return)
3	Treasury Bill
4	Apple [AAPL]
5	Ford [F]
6	Walmart [WMT]
7	Goldman Sachs [GS]
8	Retail Sector Index Fund [XRT]

Note: The returns are calculated using the following formula:

$$r_t = (P_t + d_t - P_{t-1})/P_{t-1} * 100.$$

where r_t is the return, P_t is the month end stock price, and d_t is the dividend for month t. The returns are in percent.

Section I: Risk and Return

1.   What is the monthly arithmetic mean of the market return (S&P 500 Index) and of the treasury bill return over the period October 2010 to September 2015?

2.   Suppose you were to invest $1,000 in the market portfolio (S&P500) at the start of October 2010 and reinvest all dividends. How much would your investment be worth at the end of September 2015?

3.   For each of the four stocks and for the ETF, calculate the average monthly return (arithmetic mean) over the five year period and the monthly standard deviation of return.

4.   For both Walmart and the ETF, calculate the geometric mean over the five year period. State your answers as a monthly return and as an annual return (use (1+monthly_ret)^12). For these two investments, compare the monthly geometric return with the monthly arithmetic return (from question 3). Which is higher? Is the difference between geometric and arithmetic means greater for Walmart or the ETF?

5.   What is the standard deviation of the return on a portfolio that is composed of 40 percent Apple and 60 percent Goldman Sachs? Compare this portfolio's standard deviation to the standard deviations of Apple and Goldman Sachs from Question 3. Which is lowest? Why?

6.   Compute the monthly mean equity premium, i.e., the market return less risk free rate as measured by the US Treasury Bill. Multiply by 12 to approximately annualize. Would you be comfortable using this number as the input into the CAPM?

Section II: Capital Asset Pricing Model

7.   Compute estimates of the betas for the four stocks and the ETF using the five years of monthly data from October 2010 to September 2015.

8.   Using five years from October 2010 to September 2015, note the beta of a portfolio composed of Walmart stock (from question 7). Consider a portfolio consisting of a mix of treasury bills and the market (S&P500) index. What should the portfolio weights of treasury bills and the market index be for the portfolio to have the same beta as Walmart? Compute the standard deviations of the returns on these two portfolios (one of only Walmart and one of the market and T-bill mix) for the five year period. What explains the difference between the two portfolios' standard deviations?

9.   What is the return of Walmart stock for August 2015? Using the CAPM (and the beta from question 7), and the S&P 500 and the treasury bill returns for August 2015 estimate the expected return of Walmart for this month? What is the magnitude of the unexpected return? What is a possible explanation for this unexpected return?