NORTHWESTERN UNIVERSITY
KELLOGG GRADUATE SCHOOL OF MANAGEMENT

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Investments
EMP 69

Problem Set 1

The data for this problem set is available on the course web page: http://www.kellogg.northwestern.edu/faculty/hagerty/ftp/Emp_Investments/invest_webpage.htm. FYI: Historical prices can be found at Yahoo Finance (http://finance.yahoo.com/q/hp?s=GE&a=11&b=31&c=2000&d=11&e=31&f=2007&g=m)

The data is weekly prices for five ETF's over the period Oct 2004 to Dec 2007. An exchange-traded fund (ETF) is an investment company that typically has an investment objective of striving to achieve a similar return as a particular market index. The ETF will invest in either all or a representative sample of the securities included in the index it is seeking to imitate. Like closed-end funds, ETFs can be traded on a secondary market and thus have a market price that may be higher or lower than its net asset value (NAV). The net asset value is the total value of a fund's assets less the liabilities. If the ETF shares trade at a price above their NAV, they are said to be trading at a premium. Conversely, if they are trading at a price below their NAV, they are said to be trading at a discount. For example, if the net asset value of the fund is $50 and the fund is selling at $55 on the exchange, the fund is said to be trading at 10% premium to the NAV. If the fund is selling at $45, it is said to be trading at a 10% discount to the NAV. Typically, ETFs track stock indexes and are offered through a variety of well-known companies, including Standard & Poor's, Dow Jones, Vanguard, Merrill Lynch, and Barclays. The oldest and biggest ETF tracks the S&P 500 index. It's called SPDRs, short for Standard & Poor's Depository Receipts. It began trading on the American Stock Exchange under the symbol SPY. Since exchange-traded funds track specific indexes, their price fluctuates with the performance of the index.

The EFT's are:

NAME	Ticker Symbol	Description
SPDRs	SPY	S&P 500
iShares MSCI Japan Index	EWJ	JAPAN
PowerShare QQQ	QQQQ	SMALL STOCKS
Vanguard Energy	VDE	ENERGY
iShares Dow Jones US Real Estate	IYR	REAL ESTATE

For this problem set you need to compute the historical return, standard deviation and correlations. A sample spreadsheet which does the calculations for GE and Microsoft is available on the course webpage.

1. For each stock compute the weekly returns using the formula:

$$\text{Return} = \frac{P_{t+1}}{P_t} - 1$$

2. Compute the average monthly return. To do this use the AVERAGE function in Excel and then annualize the number, i.e.,

$$\text{Average Annual Return} = \left(1 + \text{Average Weekly Return}\right)^{52}$$

3. Compute the standard deviation of the monthly returns. To do this use the STDEV function in Excel and then annualize the number, i.e.,

$$\text{Annual StDev} = \sqrt{52} * \left(\text{ Weekly StDev}\right)$$

4. Create a chart in Excel that plots the annualized standard deviation (x-axis) and the annual average return (y-axis) for each of the five EFT's.

5. Compute the correlation between the weekly returns for all the possible pairs of the five ETFs. There are ten possible pairs. To do this use the CORREL function in Excel.

6. a. Draw the expected return and standard deviation for all the combinations of QQQQ and VDE (i.e. vary the portfolio proportion for QQQQ between -1 and 2 at intervals of .2) (Excel Tip: To graph the results, use X-Y Scatter with the standard deviation in the first column.) Which combinations are clearly undesirable?

   b. If you needed a 4% annual expected return, approximately how would you divide your invest between QQQQ and VDE? What is the standard deviation of this portfolio? If a T-bill with an annual rate of return of 3% was available in addition to QQQQ and VDE, could you do better?