Project 1

Physics 250 Econophysics

In this project, the goal is to write a computer code that will compute and plot the trailing 3 months and 12 month returns for a small portfolio of stocks, stock indexes, and funds.

First, define the trailing returns $R(t,\Delta)$ in % at a time t over a previous time interval Δt:

$$R(t,\Delta) = \left\{ \frac{P(t) - P(t-\Delta t)}{P(t-\Delta t)} \right\} \; x \; 100\%$$

There are an average of 252 trading days in a year, so an average of 21 trading days in a month. here $P(t)$ is the **daily closing price** (in $) of the stock at time t.

1. Use the python codes at:

http://physics.ucdavis.edu/~rundle/PHYS250_ECONOPHYSICS/CODES/

to download data on funds from Yahoo finance. Note that the comments at the beginning of the codes tell you how to use them.

The format for the data is in 7 columns:

decimal_date opening_price daily_high_price daily_low_price daily_close_price share_volume analog_date

This data is in a form that can be read by almost any API, such as Matlab, IDL, Python, Excel, etc.

2. Write a code that will compute and plot (vs. time) the 3 month and 12 month returns for a given stock, stock index, ETF, or Mutual Fund. Test it on the S&P 500 (SPX) index going back to 1960. Note that for Yahoo finance, the SPX is designated as ^GSPC

3. Now repeat this for 9 others, with the proviso that they go back at least 12 years (to January 1, 2000). Include as one of these the VIX (implied volatility of the SPX, used in options trading).

Note that the Dow Jones (DJI = ^DJI) data is not available for download, although the Dow Jones ETF (DIA) is available.

4. For each time series, and for each time interval (3 or 12 months) compute the largest Drawdown, defined as the most negative value of the returns $R(t,\Delta)$.

5. What do you notice when you compare the SPX plot with the VIX plot?