

EconS 502: Macroeconomic Theory II

Professor: S. Choi

Due: In Class, Wednesday, 11th March

### PROBLEM SET 5

1. You are a financial advisor. Your client is a long-term, passive investor (i.e., an investor willing to hold a diversified portfolio for a relatively long time) like Seung Mo Choi.

(a) You want to understand who your client is. Wikipedia or google "efficient market hypothesis" and briefly explain why your client might want to be a long-term, passive investor.

(b) All observed returns in data are nominal. We need to transform them to real returns based on the Fisher equation. (Wikipedia or google "Fisher equation" if you are not familiar.) Visit the Consumer Price Index (CPI) website of Bureau of Labor Statistics at <http://www.bls.gov/CPI>. Click "Table Containing History of CPI-U U.S. All Items Indexes and Annual Percent Changes From 1913 to Present." Obtain "Percent Dec-Dec" (second column from the right) for annual observations on inflation. What is the average inflation rate in the United States in the sample (for the longest time horizon in data)?

Hint: It helps to open the txt file in a spreadsheet such as Microsoft Excel. If you use Excel, save the txt file in your computer, click "Open" in Excel menu, choose "All Files" as "files of type", double-click your txt file, choose "Delimited", click "Next", choose "Space", click "Next" and then click "Finish". This works for my Excel 2007. Do appropriately for your version of a spreadsheet.

(c) Consider stock market returns. Your client is interested in several portfolios constructed by size and book-to-market ratio. The reason is as follows. There are millions of individual stocks in the world, and they are all different in their characteristics. Two important dimensions of those characteristic are the size (i.e., whether the

company is big or small in market value) and the book-to-market ratio (i.e., whether the company's book value is high or low compared to its market value). For example, one may put together all "big" companies and form up a portfolio, minimize idiosyncratic risks.

Visit [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html), which is the data library of Kenneth French. Download "6 Portfolios Formed on Size and Book-to-Market (2 x 3)". Read "Details" for your information. Scroll down to "Average Value Weighted Returns – Annual". This dataset provides the nominal annual returns (%) when you invest in one of 6 portfolios formed by size and book-to-market ratio. For example, if you had invested \$1 in the portfolio of "small firms with high book-to-market ratio" in 1927, you would have made a 35.58% annual nominal return. By subtracting year- $t$  inflation rate from year- $t$  nominal return, obtain year- $t$  *real* return (%) for each portfolio. Your client is asking.

Client: "I will consider to invest in some of these 6 portfolios. But I don't understand how they differ exactly. What are the average annual real returns?"

Compare average annual real returns for the 6 portfolios (for the longest time horizon in data). Which one provides a higher average return, small vs. big size and high vs. low book-to-market ratio?

(d) Client: "Is a portfolio with a higher average return recommended?"

You are somewhat relieved. You thought this client, who classified him/herself as a long-term, passive investor, was an expert in financial economics. Perhaps he/she is not.

You: "Well, there is a trade-off, though. The portfolio with a higher average return tends to be more risky. So it helps to look at the standard deviation which is a measure of the risk. From here it really depends on your appetite. You may prefer apples to oranges, or oranges to apples. So you may prefer a portfolio with higher average return and more risk to the one with lower average return and..."

Client: "Show me each portfolio's standard deviation or whatever is your risk measure. Give me a specific portfolio that *outperforms* others!"

Compare the sample standard deviations for the 6 portfolios (for the longest data horizon). Plot standard deviations on x-axis and averages on y-axis, for the 6 portfolios. Discuss your figure. Is there a portfolio that "outperforms" others (whatever that means)? Draw a possible indifference curve for a hypothetical investor (who is, of course, risk-averse) and discuss his/her optimal portfolio decision.

- (e) Your client looks for more specific, up-to-date information. You have decided to investigate whether the market-wide dividend-price ratio predicts the following 7-year returns on those 6 portfolios. At Kenneth French's data library, download "D/P Breakpoints". We will look at median D/P. The 13th column provides a median for all D/P observations for individual stocks. (For example, it is 6.038% in 1926.)

Attempt to generate a figure like John Cochrane's published in Wall Street Journal on November 12, 2008. Show the movement of median D/P in year  $t$  for  $t = 1945, 1946, \dots$  (Start from 1945. It helps to focus.) Show each movement of the following 7-year gross returns, from year  $t$  to  $t + 6$  (or from  $t + 1$  to  $t + 7$  if you believe it is more plausible) for  $t = 1945, 1946, \dots$ , on 6 portfolios. That is, draw 6 figures that shows (i) market's median D/P (which is common to all 6 figures) and (ii) the following 7-year gross return on each of 6 portfolios.

Based on your figures, discuss your forecast on the future return on each of 6 portfolios, assuming that your client is investing in 2008. And/Or discuss why you want to be more cautious in this forecast.

Client: "So is it (2008) a good year to invest?"

Provide the best report for your client. Feel free to draw other figures if needed. For example, you might want to have a simple plot of median D/P on x-axis vs. the following 7-year gross return for a portfolio on y-axis. Feel free to provide econometric analyses to strengthen your predictions.