FIN 3080 Investment Analysis and Portfolio Management

Spring 2025 | CUHK (SZ)

Assignment I

Due: 23:59, February 25th, 2025

Disciplines

- Late submissions without valid justification will result in point penalties.
- A complete submission must include:
  - One readable PDF (1.5-spaced, 11pt font, not exceeding 5 pages) containing arguments, tables, and figures.
  - A compressed archive named `YourID_YourName.zip` with all code files needed to reproduce empirical results.
- Collaboration with peers is permitted, but plagiarism or data fabrication will result in disciplinary action.
- You may use any programming language for assignments. Note that Excel is excluded and cannot be used for programming tasks.

Problems

1. Please access *Stock Trading*, *Financial Statements* and *Financial Indicators* databases on CSMAR and download the following data for all listed firms in the A-share market: (i) monthly *stock prices, stock returns, market value of tradable shares* from Jan. 2000 to Sep. 2023; (ii) quarterly *total assets, total liabilities, earnings per share, ROA (return on asset), ROE (return on equity), R&D expenses* from 2000Q1 to 2023Q3; (iii) *establishment date* and *market type*. Complete the following tasks using the downloaded data:
   (a) Manually calculate monthly *P/E ratios (stock price/earnings per share)*, monthly *P/B ratios (stock price/book value per share)*, quarterly *R&D expense/total asset ratios* and quarterly *firm ages (current date - establishment date)*.
   (b) Provide summary statistics for monthly *stock returns, P/E ratios, P/B ratios* and quarterly *ROA, ROE, R&D expense/total asset ratios, firm ages* by market type (i.e., main board v.s. GEM board), compare summary statistics across two markets and discuss your findings. Note that summary statistics should at least include *number of observations, mean, median, p25, p75, standard deviation*.

2. Leveraging the data from problem 1, plot two time-series for median *P/E ratio* by market type. Then analyze the following: (i) Is it advisable to consider new investments in either market as of Sep. 2023? (ii) Given the *P/E ratio* figure, can you describe a trading strategy based on index ETF to make money?

3. The attached data file *problem3_data.csv* contains annual *return on equity (ROE)* and *total revenue* for firms listed in the main board from 2011 to 2020 (excluding financial companies). Please use this data to calculate annual median values for *ROE* and the *total revenue growth rate* for each year from 2011 to 2020. Then plot two time-series illustrating the percentages of companies that consistently maintain above-median *ROE* and *total revenue growth rate* over 2011 to 2020, respectively. Taking *ROE* for example, in 2011, you determine the percentage of firms with above-median *ROE* (which by definition is 50%); then in 2012, you calculate the percentage of firms with above-median *ROE* in both 2011 and 2012, and continue this analysis until 2020.

Hints

1. For each table, CSMAR details variable name, unit and description in "*Field Description and Sample Data*".

2. The main board includes the *SME* board. The GEM board is consisted of *ChiNext* and *STAR*.

3. You may back out the total number of tradable shares for company i at time t with

$$Total\#of\ tradable\ shares_{i,t} = \frac{Market\ value\ of\ tradable\ shares_{i,t}}{Closing\ price_{i,t}}.$$

   Beware of the unit of *market value of tradable shares* on CSMAR.

4. Note that financial statements are usually reported quarterly while stocks are traded every trading day. To construct monthly valuation measures, you may divide the closing price with the latest accounting indicator. For example, you may construct the *P/E ratio* for company i at 2019m11 (i.e., Nov. 2019) as follows:

$$P/E_{\,i,2019m11} = \frac{Closing\ price_{i,2019m11}}{Earnings\ per\ share_{i,2019q3}}.$$

5. You may exclude *parent statements* from financial statement and financial indicator data.

6. There may be multiple versions for certain earning capacity variables. You may choose one version and rationalize your choice in your solution.

7. In Problem 3, you may focus on a (sub-)sample of listed firms with complete records of *ROE* and *total revenue* from 2011 to 2020. The resulting two time-series should be decaying over time by construction.