FIN 3080 Investment Analysis and Portfolio Management

Spring 2025 | CUHK (SZ)

Assignment II

Due: 23:59, March 21, 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

Please access the CSMAR database and download the following data for all listed firms in the A-share market: (i) monthly *Stock Closing Price*, *Return (without cash dividend reinvested)* over Dec. 2009 to Dec. 2024 from *Individual Stock Trading* table, (ii) quarterly *Return on Equity - TTM* and *Net Assets per Share* over 2009Q3 to 2024Q4 from *Financial Indicator* table, (iii) daily *stock volatility* (of the log return of the lastest 250 trading days) at 2010/12/31 from *Stock Market Derivative Index* table. Then derive monthly *P/B ratios* for all A-share stocks from Jan. 2010 to Dec. 2024. Exclude records with *P/B ratios* less than *P/B ratio*'s 5th percentile or greater than *P/B ratio*'s 95th percentile.

1. Focusing on the observations for all A-share firms at the end of 2010, regress the *P/B ratio* at Dec. 2010 on *Return on Equity - TTM (ROE)* at 2010Q4 and *Stock Volatility* at 2010/12/31, i.e., you estimate the following cross-sectional regression:

$$P/B_i = \alpha + \beta_1 ROE_i + \beta_2 Stock\,Volatility_i + \epsilon_i.$$

   Report regression results and discuss your findings.

2. For each month from Jan. 2010 to Dec. 2024, sort firms based on their last-month *P/B ratios* and divide firms into ten groups according to last-month *P/B ratio* deciles. By holding all stocks within each group with equal weights and rebalancing positions every month, we can construct ten portfolios. Please calculate the monthly returns for the ten portfolios and use a bar chart to illustrate average returns for the ten portfolios from Jan. 2010 to Dec. 2024, and discuss your findings.

Hints

1. A cross-sectional data set is consisted of observations for different listed companies at a single time point.

2. 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/B ratio* for company i at 2019m11 (i.e., Nov. 2019) as follows:
$$P/B_{\,i,2019m11} = \frac{Closing\ price_{i,2019m11}}{Net\ Assets\ per\ Share_{i,2019q3}}.$$

3. You may exclude *parent statements* from financial indicator data.

4. In Problem 2, you are expected to construct ten portfolios based on *P/B ratios* in the previous month. In other words, the composition of these portfolios changes every month. Denote by $D_{i,t}(i \in \{1,2,\cdots,9\})$ the 9 deciles/cutoffs for *P/B ratios* at t and further define $D_{0,t}$ ($D_{10,t}$) as the minimal (maximal) *P/B ratios* at t. Then portfolio i at t consists of equal-weighted *stock j's with* $P/B\,ratio_{j,t-1} \in [D_{i-1,t-1}, D_{i,t-1}]$ and the return for the i-th portfolio at month t (denoted by $r^p_{i,t}$) is given by
$$r^p_{i,t} = \frac{1}{N_{i,t}} \sum_{j=1}^{N_{i,t}} r^s_{j,t},$$
where $N_{i,t}$ denotes the number of stocks with $P/B\,ratios$ at $t-1$ lying in $[D_{i-1,t-1}, D_{i,t-1}]$ and r^s_j denotes the monthly return for $stock_j$ at t.

   You may find bysort and xtile in Stata helpful to generate *P/B ratio* deciles by month.