FIN3080_Assignment 2 Report

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Problem 1

Problem 1-1: Regress the P/B Ratio on ROE and Stock Volatility as of 2010Q4

1. Regression Expression

$$\hat{P/B} = -2.1009198889502563 + 4.11136805 * ROE + 25.19690315 * Volatility$$

2. Statistics Summary

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OLS Regression Results

Dep. Variable:	P/B_Ratio	**R-squared:**	0.196
Model:	OLS	**Adj. R-squared:**	0.195
Method:	Least Squares	**F-statistic:**	159.1
Date:	Wed, 22 Mar 2023	**Prob (F-statistic):**	1.47e-62
Time:	01:43:25	**Log-Likelihood:**	-2648.3
No. Observations:	1309	**AIC:**	5303.
Df Residuals:	1306	**BIC:**	5318.
Df Model:	2		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
const	-2.1009	0.342	-6.141	0.000	-2.772	-1.430
ROE	4.1114	0.728	5.650	0.000	2.684	5.539
Return Volatility	25.1969	1.481	17.008	0.000	22.291	28.103

Omnibus:	149.632	**Durbin-Watson:**	1.868
Prob(Omnibus):	0.000	**Jarque-Bera (JB):**	202.214
Skew:	0.904	**Prob(JB):**	1.23e-44
Kurtosis:	3.660	**Cond. No.**	30.9

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It is well-noticed that p-values for three coefficients in our regression model are all 0 (<0.001), which means my model is convincing.

3. Visualization

$$R^2 = 0.20$$
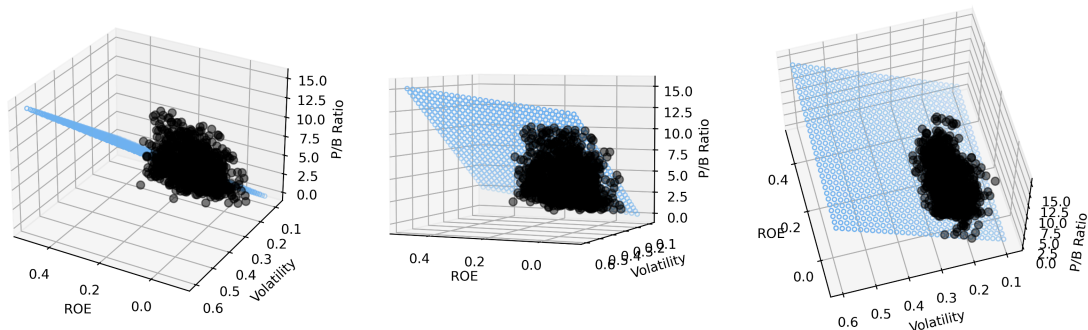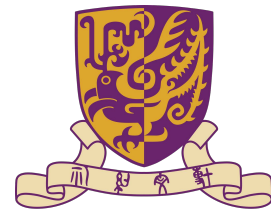
Data Acquisition and Data Processing Highlights

Data Acquisition Highlights

- **Market Value**: Market Value should time 1000 because the unit for this ticker in the database is **CNY1000**.

- **Total Asset, Total Liability, ROE**: When accessing data from CSMAR, I set the condition **"Statement Type = Consolidated Statements"** since Consolidated statements reflect the financial position and operating results of the entire enterprise group while the Parent statements only reflect the business situation of the parent company.

- **Return on Equity:** Employ **Return on Equity - TTM** since TTM-version ROE provides a more up-to-date picture of a company's ROE.

- **Monthly P/B Ratio**: Monthly P/B = Monthly Market Value / (Total Asset - Total Liability)

Data Processing Highlights

- **Monthly Equity**: Replace the NaN value in the Total Equity with **the previous record.**

- **ROE on 2010Q4**: Using the record on 2010-12-31 since ROE is quarterly, which means ROE is computed **until the end of each quarter in quarterly report**.

- **Return Volatility on 2010Q4**: Return Volatility should **be divided by 2** because we are to convert the annual one into the quarterly one (Standardization).

- **Outliers Removal before Regression**

  - **Outliers Detection**

    By plotting the distribution of P/B Ratio(y), ROE(x1) and Stock Volatility(x2), it is well noticed that **there are some outliers in the P/B Ratio and ROE (particularly on the right-hand side)**, in order to get a more **robust** model, we need to remove outliers for P/B Ratio and ROE before implementing regression.
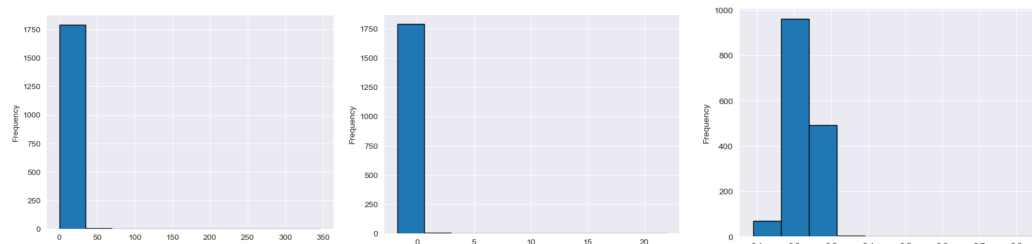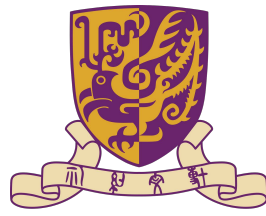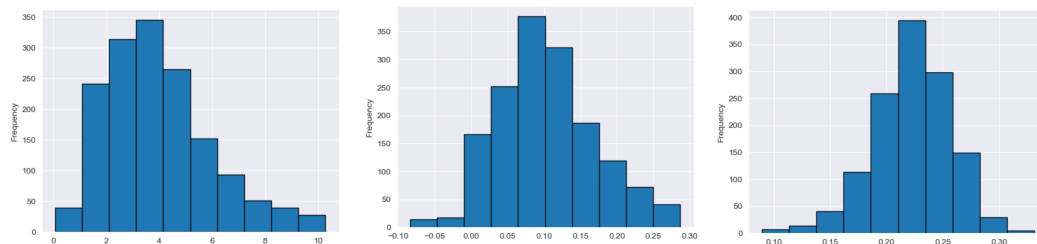
- **Outliers Removal**

We remove outliers based on **IQR (Inter Quartile Range) Method**

IQR = 3rd Quantile - 1st Quantile;

- Left-outlier boundary = Q1 - 1.5 * IQR;
- Right-outlier boundary = Q3 + 1.5 * IQR.

Problem 1-2: Discuss Findings based on Regression Results

Finding 1

- *Observation*: P/B Ratio is positively correlated with ROE.

- *Analysis*:

    - Higher ROE means higher earnings per equity, means higher profitability of the firm, means a more substantial positive cash flow in the future, which increases the valuation of equity, i.e., the P/B Ratio.
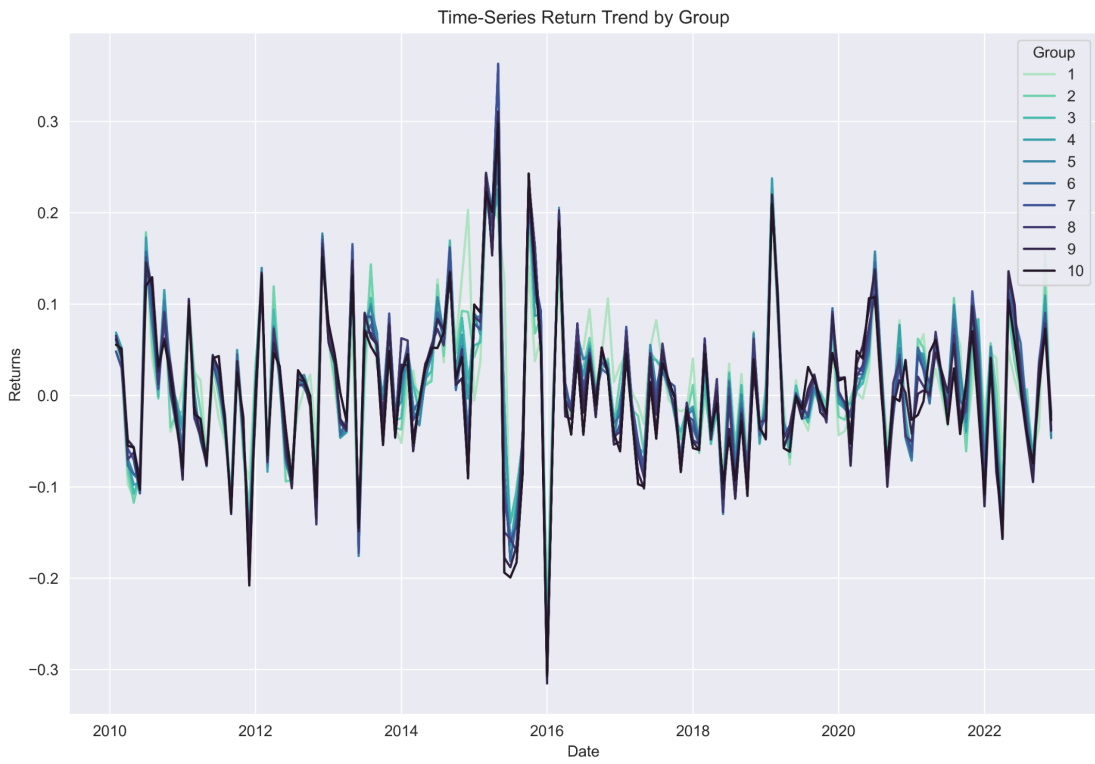
Finding 2

- *Observation*: P/B Ratio is positively correlated with Stock Volatility.

- *Analysis*: There are several possible explanations:

    - Higher Volatility often happens to High-Tech company, and those companies prefer to do repurchase rather than pay dividend when deciding the payout policy, which often increases the valuation.

    - Higher Volatility may attract more speculators, and they will push up the valuation.
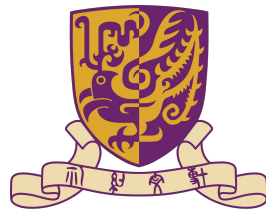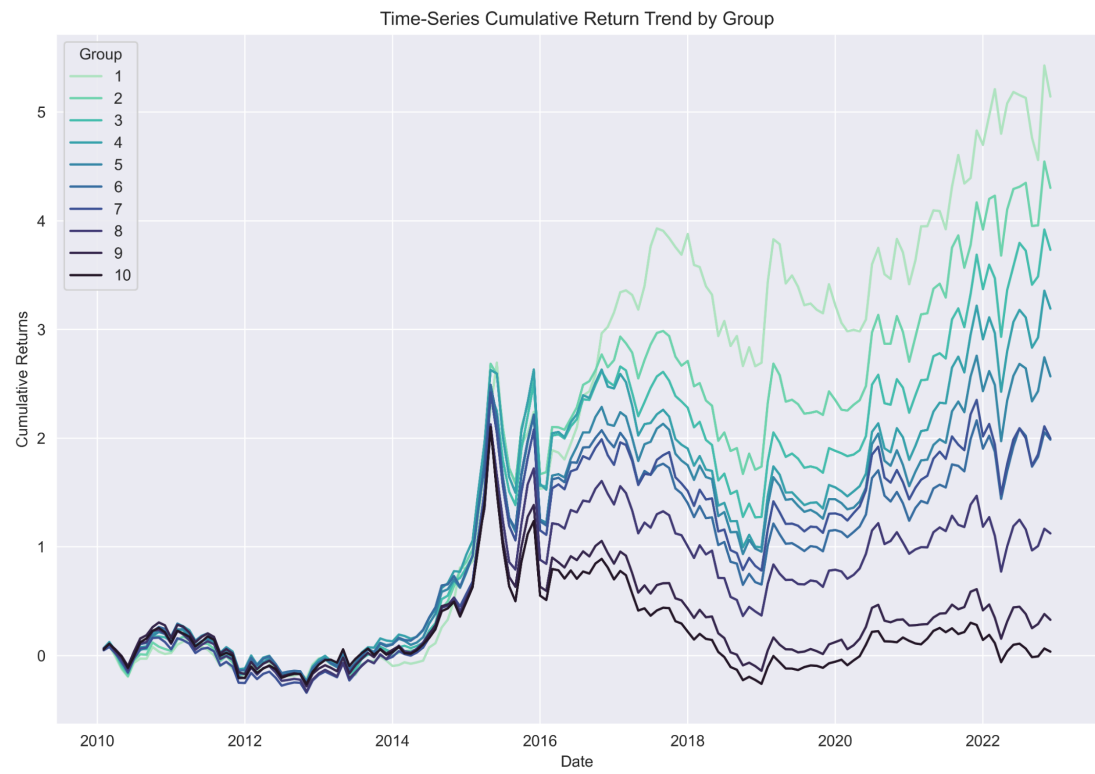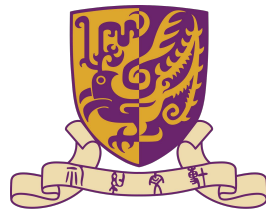
Problem 2

Problem 2-1: Plot the Monthly Return Time-Series for the Ten Portfolios

1. Current Monthly Return

2. Cumulative Monthly Return

Problem 2-2: Discuss Findings based on Time-Series Results

Finding 1

- *Observation*: Group 10(Largest last P/B Ratio)'s monthly return is much more volatile than Group 1(Smallest last P/B Ratio)'s.

- *Analysis*: There are several possible explanations

    - Higher the P/B Ratio, the firm is more likely to be High-Tech company, which has more volatile cash flow, which makes the return more volatile.

    - Higher the P/B Ratio, the firm is more likely to be High-Tech company, which attract some speculators, which makes the return more volatile.

Finding 2

- *Observation*: Starting from 2014, most of the groups have positive cumulative return.

- *Analysis*:

    - Although there exist some risks in the Chinese Stock Market, most of the stocks possess positive returns.

Finding 3

- *Observation*: Starting from 2016, the group with lower P/B Ratio has higher cumulative return.

- *Analysis*:

    - Lower the P/B Ratio, the firm is more likely to be a mature and stable one, which may create more stable and consistent return.