

Comparative Analysis of Interfering Factors of Stock Price Return between Hong Kong and US

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Abstract: Affected by the outbreak of the COVID-19, the factors affecting equity yields will become changed. This paper aims to analyze the financial information that affects stock returns in the HK market versus the US market from four perspectives-market capitalization, yield rates, correlation of major indices and liquidity. Multiple linear regressions were conducted separately for HK and US stocks and used factor analysis as a supplementary part to further explain these two markets. We show experimentally that the US stock market outperforms the HK stock market in terms of the explanatory degree of model. The solvency indicators are a class of common indicator that affects the expected rate of return in HK and US market.

Keywords: Hong Kong market, US market, expected rate of return, financial indicators

1. Introduction

At the beginning of 2020, global economic activity was disrupted by the outbreak of the COVID-19, which triggered a massive sell-off in the markets, resulting in a liquidity crisis and a heavy blow to global stock markets. In the post-epidemic era, the factors affecting equity yields will certainly be different from those of the past.

The use of existing information to predict future changes in a volatile and dynamic financial market is a direction that has been explored by numerous scholars. Determining the factors influencing stock yields has always been a popular topic in the finance field. A large number of economists have won the Nobel Prize in Economics for their theoretical and model innovations on this topic. The Capital Assets Pricing Model proposed by William Sharp and other academics in 1964 pioneered the theoretical precedent [1]. Fama and French have proposed a three-factor and five-factor model based on CAPM successively, which further enriched the influencing factors of the expected rate of return (ROR). At the same time, there are also a number of scholars who focus on the impact of financial information on expected ROR. Graeme found that the relationship between operating leverage and the expected return is actually non-monotonic [2]. Michael, et al. showed statistically significant non-beta risks associated with firm size and book-to-market equity [3]. However, these papers only discussed individual markets and there is little paper comparing two different stock markets.

Therefore, this paper focuses on the financial information affecting stock returns in the Hong Kong (HK) and United States (US) markets in order to make up for the absence in this area.

This paper is organized as follows: Part II presents a comparative analysis of the HK and US markets from four perspectives, market capitalization, yield rates, correlation of major indices and liquidity. The HK stock market sample is drawn from stocks outstanding on the HK Stock Exchange, while the samples selected for the US stock market are from the stocks circulating in the New York Stock Exchange. In the section on the correlation of major indices, the samples are the Hang Seng Index and the S&P 500 Index. All samples were traded from 2019 to 2021 and the invalid values have been excluded. The results show that the US stock market outperforms the HK stock market in terms of market capitalization, yield rates and liquidity. There is a correlation between the HK stock market index and the US stock market index in terms of monthly G/L. In Part III, multiple linear regressions were conducted separately for HK and US stocks, and the final experimental results were analyzed. The HK stock market sample was selected from the top 300 companies listed on the HK Stock Exchange (HKSE) in terms of market capitalization, while the US stock market sample was chosen in the same way on the New York Stock Exchange (NESE). In conducting the multiple linear regressions, the annual share price return of listed companies in year N+1 was selected as the explanatory variables. The explanatory variables are four kinds of financial indicators related to the stock price return in year N: solvency, profitability, growth ability, and capital structure indicators. The solvency indicators for the sample are: Current Ratio, Quick Ratio, Money Funds/Current Liabilities (MF/CL), Operating Profit/Current Liabilities (OP/CL), Operating Profit/Total Liabilities (OP/TL), Net Cash Flow from Operating Activities/ Total Liabilities (NCF from OA/ TL), Equity attributable to shareholders of the parent company/Total liabilities (EASPC/TL), EBITDA/TL, EBIT/interest expense, long-term debt/working capital. The growth capability indicators for the sample are: Year on year growth rate of basic earnings per share (YoY+% basic EPS), Year on year growth rate of net cash flow from operating activities per share (YoY+% NCF from OA PS), Year on year growth rate of total operating revenue (YoY+% TOR), Year on year growth rate of operating revenue (YoY+% OR), Year on year growth rate of net profit attributable to shareholders of the parent company (YoY+% NPASPC), Year on year growth rate of shareholders' equity (YoY+% SE), Year on year growth rate of net cash flow from operating activities (YoY+% NCF from OA). The profitability indicators for the sample are: Gross profit margin of sales (GPMS), Year on year growth rate of gross profit margin of sales (YoY+% GPMS), Net profit margin on sales (NPMS), Year on year growth rate of net profit margin on sales (YoY+% NPMS), Return on net assets (RONA), Year on year growth ROR on net assets (YoY+% RORNA), Net profit margin on total assets (NPMTA), Year on year growth rate of net profit margin on total assets (YoY+% NPMTA). The capital structure indicators of the sample are: Asset liability ratio (AL), Equity multiplier, Equity ratio, Net asset liability ratio (NAL), Current assets / total assets (CA/TA), Non-current assets / total assets (NCA/TA), current liabilities / Total liabilities (CL/TL), non-current liabilities / Total liabilities (NCL/TL). Using the stepwise function of the statistical software, not only were the variables that had a significant effect on the expected return screened, but also ranked according to their degree of influence. Finally, the R² and Durbin-Watson values were used as the criterion for evaluating the goodness of fit (GOF) of the model. The results of the analysis show that, compared with 2019, the GOF of the multiple linear regression models for both markets in 2020 have significantly decreased. In 2019 and 2020, the multiple linear regression model of US stock market is significantly more explanatory than that of HK stock market, and the expected return on US stocks is heavily influenced by solvency. An effective qualitative conclusion can hardly be formed as the model fit for HK stock is too poor. Therefore, the factor analysis in Part IV is used as a supplementary part to further explain the expected returns of the HK and US stock markets. Through a dimensionality reduction, a number of highly correlated financial indicators are clustered together into a few latent

variables, which can reduce both the number of variables needed to be analyzed and the complexity of the problem analysis.

2. Comparative Analysis of Hong Kong and US Stocks

2.1. Market capitalization comparison

According to Table 1, in the case of roughly the same number of companies listed on the HKSE and the NYSE, the NYSE market capitalization is much higher than the HKSE market capitalization from 2019 to 2021. The HKSE market capitalization has been maintained at around 15%-18% of the NYSE market capitalization. We use

$$\text{Warren Buffett Index} = \frac{\text{Total market value}}{\text{GDP}} \quad (1)$$

to make a macro comparison of different stock markets. According to the World Bank data and the corresponding calculations, the Warren Buffett Index value of the HKSE is about 10 times higher than that of the NYSE. This result suggests that the market capitalization of NYSE is still in a reasonable range, but that of the HKSE is on the high side. The difference is caused by the historical level of HK and US stocks. The current HSI valuation is about 13 times, the S&P 500 valuation is about 22 times. It can be seen that the market value of Hong Kong stocks is still low.

Table 1: Market Value Indicators Between HK Market and US Market.

	<i>Number of Listed Companies (Mean)</i>	<i>Total Market Value (Mean) (\$ billion)</i>	<i>Warren Buffett Index</i>
HK Market	2,153	54,737.84	15.29
US Market	2,047	341,535.29	1.56

2.2. Yield comparison - based on HSI and S&P 500 Index

According to public data, the HSI returns in 2019, 2020 and 2021 are 9.07%, -3.40% and -14.08% respectively, while the S&P 500 Index returns are 20.31%, 14.43% and 26.15% respectively. It can be intuitively seen that the return of the US stock market is higher than that of the HK stock market, and the stability of the return of the US stock market is higher than that of the HK stock market.

2.3. Correlation between the HSI and the S&P 500 Index

According to public data, the monthly returns of the HSI and S&P 500 Index for 2019-2021 are used for correlation analysis, and the results are shown in the Table 2. The Pearson correlation coefficient value for the increase and decrease of the two indices is 0.620 and the value is significant at a 1% confidence level. This result indicates that there is a correlation between the HSI and the S&P 500 Index in terms of monthly increase and decrease, and the correlation is high.

Table 2: Correlation Analysis of HSI and S&P 500 Index.

		HSI Chg. (%)	S&P 500 Index (%)
HSI Chg. (%)	Pearson correlation coefficient	1	.620**
	Sig.(two-tailed)		.000
	N cases	36	36
S&P 500 Index (%)	Pearson correlation coefficient	.620**	
	Sig.(two-tailed)	.000	
	N cases	36	36

2.4. Liquidity comparison

The liquidity of a stock market refers to the ability to liquidate the assets of the stocks outstanding in the market and is measured mainly by two dimensions which are time and price. Stock is relatively liquid if it can be bought or sold in a short time at the desired price. We quantify the liquidity of stocks using the Amihud Illiquidity Measure proposed by Professor Amihud in 2002 [4]. According to the formula

$$Amihud = \frac{1}{N} \sum_{t=1}^N \frac{|r_t|}{Q_t/10^6} \quad (2)$$

Where r_t is the daily individual stock return, Q_t is the daily trading amount, N is the number of trading days per year, and Amihud value is negatively correlated with the liquidity of the market. The sample stocks selected for the HK market are all stocks listed on the HKSE, and the sample stocks selected for the US market are all stocks listed on the NYSE, and the time points where the samples are selected are from 2020 to 2021. According to the calculation, the Amihud value of the HK market is about 2.31 in 2020 and about 1.79 in 2021. the Amihud value of the US market is about 0.03 in 2020 and about 0.01 in 2021. the Amihud value of the HK market is higher than that of the US market, so the liquidity of US market stocks is better than that of the HK market. In other words, the liquidity risk of HK market stocks is a bit higher. This is related to the market capitalization. 20% of the stocks in the HK market contribute more than 90% of the liquidity. The entire market liquidity is concentrated in high market capitalization listed companies. The US market has a higher market value and takes advantage of its sufficient capital and sound system. The above reasons have resulted in the good liquidity of the US stock market.

3. linear regression models (stepwise approach)

3.1. Data Comparison In 2019

A total of six financial indicators can have a substantial impact on the expected ROR in the linear regression model for HK market. As shown in Table 3, the model's Durbin-Watson value is 1.937, which is close to 2, indicating that the autocorrelation of the model's independent variables is negligible. It is properly built. CL/TL, Equity ratio, YoY+% SE, Turnover rate, GPMS, and NPMS were rated in order of priority. The first and second indicators are used to assess the company's capital structure. The third indication is used to assess the company's growth potential. The fifth and sixth indicators are used to assess the company's profitability. The model's R^2 is 0.157, indicating that

these six indicators and the beta accounted for 15.7% of the variation in expected returns. In comparison to the regression model for US stocks, the GOF is not as good.

In the linearly regression model for US market, there are a total of 10 financial indicators that have a significant impact on expected ROR. The Durbin-Watson value of this model is 2.187, and the autocorrelation of the model arguments is not obvious. These financial indicators are sorted by the degree of impact on the expected ROR, which are: NPMS, Turnover rate, MF/CL, YoY+% TOR, EBITDA/TL, NCF from OA/ TL, OP/TL, OP/CL, CL/TL, and GPMS. The first and tenth indicators are used to determine profitability. The third, fifth, sixth, seventh, and eighth indicators are used to determine solvency. The fourth indicator is used to determine growth capacity, and the ninth indicator is used to determine the capital structure of businesses. The model's R² is 0.711 in the Table 3, indicating that these ten indicators explain 71.1% of the change in expected ROR, which is much better than the model for HK market.

Table 3: Results of HK Market and US Market Linear Regression Model in 2019.

model	Model summary			
	R	R ²	adj. R ²	Durbin-Watson
HK 2019	0.396	0.157	0.137	1.937
US 2019	0.834	0.711	0.694	2.187

In the model of HK 2019, the impact of capital structure on expected ROR is higher. But the US model is the opposite, with indicators of solvency for the majority of all explanatory variables. The impact of capital structure on expected ROR of US stocks is significantly lower than that of other types of indicators. According to our analysis, there may be the following reasons.

It may essentially be due to fundamental differences in the structure of the stock markets in HK and US. The number of institutional investors in the HK market is smaller than in the US market, and foreign institutional investors dominate the HK stock market.

In 2019, the US was affected by the trade war, economic slowdown, and inversion of US Treasury yields. The shock amplitude of the three major US stock indexes exceeded 20%.

Under the condition of a poor external macro environment, investors may pay more attention to the short-term operating ability of enterprises.

3.2. Data Comparison In 2020

Compared with the model in 2019, the 2020 regression model in the HK market and US market has significantly reduced the GOF. For the HK market, the R² of this model is 0.084, and the Durbin-Watson value is 2.036 in the Table 4. A total of 3 financial indicators has a significant impact on expected ROR. In order of importance, they are CA/TA, GPMS, YoY+% SE. These financial indicators are used to measure the capital structure, profitability, and growth capacity of the enterprise, respectively. Based on the result in Table 4, they can explain the 8.4% change in explained variable. The model's GOF is very poor, indicating that the linear model is no longer usable at this time.

In US model in 2020, R^2 is 0.211 in the Table 4. Compared to HK market model, the GOF is strong. The absolute value of the difference between this number and 2 is the biggest of all linearly regression models, and the Durbin-Watson value for this model is 1.689. This value is slightly low, but within the acceptable range. In this model, a total of four financial indicators has a significant impact on the expected ROR. In order of importance, they are MF/CL, YoY+% OR, OP/TL, and NPMS. Among them, the first and third items belong to the solvency indicator. The second belongs to the growth ability indicator, and the last one belongs to the profitability indicator. With the beta, these four financial measures explain the change in the explained variable of 21.1% in the US market. Compared with the 2019 regression model, this model's GOF is at a low level. In this model, the solvency indicator still occupies a major part of the independent variable. This conclusion is consistent with the 2019 model. Based on linear regression model, solvency should be a type of indicator that investors should focus on when they plan to invest the US market.

Table 4: Results of HK Market and US Market Linear Regression Model in 2020.

model	Model summary			
	R	R^2	adj. R^2	Durbin-Watson
HK 2020	0.289	0.084	0.075	2.036
US 2020	0.460	0.211	0.189	1.689

On the whole, whether it is the HK market or the US market, the GOF of the linear regression model in 2020 has decreased significantly compared with 2019. Due to the spread of the COVID-19, global financial markets have been hit hard. Local market panic will quickly spread to the world, which will exacerbate the liquidity tension and the price of financial assets will fluctuate sharply. In this case, a simple linear model can no longer effectively fit the expected ROR.

4. Factor analysis of HK and US stock market

For the model with poor GOF, this part makes further exploration by using the method of factor analysis. Through dimensionality reduction, the variables with high correlation are gathered together, so as to reduce the number of variables to be analyzed and reduce the complexity of problem analysis.

According to the results of the factor analysis, the value of KMO test statistics for HK stock market is 0.592 and 0.522 respectively in 2019 and 2020. They are all greater than the threshold of 0.5. So, the selected financial accounting variables are suitable for the factor analysis. The significance of Bartlett's test of the above models is 0.000 which is less than 0.05. The variables are relevant and the factor analysis is effective.

Table 5: 2019 HK Total Variance Explained.

Competen t	Initial Eigenvalue		
	Total	Percentag e Variance	Cumulativ e %
1	3.375	19.851	19.851
2	2.495	14.678	34.528
3	1.929	11.346	45.874
4	1.741	10.243	56.117
5	1.2	7.057	63.174
6	1.078	6.34	69.514
7	1.004	5.905	75.419

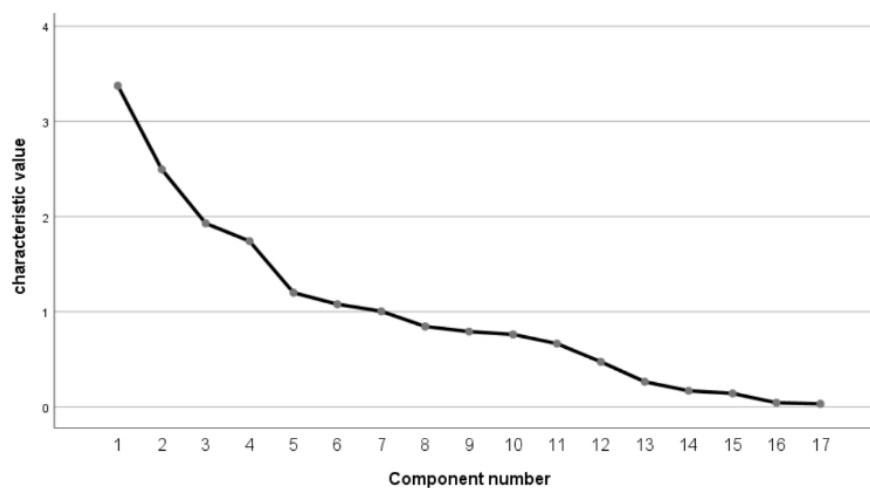


Figure 1: Gravel Map for HK Market in 2019.

As shown in Figure 1, there are seven effective factors. Based on the Table 5, these factors explain 75.419% of the variables. The main component of the first factor originates from solvency indicators and the highest value is 0.916. It can be named as the solvency factor. In the second factor, capital structure and profitability indicators perform better. The maximum value of the indicators exceeds 0.5, so they can be named as long-term operation factors. The third factor with significant performance on growth ability is named the growth factor. The fourth factor, in which the capital structure indicators occupy the principal components, is designated as capital structure factor. The fifth to seventh factors have no particularly prominent indicators, so they are called residual factors.

Based on the Table 6 and Figure 2, there are five effective factors. The contribution rate of these factors to the variable is 75.592%.

Table 6: 2020 HK Total Variance Explained.

Component	Initial Eigenvalue		
	Total	Percentage Variance	Cumulative %
1	3.599	23.996	23.996
2	2.923	19.489	43.485
3	2.177	14.512	57.997
4	1.523	10.15	68.147
5	1.117	7.445	75.592

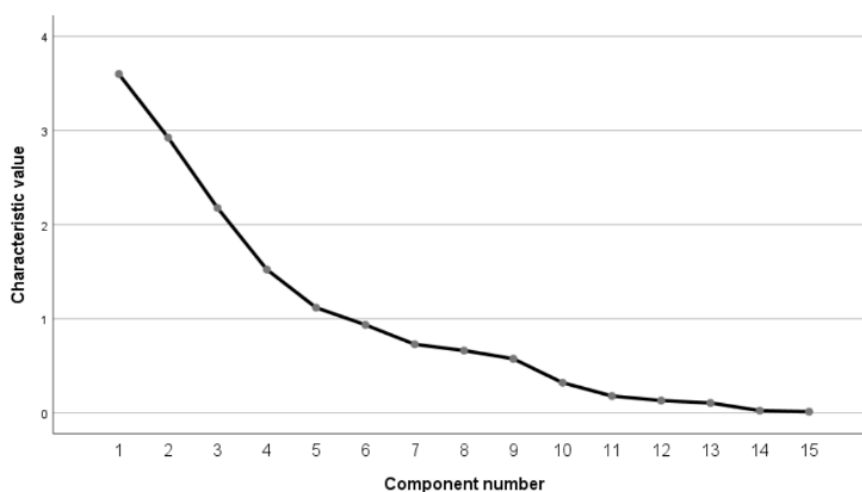


Figure 2: Gravel Map for HK Market in 2020.

The first factor is solvency factor which is similar to the analysis in 2019. The composition of the second and the fourth factor is complex, so they are named complex factor. The third factor is a capital structure factor. In the fifth factor, the performance of trading indicators is more significant, so it is named trading factor.

The value of KMO test statistic for US stock market is 0.653 in 2020 which is higher than the threshold 0.5. The selected financial accounting variables are suitable for the factor analysis. The significance of Bartlett's test of this model is 0.000 which is less than 0.05. The variables are relevant and the factor analysis is effective. Table 7 and Figure 3 are the result of factor extraction and gravel map for US stock market in 2020 respectively. Seven effective factors are extracted. 75.241% of the variables are explained by these factors.

Table 7: 2020 US Total Variance Explained.

Component	Total	Initial Eigenvalue	
		Percentage Variance	Cumulative %
1	4.582	22.912	22.912
2	2.912	14.559	37.471
3	2.226	11.129	48.6
4	1.729	8.646	57.246
5	1.434	7.17	64.416
6	1.101	5.503	69.919
7	1.064	5.322	75.241

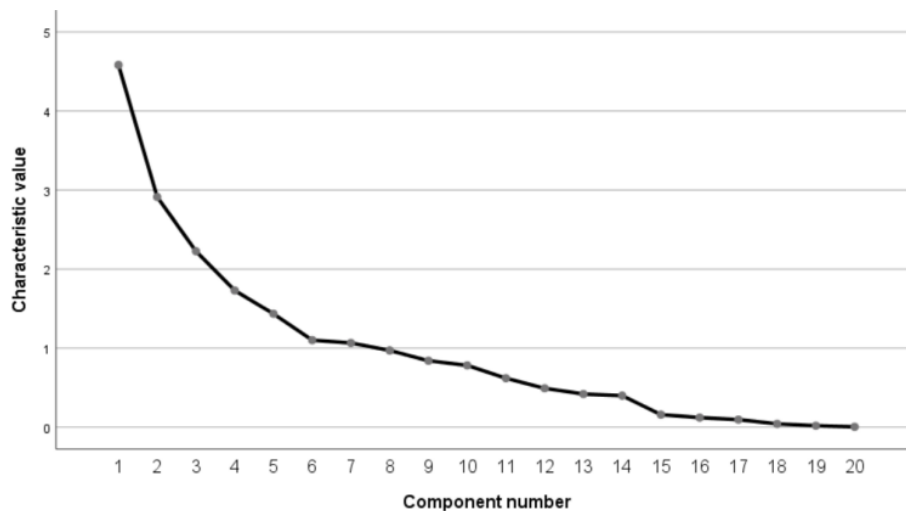


Figure 3: Gravel Map for US Market in 2020.

According to the rotated component matrix, the main component of the first factor is solvency indicators. The second factor is mainly composed of profitability indicators. The third factor and the fifth factor are mostly composed of growth capacity indicators. The third factor is mainly related to the growth capacity indicators of business activities, and the fifth factor is related to shareholders' equity. In the fourth factor, the capital structure indicators are more significant. There are no significant indicators in the sixth and seventh factors, which can be uniformly defined as residual factors.

5. Conclusion

The development of US stock market is relatively mature, which is superior to HK stock market in terms of market value, yield and stock liquidity. Affected by many uncertain factors, the expected ROR of HK market cannot be explained by a simple linear model, but the linear GOF of US stocks in the same period is much better than that of HK stocks. According to the conclusion of the linear fitting and factor analysis models, the solvency indicators are a class of common indicator that affects the expected ROR. Among them, NCF from OA / TL, OP / TL and MF / CL are indicators that need special attention of investors.

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