The Study on Foreign Investment Strategy in Chinese Stock Market: Based on the Empirical Analysis of Foreign Investments Holdings

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The Study on Foreign Investment Strategy in Chinese Stock Market: Based on the Empirical Analysis of Foreign Investments Holdings

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by

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Abstract

This paper focuses on the study of foreign investment style in Chinese stock market. First of all, it will trace the history of development of foreign investment by introducing the Shanghai & Shenzhen Stock Connect and the QFII system, and show that China has attracted a lot of international funds. Secondly, the paper will build a portfolio based on statistical data provided by Wind on individual stocks held by foreign investors, calculate the returns and compare the portfolio with benchmark indexes. By studying the industry allocation, market allocation and individual stock holding weights of the portfolio, the author found that the style of foreign investment is relatively stable, and focuses on company characteristics such as size and sales performance. Then, the paper also conducts an attribution analysis on the returns of the portfolio using Brinson model and multiple factors in Wind, and summarizes the preferences of foreign investors. Finally, the author analyzes the sources of differences between domestic and foreign investment in the A-share market from a qualitative perspective, and finally gives conclusions and investment recommendations.

Keywords: Shanghai & Shenzhen Stock Connect; QFII; Attribution Analysis; Stable Style

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1. Introduction

1.1 Research Background

Starting from 1990s, China has established Shanghai Stock Exchange and Shenzhen Stock Exchange. After that, the size of Chinese stock market kept expanding. Now it has become the second largest market right after the United States. As the globalization accelerated, international investment was increasing, too. In 2002, China formally introduced the QFII system, which was Qualified Foreign Institutional Investor, aiming for attracting more value investors across the world because more long-term investments into the stock market would help domestic investors to have a mature investment philosophy. From 2014, China has started the Shanghai-Hong Kong Stock Connect. On September 2019, People's Bank of China (PBC) and the State Administration of Foreign Exchange (SAFE) canceled the investment quota of QFII and simplified the fund management requirements of foreign investors investing in domestic stock futures. All of these made it easier for foreign investors to expand their investment size, which would have a greater impact on the A-share market.

Now there are two main channels for foreign investors to enter the A-share market: QFII/RQFII and Shanghai & Shenzhen Stock Connect. Below is a brief introduction.

QFII: Investment through QFII needs an intermediary agency. For foreign institutional investors, to enter the A-share market requires the qualification approval of the Securities and Exchange Commission (SEC) and the approval of the quota of the SAFE. Also, foreign currency needs to be converted into RMB, and then domestic commercial banks and brokerages are entrusted as intermediary agencies to make investments in Shanghai and Shenzhen Stock Exchange. QFII/RQFII is only for institutional investors. Individual investors can only make such investments by buying products of institutions. In addition, applying for QFII/RQFII qualification requires a series of procedures. There are also strict requirements on fund custody and operation. (RQFII and QFII are basically similar, the difference is that RQFII needs to raise RMB funds overseas, that is, to obtain offshore RMB funds)

Shanghai & Shenzhen Stock Connect: This channel takes the stock exchange as the main body, and through the mutual declaration between the Shanghai Stock Exchange and the Stock Exchange of Hong Kong, enables clients in HK to declare transaction orders through local brokers to realize cross-border trading. The specific operation method is: The SPV established by the exchanges will accept the buying and selling orders placed by the customers of the two places, and pass the orders to the exchange platform of the other party. After the transaction is executed, it will be confirmed and conveyed to the customers. The exchanges, clearance institution, and regulatory authorities of the two places cooperate with each other to complete the process of

matching transactions and fund clearance. Since the exchanges and clearance of the two places are directly interconnected, institutional investors and brokerages don't have to take a series of qualification procedures as QFII requires. Also, individual investors can use this channel.

According to Wind, by the end of April 2020, 326 qualified foreign institutional investors had been approved for investment quotas of US$111.376 billion; the RQFII system had been expanded from Hong Kong to 20 countries and regions, and a total of 262 RQFII institutions have been approved for investment quotas of RMB 758.772 billion.

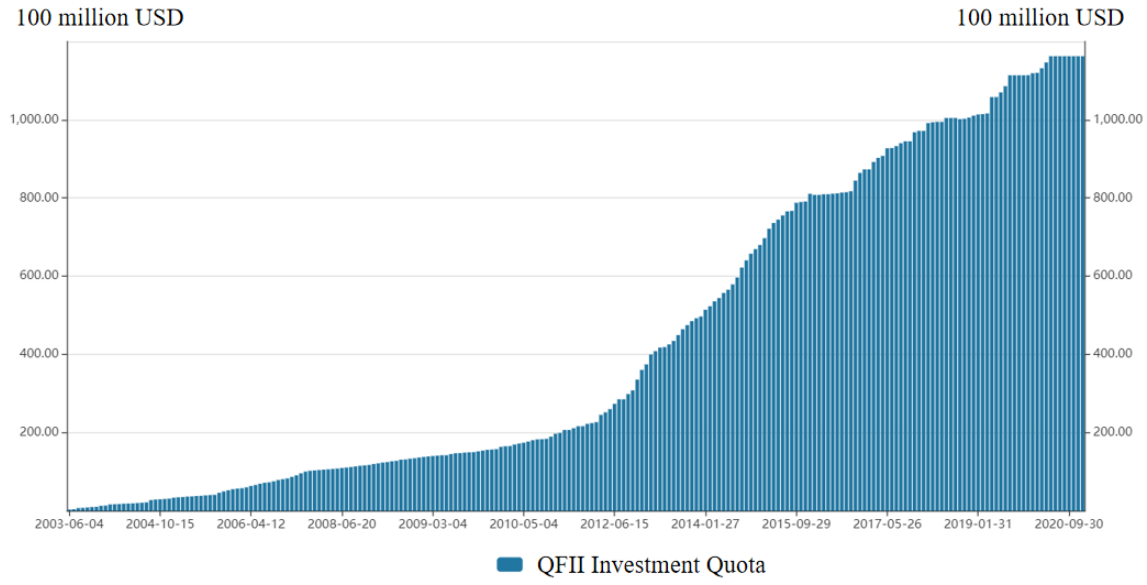

Figure 1:Market Value of QAII's Holding of A-Shares in 100 million USD (2003-2020)

In recent years, foreign investors have continued to add to their positions in A-share. As of May 2020, the market value of QFII's holdings of the A-share had exceeded 150 billion yuan, and the market value of Shanghai&Shenzhen Stock Connect had reached 1478 billion yuan. Total market value of foreign investment holdings raised to 1.6 trillion yuan. Some researchers predict that by the end of 2024, the value of foreign equity holdings will reach 6 trillion yuan, which may exceed that of domestic institutions.

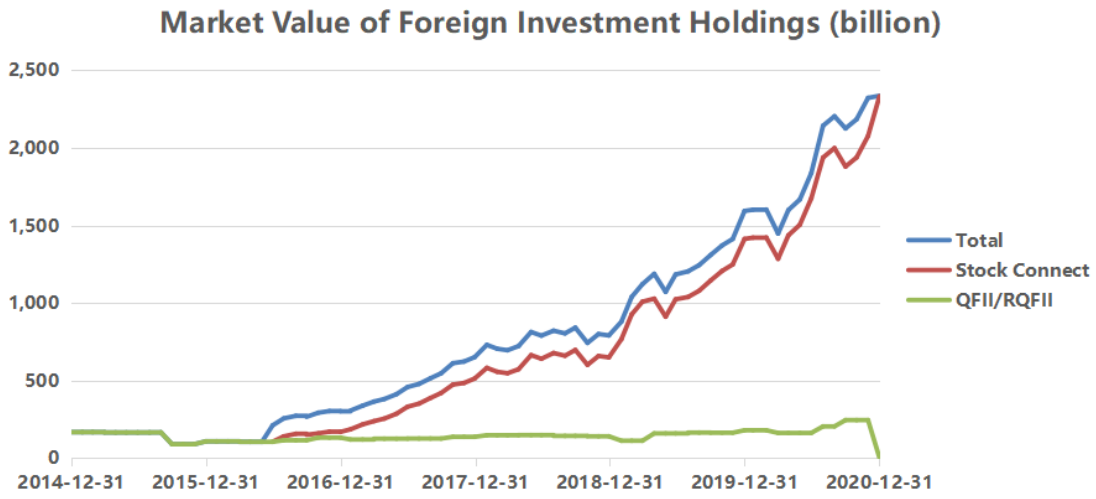

Figure 2: Market Value of Foreign Investment Holdings in billion USD (2014-2020)

It can be seen that the market value of A-share held by foreign investors has been steadily rising, and the growth rate accelerates from 2018. Shanghai & Shenzhen Stock Connect contributed most of the funds. The reasons may be that it has low cost, more flexible mechanism, and similar coverage of investable companies.

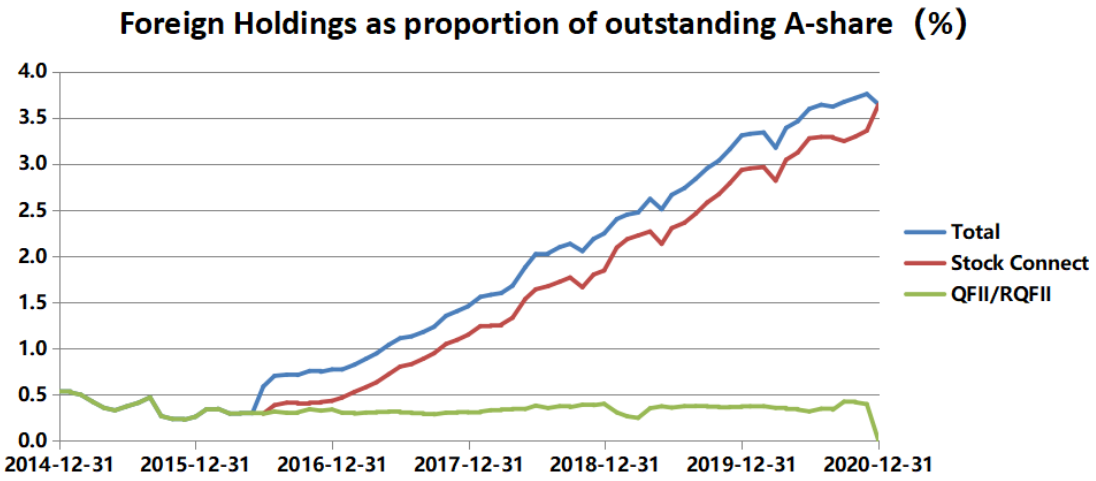

Figure 3: Foreign Holding as Proportion of Outstanding A-Share (2014-2020)

From 2016 to the end of 2020, the market value of foreign holdings in A-share has increased by 3%. With the development of China's economy, more and more international funds will flow into Chinese market, and this proportion will become higher and higher.

Since foreign shareholding has become an important investment force in Chinese capital market and has achieved relatively high returns in the past period of time, it is necessary for us as domestic investors to understand their investment style and stock

selection strategy and find out what we can learn from them.

This paper plans to use the statistical data of foreign investments provided by Wind to construct a portfolio to simulate the foreign holdings and calculate the returns. The author will use Wind common stock fund index (885000.WI), which is calculated based on all stock funds in Chinese market, to represent the returns of domestic institutional investors. The stock returns, market value and other data used to construct the factors are taken from Wind and have been standardized.

The author will first comment on the performance of the simulated portfolio, conduct an attribution analysis on the returns using Brinson and multiple factors in Wind to study the exposure degree of the portfolio on each factor, and then summarize the preferences of foreign investors. Finally, the author will analyze the sources of differences between domestic and foreign investment in the A-share market from a qualitative perspective.

1.2 Literature Review

1.2.1. Study on Foreign Investment Itself

In the past, many researchers studied the behaviors of foreign investors entering new rising stock market. By the empirical analysis of foreign investment entering Japanese market from 1975 to 1991, Kang & Stulz (1997) found that foreign investors preferred large-sized companies in the manufacturing sector and focused on the characteristics such as sales performance, low leverage, high BM ratio and low unsystematic risk.

Also, Choe, Kho & Stulz (2001) and Dvořák (2005) mentioned that, since foreign investors had less information about domestic stock market and some companies than domestic investors, they were often at a disadvantaged positions which might affect their investment decisions. Therefore, Ferreira & Matos (2008) discovered that foreign institutional investors, regardless of their regions, had a preference towards large-sized companies with no controlling shareholder. Also, they tended to invest in companies within countries and regions which had a stricter disclosure standard. Such conclusion is similar to what Covrig et al. (2006) found out: foreign institutional investors preferred companies with higher information transparency.

Grinblatt & Keloharj (2000) studied the market data of Finland and discovered that foreign investors were usually momentum investors. This meant that they tended to long shares that beat the market in the past and short shares with bad performance, while domestic investors did the opposite. Even if the researchers controlled the behavioral differences, foreign investors outperformed domestic individual investors.

1.2.2. Effects of Foreign Investment on the Domestic Capital Market

Existing literature has enough study about the effects of QFII on the domestic market. Main areas of study include information asymmetry and volatility.

Information asymmetry: Kim et al. (2019) found that, by studying Korean market, foreign institutional investors could reduce the degree of information asymmetry to a certain extent. Hung & Tseng (2009) also came up with a similar conclusion when analyzing the Taiwan stock market data: the QFII system alleviated the stock market information asymmetry and the agency problem of listed companies.

Volatility: Scholars have different views about the impact of foreign investments on the volatility of the domestic stock market. Some of them believe that foreign investments are helpful to reduce the volatility of the domestic stock market. For example, Holmes & Wong (2001) asserted that that foreign institutional investors were often able to make more rational investment behaviors, thereby alleviating the influence of noise traders and reducing the volatility of stock market returns. However, when Elsiefy & Abdelaal (2017) studied the investors' behaviors in the Qatar stock market, they found that foreign institutional investors showed stronger herding behavior, and such behavior increased the volatility of the stock market.

1.2.3. QFII in Chinese A-share Market

Scholars have studied the overall return of foreign investments in Chinese stock market as well as the company-level stock return. Han, Zheng, Li & Yin (2015) found that foreign institutional investors have reduced volatility and acted as market stabilizers as China gradually opened the capital market. On the contrary, domestic institutional investors have exacerbated stock market volatility. At the company level, Chen, Du, Li & Ouyang (2013) stated that foreign institutional investors increased the volatility of company stock returns, while foreign individual investors reduce the volatility of company stock returns. Their empirical analysis also showed that there was a positive correlation between domestic shareholding (individuals, institutions, and governments) and the volatility of company stock returns.

The research literature on QFII shareholding style is also relatively sufficient. The China Research Institute of Listed Companies conducted a research which found that QFII paid more attention to industry safety than public offerings, and was more likely to choose traditional industries that were less affected by macro-economic control. According to the 2010-2015 annual report, the top five industries of QFII's holdings were banks, pharmaceuticals and biology, food and beverage, transportation, and household appliances. Most of foreign investors chose companies with low PE and high dividends. These characteristics reflected QFII's risk aversion and conservative investment philosophy.

2. Data

2.1 Data Source

This paper plans to use the statistical data of foreign investments provided by Wind to construct a portfolio to simulate the foreign holdings and calculate the returns. The author will use Wind common stock fund index (885000.WI), which is calculated based on all stock funds in Chinese market, to represent the returns of domestic institutional investors.

The stock returns, market value and other data used to construct the factors are taken from Wind and have been standardized.

2.2 Expected Conclusion

Preliminary empirical analysis shows the robustness of foreign investments style and preference towards companies with good performance and large size. When it comes to individual stock selection, foreign investors would tend to choose companies with relatively low valuation, high profitability, large size and low volatility. Since overseas markets are more mature and effective as market participants are mostly institutions. they have longer investment periods and more reasonable expected returns on stocks. Thus they have a stronger ability to find undervalued great companies. Though we have assumed that the foreign investment style will benefit more from the value factor and the market value factor, further analysis is necessary.

In addition, the Chinese market is still greatly affected by technical factors (such as momentum) because more market participants are still individual investors.

3. Empirical Analysis of Investment Strategies of Foreign Investors

3.1 Research Range

This paper will use the statistical data of foreign investments provided by Wind to construct a portfolio of foreign investments. There will be one portfolio reallocation every year. The time period is from Dec 31st 2015 to Dec 31st 2020.

3.2 Portfolio Overview

The portfolio of foreign investment gained an absolute return of 265.38% from the start of 2016 to the end of 2020. The yearly return is 29.47% and the maximum drawdown is 25.09%. The Sharpe ratio is 1.37. The following gives the portfolio value against different Chinese equity benchmark indexes.

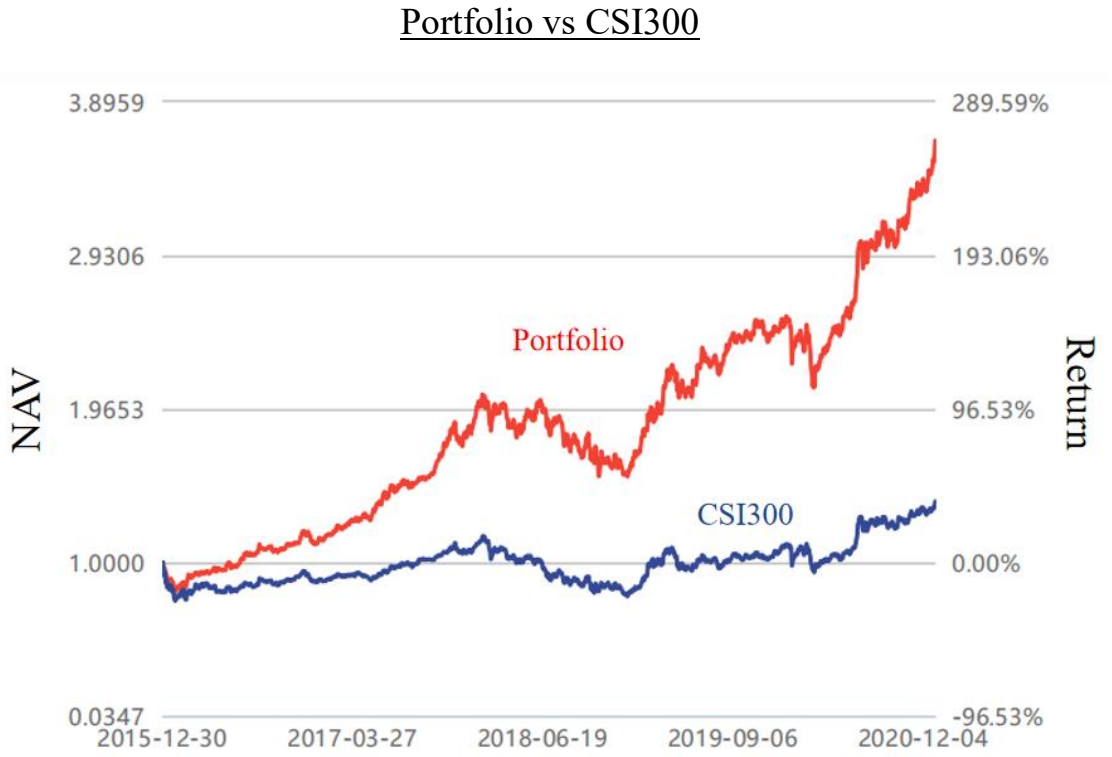

Figure 4: Relative Return of Portfolio vs CSI300 Index (2015-2020)

The portfolio beats the CSI300 Index by a relative return of 226.97%.

Portfolio vs CSI500

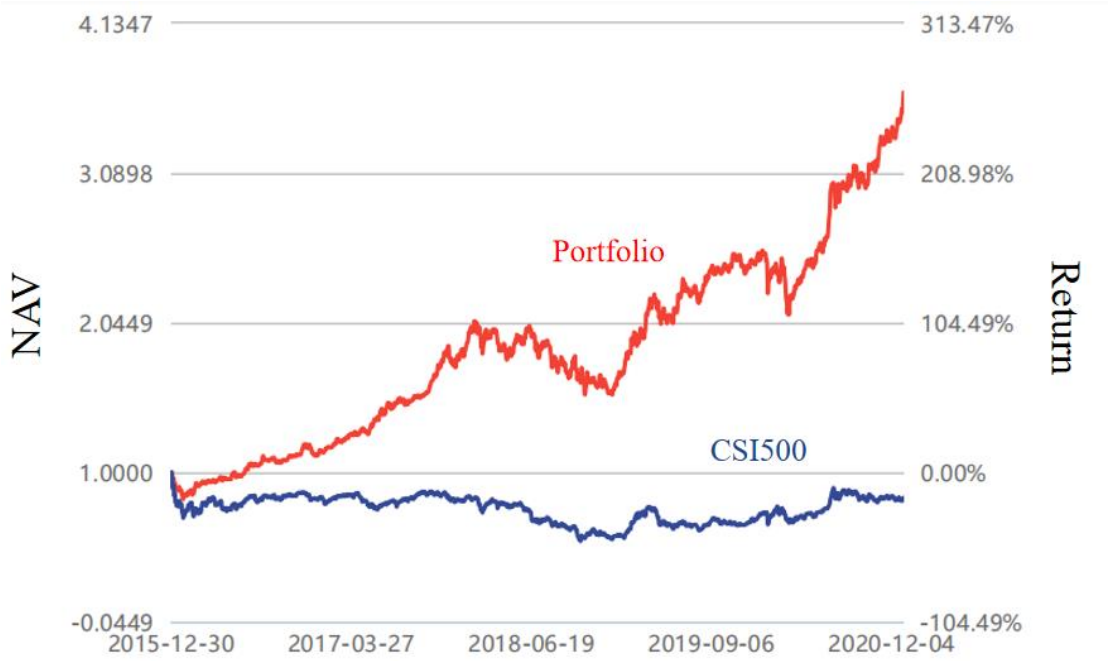

Figure 5: Relative Return of Portfolio vs. CSI500 Index (2015-2020)

The portfolio beats the CSI500 Index by a relative return of 283.14%.

Portfolio vs Fund Index

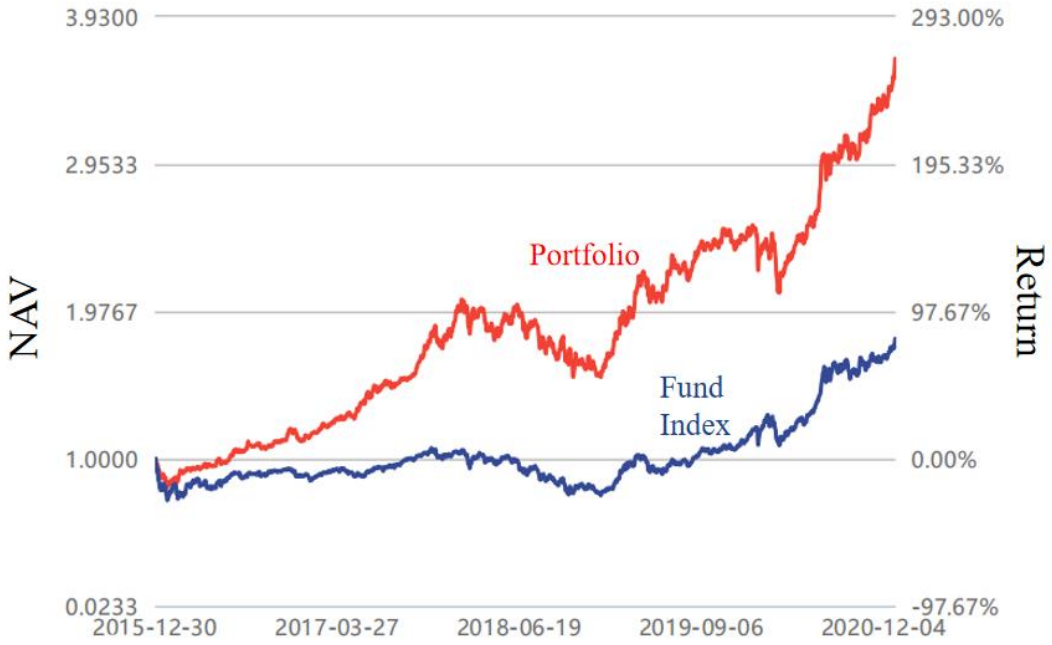

Figure 6: Figure 4: Relative Return of Portfolio vs Fund Index 2015-2020)

The portfolio beats the Wind common stock fund index by a relative return of 185.77%.

CSI300 (沪深 300) Index Introduction:

The CSI 300 Index is composed of 300 stocks with large market capitalization and great liquidity in the Shanghai and Shenzhen Stock Exchange. CSI300 reflects the overall performance of the listed stock prices of the Chinese A-share market.

Table 1: CSI300 Index Top 10 Weighted Stocks Sample

Ticker	Name	Weight	Circulated Market Value (100 million)	Industry
600519.SH	Kweichow Moutai	5.13%	11,385.29	Daily Consumption
601318.SH	Ping An Insurance	4.50%	8,036.11	Finance
600036.SH	CMBC	3..06%	6,733.79	Finance
000858.SZ	Wuliangye	2.75%	4,508.59	Daily Consumption
000333.SZ	Midea Group	2.25%	4,080.42	Consumer Discretionary
600276.SH	Hengrui Medicine	1.83%	2,881.91	Healthcare
601166.SH	Société Générale	1.78%	3,600.13	Finance
601888.SH	China Duty Free Group	1.55%	2,851.30	Consumer Discretionary
000651.SZ	Gree	1.43%	2.852.05	Consumer Discretionary
601012.SH	Longigroup	1.42%	2,445.16	Information Technology

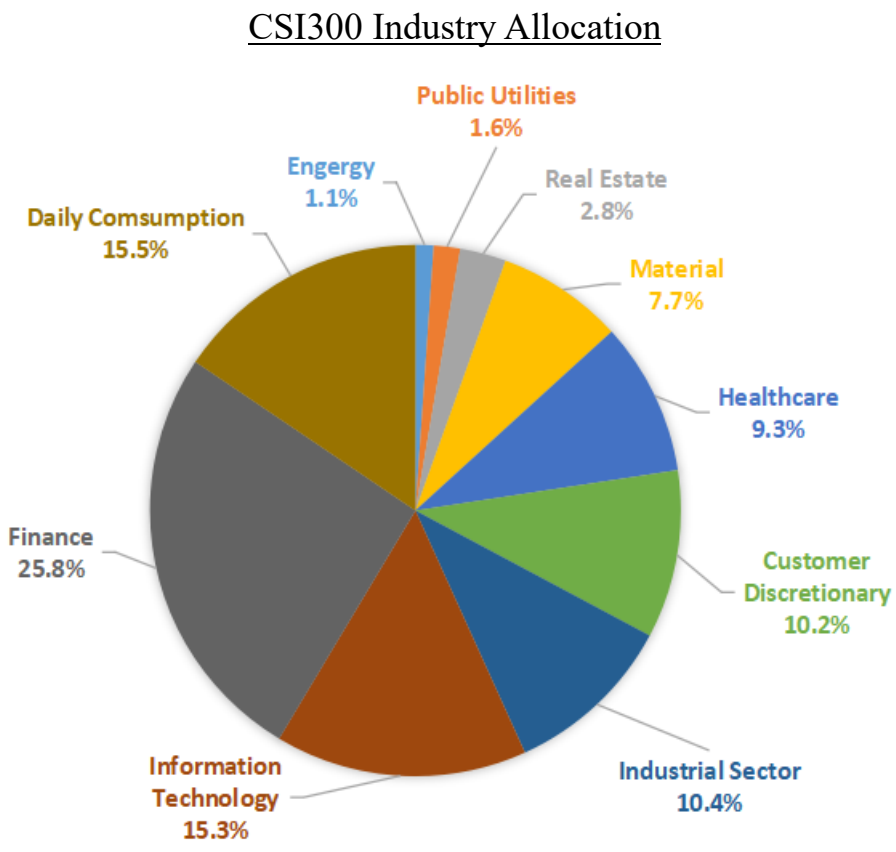

Figure 7: CSI300 Industry Allocation (in %)

CSI500 (中证 500) Index Introduction:

The CSI 500 Index is composed of the top 500 stocks ranked by market capitalization after excluding the constituent stocks of CSI300 Index and the top 300 stocks by market capitalization from all A-shares. CSI500 reflects the stock price performance of small and medium-sized companies in the Chinese A-share market.

Table 2: CSI 500 Index Top 10 Weighted Stock Sample

Ticker	Name	Weight	Circulated Market Value (100 million)	Industry
300274.SZ	Sungrow Power	1.56%	649.32	Industrial Sector
600426.SH	Hualu-Hemgsheng	0.86%	418.64	Material
600143.SH	Kingfa Science & Technology	0.80%	415.18	Material
600089.SH	TBEA	0.80%	346.21	Industrial Sector
601233.SH	Tongkun Group	0.73%	349.58	Material
300012.SZ	CTI-Cert	0.72%	345.16	Industrial Sector
002074.SZ	Guoxuan High-Tech	0.67%	364.63	Industrial Sector
603882.SH	KingMed	0.67%	295.64	Healthcare
300496.SZ	Thundershoft	0.63%	344.14	Information Technology
300285.SZ	Sinocera	0.61%	284.88	Material

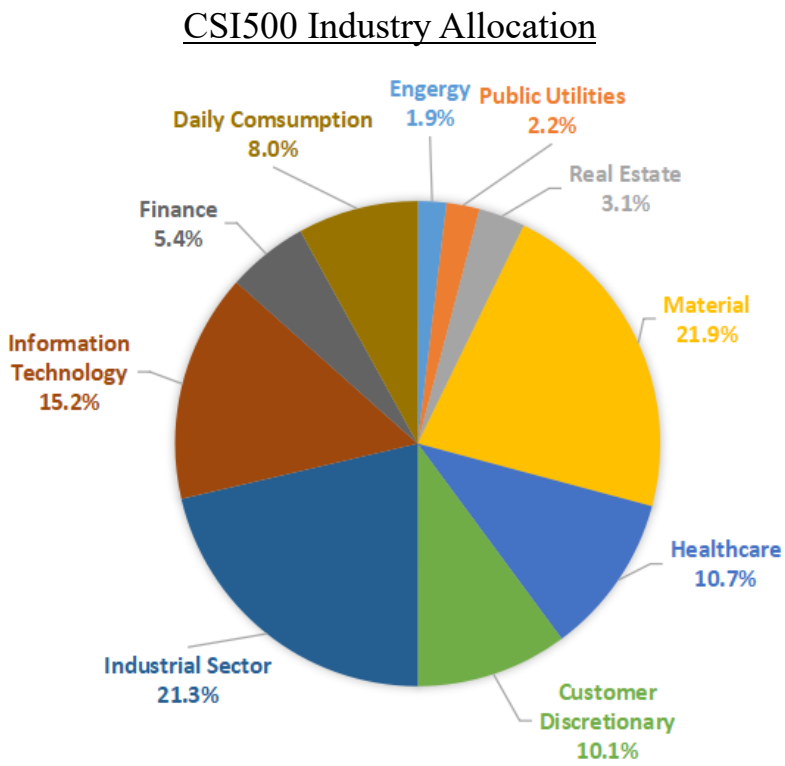

Figure 8: CSI5000 Industry Allocation (in %)

Introduction to Common Stock Fund Index:

This index is issued by Wind Information, with the index code of 885000.WI, and it includes common stock funds in China. It definition is as follows: taking stock investment as the principal thing, the minimum proportion of equity assets such as stocks to fund assets is greater than or equal to 60%, or the type of fund is specified in its fund contract and fund prospectuses as stock type. The fund name defined by the company or abbreviation contains "stock" and other words, then the secondary classification is the common stock fund. Besides, a sample of the new fund will be added three months after its issuing.

Wind Fund Return Index is calculated by the equal weight of Compound Weighted Net Return, that is, it is by the equal weight of Compound Weighted Net Return of the calculation frequency of index sample funds. The calculation of the index takes into account the reinvested income of the dividends.

$$WFI_t = \frac{1}{N_t}\left(\sum_{i=0}^{N_t}\frac{CNAV_{i,t}}{CNAV_{i,t-1}}\right) \times WFI_{t-1}$$

WFI_t is the index value at time t;
WFI_{t-1} is the index value at time t-1;
N_t is the number of constituent funds of the index at time t;
$CNAV_{i,t-1}$ is the compound weighted net value corresponding to fund i at time t-1.

Overall, the portfolio outperformed CSI300, CSI500 and the Wind common stock index in the past five years. This means the simulated foreign investment portfolio achieved excess returns compared to the market and domestic institution investors.

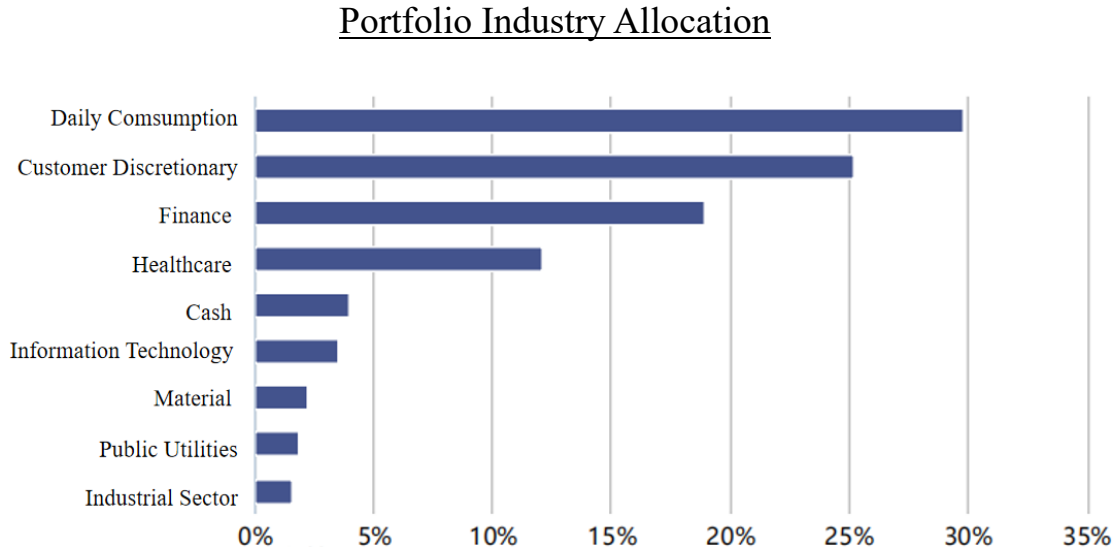

Figure 9: Foreign Investment Portfolio Industry Allocation (in %)

Table 3: Foreign Investment Portfolio Top 10 Stock Held

Stock	Market Value Held (100 million RMB)	Weight	PE (TTM)
Kweichow Moutai	2045.20	15.20%	56.30
Midea Group	1403.35	10.43%	27.75
Hengrui Medicine	1239.71	9.21%	101.56
Wuliangye	979.29	7.28%	58.38
China Duty Free Group	747.15	5.55%	153.29
Ping An Insurance	712.52	5.30%	12.94
Gree	598.86	4.45%	22.89
Bank of Ningbo	507.74	3.77%	14.88
CMBC	447.11	3.32%	12.02
Haitian-Food	377.48	2.81%	106.72

From the perspective of industry allocation, foreign investors focus on the consumption (liquor & household appliances) and financial (banks) industry.

Also, it can be seen that foreign investors prefer the 'blue chip' stocks such as Moutai, Midea, Hengrui and so on. The stocks with high weights usually have the characteristics of high sales performance and large size.

3.3 Industry Allocation & Brinson Attribution Analysis

Brinson Model is the most commonly used performance decomposition model, which was put forward by Brinson and Fachler (1985). In this model, the excess return of portfolio returns relative to performance benchmark returns is divided into three effects, including allocation effect, selection effect, and interaction effect.

Allocation Effect: It can be understood as an index to evaluate the investment managers' industry allocation ability. The larger the value is, the stronger the industry allocation ability will be.

Selection Effect: It can be understood as an index to evaluate the investment managers' industry selection ability. The larger the value is, the stronger the industry selection ability will be.

Interaction Effect: It refers to the remaining unexplained factors after excluding the allocation effect and selection effect from the total effect.

Here we adopt the multiperiod model - arithmetic average, and the algorithm is described as follows:

Suppose a stock portfolio is divided into M subdivided asset classes (such as industries, or even individual stocks), then the return contribution of category *i* will be

$$a_{i,1} = w_{i,0} \times r_{i,1}$$

Where $w_{i,0}$ is the initial weight, $r_{i,1}$ is the return of the first period (the return can only be calculated across two periods).

The return contribution of the two periods is as follows:

$$a_{i,2} = a_{i,1} + w_{i,1} \times r_{i,2}(1 + R_{p,1})$$

The cumulative return over the two periods due to category i denoted by $a_{i,1,2}$ is

$$a_{i,1,2} = a_{i,1} + a_{i,2}(1 + R_{p,1})$$

The cumulative return between Period 1 and Period n due to category i is

$$a_{i,1,n} = \sum_{k=1}^{n} a_{i,1}\left(1 + R_{p,k}\right) = \sum_{k=1}^{n} a_{i,1} \prod_{j=1}^{k-1}\left(1 + R_{p,j}\right)$$

Where $R_{p,k}$ represents the compound return in k-1 period. The function of the third factor $(1+R_{p,k})$ is to transmit the effect of the total return of the portfolio to each category, and the advantage is that the arbitrary attribution effect can be decomposed for all types of multiperiod assets. On this basis, the multiperiod Brinson industry attribution framework can be expressed as follows:

Table 4: Multiperiod Brinson Industry Attribution

	Return $r_{p,i}$ on Portfolio Industry i	Return $r_{b,i}$ on Portfolio Industry i
Weight $w_{p,i}$ of Portfolio Industry i	$\sum_{k=1}^{n} a_{i,1} \prod_{j=1}^{k-1}\left(1 + R_{p,j}\right)$	$\sum_{k=1}^{n} a_{i,1} \prod_{j=1}^{k-1}\left(1 + R_{aa,j}\right)$
Weight $w_{b,i}$ of Portfolio Industry i	$\sum_{k=1}^{n} a_{i,1} \prod_{j=1}^{k-1}\left(1 + R_{ss,j}\right)$	$\sum_{k=1}^{n} a_{i,1} \prod_{j=1}^{k-1}\left(1 + R_{b,j}\right)$

R notations represent previous compound returns of the actual fund portfolio, active asset allocation portfolio, active stock selection portfolio, and benchmark portfolio, respectively.

With this method, the asset allocation effect, stock selection effect and interaction effect at the fund level can be calculated in the same way as the single-period Brinson model, and more importantly, the attribution analysis can be decomposed into the dimension of subdivided portfolio assets, such as industry or individual stock. However, there are some limitations with the Brinson model. Frongello (2002) showed that Brinson model only compounds the single-period selection results earned over the portion of the portfolio that has grown due to selection alone. This is flawed because single-period attributes compound over the total cumulative return of the portfolio. The selection (same for allocation) could then be understated.

According to Wind Primary Industry Category, we will conduct the Brinson Attribution Analysis to the portfolio (Benchmark: CSI300).

Table 5: Final Weights

	Final Weights		
Category	**Portfolio**	**Benchmark**	**Portfolio - Benchmark**
Material	2.20%	6.45%	-4.25%
Telecommunication	0.00%	0.25%	-0.25%
Real Estate	1.04%	2.76%	-1.72%
Industrial Sector	1.55%	9.94%	-8.39%
Public Utilities	1.82%	1.67%	0.15%
Finance	18.90%	26.52%	-7.62%
Consumer Discretionary	25.18%	10.56%	14.62%
Energy	0.00%	1.08%	-1.08%
Daily Consumption	29.82%	15.83%	14.00%
Information Technology	3.47%	15.48%	-12.02%
Health Care	12.08%	9.45%	2.63%
Other	0.00%	0.00%	0.00%
Cash	3.94%	0.00%	3.94%

Table 6: Return

	Return		
Category	**Portfolio**	**Benchmark**	**Portfolio - Benchmark**
Material	215.01%	42.59%	172.42%
Telecommunication	0.00%	-40.69%	40.69%
Real Estate	-7.66%	-10.12%	2.47%
Industrial Sector	220.94%	-8.68%	229.62%
Public Utilities	61.37%	-21.45%	82.82%
Finance	73.06%	16.64%	56.42%
Consumer Discretionary	234.53%	55.96%	178.57%
Energy	0.00%	-23.92%	23.92%
Daily Consumption	551.35%	364.55%	186.80%
Information Technology	106.17%	35.63%	70.54%
Health Care	472.21%	108.32%	363.88%
Other	0.00%	6.92%	-6.92%

Table 7: Cumulative Return Contribution

	Cumulative Return Contribution		
Category	**Portfolio**	**Benchmark**	**Portfolio - Benchmark**
Material	6.20%	2.58%	3.61%
Telecommunication	0.00%	-0.33%	0.33%
Real Estate	-0.33%	-0.45%	0.12%
Industrial Sector	7.21%	-1.43%	8.64%
Public Utilities	3.26%	-0.91%	4.16%
Finance	28.61%	5.18%	23.44%
Consumer Discretionary	63.00%	5.33%	57.67%
Energy	0.00%	-0.63%	0.63%
Daily Consumption	114.35%	17.28%	97.06%
Information Technology	8.80%	5.69%	3.11%
Health Care	34.14%	6.13%	28.01%
Other	0.00%	0.01%	-0.01%

Table 8: Brinson Attribution Analysis

	Attribution Analysis			
Category	**Allocation Effect**	**Selection Effect**	**Interaction Effect**	**All Effects**
Material	-0.76%	11.28%	-6.91%	3.61%
Telecommunication	0.33%	0.33%	-0.33%	0.33%
Real Estate	0.12%	-0.22%	0.22%	0.12%
Industrial Sector	0.72%	26.65%	-18.74%	8.64%
Public Utilities	0.76%	3.44%	-0.04%	4.16%
Finance	-3.46%	28.84%	-1.94%	23.44%
Consumer Discretionary	12.34%	21.42%	23.91%	57.67%
Energy	0.63%	0.63%	-0.63%	0.63%
Daily Consumption	37.26%	23.05%	36.76%	97.06%
Information Technology	-5.19%	21.38%	-13.07%	3.11%
Health Care	4.36%	17.86%	5.79%	28.01%
Other	-0.01%	-0.01%	0.01%	-0.01%
Cash	0.00%	0.00%	0.00%	0.00%
Total	47.10%	154.65%	25.03%	226.78%

From the above tables:

1. Allocation Effects: The portfolio gives more weights to daily consumption, customer discretionary and financial industry. Since the first two have higher allocation effects, such choice is successful. However, the allocation effect of the financial industry is lower as it is not driving the expected return.
2. Selection Effects: Industrial sector, finance, customer discretionary and IT industries all have relatively high selection effects, which means foreign investors have stronger stock selection ability in these industries.
3. All Effects: Heavy investments in daily consumption, customer discretionary and healthcare industries are successful. Also, foreign investors have strong stock selection abilities within these industries. Though the allocation effect of the financial industry is lower, the stock selection within this industry is strong.

3.4 Wind Factor Analysis

The author will conduct the Factor analysis to the portfolio (factors and sub-factors in Wind Database) and study the exposure of the portfolio on each factor and compare with the benchmark.

Exposure value of style factor = weighted average of factor values of each constituent stock within the research range

The specific formula is as follows: Factor exposure value = SUM [at the time T of portfolio reallocation date, SUM (the factor value of each constituent stock within the research range * the corresponding weight of constituent stock)] / the number of portfolio reallocation date.

Meaning: Specify the research scope or study the bias of each style factor in the market within a specified time frame.

It is mainly to compare the exposure differences between factors with same style factor in different research markets. For example, the growth style exposure in CSI 500 is generally greater than that in Hushen300. It can be considered that the constituent stocks in CSI 500 are more prone to grow than those in CSI 300.

Style contribution rate = the factor coefficient of each constituent stock within the research range obtained through the single-factor regression algorithm, namely, style factor contribution rate.

Meaning: The influence brought by a change in the value of 1 factor per unit within a specified period of time and specified research scope or research market on the earnings of the next period (regression coefficient), so we call this regression coefficient as the contribution rate. Here, a five-bit box chart is used to show the time sequence chart of style factor contribution rate, so that you can easily check the average contribution rate of a factor (median line of a box). The possible maximum return of a factor (Upper line of a box) and the possible minimum return of a factor (Lower line of a box) are shown in the chart below.

The following is a description of the single factor analysis algorithm:

1. De-Extremalization

The median de-extremalization method, also known as the MAD de-extremalization processing method, is used to pull back the data that deviates from the median by 5 times. The median absolute deviation MAD) is more robust to outliers than a standard deviation. When calculating the standard deviation, the distance between data points and their mean value is required to be squared, so the influence of deviation on points with more serious deviation is aggravated, that is to say, the outliers seriously affect the solution of standard deviation. Therefore, the median extremum method can be used to better measure and correct the outliers. (Default N=5)

$$new\_x_i = \begin{cases} md + N * x_{\text{MAD}}, & if\ x_i > md + N * x_{\text{MAD}} \\ md - N * x_{\text{MAD}}, & if\ x_i < md - N * x_{\text{MAD}} \\ x_i, & if\ md - N * x_{\text{MAD}} < x_i < md + N * x_{\text{MAD}} \end{cases}$$

Where md = median (x_i, i = 1, 2, ..., n)

x_{MAD} = median ({$|x_i - md|$, i = 1, 2, ..., n})

2. Filling Up the Missing Value

Replace it with the median of the portfolio industry: in a certain time section, select the stocks in the same industry that lack the factor data in the portfolio, calculate the median of the factor sequence of these stocks, and fill up the missing value with the median.

3. Neutralization of Industry and Market Capitalization

In general, the earnings performance of a factor is usually affected by other factors, of which market capitalization and industry are common influencing factors. For example, the price to book ratio is highly correlated with market capitalization. In this case, if we use the price to book ratio without neutrality of market capitalization, the results of stock selection will be relatively concentrated. Meanwhile, the price-to-book ratio of

sunrise and sunset industries also has certain characteristics in general, that is to say, industries also affect the valuation factor, so the results we obtain have some redundant preferences.

There is a correlation between the factors, which leads to a repeated exposure when the factors are used for income interpretation. Therefore, it is necessary to minimize the correlation between the factors by means of neutralization.

Here, linear regression is adopted. Regression is the most commonly used method when doing market capitalization and industry neutralization, and its main principle is to obtain a factor that has no linear correlation with industry and market capitalization, that is, through the establishment of the linear regression, the original factor value is used as the dependent variable, market capitalization and industry dummy variables are used as independent variables for regression, and the residual extracted is used as a new factor after neutralization. Of course, it can only choose the industry or market capitalization for neutralization (regression). After this treatment, the linear correlation between the neutralization factor and the industry and market capitalization factors is 0. The calculation formula is as follows:

$$x_i = a_i \mathrm{mkt}_i + b_{i,k} \mathrm{ind}_{i,k} + \varepsilon$$

$$new\_x_i = \varepsilon$$

Where a_i is the regression coefficient of logarithmic market capitalization factor mkt_i; $b_{i,k}$ is the regression coefficient of industry factor $ind_{i,k}$; k is the industry serial number of the individual stock. The reason why we take logarithmic market capitalization is that we want the market capitalization to be close to a normal distribution, so that the regression can be more accurate.

4. Standardization

Factor data of stocks measure the information of stocks from different dimensions. Without unified dimensionality processing, it is impossible to truly and accurately reflect the information hidden in factor data, and there is no comparability between some indexes. Therefore, before the analysis, the data needs a standardized processing and unified dimension.

In this paper, the weighted normalization method is adopted, and the weighted logarithmic circulation market capitalization (MKT) can better reflect the risk exposure of stocks to the benchmark stock pool. The calculation formula is as follows:

$$\mu = \frac{\sum_{i=1}^{n} \mathrm{mkt}_i \times x_i}{\sum_{i=1}^{n} \mathrm{mkt}_i}, \sigma = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \mu)^2}{n-1}}$$

$$new_{xi} = \frac{x_i - \mu}{\sigma}, i = 1, 2, \cdots, n$$

Where μ is the weighted mean of the market capitalization of the individual stock factor data, which can make the return of the weighted portfolio of the market capitalization overexpose to almost 0 in all style factors; σ is an equal-weighted standard deviation, which prevents large-cap stocks from having an excessive effect on the overall factor exposure.

General Factor Category

Analysis Result: Diagram

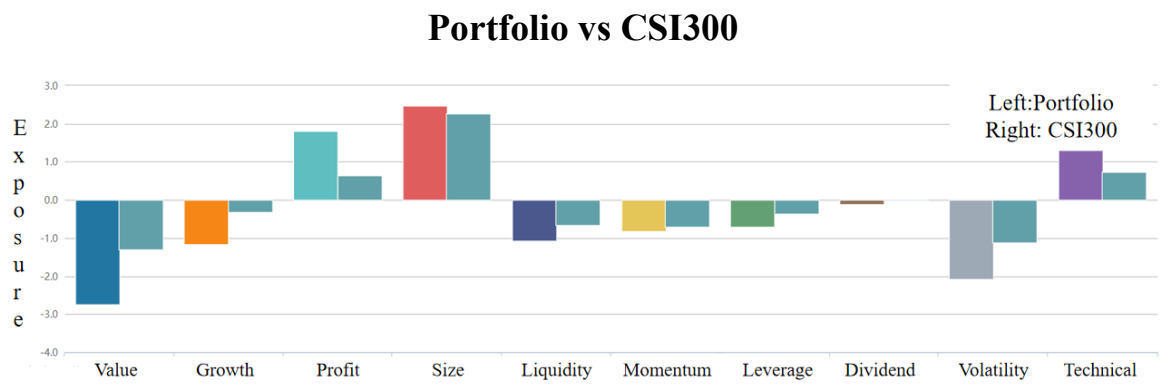

Figure 10: Foreign Investments Factor Exposure in Comparison with CSI300 Index

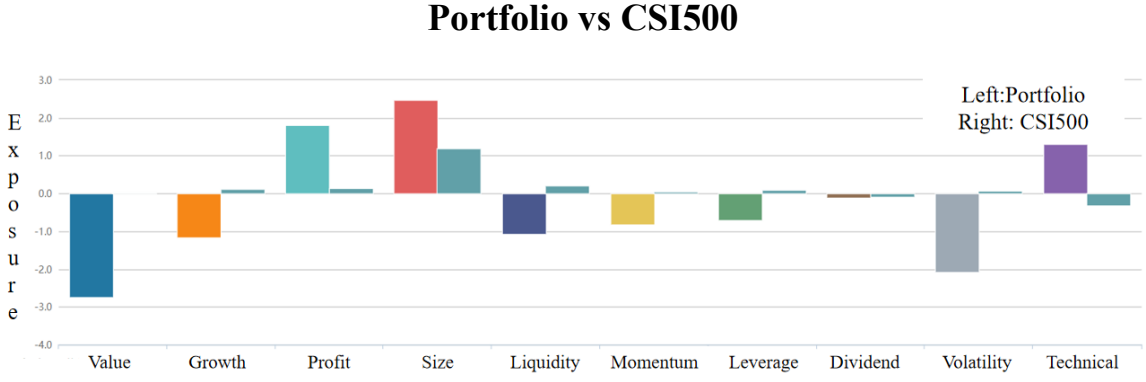

Figure 11: Foreign Investments Factor Exposure in Comparison with CSI500 Index

Note: Due to translation, 'value' here means valuation factor. High valuation usually means high stock price relative to EPS or net asset.

Analysis Result: Tables

Table 9: Foreign Investments Factor Exposure

Factor	Portfolio	CSI300	CSI500
Valuation	-2.7503	-1.2942	0.0166
Growth	-1.1691	-0.3114	0.1202
Profit	1.8107	0.6511	0.1403
Size	2.4847	2.2622	1.1857
Liquidity	-1.083	-0.6555	0.2001
Momentum	-0.8216	-0.7132	0.0398
Leverage	-0.7094	-0.3555	0.0913
Dividend	-0.1183	-0.0231	-0.0905
Volatility	-2.0794	-1.1214	0.0667
Technical	1.304	0.7394	-0.3199

Foreign investments factor exposure from Table 9:

1. Valuation: Valuation factor is much lower than indexes, which means strong preference towards undervalued stocks.
2. Growth: Growth factor is lower than CSI300 and much lower than CSI500, meaning not focusing on investing in growing stocks.
3. Profit: Profit factor is much higher than indexes, implying putting more weights in companies with high sales performance.
4. Size: Size factor is higher than CSI300 and much higher than CSI500. Foreign investors tend to choose firms with large size.
5. Liquidity: Measured by daily turnover rate and trading volume. Liquidity factor is lower than two indexes.
6. Momentum: Measured by periodic price variation (%). Momentum factor is lower than CSI300 and much lower than CSI500.
7. Leverage: Leverage factor is lower than indexes, meaning preference towards firms with low leverage.
8. Dividend: Dividend factor is close to CSI500 and a bit lower than CSI300. No obvious trend.
9. Volatility: Volatility factor is much lower than indexes, meaning preference towards stocks with lower volatility.
10. Technical: Technical factor is higher than indexes, which is mainly contributed by ASI.

In conclusion, foreign investments have a steady style. Investors focus on firms with high profitability, large size, low leverage and valuation, which is consistent with prior studies showing foreign institutional investors tilt to large, profitable rather low risk and low leverage firms (Ferreira & Matos, 2008).

Table 10: Sub-Factor Analysis Result

Factor	Sub-Factor	Portfolio	CSI300	CSI500
Valuation	Price-to-Book Ratio	-0.8698	-0.4589	-0.0186
	Price-to-Earnings Ratio	-0.5261	-0.2341	0.031
	Price-to-Sales Ratio	-0.8114	-0.3358	-0.0297
	Price Cash Flow Ratio	-0.543	-0.2653	0.0338
Growth	Net Profit Growth Rate	-0.3142	-0.0862	0.0498
	Revenue Growth Rate	-0.33	-0.0657	-0.0339
	Operating Profit Growth Rate	-0.3184	-0.1	0.0533
	ROE Growth Rate	-0.2065	-0.0596	0.0511
Profit	Return on Equity	0.455	0.2405	0.06
	Gross Profit Rate	0.888	0.3159	0.011
	Net Profit Ratio	0.3075	0.0932	0.0414
	Net Operating Cash Flow/Revenue	0.1602	0.0014	0.0278
Size	Log of Market Value	2.4847	2.2622	1.1857
Liquidity	Daily Turnover Rate(one-month)	0.0766	0.1279	0.1329
	Transaction Activity(3-month)	-0.6797	-0.5039	0.0138
	Transaction Activity(12-month)	-0.4799	-0.2794	0.0534
Momentum	Price Variation %(1-month)	-0.509	-0.422	0.022
	Price Variation %(3-month)	-0.0687	-0.1003	0.0206
	Price Variation %(6-month)	-0.2439	-0.1909	-0.0028
Leverage	Long Term Debt Ratio	-0.9518	-0.3684	-0.0195
	Debt-to-Asset Ratio	-0.568	-0.1098	-0.034
	Cash Recovery Rate	0.2424	0.0129	0.1109
	Equity Ratio	0.568	0.1098	0.034
Dividend	Dividend Yield	-0.1183	-0.0231	-0.0905
Volatility	Standard Deviation of Return Rate(1-month)	-0.569	-0.3661	-0.0162
	Standard Deviation of Excess Return(12-month)	-0.3179	-0.1139	0.0252
	Cumulative Return Rate(12-month)	-0.8747	-0.5275	0.0325
	Standard Deviation of Residual Yield(12-month)	-0.3179	-0.1139	0.0252
Technical	Standard Deviation of Turnover Rate(1-month)	0.0469	0.0375	0.04
	Accumulating Swing	1.2572	0.7019	-0.3599

According to the holding weights, the author calculated the average indicators of the portfolio.

ROE	Debt-to-asset Ratio	PE	Market Value (100million)	Beta
21.04%	44.16%	60.91	865.11	0.9306

Qualitative Analysis of Differences between Domestic and Foreign Investors

According to the portfolio constructed before, the simulated foreign investment has an annual return of 29.47%, which greatly beats the market indexes and fund index. What causes this result? The author will take the example of an investment institution from Scotland, Baillie Gifford (BG), which makes a huge amount of investment in China, to analyze the source of differences between domestic and foreign investors.

A) The sources of funds are different. Foreign investments have most of their funds from institutions. For example, BG has over 90% of its managed assets from global institutional funds, including pension fund, insurance, college donation funds, sovereign funds. Pension fund accounts provide contribute about 50% to the mutual funds across the US. Comparatively, most of domestic public funds come from individual investors. By the end of 2018, individual investors held about 51.12% of total funds, while institutional investors held 48.88%. The high proportion of individual investors means that the funds might be unstable because there can be problems such as lots of redemption requests. However, institutions usually have more rational minds and stable investing methodology than individuals, and they care about the development of the companies they invest in.

B) The periods of funds are different. International funds usually have long investing periods. For instance, BG has an average holding period of 11 years of its equity in China. BG has the philosophy that is, only make the right money. At the same time, BG has cooperated with world top universities to conduct long-term research. Researches start from studying the social trends. When it comes to specific company, the study starts from primary market all the way to secondary market. For money from individual clients, BG will employ the form of trust fund to lock in the time periods so that it can have over 10 years to do the investment, as BG hopes its customers can understand the future change that will take place in the world during the next decade. The oldest customer of BG has a history of 110 years. In contrast, since there are many individual customers of Chinese domestic public funds, their average holding period is shorter. According to statistics, people buying

funds using Alipay in China averagely hold them for 337 days, and this number is increasing.

C) Mechanism. Foreign funds often have the form of partnership while domestic fund companies usually have the agency problem. One of the noticeable characteristics of BG is that it is unlimited partnership. Partners' equity is bound with the customers' equity. Now BG has over 40 partners and their shared philosophy is that: the partner is only the guardian of the company and is responsible for finding out the next generation of partners. In addition, before the partners retire, they need to sell their shares to the next partner at the original price. Such corporate mechanism contributes to the low 5% volatility of BG's investment team. This means, for most of the members in the team, BG is the only company they have ever worked for.

D) Difference in investing culture. This point has already been partly illustrated in previous discussions. Overall, foreign investors focus more on value investing and have low turnover rates, while domestic investing is more speculative. Individual investors contribute to about 85% of daily transactions. Thus, as more and more international funds enter the A-share market, it will gradually become a long-term, healthy, mature investing market. There is a sentence on the official website of BG saying that actual investors think in decades, not in quarters. In order to achieve such depth of thinking, BG sponsored a lot of research in world top universities to study the potential changes of each industry during the next 10 to 20 years. Later, when considering specific companies to invest, BG will use its 10-question structure to study, from the company's contribution to social and economic development, to its own performance growth, innovation potential, and so on. In the past ten years, BG has invested in a number of Chinese big stocks such as Alibaba, Tencent, Meituan, and Netease, all of which were discovered from the primary market and then passed on to the secondary market. Furthermore, BG holds shares of fewer than 200 companies worldwide, and the top 20 companies account for more than half of the total assets. This is because the purpose of BG is to find companies which can create most of the wealth and help them grow.

4. Stock Pool Filter Model

According to the previous factor analysis, qualitative analysis and foreign investment preferences discussed before, the author builds up a stock pool filter model. The model can evaluate individual stocks from different aspects and finally give out investment advice.

Design the model as: $\mathbf{Y = aX_1 + bX_2 + cX_3 + dX_4 + eX_5 + fX_6}$

Y is the evaluation of the stock given by the model and the higher, the better. Considering the results of the risk factor analysis and data availability, let X_1 be PE (price earning ratio), X_2 be Beta, X_3 be ROE (return on equity), X_4 be the logarithm of market value in circulation, X_5 be the debt-to-asset ratio, X_6 be the one-month price variation (%). And the coefficients are as the following:

a = -0.5261
b = -0.8747
c = 0.455
d = 2.4847
e = -0.568
f = -0.5090

The model is:
$\mathbf{Y = -0.5261X_1 - 0.8747X_2 + 0.455X_3 + 2.4847X_4 - 0.568X_5 - 0.5090X_6}$

Since the author is using the Wind database and only has access to data from 2014, it is acknowledged that the simulated portfolio constructed using limited data might not have a persistent performance over time. Also, foreign investment preference can change across time (e.g. towards companies with higher growth potential). And foreign investments are affected by many other factors such as interest rates of their domestic countries. Based on the available data, our study says that stocks with Y higher than 29.5 (average of the simulated portfolio) get into the stock pool.

5. Conclusion & Recommendations

1. Since foreign shareholding has become an important investment force in Chinese capital market and has achieved relatively high returns in the past period of time, it is necessary for us as domestic investors to understand their investment style and stock selection strategy and find out what we can learn from them.
2. Foreign investments have a steady style and prefer 'blue chip' stocks. Investors invest less in firms with small-to-medium size.
3. Foreign investors focus on firms with high profitability, large size, low leverage and valuation.
4. We, as domestic investors, should focus on value investment, not short-term speculation. It is important to maintain a rational mind and look for companies with high operating efficiency, such as high ROE and operating margins.
5. When considering whether a firm is worth investing in, we should think in a longer horizon. For example, it is worth thinking about the potential changes in the industry during the next 10 years.
6. According to style factor analysis, qualitative analysis and foreign investment preferences discussed before, the author builds up a stock pool filter model.

$$\mathbf{Y = -0.5261X_1 - 0.8747X_2 + 0.455X_3 + 2.4847X_4 - 0.568X_5 - 0.5090X_6}$$

Stocks with Y higher than 29.5 get into the stock pool. Again, since the author is using the Wind database and only has access to data from 2014, it is acknowledged that the simulated portfolio constructed using limited data might not have a persistent performance over time.

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