

Investment Portfolio Structure Based on Policy Orientation in Emerging Markets: Example from Emerging Industries of Strategic Importance in the Greater Bay Area of China

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Abstract. This article employed data of all listed firms in Shanghai and Shenzhen Stock Exchange of China, screened companies feasible for policy orientation including emerging industries of strategic importance and the Greater Bay Area strategy to form an investment portfolio, to study whether policy orientation is a feasible information source for individual investors in emerging markets. Around 10 target stocks were selected and weighted according to their scale in Market Value respectively, and a 3-year back test was conducted in order to compare the performance of the portfolio and market. Heterogeneous position-adjustment strategies were considered to simulate the excessive transaction behavior of individual investors. Cumulative total and annualized return, volatility rate and Sharpe ratio were calculated using the data within the past 3 years to indicate the performance of the portfolio. It has shown that the Sharpe ratio of the portfolio was high, regardless of whether an adjustment of position was made. Also, the portfolio significantly outperforms the benchmark index, with a higher frequency of earning a positive excessive return on a day-to-day basis. It can be concluded that policy orientation can be applied in investment portfolio decisions for individual investors, in weakly-efficient emerging markets where the source of information is limited.

Keywords: Investment portfolio; Policy orientation; Individual Investors

1. Introduction

Chinese stock market is an emerging market that enjoys a history of only around 30 years. As a relevantly nascent market, individual investors constitute the major part of participant. Historically, in Jia and Chen, it has been proven that Chinese stock market performance was inconsistent with the efficient market theory [1], but the market gradually becomes more efficient it presents a weak form of market efficiency according to Lim et al. [2]. The 2021 Annual Report on Investor Service and Protection of Securities Companies released by the Securities Association of China pointed out that, by the end of March 2022, 97% of the 200 million investors in Chinese capital market are minority investors [3]. Kahneman in 1973 stated that “attention” of individuals is limited [4], and therefore is a scarce resource especially for individual investors that have relevantly less time and effort to seize and process information reflected in transactions comprehensively, and such limited attention phenomenon hampers market efficiency. According to Han and Hong, industrial policy has always been an important tool for the Chinese government to control and stimulate the economic activities [5], therefore such policies coming into effect are important information sources for investors.

In February 2019, the Central Committee of the Chinese Communist Party and the Chinese State Council issued the outline development plan for the Guangdong-Hong Kong-Macao Greater Bay Area, known as the Greater Bay Area in brief, including Hong Kong, Macau and 9 cities among the Pearl River Delta. According to the outline of the plan, the Greater Bay Area will become a world-class urban agglomeration, an international technology innovation center, an important support for the construction of the “Belt and Road”, a demonstration area for in-depth cooperation between Mainland China and Hong Kong and Macau, and become a model for high-quality development that has been accentuated in the past years. The Greater Bay Area will accelerate the development of advanced manufacturing industries, promote the extension of manufacturing industries from processing and production links to R&D, design, branding, marketing and other links and eventually promote the cultivation and expansion of strategic emerging industries. Previously, in 2016, the “Thirteenth Five-Year Plan for the Development of Bio-Industry” clarified the strategic-important

position of the biopharmaceutical industry and put forward the viewpoint of building a new system for the biopharmaceutical industry, after which biopharmaceutical industry has become one of the emerging industries that have developed robustly in China with its market size increasing over recent years. With the continuous development of the overall technical level, the industry has a large space for development. Under the outbreak of COVID-19 and the upcoming global pandemic in year 2020, the biopharmaceutical industry has become an important industry related to the national economy and people's health and therefore a hotspot for investors. In November 2020, "Vision for 2035" promoted by the Chinese Communist Party clarifies the new material industry as a strategic emerging industry for future development. Therefore, together with the hortatory policies of itself, the Greater Bay Area has become a nurturing base and a pioneer demonstration area for strategic emerging industries, and the performance of enterprises in related industries that are supported by policies within its scope deserves attention when investing.

Therefore, this study mainly concerns whether policy orientation itself can serve as an effective standard for investment portfolio decisions in emerging markets, by developing a practical and effective investment portfolio that brings about potential investment opportunity in gaining excessive return using data of all listed company in Shanghai and Shenzhen Stock Exchange, and selected companies strongly related to the Greater Bay Area in policy-supportive industries. Based on Evidence from developed markets' evidence, Goetzmann and Kumar showed that the vast majority of individual investors tend to hold under-diversified portfolio [6], and Ivković et al. stated that individual investors that focus on a few securities tend to perform significantly better than those vastly diversifying [7]. Abreu and Mendes used empirical data to prove that investors' educational levels and their financial literacy have a positive impact on investor diversification as well [8]. When attention is paid towards trading behavior of investors, Odean concluded that although theoretically, the market environment clearly favors a buy and hold strategy, empirical evidence has shown that trading volume of investors exceeded the level where economic models could explain [9], while Barber and Odean pointed out that trading excessively active is at high cost for individual investors, and such behavior eventually leads to underperformance comparing to the market [10].

Considering such circumstances and investors' characteristic, the number of target stock is limited in order to seek balance between diversification and investor abilities, and a 3-year back test of portfolio return is conducted in order to prove its practicability. In order to simulate the tendency of investors to conduct excessive transactions, different position-adjustment strategies that varies in frequency of adjust was examined in order to examine whether such trading behavior has a tendency to affect the performance of the portfolio. The result of the portfolio shows that portfolio developed considering policy trend performs robustly better than the benchmark index disregarding the existence of excessively trading behavior, which proves that policy orientation is a feasible criteria of investment decisions in Chinese market.

The remainder of the paper is organized as follows. Section 2 presents data and methodology. Section 3 portrays the results. Section 4 concludes.

2. Data and Methodology

The population of data selected in this article includes all stocks in Shanghai and Shenzhen Stock Exchange on the observation date of August 1st, 2019, which consists a total of 3,581 listed companies. Industries are limited to policy-support ones, including new material, high-end manufacturing and biopharmaceutical industry. Also, in order to meet the standard as Firm in the Greater Bay Area, at least one of the following criteria shall be satisfied: a) Place of incorporation is located in the Greater Bay Area; b) Operating headquarter is located in the Greater Bay Area; and/or c) Over 50% of revenue is generated in the Greater Bay Area. Also, the company shall be properly operating, unrelated to violations of laws and regulations and receives unqualified opinion for its financial statements. After filtering with the above standards, only firms that are the largest 100 in scales (on observation date),

determined by Market Value calculated using equation (1), will be included. All data is collected from WIND database.

$$MV_i = P_i \times S_i \quad (1)$$

Where i indicates each target stock, P indicates market price of stock on observation (or adjustment) date, S indicates number of shares outstanding on observation (or adjustment) date.

Assumption is made that 1,000,000 CNY was initially invested by the investor, who did not retain any earning and kept reinvesting instead over the whole period. Different position adjustment strategies will be tested, differing in time interval of adjustment, including weekly, monthly, quarterly, annually, together with not adjusting. The time interval of portfolio return back testing is 3 years from the observation date that ends on August 1st, 2022, and CSI 300 (“Hushen” 300, the index used most to reflect market performance and trend of Chinese stock markets from a holistic aspect) is considered the benchmark index for comparison.

Initial target stock pool selection and position adjustments employs the same criteria concerning the weight of target, which is set as the market value of stock over total market value of portfolio on observation (or adjustment) date, calculated using equation (2):

$$w_i = \frac{MV_i}{\sum_{i=1}^n MV_i} \quad (2)$$

Where n indicates the number of target stocks in portfolio and MV indicates market value calculated by equation (1).

Given that the study intends to shed light on individual investors with limited financial literacy along with time and effort, around 10 stocks will be selected on the observation date and will not be changed even with the contingent existence of position adjustments, which only concern weighing targets on adjustment dates. The target stock pool of portfolio is presented in the following table:

Table 1. Target stock pool (Observation Date: August 1st, 2019)

Code	Firm Name (in brief)	Industry	Weight (%)
300760.SZ	Mindray Bio-Medical Electronics	Biopharmaceutics	31.40
002594.SZ	BYD	High-end manufacturing	24.89
002475.SZ	Luxshare Precision Industry	High-end manufacturing	19.08
300601.SZ	Kangtai Biological Products	Biopharmaceutics	6.73
300014.SZ	Eve Energy	High-end manufacturing	4.95
002180.SZ	Ninestar	High-end manufacturing	4.22
603882.SH	Kingmed Diagnostics Group	Biopharmaceutics	2.78
002920.SZ	Desay Sv Automotive	High-end manufacturing	2.36
002709.SZ	Tinci Materials Technology	New Material	1.51
002030.SZ	Daan Gene	Biopharmaceutics	1.39
300769.SZ	Dynanonic	New Material	0.66

Also, annualized volatility rate is employed as a measurement of risk of portfolio itself, which is calculated using equation (3):

$$AVR = \sigma_r \times \sqrt{t_r} \quad (3)$$

Where σ_r indicates the standard deviation of portfolio return, and t_r depends on the return calculation period, since daily return is used within this study, t_r equals 250 (annual transaction days).

Sharpe ratio is a classical indicator of whether portfolio offers proportionate or excessive return relative to its volatility, general a ratio over 1.0 is considered feasible. According to Sharpe (1966), the ratio is calculated using equation (4):

$$SR_p = \frac{R_p - R_f}{\sigma_p} \quad (4)$$

Where R_p indicates return of portfolio, R_f indicates risk-free return (empirically, 1-year deposit interest rate announced by Central Bank of China is used, which was constantly 1.50% throughout the observation period) and σ_p is the standard deviation of portfolio excessive return, the difference between portfolio return and benchmark return.

3. Empirical Results

3.1 Overall performance without position adjustment

As highlighted in Fig. 1, when the buy and hold strategy was applied to the portfolio, it performed significantly better than market, with a curve lying at a way higher section compared with the benchmark index. As reported in Table 2, a total return of 246.95% (51.15% when annualized) has been realized, achieving a Sharpe ratio of 1.583 which proved that the portfolio performance was considerable under the level of risk taken.

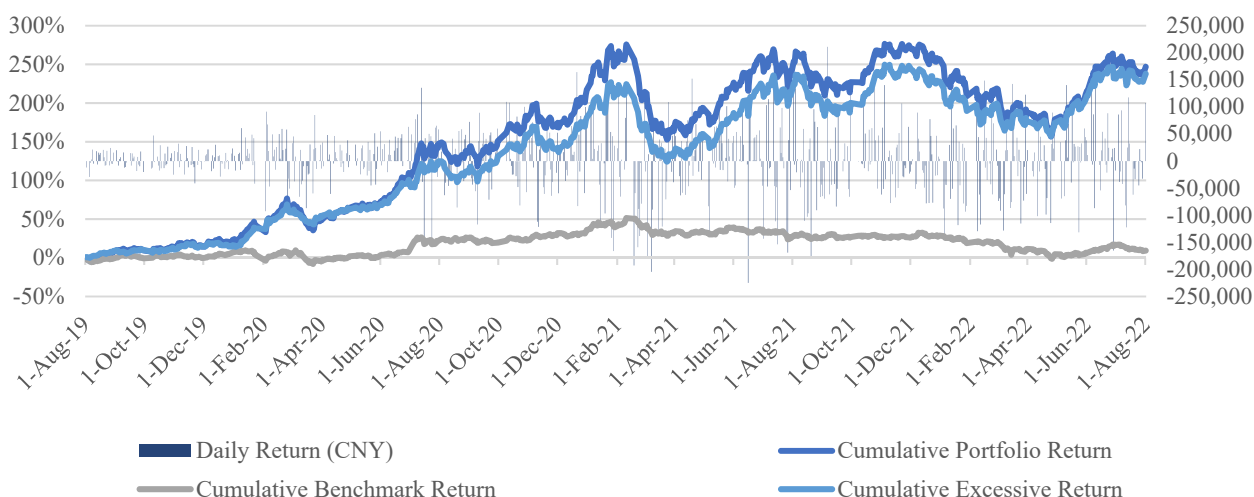


Fig. 1. Portfolio Performance Overview (Without position adjustment)

Table 2. Performance of portfolio without position adjustment

Total Portfolio Return	Annualized Portfolio Return	Annualized Volatility Rate	Sharpe Ratio
246.95%	51.15%	34.03%	1.583

When considering the day to day performance, the excessive return of portfolio was employed by comparing with the return of the benchmark index. As shown in Fig.2, under the time-series perspective of empirical data, the daily excessive rate of return fluctuates between $\pm 5\%$, which is in accordance with its under-diversification compared to the benchmark index that it is possible for the portfolio to amplify the market response more dramatically.

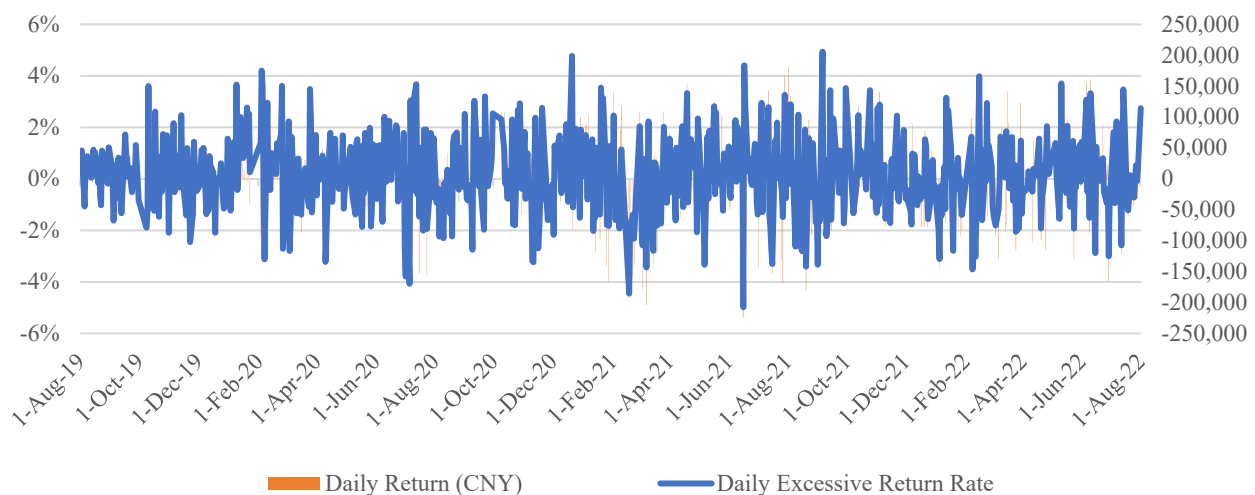


Fig. 2. Portfolio Daily Excessive Return (Without position adjustment)

However, when statistically analyzing the daily excessive return of portfolio, as reported in table 3, within the total 728 transaction days, the mean daily excessive return was 0.1751%, the median was 0.12%, and the mode was 0.05%, indicating that the portfolio tend to outperform benchmark index. Also, as shown in Fig.3, daily excessive rate of return concentrates more on the positive side, proving that historically the portfolio outperforms benchmark index more often from day to day.

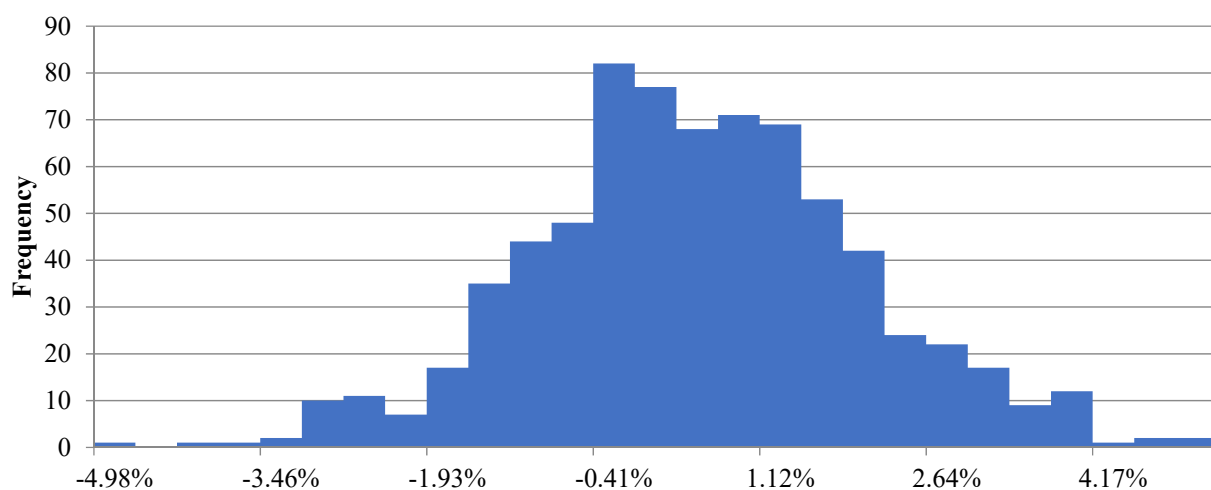


Fig. 3. Distribution of Portfolio Daily Excessive Return (Without position adjustment)

Table 3. Descriptive Statistics of Portfolio daily excessive return

Mean	Standard Error	Median	Mode	Standard Deviation	Variance
0.1751%	0.0558%	0.1200%	0.0500%	1.5050%	0.0227%
Kurtosis	Skewness	Range	Min	Max	Sum
24.3252%	4.5757%	9.9100%	-4.9800%	4.9300%	127.4400%

Notes: There are 728 observations.

3.2 Heterogeneous performance with different position adjustment strategies

The following Figure 4-7 and Tables 4-7 show and report the result of various strategies of position adjustment that differs in time interval, from weekly to annually respectively. The overall shape and trend of cumulative portfolio is similar with the result of buy and hold presented in section 3.1.

Accordingly, it turned out that adjusting position weekly, which indicates a highest transaction frequency, paid back most with a highest total return of 255.18% and a Sharp ratio of 1.600, which is not consistent with the theoretical consensus that excessively trading actually does harm to investment return. However, acknowledging that random is inevitable within market activities, such consensus allows exceptions. Moreover, by comparing the result of different strategies, the lowest total return occurs when adjusting monthly, but still reached the level of 237.40% and a Sharpe ratio of 1.535 which is at a relevantly acceptable level. Therefore, it is possible to conclude that potentially existing tendency of investors to excessively trade does not significantly harm the total return earned by investors when holding this portfolio, proving that such portfolio is feasible.

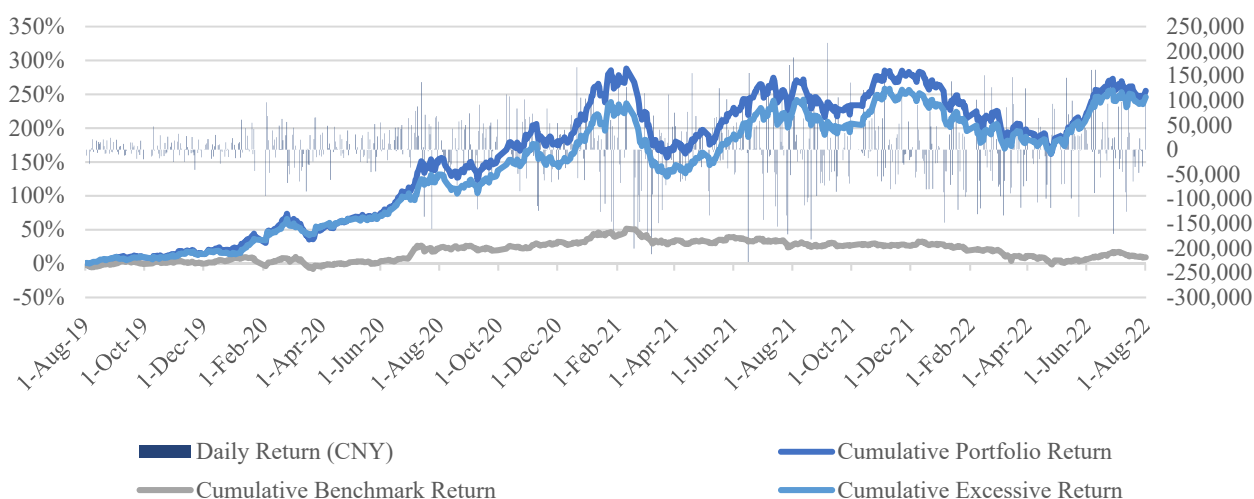


Fig. 4. Portfolio Performance Overview (With weekly position adjustment)

Table 4. Performance of portfolio with weekly position adjustment

Total Portfolio Return	Annualized Portfolio Return	Annualized Volatility Rate	Sharpe Ratio
255.18%	52.33%	34.18%	1.600

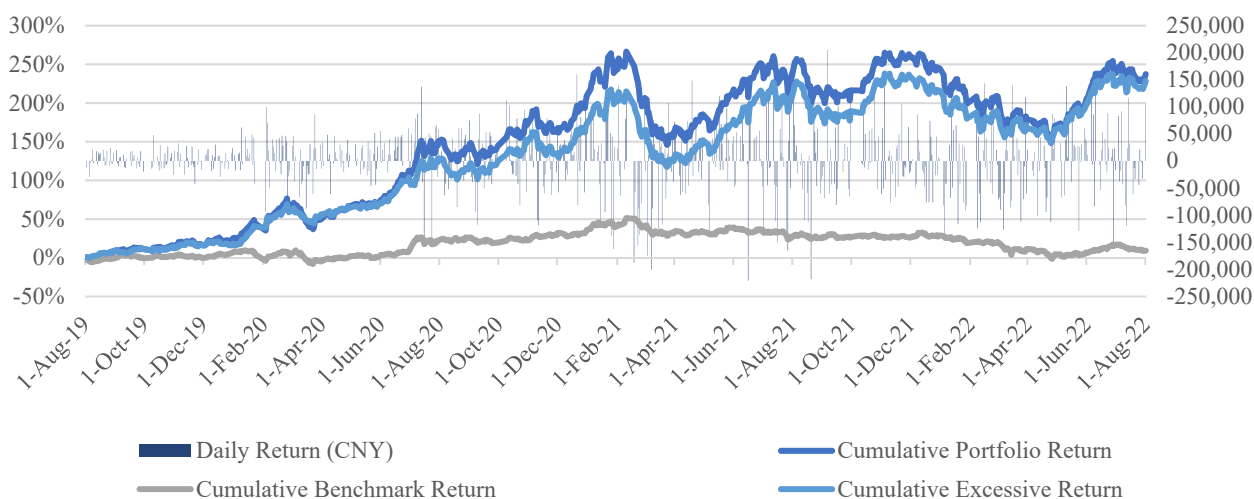


Fig. 5. Portfolio Performance Overview (With monthly position adjustment)

Table 5. Performance of portfolio with monthly position adjustment

Total Portfolio Return	Annualized Portfolio Return	Annualized Volatility Rate	Sharpe Ratio
237.40%	49.75%	34.16%	1.535

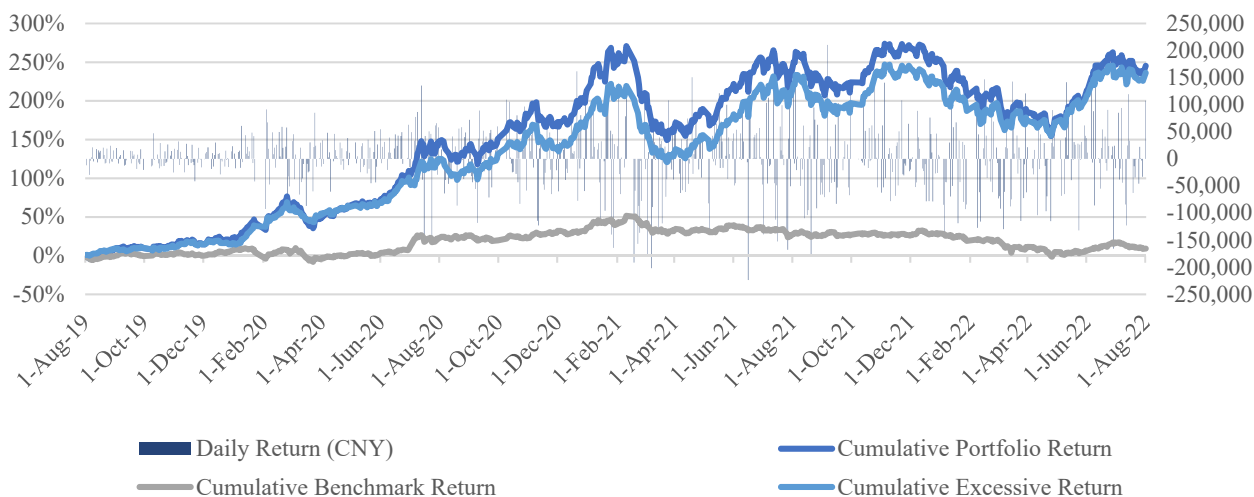


Fig. 6. Portfolio Performance Overview (With quarterly position adjustment)

Table 6. Performance of portfolio with quarterly position adjustment

Total Portfolio Return	Annualized Portfolio Return	Annualized Volatility Rate	Sharpe Ratio
245.42%	50.93%	34.15%	1.572

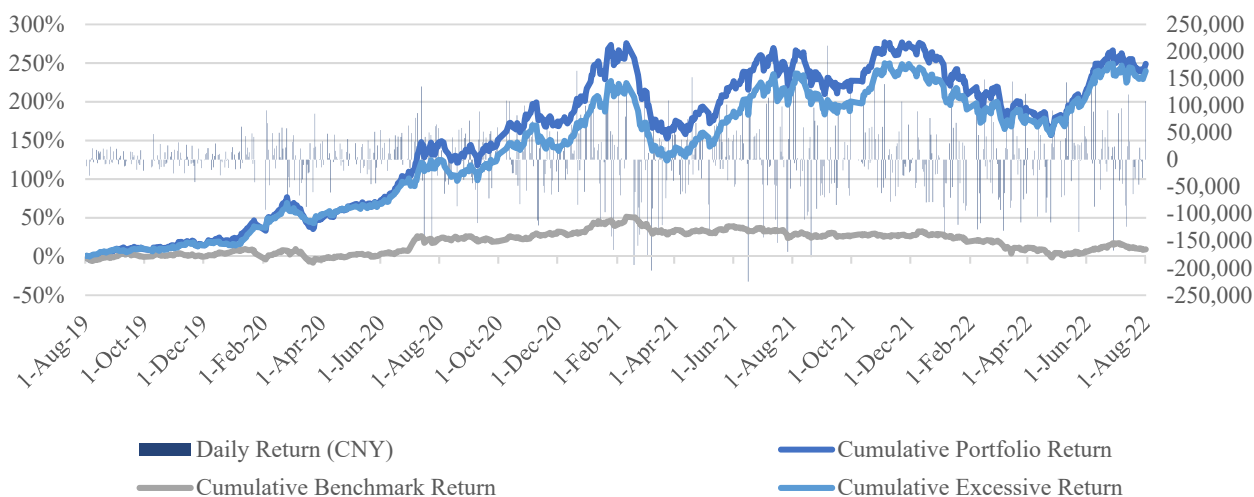


Fig. 7 Portfolio Performance Overview (With annual position adjustment)

Table 7. Performance of portfolio with annual position adjustment

Total Portfolio Return	Annualized Portfolio Return	Annualized Volatility Rate	Sharpe Ratio
248.93%	51.43%	34.11%	1.589

4. Conclusion

The study aims at examining whether policy orientation is possible to serve as a feasible information source in investment decisions within emerging and relevantly inefficient stock markets. From the aspect of an individual investor in an emerging stock market, a portfolio is developed and

examined in the article, using data from all Shanghai and Shenzhen Exchange listed A-share company by screening companies squaring with the criteria of firms enjoying the hortatory policy trend of China on the Greater Bay Area and emerging industries of strategic importance. 11 samples from all 3,581 listed companies were selected and developed a portfolio, and the weight of targets is determined by the proportion of market value, respectively. A 3-year back test was conducted in order to find out the performance of portfolio, and heterogeneous position-adjustment strategies were examined.

It is convincing to conclude that policy orientation is able to serve as an information source, as Sharpe ratio kept high regardless of the existence of excessive trading habit of investors indicated by strategies of position adjustments. Also, the portfolio significantly outperform the benchmark index, with a higher frequency of earning a positive excessive return on a day to day basis disregarding the market trend itself. Such outperformance is emphasized under the circumstance that the target stocks are relevantly small in number and concentrated in industries, meaning that such portfolio is way under-diversified compared to the benchmark. Therefore, conclusion can be made that even though it's inevitable for macroeconomic environment and market sentiment to vary, emerging industries of strategic importance that receives the support from hortatory-trend policies tend to keep a robust growth in stock markets. Therefore, policy orientation itself can be applied in investment portfolio decisions for individual investors, especially in markets where the source of information is limited.

However, the study is limited in the scale of geography, targets and time, since only Chinese-Greater Bay Area firms in certain industries within the range of emerging industries instead of all of them were selected, and the result of the 3-year back test is a relevantly short period of time for gaining confidence in future performance. Also, even though heterogeneous position-adjustment strategies were examined in order to simulate the excessive-transaction behavior, such simulation was not vivid enough, leaving a series of other decisions that might be made by investors under different ramifications. Therefore, a more comprehensive study can be conducted in the future, considering a wider range of geographic locations, including a more complex industry, and examining for a longer period of time, together with a more detailed excessive-transaction simulation.

References

- [1] Jia, Q. and Chen, Z. An empirical analysis of efficiency in China stock market. *Journal of Finance Research*, 2003(07):86-92.
- [2] Lim, T. C., Huang, W., Yun, J. L. X., et al. Has stock market efficiency improved? Evidence from China. *Journal of Finance & Economics*, 2013, 1(1): 1-9.
- [3] Securities Association of China. 2021 Annual report on investor service and protection of securities companies, 2022.
- [4] Kahneman, D. *Attention and effort*. Prentice-Hall, 1973: 4-12.
- [5] Han, Q. and Hong, Y. National industrial policy, asset price and investor behavior. *Economic Research Journal*, 2014,49(12):143-158.
- [6] Goetzmann, W. N., Kumar, A. Equity portfolio diversification. *Review of Finance*, 2008, 12(3): 433-463.
- [7] Ivković, Z., Sialm, C., & Weisbenner, S. Portfolio concentration and the performance of individual investors. *Journal of Financial and Quantitative Analysis*, 2008, 43(3): 613-655.
- [8] Abreu, M., and Mendes, V. (2010) Financial literacy and portfolio diversification. *Quantitative Finance*, 2010, 10(5): 515-528.
- [9] Odean, T. Do investors trade too much?. *American Economic Review*, 1999, 89(5): 1279-1298.
- [10] Barber, B. M., Odean, T. Trading is hazardous to your wealth: The common stock investment performance of individual investors. *The journal of Finance*, 2000, 55(2): 773-806.