Stock Market Simulation

An Interactive Qualifying Project Report: Submitted to the Faculty of

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By

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Abstract

This project was a seven-week stock trading simulation. The goal of the project was to gain valuable stock trading experience by buying and selling in the real-time stock market. This project would review the current Chinese stock market, analyze, and compare two existing trading techniques, and trade on targeted companies. The initial investment was 15000 yuan. The profits stood at 17.56% for swing trading and 12.33% for technical trading. Swing trading yielded considerable better return, whereas technical trading produced slightly less gains. The trading outcome provided a realistic and fair basis for comparison, given that both methods were applied in the same time frame, which followed a panic sell-off in the Chinese stock market. The experiences learned in this project will be helpful for potential investors to make calculated, well-informed stock investment decisions in the future.

Acknowledgements

I would like to express my sincere gratitude to Professor Tang for his invaluable guidance and unwavering support throughout the duration of my IQP project. His expertise, insightful feedback, and dedication to the project were instrumental in its successful completion. I am also deeply thankful to my dear friend, Rui Guo, for his unwavering support on collecting stock data throughout this endeavor. Additionally, I extend my appreciation to my school, Worcester Polytechnic Institute, for providing the resources and environment that allowed me to pursue this research. Your contributions have been indispensable in making this project a success.

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Chapter 1: Introduction

The aim of this research is to provide a foundational understanding of the principles underpinning the stock market, to identify and implement suitable trading methods in the real-time Chinese stock market, to discern the effects of current news on stock price trajectories, and to explore various data analysis techniques. To fulfill these objectives, the groundwork is organized into four chapters, detailed as follows. In the first chapter, there's a presentation on the history of the Chinese stock market. It then delves into the critical factors influencing the market and offers examples of historical events affecting specific stock values. The various Stock Exchanges in China and several notable stock indices are also introduced. The second chapter focuses on analyzing two prevalent trading techniques and data analysis methods that contemporary investors employ for evaluating stock prices and values. Chapters three and four begin by introducing the chosen applications and securities dealers. Subsequently, two Chinese companies are selected for investment using one of the two highlighted investment strategies. Real-time stock trading commences with an initial investment of 15,000 yuan and spans six weeks. Weekly trading records are maintained, serving as a basis for contrasting the advantages and disadvantages of the diverse trading approaches. By the project's conclusion, the hope is to cultivate a refined skill set in stock trading and to make informed investment decisions.

1.1 Stock Market History

Early before the first stock market appeared in 1500s, many markets that are similar to the stock market today have arisen. For example, in 1100s, European money lenders exchanged their

loans for a different loan with others in order to avoid a high-risk loan. Later on, those lenders started to sell debt to some individual investors.

In the 15th century, as number of maritime trades, plundering and colonialism rose, plenty of seafarers appeared and became rich in western countries. To organize the voyages trades, it was necessary to build a fleet of ships, which not only required huge amounts of money, but also need to take risk of encountering ocean hurricanes and indigenous people's attack. As the earliest countries to start ocean navigation, Netherlands and The United Kingdom began to use shares to mitigate the risk. Ship owners sought out investors to put up money for the voyage. If the voyage succeeded, the investors could get a return for a certain percentage. Whereas if the voyage was not successful, investors had to bear the risks. The earliest printed shares ever discovered is published by Dutch East India Company in 1606.

Due to the inconvenient management of trading hard copy shares, London government found the first joint stock market in 1773. After two decades, the New York Stock Exchange was set up in New York, United States and quickly became the most popular stock exchange in the world at that time. Its volume of business surpassed the NASDAQ and became the biggest stock exchange after it merged with Euronext.

1.2 Important Factors of Stock Market

The stock market is complicated and unstable. There are several significant factors that may influence the price and trend of stocks. (Jincheng 2018).

The key factor should be the internal operations and developments of listed company. Listed companies are the one who not only issue stocks, but also operate and invest the stock funds. Thus, their business conditions, management abilities, financial status, scientific and technological development, and industrial competitions have great impacts on the stock price. Due to the clear boundary of property rights, companies' corporate factors generally only have a profound impact on the stock market value of the companies themselves, which is a typical impact factor in micro level.

Second factor should be the military factor. Military conflicts are the result of conflicts within or between countries or between international groups that have reached a level that cannot be resolved by political means. Military conflict may cause the turmoil of social and economic life, even break the normal international order. It destroys the normal trading of the stock market and inevitably leads to the violent turbulence of the relevant stock prices. For example, at the beginning of the Gulf War, all the major stock markets in the world were in a downward trend, and all of them fluctuated sharply as the war situation changed.

Third, the hyperinflation also has a direct impact on the stock market. In order to alleviate the negative impact of inflation, the government usually adopts tight monetary policy or tight fiscal policy to control the money supply. For example, governments will increase the interest rate of banks to attract more investors to put money in the saving account rather than investing, which will reduce the monetary liquidity in the stock market, leading to the downturn of the stock market and the decline of stock prices.

Fourth, currency exchange rates also influence the stock market. The impact of currency exchange rate on the stock market is realized through the exchange of domestic currency and foreign currency. In an open market, if the exchange rate rises, people are more likely to exchange the foreign currency for domestic currency. These funds are likely to enter the local stock market, resulting in increase in stock demand, which lead to the rise of stock prices. On the other hand, if the exchange rate drops, people will exchange the domestic currency for foreign currency, which will lead the capital to flow into foreign exchange markets. Thus, the decrease in stock demand will cause the stock price dropped.

Since the stock market is complicated, there are so much more factors influenced the stock trend such as politics factors, legislation factors, weather factors, environment factors, and sometimes even human factors when people using tricks to control the short-period stock price. Thus, when trading stocks, learning how to maximize economics benefits under different market circumstances is important.

1.3 Stock Market Crash in History

The stock market crash refers to the collapse of the stock price due to the accumulation of internal contradictions in the stock market reaches to a certain extent and triggered by some accidental factors, which causing enormous social and economic turbulence, along with huge losses causes by abnormal economics phenomenon. Stock market crash is different from the general stock market volatility, also different from the general stock market risk.

Throughout the history, almost every country or region with a stock market has experienced

a crash. Two representative crashes since the beginning of the stock market will be introduced.

As the previous part mentioned, 17th-century Dutch is the starting point of capitalism. They formed the earliest joint stock company in the world: east India company. They built the world's first stock exchange, pioneered modern banks, and invented the credit system that is still in use today. However, in the meantime, the first capital market burble was born. This significant stock market crash in the 17th century Netherlands is called the tulip bubble, also known as the tulip effect. It has been called the earliest speculative activity in recorded human history. In the autumn of 1636, the price of the most valuable varieties of tulip went up, and a single tulip were sold for 4600 florins (Dutch currency units), at a time when a bull is only worth 480 florins. In order to facilitate the tulip trading, people simply found a fixed trading market in Amsterdam's stock exchange and created options with leverage functions. As a result, by 1637, the price of tulips had risen to appalling levels, which was as high as 5,900% compared with the previous year. However, when people immersed in a tulip mania, a collapse is imminent. On February 4th in 1637, lots of sellers suddenly start to undersell, cause the public began to panic, leading to the collapse of the tulip market. The price of tulip bulbs plummeted overnight. After a week, the price of rare breed tulips had dropped by an average of 90 percent, and the common breed tulips were only selling for less than an onion. Thousands of people were bankrupt in this market crash, and the Dutch Supreme Court forbade the tulips trading from then on.

The second crash is The New York Stock Market crash in the October 1929, it was the most influential and harmful economic event in American history. This stock market crash lasted for 4

years. The impact of this crisis rippled through Britain, Germany, France, Italy, Spain and other countries, and eventually evolved into a big economic crisis in the whole western capitalist world. Before the crash, the U.S. economy was booming, and the stock market was extremely active. On January 2, 1929, the first day of the New Year's trading at the New York Stock Exchange, the number of orders was enormous, the stock prices rose rapidly, and the whole Wall Street was in a frenzy of excitement. However, on September 5th, 1929, a sharp drop occurs for the first time after the consecutive months of increases, which shook the confidence of investors. On October 24th, 1929, the panic selling reached nearly 13 million shares. Major New York banks quickly formed a "bailout fund" team. Even Richard Weeney, the head of the New York Stock Exchange, bought shares himself in the hope of turning back the powers of darkness. On October 28th, 1929, the Dow Jones index fell 50 points more. On the second day, the Dow Jones index plunged from a peak of 386 to 298 with a 22% decline. In November, the stock market continued its downward spiral with 48% drop which the Dow Jones index slides to 198 points. The next year, the stock market rebounded sharply from January to March and the Dow Jones index returned to 297 in April. However, the rebounded did not last long, from May 1930 to November 1932, the market plunged six times in a row, with the Dow falling to 41 points. U.S. Steel's stock price has fallen from $262 to $21 a share since before the crash. General Motors dropped from $92 to $7. This crash caused tons of investors losing their money and confidence, and the market did not bounce back until 1954, the time when the Dow Jones index got back to the 1929's number again.

1.4 Stock Exchange

The stock exchange in China, primarily represented by the Shanghai Stock Exchange (SSE) and the Shenzhen Stock Exchange (SZSE), holds significant prominence in the global financial landscape. Established in 1990, these bourses quickly became integral parts of China's economic transformation, channeling capital and enabling a multitude of companies to raise funds for expansion and innovation. Over the years, as China burgeoned into a global economic powerhouse, its stock exchanges evolved in tandem, introducing a series of reforms, technological upgrades, and mechanisms to bolster transparency and investor confidence. This rapid development, combined with the country's vast market potential and vibrant entrepreneurship, has attracted both domestic and foreign investors. Moreover, the inclusion of Chinese A-shares in major global indices underscores the growing international recognition of China's stock market. As a result, the stock exchanges in China not only play a pivotal role in domestic economic development but also exert considerable influence in the global financial arena.

1.4.1 Shanghai Stock Exchange

The Shanghai Stock Exchange (SSE) stands as a prominent pillar of China's rapidly evolving financial landscape. Founded in 1990, it has grown to become one of the world's largest stock exchanges, playing a pivotal role in China's economic development and global integration. The SSE primarily trades in Chinese yuan (RMB) and serves as a hub for domestic and international investors to participate in China's booming financial markets. Known for its emphasis on regulation and transparency, the SSE hosts a diverse range of listed companies, including state-

owned enterprises, private firms, and multinational corporations. Its significance extends beyond China's borders, as it plays a crucial role in shaping global investment strategies and reflecting the nation's economic vitality. As China continues to open up its financial markets to the world, the Shanghai Stock Exchange remains a dynamic and influential player in the international financial arena.

1.4.2 Shenzhen Stock Exchange

The Shenzhen Stock Exchange (SZSE) is a vital component of China's rapidly expanding financial ecosystem. Established in 1990, alongside the Shanghai Stock Exchange, the SZSE is located in the southern city of Shenzhen and serves as a crucial platform for both domestic and international investors. Over the years, it has evolved into one of the largest and most dynamic stock exchanges in the world. The SZSE primarily trades in Chinese yuan (RMB) and is renowned for its focus on technology and innovation-oriented companies. It is home to a diverse array of enterprises, ranging from startups and high-tech firms to established corporations. The SZSE plays a pivotal role in the development of China's private sector, fostering entrepreneurship and driving economic growth. As China continues to embrace financial reforms and internationalization, the Shenzhen Stock Exchange remains a vital nexus for global investors seeking exposure to China's dynamic and rapidly evolving economy.

1.4.3 Hong Kong Exchanges and Clearing Limited

Hong Kong Exchanges and Clearing Limited (HKEX) is a world-renowned financial institution that serves as the backbone of Hong Kong's thriving financial sector. Established in

2000, HKEX is one of the leading securities exchanges globally, known for its efficiency, transparency, and strong regulatory framework. It operates diverse markets, including equities, derivatives, commodities, and fixed income, providing a comprehensive platform for investors and issuers alike. HKEX has played a pivotal role in connecting international capital with the dynamic economies of the Asia-Pacific region, making Hong Kong a premier global financial hub. Its commitment to innovation and technology has positioned it at the forefront of market development, facilitating the trading of various asset classes and promoting sustainable finance practices. With its unwavering dedication to maintaining the integrity of financial markets, HKEX continues to contribute significantly to the growth and stability of Hong Kong's financial ecosystem.

1.4.4 Taiwan Stock Exchange Corporation

The Taiwan Stock Exchange Corporation (TWSE) is a vital component of Taiwan's financial infrastructure and serves as a critical platform for capital market activities. Established in 1961, the TWSE has played a central role in Taiwan's economic development, providing a venue for companies to raise capital, investors to trade securities, and facilitating the growth of the nation's financial sector. With a strong emphasis on transparency and regulatory standards, the TWSE has earned a reputation for integrity and stability. It hosts a diverse array of companies, ranging from large multinational corporations to smaller enterprises, contributing to the vibrancy of Taiwan's economy. As Taiwan continues to assert itself in the global marketplace, the TWSE remains a fundamental institution for investors seeking exposure to this dynamic and innovative market.

1.5 Stock Market Index

A stock market index indicates the value of a group of selected stocks. The compilation method and nature of stock index is a basis for classification. Stock index can be divided into five categories: scale index, industry index, theme index, style index and strategy index in China market.

Among these five indexes, the scale index is most familiar to everyone, such as the "CSI 300" index, which reflects the overall situation of 300 large-scale enterprises with good representation, liquidity and active trading in the Shanghai and Shenzhen markets.

The industry index represents the overall situation of a certain industry. For example, "Hushen 300 medicine" is even an industry index, which is composed of 17 pharmaceutical and health industry stocks, and also reflects the overall performance of the stocks of Companies in this industry.

The overall situation of the theme (such as artificial intelligence, new energy vehicles, etc.) is represented by the theme index, which is the related index "technology leader", "new energy vehicles", etc.

In this part, four of the most popular 4 indexes in Chinese stock market will be introduced.

1.5.1 Shanghai Composite Index (SSEC)

Shanghai Composite Index (SSEC) is the most popular index in Chinese stock index. This index shows all companies trends which listed on Shanghai Stock Exchange. It contains SSEC 50 index which tracks the 50 largest and most influential businesses stocks in Shanghai Stock

exchange, SSEC 180 index and so on. SSEC was first published on Jul 15, 1991. By SSEC, we can know overall stock trends of Shanghai Stock Exchange.

SSEC current market value is 3186.48. It decreased 12.45% since last year when the value was 3639.78 and increased 3218% since it was first published when the value was 95.79. The SSEC's market summary is shown in Figure 1.1 below.
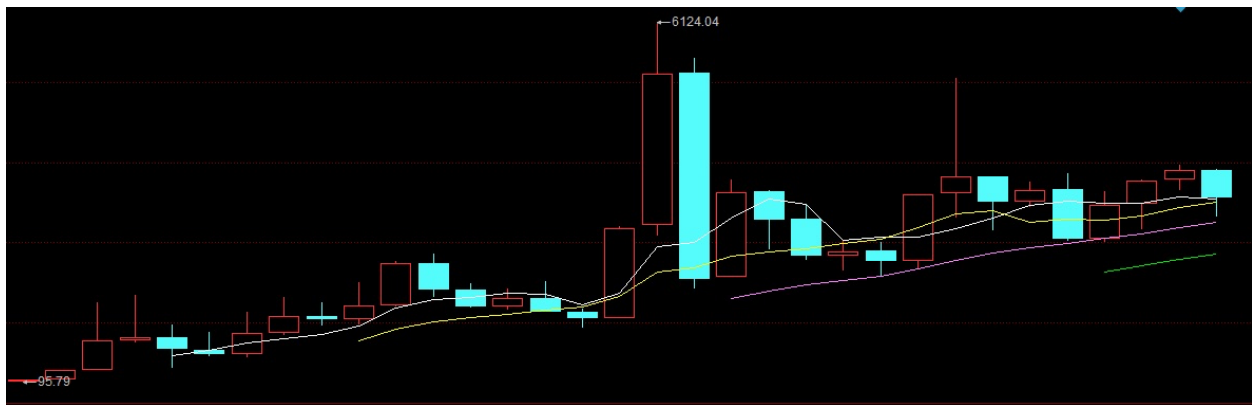
Figure 1.1. SSEC Market Summary from 1991 to 2022

1.5.2 Shenzhen Composite index (SZI)

Shenzhen Composite index (SZI) shows all companies trends which listed on Shenzhen Stock Exchange. Shenzhen Stock Exchange has some different points with Shanghai Stock Exchange as blow:

1.   Different requirement of listing. Shanghai Stock Exchange is suitable for big companies and their business is stable. Shenzhen Stock Exchange is suitable for small and developing companies.

2.   Different functions. Shanghai Stock Exchange has some policy functions. For

example, dealing listing applications, organizing and monitoring stock exchanges, managing and publishing information. Shenzhen Stock Exchange is more market oriented.

SZI's current market value is 11702.39. It decreased 21.24% since last year when the value was 14857.35 and increased 1084% since it was first published in 1991 when the value was 988.05. The ZSI market summary is shown in Figure 1.2 below.
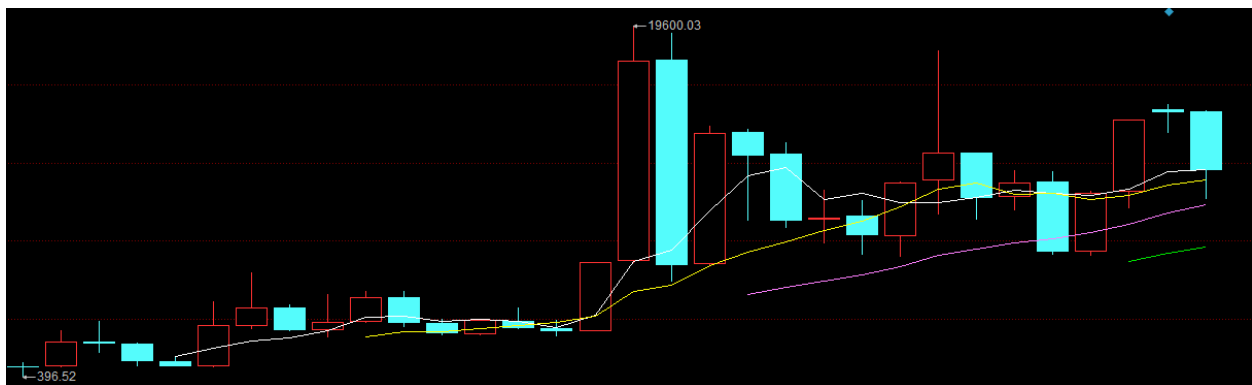
Figure 1.2. SZI Market Summary from 1991 to 2022

1.5.3 Growth Enterprise Index (Gem Index)

The growth enterprise market, also known as the second board market, is a kind of securities market different from the main-board market. It is a securities exchange market that provides financing channels and growth space for entrepreneurial enterprises that cannot be listed on the main-board market. Gem is an important supplement to the main-board market and plays an important role in the capital market. The stock code of companies listed on China growth enterprise market starts with "30".

Companies listed on the growth enterprise market have high growth potential, but they are

often established in a short time, small in scale, and not outstanding in performance. It can be said that gem is a stock market with low threshold, high risk and strict supervision. It is also a cradle for incubating entrepreneurial and small and medium-sized enterprises.

GEM index current market value is 2533.02. It decreased 23.77% since last year when the value was 3322.67 and increased 156.91% since it was first published in 2010 when the value was 986.02. The GEM market summary is shown in Figure 1.3 below.
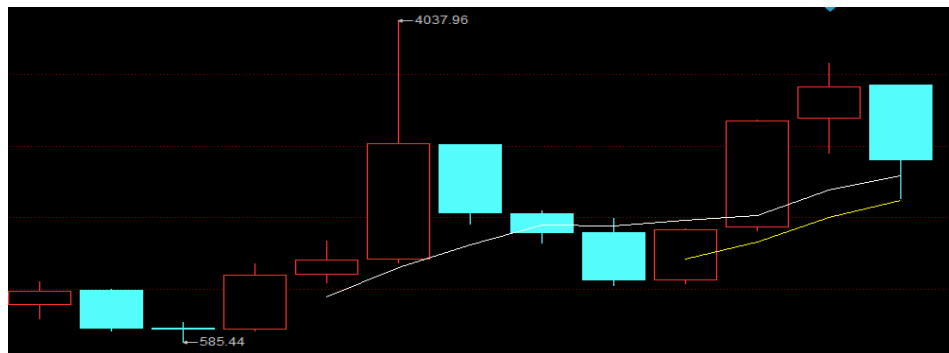
Figure 1.3. GEM index from 2010 to 2022

1.5.4 Science and technology innovation Index (STAR index)

The science and technology innovation board (STAR market) is a new board independent of the existing main board market, and the registration system is piloted in this board.

Science and Technology Innovation Board of the Shanghai Stock Exchange is oriented to the world's science and technology frontier, mainly serving the scientific and technological innovation enterprises that meet the national strategy, break through key core technologies, and have high market recognition.

STAR index current market value is 1030.12. It decreased 26.32% since last year when the value was 1398.19 and increased 3.01% since it was first published in 2019 when the value was 1000. The STAR market summary is shown in Figure 1.4 below.
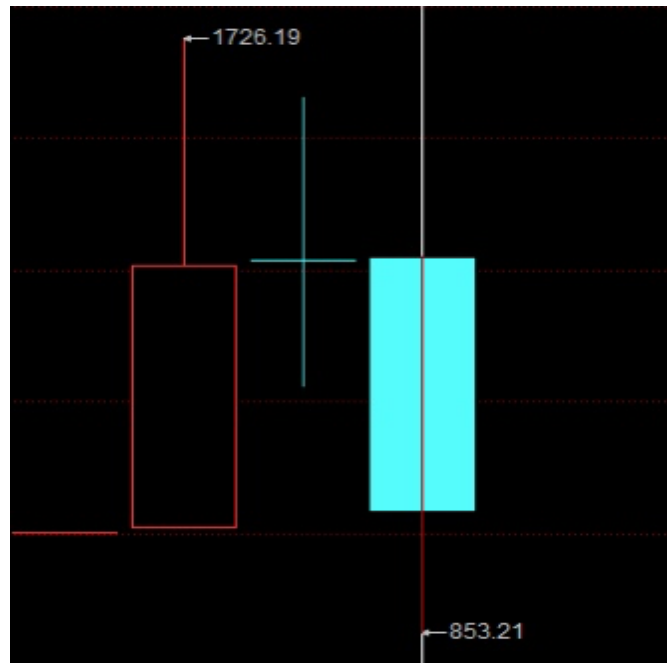

Figure 1.4. STAR Market Summary from 2019 to 20122

Chapter 2: Methodology

2.1 Stock trading platform

There are so many stock trading platforms, such as Huatai Securities, CSC, PingAn Securities, East Money Information, Infind and many others. Each trading platforms has advantages and disadvantages: some of these might have lower commission fee, some might have better user interface. In China, most popular stock simulation engines are East Money Information and Infind. They can provide perfect user interface. Company's finical report, historical information, latest news can be found easily. As a new investor, the stock market is variable and unpredictable. We need to take care of our money. Thus, less money was invested into the market. The stock simulation function was not used since the real money transactions is what will affect our emotions when we make decisions, which can make us better understand the stock market.

This project will use the Infind to perform stock simulation, because Infind is more friendly to new users. In this project, the initial virtual cash balance is ￥40000.

2.2 Investment Strategy

2.2.1 Technical trading

Technical trading is using found patterns from past trading data to predict what might happen of stocks in the future. Technical traders would examine stock charts for signs of breakout (Bergen, 2016). By watching lines on stock or index graphs, technical traders can identify buying or selling signals from the signs of convergence or divergence.

There are two interesting technical trading logics in China stock market. Firstly, existence is rationality. The information of the stock transaction contains all the information what we need for investment, so we only need to study the transaction information, and there is no need to study the fundamentals of companies. Secondly, there is nothing new under the sun. Human behavior patterns will continue to repeat, and past behavior will indicate future behavior. Therefore, similar patterns will appear repeatedly, similar time periods will appear repeatedly, similar proportion pullbacks, similar wave patterns, and similar K-line combinations will appear repeatedly. Studying the patterns that have repeatedly appeared in the past can indicate the future trend of stock prices.

The signs of convergence and divergence can be identified through a trend analysis on Moving Average Convergence Divergence (MACD). MACD is a momentum indicator for analyzing the stock trend. It reflects the moving of future contract price and the spot price. MACD is calculated by subtracting the 26-day exponential moving average (EMA) from the 12-day EMA (Hartle, 1991). Also, VOL is another important indicator for transactions. VOL shows stock trading volume at this day. Finally, MACD indicator, VOL indicator and pattern analysis will be used for trend analysis, including using to make stock investment decisions. More information about pattern analysis would be explained in Chapter 3.

2.2.2 Swing Trading

Swing traders hold stocks for at least overnight or up to several weeks. In China market, you need to hold the shares at least one night. Swing traders are trying to identify a trend, and profit from both the uptrend and downtrend. Due to the lack of short tool Chinese stock market

has long been one-way market, investors can only sell their stocks when the market is in a downward trend in time. Otherwise, loss can only grow.

This project will only perform bullish swing trade. To correctly operate bullish swing trade, traders need to prevent entering the market at a counter trend. By examining the lowest point ("stop out" point) of the downtrend, traders can limit the losses from exiting the market on time when the stock decreases under the "stop out" point. By finding the highest point of the uptrend, traders can determine a target of profit (Ally, 2017).

To determine when to enter the market to make the maximum profit, this project will calculate the reward-to-risk ratio. If the potential profit is twice as much as the potential loss, the trade is worthwhile. Once the stock hits the target price, traders should consider selling a portion of their stocks to lock in some gains.

2.3 Data Analysis Method

Before starting a stock transaction, traders need to use two primary methods, fundamental analysis and technical analysis to analyze the company selected. Fundamental analysis method not only focuses companies' quantitative and the qualitative factors but also the industry should be considered. This includes the financial report, income statement, balance sheet and cash flow statement. The technical analysis method concentrates on the statistical analysis of stock price movements based on the existing publicly available information. This project will be using both analysis methods to make investment decisions.

2.3.1 Fundamental Analysis

Fundamental analysis is a comprehensive approach used by investors to evaluate a company's financial health and performance before making investment decisions in the stock market. This method involves studying a company's fundamental factors, such as its financial statements, management team, industry position, and economic conditions. Analysts delve into financial statements, including the income statement, balance sheet, and cash flow statement, to assess key metrics like revenue growth, profitability, debt levels, and cash flow generation. They also examine the company's competitive positioning, market share, and industry trends to gauge its long-term potential. Fundamental analysis helps investors identify intrinsic value, assess risk, and make informed decisions based on a company's underlying fundamentals rather than short-term market fluctuations. It is a fundamental tool for long-term investors seeking to make well-informed choices in the stock market.

2.3.2 Technical Analysis

Technical analysis is a widely utilized approach for analyzing stocks and financial markets. This method involves the examination of historical price charts, trading volumes, and various technical indicators to predict future price movements of a selected company or asset. It operates on the premise that historical price patterns tend to repeat themselves due to collective investor behavior and market psychology. Technical analysts look for patterns such as trend lines, support and resistance levels, moving averages, and oscillators to identify potential buy or sell signals. By studying these charts and indicators, investors seek to gain insights into the timing and direction

of a stock's price movements. While technical analysis doesn't consider fundamental factors like financial statements, it provides valuable information for short to medium-term trading decisions and can be a valuable tool for investors seeking to make informed choices in the stock market.

Chapter 3: Technical trading

This chapter will record the process of trading stocks by using technical trading strategy. Firstly, this chapter introduces one selected company, and the reasons why it was chosen for investment. Secondly, this chapter will present the initial investment record, and the MACD, VOL chart for the company in next four weeks. The transaction data will be documented at the end of each week's report. Finally, this chapter will analyze and display the results of the total gain or loss after the four-week simulation.

3.1 Company Selected

After comparing different companies, NavInfo from Automotive industry was chosen.

3.1.1 NavInfo

NavInfo was founded by China's State Bureau of Surveying and Mapping (SBSM) in 1992. NavInfo took lead in obtaining the first-class surveying and mapping qualification and developed first commercial navigation map product in China. It also opened commercialization of China's navigation industry, and then successively launched a series of new businesses such as Internet of vehicles, automatic driving, and vehicle chips.

According to financial data from market watch, NavInfo was loss making in 2018, 2019 and 2020 due to investment of R & D and covid19 effect. It turned losses into profits in 2021 third quarter by vehicle chip shipment increased and automatic driving order increased.

From Figure 3.1, it is obvious that NavInfo stock price fluctuated between ￥10 and ￥23

in last two years. Its stock price did not rise with business increasing.

Figure 3.1 below shows the NavInfo stock price monthly chart from 1st Jan 2020 to 31st May 2022.

Figure 3.1 NavInfo stock price monthly chart from 1ˢᵗ Jan 2020 to 31ˢᵗ May 2022

3.2 Simulation

The initial investment that was put in for NavInfo is 15000RMB. During this four-week simulation, this stock was also sold or bought from time to time to get more profit.

1100 shares were bought at 24th May with the price 12.78 RMB per share. The purchase of these shares at this time point was due to following reasons:

Firstly, China stock market had a long time felling from Jan to Apr in 2022 as Figure 3.2 showed. For example, Shanghai Stock Exchange index felled 16.28% during this period.

Especially in week18, whole stock market decline accelerated because the war of Russia and Ukraine started. However, whole stock market became stable after a panic selling. The decision was made at this moment to go into the market to get some profits.

Figure 3.2 below shows the stock market felling from Jan to Apr in 2022.
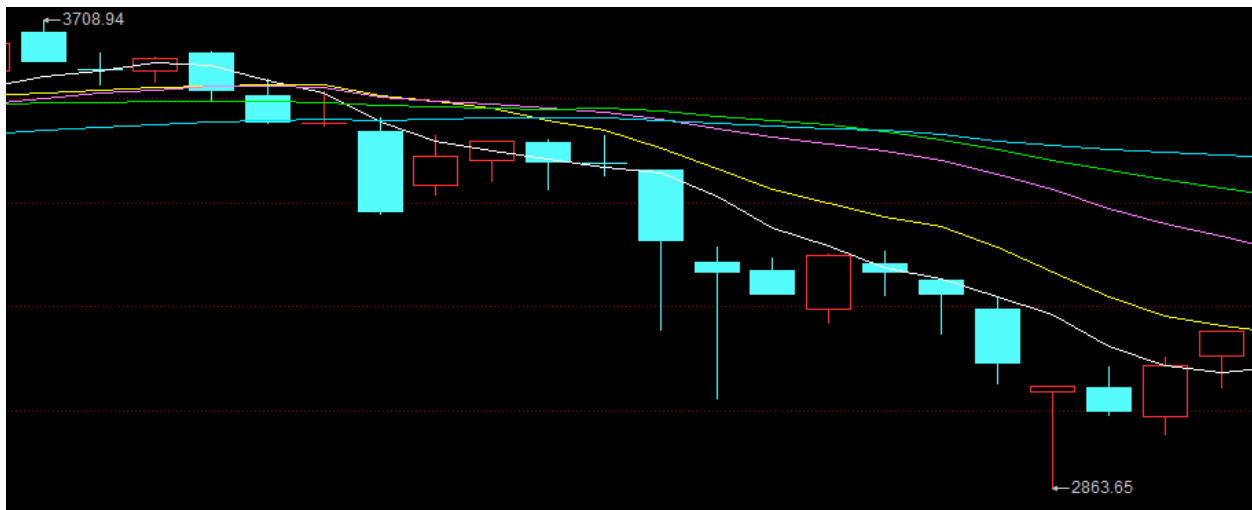
Figure 3.2 Shanghai Stock Exchange weekly index from 17th Dec 2021 to 20th May 2022

Secondly, NavInfo turned losses into profits in 2021. In first quarter of 2022, its net profit increased 122.97%~129.86% year on year to 10.37 million~13.49million. Even whole automobile industry was in trouble in first quarter of 2022, NavInfo's business got growth by "smart cloud" and "smart vehicle chips" part. It can be estimated NavInfo will continue getting growth in 2022 with automobile industry prosperity improvement.

Thirdly, although NavInfo shares price kept same trend as the whole market which had a long time felling from Jan to Apr, it rose quickly after the panic selling as Figure3.3 showed.

After a short-term rise, its stock price kept stable, but VOL was not higher. It was at start phase of rising.

From MACD chart, DEA and DIFF also went to high and whole EMA lines showed good performance.

Figure 3.3 below shows the stock market quick rising after the panic selling.
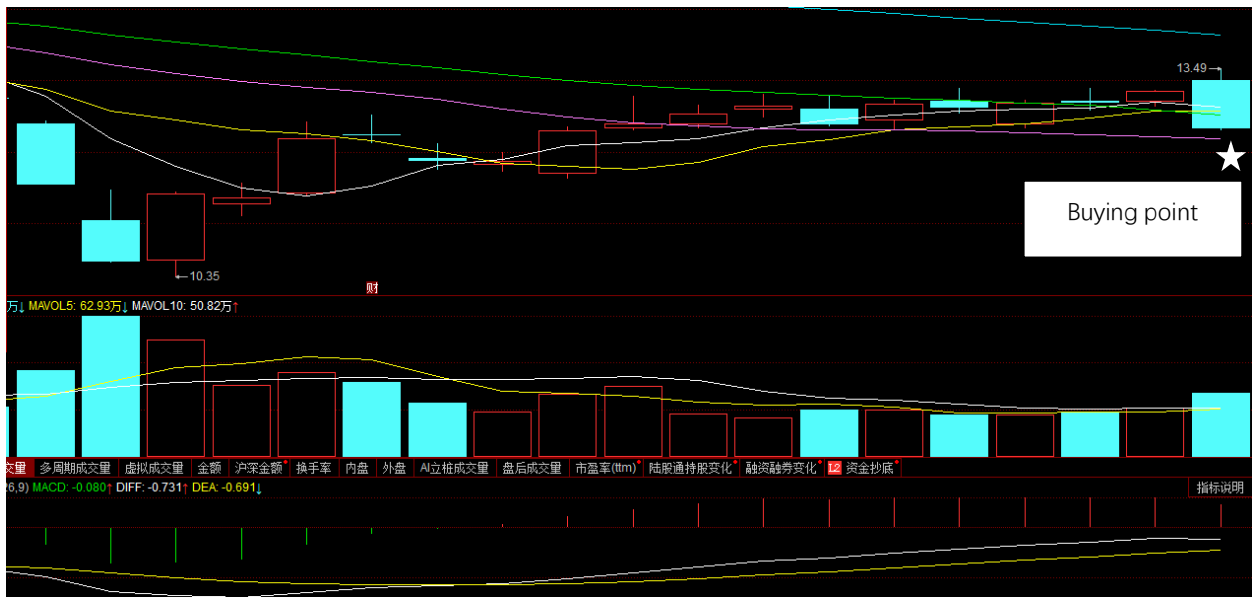
Figure 3.3 NavInfo stock daily trend from 25th Apr 2022 to 24th May 2022

3.2.1 Week One

Over the first week, the stock price of NavInfo rose 2.7% from my buying point. Form the candlestick chart, there was almost no rise after my buying point in first three days. At the same time, both VOL and MACD didn't have any changes. More information was needed to do further decision.

In the last day of this week, share price rose 3.63% with VOL and MACD a little bit increasing. None of stock was sold since both MACD and VOL was not high.

At the same time, 5-day EMA line, 20-day EMA line and 60-day EMA line were all rising, which indicated that there would be more opportunities in the future.

Figure 3.4 below shows the NavInfo stock daily trend from 24th May 2022 to 30th May 2022.

Figure 3.4 NavInfo stock daily trend from 24th May 2022 to 30th May 2022

Also, recent news was collected about NavInfo, and there was no negative news. Decision was made to hold the shares and continue to monitor it.

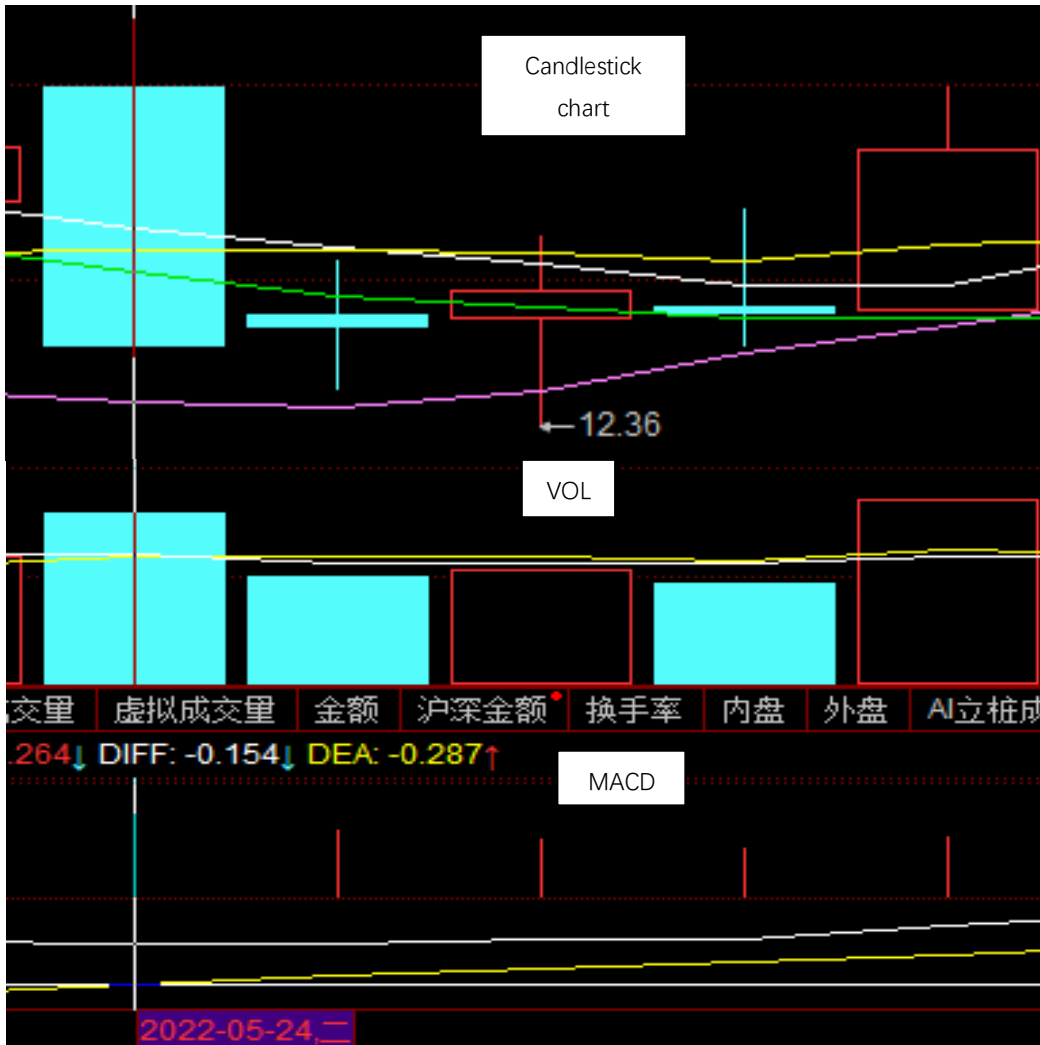The report of week one by using technical trading method is shown in Table 3.1 below.

Table 3.1 Week one report of my profile by using technical trading method

Date	Symbol	Buy/ Sell	Price	Shares	Net Cost/ Proceeds	Profit/ Loss	Total Cash	Total Profit
2022/5/24	NavInfo	Buy	￥12.78	1100	￥14063.14	￥0	￥936.86	￥0

3.2.2 Week Two

From 31st May to 7th Jun 2022, the share price of NavInfo rose 6.32% in total. Form candlestick chart, we can see both VOL and MACD were increasing. It shows a high VOL in 6th 2022 with shares price increasing 6.2%. The decision of selling some of shares at this point was made due to following reasons：

1. Stock price did not keep in the highest point with a high VOL.

2. Stock price was far away from 5-day EMA line.

However, no trade was made since I expected for more profit. Proof by facts that it was not a rational decision.

At 7th Jun, the stock price felled -2.99%. There was no negative news for NavInfo in the market and stock price was also above all EMA lines. So, these shares have still been held.

There was no transaction at this week.

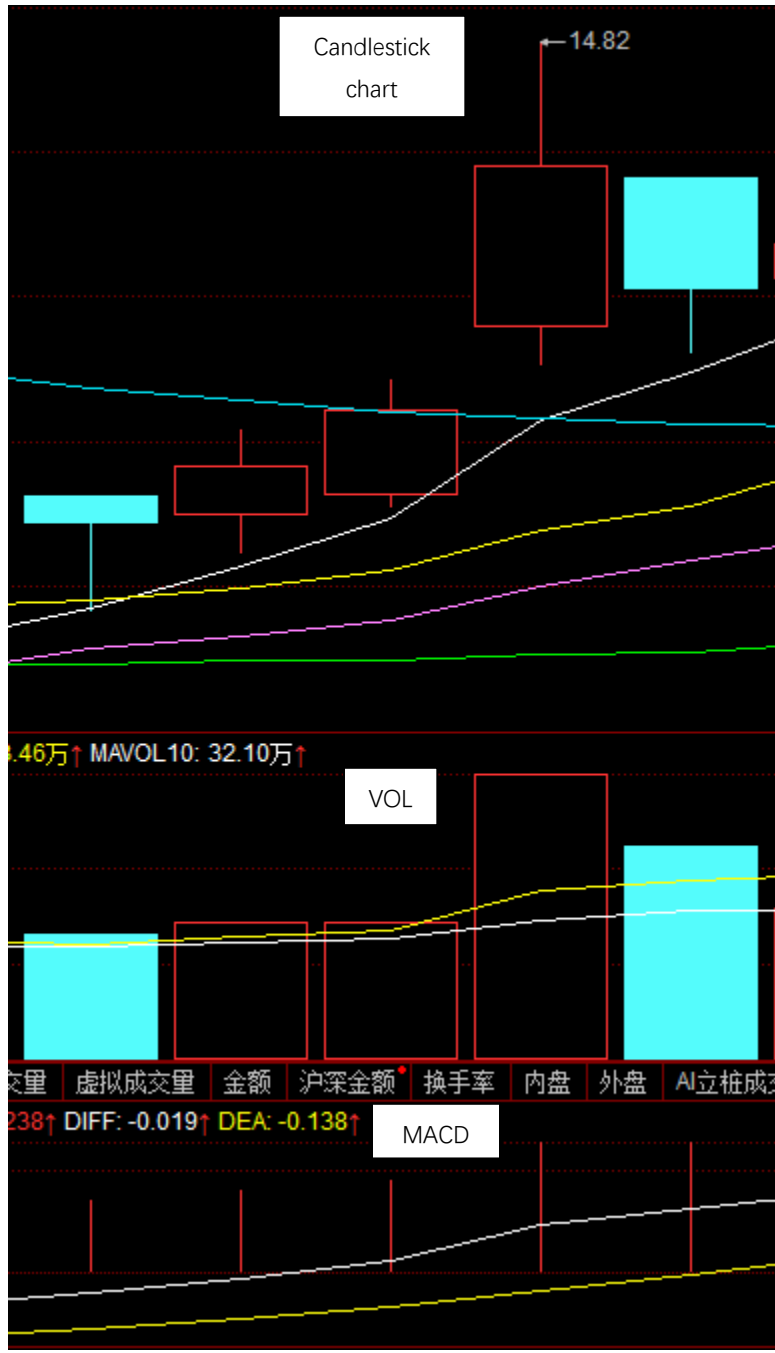The NavInfo stock daily trend from 31st May 2022 to 7th Jun 2022 is shown in Figure 3.5 below.

Figure 3.5   NavInfo stock daily trend from 31ˢᵗ May 2022 to 7ᵗʰ Jun 2022

3.2.3 Week Three

From 8th Jun to 14th Jun, the stock price of NavInfo rose 2.36% in total. From candlestick chart, we can see both VOL and MACD keep stable in the first two days. 400 shares were sold with increasing of VOL and stock price in third day. The shares were sold with following reasons:

1. VOL is higher than before with the stock price increasing.

2. The price is higher than EMA lines

Selling these shares wasn't a reflection of my pessimism towards NavInfo stock. I intended to repurchase them at the right moment.

The week three trade data by using technical trading method is shown in Table 3.2 below.

Table3.2 Week three report of my profile by using technical trading method

Date	Symbol	Buy/ Sell	Price	Shares	Net Cost/ Proceeds	Profit/ Loss	Total Cash	Total Profit
2022/5/24	NavInfo	Buy	￥12.78	1100	￥14063.14	￥0	￥936.86	￥0
2022/6/10	NavInfo	Sell	￥14.27	400	￥7240.07	+￥596	￥8176.93	+￥596

Figure 3.6 below shows the NavInfo stock daily trend from 8th Jun 2022 to 14th Jun 2022.
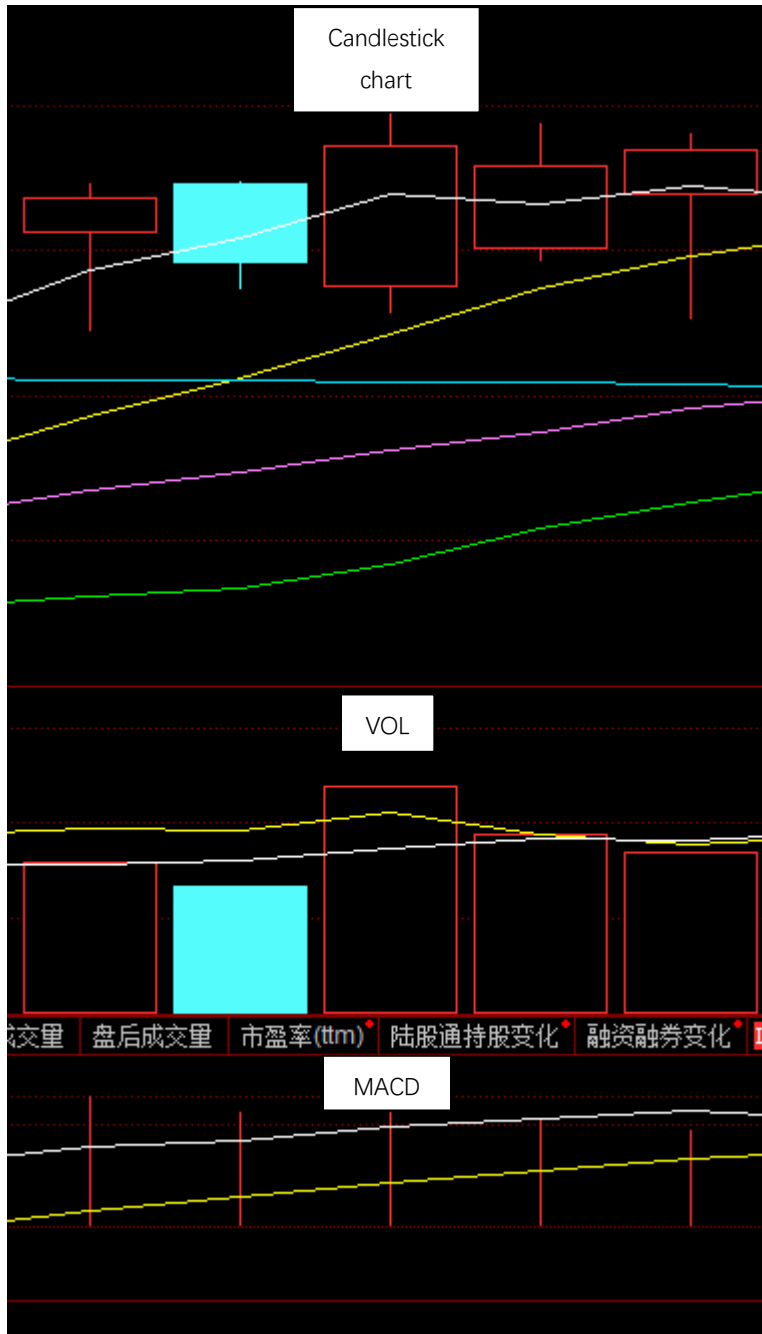
Figure 3.6 NavInfo stock daily trend from 8th Jun 2022 to 14th Jun 2022

3.2.4 Week Four

From 15th Jun to 21st Jun, the share price of NavInfo felled 3.43% in total. From candlestick

chart, we can see share price fells in a narrow range, VOL was in a low level and MACD has a

slight dropping.

Figure 3.7 shows the NavInfo stock daily trend from 15th Jun 2022 to 21st Jun 2022.

Figure 3.7 NavInfo stock daily trend from 15th Jun 2022 to 21st Jun 2022

From EMA lines, stock price was above 20-day EMA line, lower than 5-day EMA line and 10-day EMA line. If the stock price dropped lower than 30-day EMA line without high VOL, right number of shares would be considered to purchase. Now, it is not a good opportunity to buy or sell stocks.

In fact, all shares were traded away in two days after four-week simulation ending with a high share price and VOL.

Figure 3.8 shows the NavInfo stock daily trend from 24th May 2022 to 29th Jun 2022.

Figure 3.8 NavInfo stock daily trend from 24th May 2022 to 29th Jun 2022

After four-week simulation, we can see the final result from following table. When we buy or sell stocks, we need to pay taxes. All taxes are included in transaction process.

The week four trade data by using technical trading method is shown in Table 3.3 below.

Table3.3 Week four report of my profile by using technical trading method

Date	Symbol	Buy/ Sell	Price	Shares	Net Cost/ Proceeds	Profit/ Loss	Total Cash	Total Profit
2022/5/24	NavInfo	Buy	￥12.78	1100	￥14063.14	￥0	￥936.86	￥0
2022/6/10	NavInfo	Sell	￥14.27	400	￥5697.23	+￥596	￥6634.09	+￥596
2022/6/23	NavInfo	Sell	￥14.57	700	10183.70	+￥1253	￥16817.7	+￥1849

3.3 Results

After performing a four-week stock simulation by using the technical trading method,

￥1849 profit was earned on my ￥15000 investment.

Figure 3.9 displays the total cash in the profile from the inception of the investment to the fourth week of the simulation. The total cash in the account was low during the initial two weeks, due to the purchase of stock shares using cash. As the stock shares were gradually sold, the stocks were cashed out. After liquidating all the stocks, there was a balance of ￥16817.7. All applicable taxes were settled during the transactions. Finally ,￥1849 profit was obtained and earning rate was 12.33%. The total cash per week by using technical trading method is listed by using histogram in Figure 3.9 below.
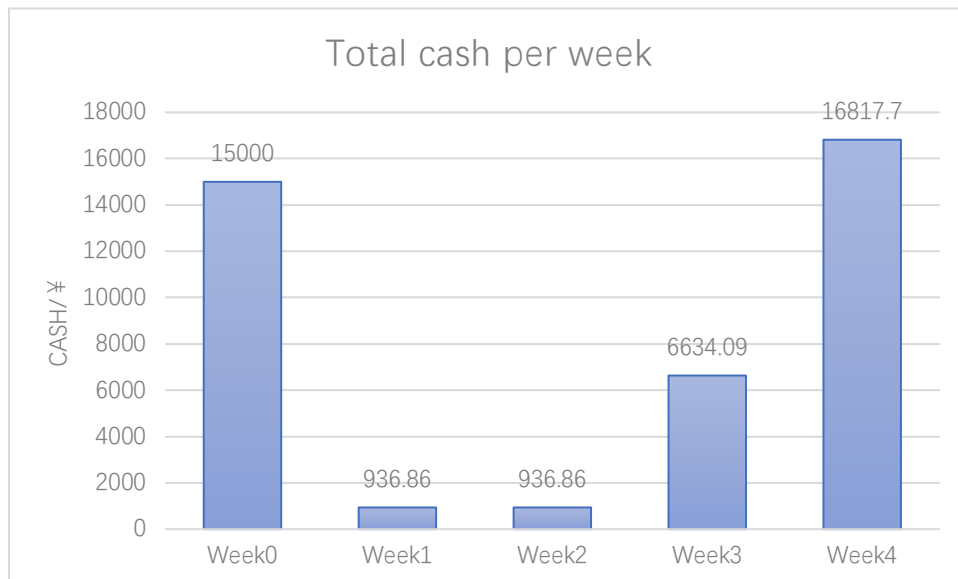

Figure 3.9 Total Cash per week by using Technical Trading method

Chapter 4: Swing Trading

This chapter records the process of trading stock by using swing trading. Firstly, this chapter introduces the selected company, and the reason why it is chosen for investment. Second, this chapter will present the initial investment record, and analysis of stock trends in the next four weeks. Like chapter three's structure, the transaction data will be documented at the end of each week's report. Finally, this chapter will analyze and display the results of the total gain or loss after the four-week simulation.

4.1 Company Selected

After comparing various companies, the investor selected a stock named Paike New Materials and Technology Co., Ltd from the Aviation Industry.

4.1.1 Paike New Materials and Technology (PNMT)

PNMT is a core supplier of ring forgings in the high-end field of domestic aerospace. It has been deeply engaged in ring forging business for more than ten years, and its products are widely used in aerospace, shipbuilding, electric power, petrochemical and other industries. Aerospace Forging business accounts for 41%. Benefiting from the high demand in the aerospace industry, PNMT revenue and profit increased rapidly. From 2016 to 2021, company's operating income increased from 340 million yuan to 1.73-billion-yuan, accounting for 38.5% of CAGR; The net profit increased from 30 million yuan to 300-million-yuan, accounting for 59.7% of CAGR.

Another important business in wind power field is growing rapidly. forged parts are widely

used in bearings, gears, flanges, and other parts of wind power units. It can be estimated that the prosperity of the wind power industry is rising, which is expected to drive the rapid growth of the company's wind power forging business income.

From Aug 2020, when PNMT IPO took place, to 31st May 2022, its stock price continuously increased 210%. The shape of its stock trend, shown in Figure 4.1. As mentioned in chapter three. Although whole stock market experienced a rapid felling in Apr 2022, PNMT can go back quickly.

Figure 4.1 below shows the PNMT stock monthly trend from Aug 2020 to May 2022.
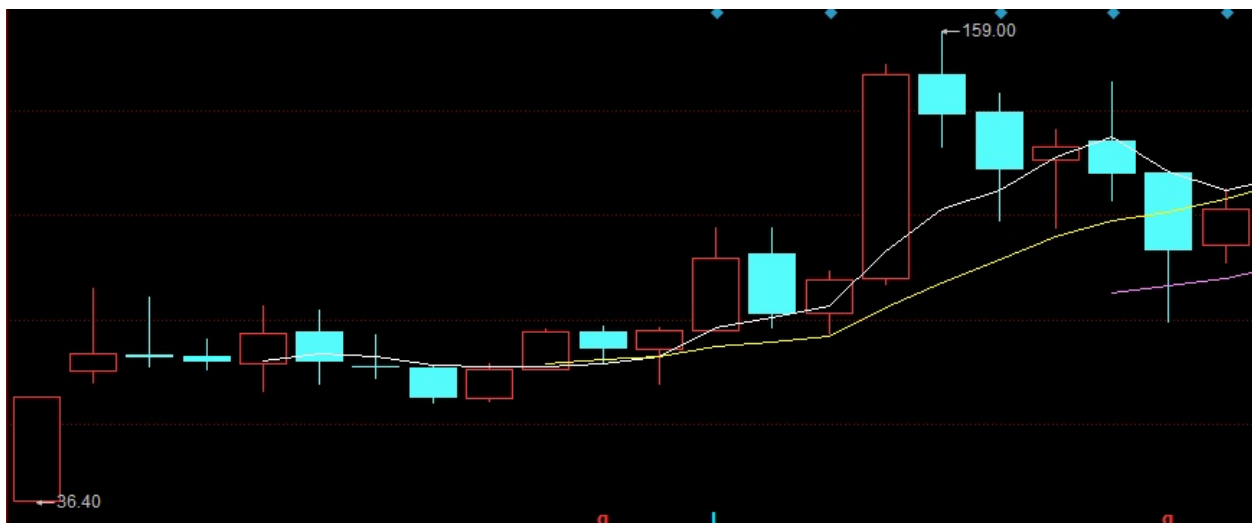
Figure 4.1 PNMT stock monthly trend from Aug 2020 to May 2022

PNMT was chosen for swing trading with following reasons:

1. PNMT business growing rapidly in last 3 years. Good business and prospect are key of stock price increasing.

Figure 4.2 below shows the PNMT net profit and year on year growth from 2018 to 2022.

Figure 4.2 PNMT net profit and year on year growth from 2018 to 2022

2. For swing trading, ideal status is this company has obvious uptrend during one period.

We can see PNMT stock price fits this. Every time its stock price felled; it can go back quickly.

We can see its stock price goes stable after a panic selling in Apr 2022 in Figure 4.3 below.

Figure 4.3 PNMT stock weekly trend from Jan 2021 to May 2022

4.2 Simulation
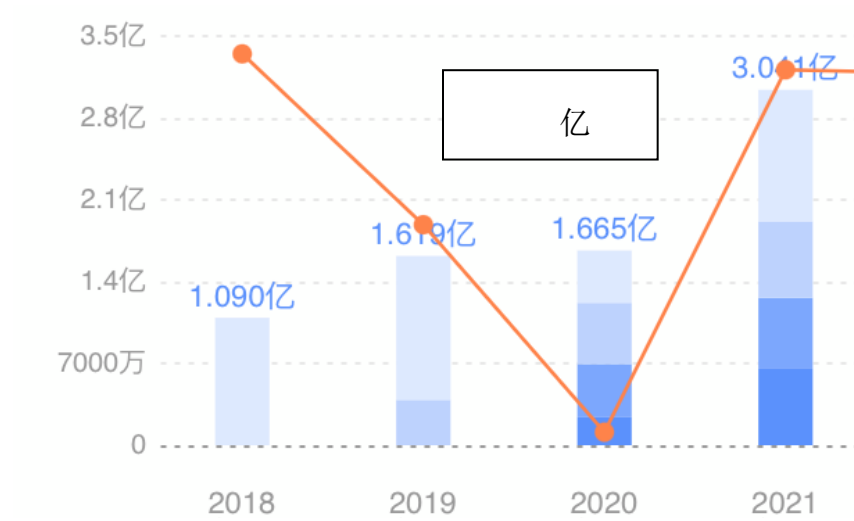
The initial investment made for PNMT was approximately ￥25000. 100 shares were purchased at ￥120.87 per share on 8th June.

4.2.1 Week One

Over the first week, PNMT stock felled 1.12% totally. In this week, three transactions were made.

Transaction1: Bought 100 shares with ￥120.87 per share

Transaction2: Bought 100 shares with ￥116.35 per share

Transaction3: Sold 100 shares with ￥123.1 per share

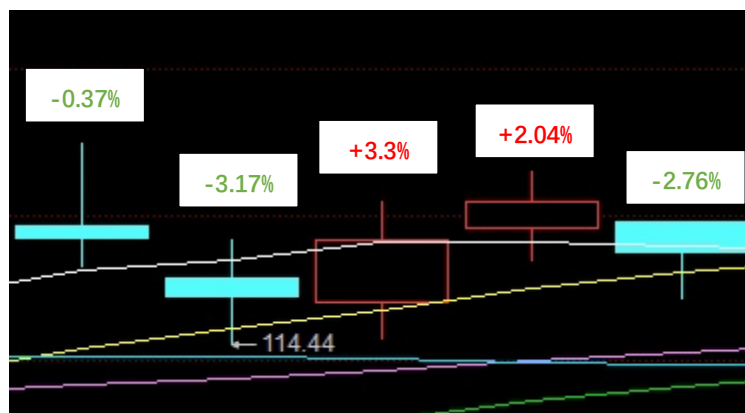Figure 4.4 below shows the PNMT stock daily trend from 8th Jun to 14th Jun 2022.

Figure 4.4 PNMT stock daily trend from 8th Jun to 14th Jun 2022

For transaction2, As seen in Figure 4.3, PNMT showed a rising trend. The highest point of uptrend is ￥127.7 which appeared at the 10:30 AM on 8th Jun. The lowest point of downtrend is

at 1: 11PM on 8th Jun with a value of ￥127.7. If we buy the stock at a price of ￥116.25, it is totally OK.

For transaction3, 100 shares were sold due to big stock price fluctuation of PNMT. From current view, it was not a good transaction.

Table 4.1 is the summary of week one transaction by using swing trading method.

Table 4.1 Week one report of my profile by using swing trading method

Date	Symbol	Buy/ Sell	Price	Shares	Net Cost/ Proceeds	Profit/ Loss	Total Cash	Total Profit
2022/6/08	PNMT	Buy	￥120.87	100	￥12092.12	￥0	￥12907.88	￥0
2022/6/09	PNMT	Buy	￥116.35	100	￥11640.12	￥0	￥457.76	￥0
2022/6/10	PNMT	Sell	￥123.1	100	￥12292.57	+￥1253	￥13560.33	+￥200.45

4.2.2 Week Two

Over the second week, PNMT stock rose 1.4% totally. In this week, two transactions were made.

Transaction1: Sold 100 shares with ￥128.99 per share.

Transaction2: Bought 100 shares with ￥123.6 per share.

Figure 4.5 below shows the PNMT stock daily trend from 15th Jun to 21st Jun 2022.
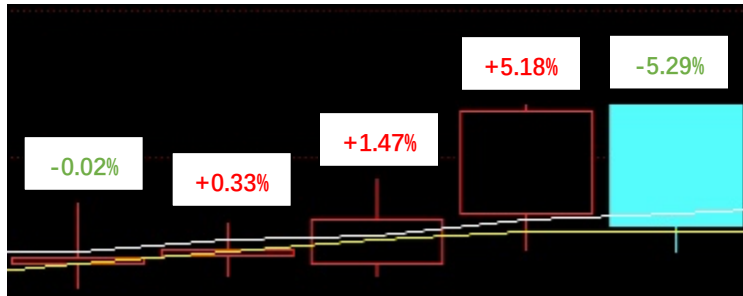
Figure 4.5 PNMT stock daily trend from 15th Jun to 21st Jun 2022

During the second week simulation, PNMT stock fluctuated widely in the last two days. The highest point of the uptrend is ￥129.26 which appeared at 10:59 AM on Jun 20th. The lowest point of the downtrend is at 2:12 PM on Jun 21st with the value of ￥120.67. If the stock were bought at a price lower than ￥124.926, then the risk to reward ratio would be lower than 1.0. To calculate the risk reward ratio, the highest point of uptrend was set as a target of profit, and the lowest point of the downtrend was set as the stop out point. The unknown trading price is X. The equation to calculate the risk to reward ratio is shown below:

(X - ￥120.67) / (￥129.26 - X) < 1.0

Given that the current stock price is ￥128.99, and the calculated ratio is 34.52, which is considerably higher than 1, they decided to sell 100 shares.

Additionally, they purchased 100 shares at ￥123.6 per share on the last day of the week, as the stock price entered a safety zone following a decline and the ratio dropped below 1. Table 4.2 is a summary of the transactions for the second week.

Table 4.2 Week two report of my profile by using swing trading method

Date	Symbol	Buy/Sell	Price	Shares	Net Cost/Proceeds	Profit/Loss	Total Cash	Total Profit
2022/6/08	PNMT	Buy	￥120.87	100	￥12092.12	￥0	￥12907.88	￥0
2022/6/09	PNMT	Buy	￥116.35	100	￥11640.12	￥0	￥1267.76	￥0
2022/6/10	PNMT	Sell	￥123.1	100	￥12292.57	+￥200.5	￥13560.33	+￥200.5
2022/6/20	PNMT	Sell	￥128.99	100	￥12880.97	+￥1241	￥26441.3	+￥1441.5
2022/6/21	PNMT	Buy	￥123.6	100	￥12365.12	￥0	￥14076.18	+￥1441.5

4.2.3 Week Three

Over the third week, PNMT stock rose 22.32% totally, and two transactions were made in this week.

Transaction 1: Bought 100 shares with ￥129 per share.

Transaction 2: Sold 100 shares with ￥147.59 per share

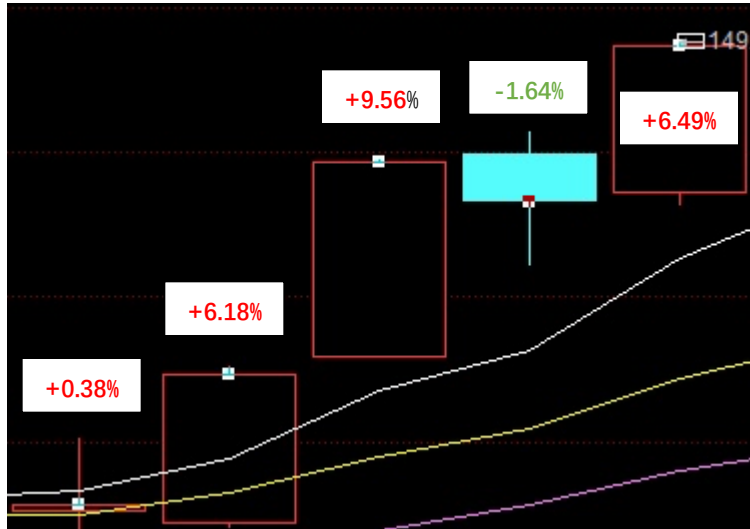Figure 4.6 below shows the PNMT stock daily trend from 22nd Jun to 28th Jun 2022.

Figure 4.6 PNMT stock daily trend from 22ⁿᵈ Jun to 28ᵗʰ Jun 2022

During the third week simulation, PNMT stock had a huge rising. The highest point of the uptrend was ￥149.62 which appeared at 1:06 PM on Jun 28ᵗʰ. The lowest point of the downtrend was at 9:33 AM on Jun 22ⁿᵈ with the value of ￥120.18. If the stock was purchased at a price lower than ￥134.9, then the risk to reward ratio would be lower than 1.0. To calculate the risk reward ratio, the highest point of uptrend was set as a target of profit, and the lowest point of the downtrend was set as the stop out point. The unknown trading price is X. The equation to calculate the risk to reward ratio is shown below:

$$(X - ￥120.18) / (￥149.62 - X) < 1.0$$

For transaction1, they purchased 100 shares at ￥129, resulting in a calculated ratio of 0.43, which is below 1.

For transaction 2, they sold 100 shares at ￥147.59, yielding a calculated ratio of 12.88, which is significantly above 1. Table 4.3 provides a summary of the transactions for week three.

Table 4.3 Week three report of my profile by using swing trading method

Date	Symbol	Buy/ Sell	Price	Shares	Net Cost/ Proceeds	Profit/ Loss	Total Cash	Total Profit
2022/6/08	PNMT	Buy	￥120.87	100	￥12092.12	￥0	￥12907.88	￥0
2022/6/09	PNMT	Buy	￥116.35	100	￥11640.12	￥0	￥1267.76	￥0
2022/6/10	PNMT	Sell	￥123.1	100	￥12292.57	+￥200.5	￥13560.33	+￥200.5
2022/6/20	PNMT	Sell	￥128.99	100	￥12880.97	+￥1241	￥26441.3	+￥1441.5
2022/6/21	PNMT	Buy	￥123.6	100	￥12365.12	￥0	￥14076.18	+￥1441.5
2022/6/23	PNMT	Buy	￥129	100	￥12905.26	￥0	￥1170.92	+￥1441.5
2022/6/28	PNMT	Sell	￥147.59	100	￥14739.09	+￥2374	￥15910	+￥3815.5

4.2.4 Week Four

Over the last week, PNMT stock felled 7.03% totally, and only one transaction was made in this week.

Transaction: Sold 100 shares with ￥135 per share.

Figure 4.7 below shows the PNMT stock daily trend from 29th Jun to 5th Jul 2022.
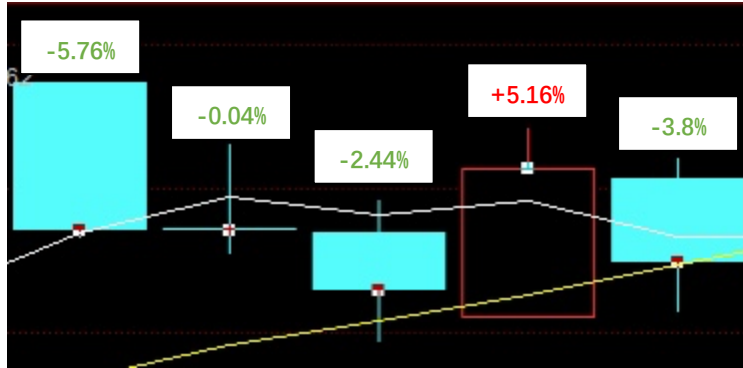
Figure 4.7 PNMT stock daily trend from 29th Jun to 5th Jul 2022

During the last week simulation, PNMT stock felled. The highest point of the uptrend is ￥149.39 which appeared at 09:30 AM on Jun 29th. The lowest point of the downtrend is at 1:30 PM on Jun 22nd with the value of ￥134.2. If the stock was bought at a price lower than ￥141.795, then the risk to reward ratio would be lower than 1.0. To calculate the risk reward ratio, the highest point of uptrend was set as a target of profit, and the lowest point of the downtrend was set as the stop out point. The unknown trading price is X. The equation to calculate the risk to reward ratio is shown below:

$$(X - ￥134.2) / (￥149.39 - X) < 1.0$$

The shares were sold at ￥135, resulting in a calculated ratio of 0.06, which is lower than 1. It wasn't a prudent decision to sell all shares at this price. The stock trend of PNMT also influenced the decision. Anticipating a continued decline, all shares were sold.

Table 4.4 is the summary of week four transaction by using swing trading method.

Table 4.4 Week four report of my profile by using swing trading method

Date	Symbol	Buy/ Sell	Price	Shares	Net Cost/ Proceeds	Profit/ Loss	Total Cash	Total Profit
2022/6/08	PNMT	Buy	￥120.87	100	￥12092.12	￥0	￥12907.88	￥0
2022/6/09	PNMT	Buy	￥116.35	100	￥11640.12	￥0	￥1267.76	￥0
2022/6/10	PNMT	Sell	￥123.1	100	￥12292.57	+￥200.5	￥13560.33	+￥200.5
2022/6/20	PNMT	Sell	￥128.99	100	￥12880.97	+￥1241	￥26441.3	+￥1441.5
2022/6/21	PNMT	Buy	￥123.6	100	￥12365.12	￥0	￥14076.18	+￥1441.5
2022/6/23	PNMT	Buy	￥129	100	￥12905.26	￥0	￥1170.92	+￥1441.5
2022/6/28	PNMT	Sell	￥147.59	100	￥14739.09	+￥2374	￥15910	+￥3815.5
2022/7/1	PNMT	Sell	￥135	100	￥13480.97	+￥575.7	￥29391	+￥4391.2

4.3 Results

After conducting a four-week stock simulation using the swing trading method, a profit of +￥4391.2 was realized from an initial investment of ￥25000. Figure 4.8 illustrates the total cash in the profile from the start of the investment to the end of the fourth week. The account had a low cash balance during the first three weeks due to continuous purchase of stock shares. However, after selling all the stock shares in the final week, the stocks were cashed out, resulting in a balance of ￥29391. All transaction fees were settled during the process. The total cash per week by using swing trading method is listed by using histogram in Figure 4.8 below.
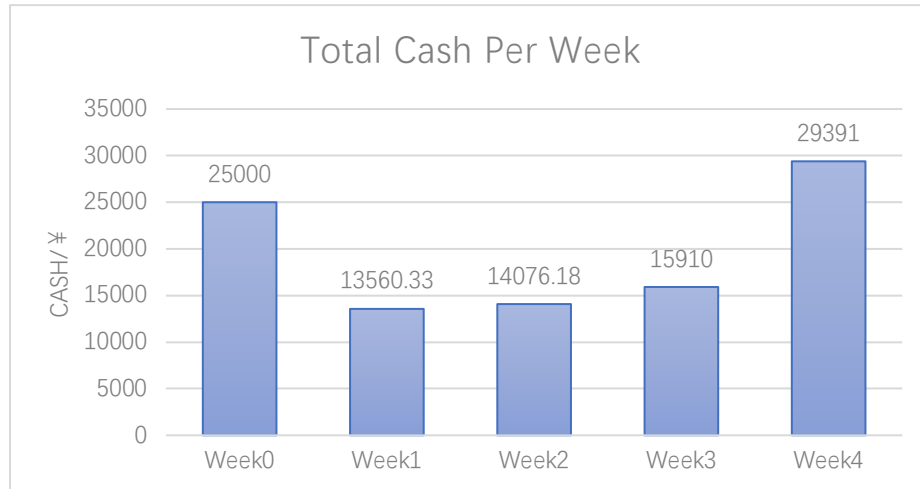
Figure 4.8 Total Cash per week by using Swing Trading method

Figure 4.9 illustrates the weekly profit generated using the swing trading method. In the first week, the total profit amounted to ￥2200.5. During the second and third weeks, profits increased due to a significant rise in the stock price. Not selling all shares during the third week, when the stock price was at its peak, was a missed opportunity. By the fourth week, influenced by broader market trends, the shares were sold at a lower price.

In the end, a total profit of ￥4391.3 was earned, resulting in an earning rate of 17.56%.

The profit per week by using swing trading method is listed by using histogram in Figure 4.9 below.
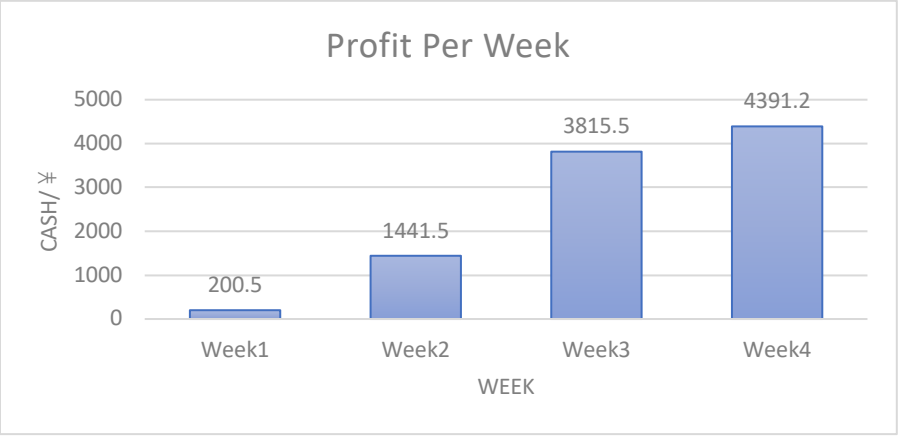
Figure 4.9 Profit per week by using Swing Trading method

Chapter 5: Analysis and Comparison

The individual tested two trading strategies during the four-week simulation: the technical trading strategy and the swing trading strategy. Swing trading yielded substantial profits, whereas the returns from technical trading were slightly lesser. The respective earning rates were 17.56% and 12.33%. The gains from swing trading were notably impressive given the brief duration. In comparison, technical trading didn't perform as well as swing trading.

The trading results are realistic and fair to analyze and compare even with different companies, because there were chosen at the same time slot which after a panic selling in China stock market.

Figure 5.1 presents the weekly earning rate differences between these two trading methods. According to the chart, swing trading has a steady increase on its weekly earning rate.
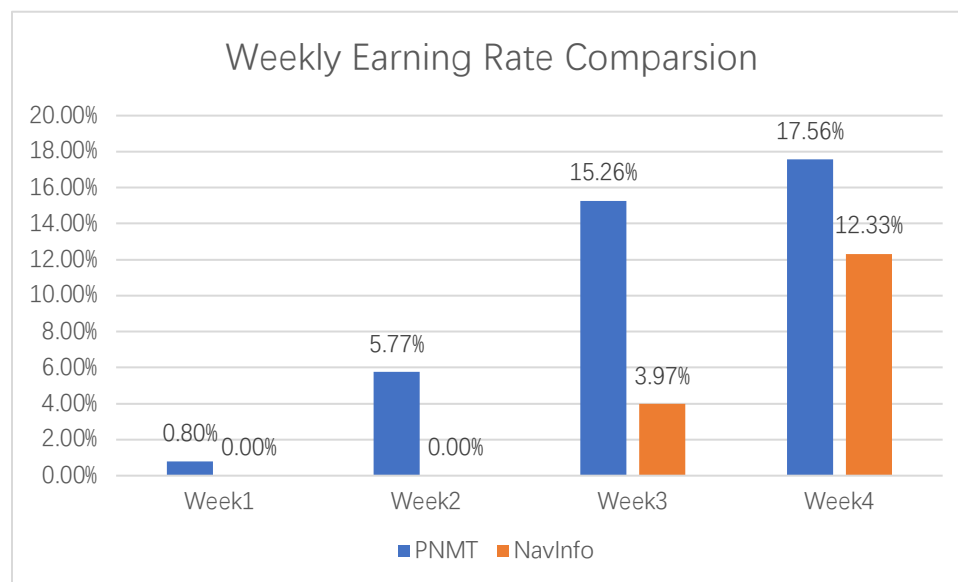

Figure 5.1 Weekly earning rate comparison of NavInfo and PNMT

For technical trading, there were not many transactions initially due to the absence of clear trading signals. Moreover, the technical index wasn't always strictly adhered to in pursuit of higher earnings. In hindsight, this approach appears somewhat imprudent.

In the case of swing trading, the stock exhibited significant growth during the four-week simulation. With the stock in an uptrend, there was more room for operation. Thus, shares were sold periodically using the swing trading method to maximize profits.

Chapter 6: Conclusion

From the results, the swing trading strategy appears to be more effective than the technical method. However, given more time, it's believed that the technical trading would have equaled the performance of swing trading, especially considering there were only a few weeks to simulate the stock market. Recent stock trends of these two companies are now comparable. Overall, the individual was pleased with the trading outcomes, not only achieving profits through both trading methods but also meeting the objectives of the project.

Initially, the objective was to acquire basic knowledge and understanding of the fundamental principles of the stock market. Through this project, that primary goal was achieved, garnering knowledge, gaining experience from the stock market, and using the acquired knowledge to predict market behaviors. The second objective was to learn how to analyze companies. By examining the final report, researching news, and scrutinizing government policies, the individual mastered the art of analyzing a company from various viewpoints. Lastly, the knowledge acquired can be utilized to predict stock market trends. However, the market is perpetually unpredictable, and it's essential to approach it with reverence.

Finally, whether it's swing trading or technical trading, the most crucial aspect is learning how to control one's emotions and remain calm during significant stock price fluctuations, enabling the right decisions to be made.

In general, this project was an outstanding experience. The individual gained a lot from it, and it could prove highly beneficial for their future financial investments.

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