Stock Market Simulation

An Interactive Qualifying Project Report: submitted to the Faculty of
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By

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Abstract

This IQP project is an eight-week stock simulation research. The goal of this project is to gain stock trading knowledge through real-time trading experience for the participants, so that one can make relatively wise and precise stock investment choice in the future. This project used three trading strategies: Swing trading strategy, News trading strategy and Day trading strategy on the targeted companies with a total investment of $500,000 for each trading strategy. At the end of the 8-week simulation, the return rate of swing trading was 1.11%, return rate of news trading was 1.72%, and return rate of day trading was 4.43%. The result indicates that day trading was the most profitable strategy among three trading methods.

Acknowledgments

The success of this IQP cannot be possible without the help of many individuals. First of all, we would like to thank Professor Tang for his support and guidance throughout the project. Professor Tang always provide us with constructive advice when we didn't do something properly and thus, we can learn much faster during the project. Also, we would like to thank my school, Worcester Polytechnic Institute for the logistical support and pacification. The project cannot be done without our school's countless recommendations and guidance.

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1 Introduction

In this chapter, we will introduce the goal of this project, background review over stock market, factors that influent market, past research in stock market simulation and the structure of this project.

1.1 Motivation and Goals

The goal of this project is to learn about stock market trading strategies and gain real experience for future investment through an eight-week stock market simulation. After the simulation, we will compare three strategies' outcome so that we can find out advantages and disadvantages of each, and we are able to have a good understanding of how stock market reflects the real financial world.

1.2 Background Review

In this chapter, we will first review the definition of stock market, the history of the stock market and some important factors that are influencing the stock market. Also, we will introduce some past researches that are related to stock market simulation.

1.2.1 What Is Stock Market

Stock is an investment that represents an ownership share in a company. Shares of private companies are issued to raise money to grow and invest in their business. Investors try to buy stocks in companies that will go up by value. If that really happens, the stock value will increase as well, and investors can sell the stocks for profits. Stock market is the place where people are able to exchange stocks, and issue stocks for

companies. Stock exchanges list shares of common equity as well as other security types, e.g. corporate bonds and convertible bonds [1].

1.2.2 Stock Market History

In 12th-century France, the *courretiers de change* was concerned with managing and regulating the debts of agricultural communities on behalf of the banks. Because these men also traded with debts, they could be called the first brokers. A common misbelief is that, in late 13th-century Bruges, commodity traders gathered inside the house of a man called *Van der Beurze*, and in 1409 they became the "Brugse Beurze ", institutionalizing what had been, until then, an informal meeting, but actually, the family Van der Beurze had a building in Antwerp where those gathering occurred; the Van der Beurze had Antwerp, as most of the merchants of that period, as their primary place for trading. The idea quickly spread around Flanders and neighboring countries and "Beurze" soon opened in Ghent and Rotterdam.

In the middle of the 13th century, Venetian bankers began to trade in government securities. In 1351 the Venetian government outlawed spreading rumors intended to lower the price of government funds. Bankers in Pisa, Verona, Genoa and Florence also began trading in government securities during the 14th century. This was only possible because these were independent city-states not ruled by a duke but a council of influential citizens. Italian companies were also the first to issue shares. Companies in England and the Low Countries followed in the 16th century. Around this time, a joint stock company--one whose stock is owned jointly by the shareholders--emerged and became important for colonization of what Europeans called the "New World."

In the 17th and 18th centuries, the Dutch pioneered several financial innovations that helped lay the foundations of the modern financial system. While the Italian city-states produced the first transferable government bonds, they did not develop the other ingredient necessary to produce a fully-fledged capital market: the stock market. In the early 1600s the Dutch East India Company (VOC) became the first company in history to issue bonds and shares of stock to the general public. As Edward Stringham (2015) notes, "companies with transferable shares date back to classical Rome, but these were usually not enduring endeavors and no considerable secondary market existed (Neal, 1997, p. 61)." The Dutch East India Company (founded in the year of 1602) was also the first joint-stock company to get a fixed capital stock and as a result, continuous trade in company stock occurred on the Amsterdam Exchange. Soon thereafter, a lively trade in various derivatives, among which options and repos, emerged on the Amsterdam market. Dutch traders also pioneered short selling – a practice which was banned by the Dutch authorities as early as 1610. Amsterdam-based businessman Joseph de la Vega's *Confusion de Confusiones* (1688) was the earliest known book about stock trading and first book on the inner workings of the stock market (including the stock exchange).

There are now stock markets in virtually every developed and most developing economies, with the world's largest markets being in the United States, United Kingdom, Japan, India, China, Canada, Germany (Frankfurt Stock Exchange), France, South Korea and the Netherlands [1].

1.2.3 Important Factors of Stock Market

Stock prices are ultimately affected by the relativity of demand and supply: price rises if there is more demand than supply and falls if there is more supply than demand. Meanwhile, there are other primary factors, such as fundamental factors, technical factors, and market sentiment [2].

For fundamental factors, there are factors such as 1. the earning base like earning per share (EPS), 2. earnings multiple that bases on the future earnings growth and discount rate, like Price-to-Earning(P/E) ratio.

Technical factors are external factors that affect the market pattern, such as inflation, economic strength, substitutes, and etc.

The market sentiment, the psychology of investor crowd, usually described as bearish or bullish, has a big influence on market performance. In a bearish market, selling takes dominant place and price falls, and in a bullish market, buying takes dominant place and price rises. News on companies, market and global politics is a source of market sentiment. Negative news, such as acquisitions and bad political situations, usually leads to selling pressure and cause price decrease, and positive news, such as releasing new products and positive profit statement, causes buying pressure and price increase [3].

Short-term investors, long-term investors have different priority evaluating the factors and there are contrarian investors that make opposite investment decisions. Long-term investors prioritize fundamental factors that drives the long-term trend of a company to help them choosing companies. Short-term investors, who only hold stocks for hours to weeks, prioritize technical factors that may lead to a sudden fluctuation.

1.2.4 Past Research

There are multiple stock researches in WPI. The aim for most of them is to learn some of the trading strategy and get some basic sense about the stock market.

Among all of the researches, one research turned a profit of $84,168 in a fourteen-week simulation (He & Wu, Wang, 2016). And this project used four different trading methods: technical trading, swing trading, position trading, and simulation trading. Each trading method was used to trade five different stocks. Among all, swing trading was the most profitable trading strategy.

Another example is a stock research conducted by Brooks in 2016 which earned a net profit of $146. He used five trading strategies and performed a six-month trading with four companies. The main difference between the two trading researches, we believe, is the company selection. The first one chose basically all tech companies while the second one invested most on the real estate companies. Therefore, we can make a conclusion that in 2016, tech stocks increase higher than the real estate stocks.

The stock market contains so many factors that sometimes we cannot accurately guess at which time will this category of stocks rise. But the more techniques that we gained from the trading, the more accurate and confident can we make decisions. Thus, this stock simulation research can definitely help us on being wiser on stock trading.

1.3 Outline of the Project

The overall structure of this project is to first research on past investment, then choose three different strategies and nine different companies for our own simulations. The simulation in this project will start with an initial investment of 500,000 dollars in total and will last eight weeks from Sep 22th to Nov 23th in 2019. The simulation results will

be used to compare the pros and cons of the three selected trading methods, and evaluation of our overall simulation will be provided at the end of the report.

For details, first of all, we will list some of the possible methodologies and each of our team member choose one for the simulation. Then we will set up our simulation on chosen software, so that we can do some trading without spending real money.

From one small clue one can see what is coming. Stock market is huge, and we cannot deal with all of them, so eight companies from different field will be chosen, and these companies' stock will be traded in our simulation.

Finally, each of us spend eight weeks on simulation, and keep track of each trading.

2 Methodology

Before traders start to trade, it's important to learn the basic investing strategies and choose the strategy that suits you the best. In this project, we study and adopt day trading, position trading, swing trading, and new trading in our simulation, and compare the profits that we can make with different strategies.

2.1 Day Trading

Day trading is defined as buy and sale of stock in same day multiple times, and it usually requires a high degree of self-discipline and objectivity. Day traders can earn a small profit in each trade, but they can trade multiple times each day, so that the profit in total may be huge as well. In order to get profit from day trading, the traders have to be active and focus on the stock frequently. There are many strategies that day trader usually uses, including scalping, range trading, news-based trading, and high-frequency trading. Some professional day traders can make live base on day trading or even be rich, however, there are some disadvantages and risks in day trading. Because the day traders have to make the purchases frequently, the commission fee and taxes will go higher along with each transaction. In addition, the day traders have to keep a high performance for each day's trading to get enough profit, but the day traders tend to be passive over time [4].

2.2 Position Trading

Position trading is a long-term trading strategy that is the opposite of day trading that position traders hold their investments and wait for their desired profits. It requires

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the traders to hold the stack for weeks to several years. The main idea of position traders is that the price trend tends to last for a long time, unless news or market earthquakes that has major impact on the trend.

Position trading doesn't need the traders to spend time studying daily news about their investments or daily price fluctuation, so it's a less time-demanding trading strategy. However, position traders need to apply technical analysis and fundamental analysis techniques to predict the price trend and be careful choosing the investments. The historical patterns and macroeconomic factors are two important resources for position traders to learn about the current position and decide investments.

2.3 Swing Trading

Swing trading is a trading strategy, by definition, that requires traders to hold stocks for several days to weeks (either long or short for more than one trading session, but usually not longer than a couple months) for observation and analysis. But in reality, swing trading sits in the middle of the continuum between day trading to trend trading. Compared to day traders who hold a stock anywhere from a few seconds to a few hours and trend traders who inspect the long-term trends of a stock in detail, swing traders hold a specific stock for a period of time, normally a few days to two or three weeks.

Identifying when to enter and when to exit a trade is the primary challenge for all swing trading strategies. However, swing traders do not need perfect timing—to buy at the very bottom and sell at the very top of price oscillations—to make a profit. Small consistent earnings that involve strict money management rules can compound returns over time. [5]

Swing trading is a little risky because the traders are holding positions overnight. And sometimes people get affected the next day. Possible examples would be news, politics, the president speech, natural disasters. These will sometimes tumble the stock overnight.

2.4 News Trading

News trading involves either buying or shorting a security immediately after a major news event. This strategy is mainly used to trade Forex and old markets. In most of the times, after a significant news event releases, markets are likely to continue moving for some time, which means that traders have the chance to follow this trend and ride the trade.

In order to make a lot of money, during or right after the time of release of major economy publishes statistics like inflation, unemployment rate or even GDP. Here are some tips for news trading beginners. Firstly, focus on the most important news, because each day there are erroneous news generated and published, traders need to filter out the most important ones to help you trade. Secondly, the usual market reaction of a news only lasts from 30 minutes up to 2 hours, so traders have to react fast. Thirdly, traders should wait for the real strong signals and their confirmation, then finish the trade. [6]

3 Simulation Setup and Company Research

In this chapter we will introduce the tools, rules, websites, and software we used in the simulation, and our company selection. We will also explain how we set up the stock trading simulation with chosen software, companies and game settings. Google, Apple, Alibaba Group, Nintendo, JD.com, Nike, Snap Inc., China Mobile are selected for our simulation. We will provide for each company a short background research that helped us narrow down the company options. In addition, we will also introduce in this chapter the two different analysis ways to analyze the stock market data that we used in this project.

3.1 Stock Simulation Engine

Various stock simulation engines are available online, such as the Wall Street Survivors, the Weseed, How the Market Works, and the Investopedia Simulator. This project will use the Investopedia Simulator and Alpaca for algorithm day trading strategy.

3.2 Basic Procedure to Create a Game

Figure 3.2.1 shows the interface of game name and basic trading rules. In this project, Game name is "IQP 1906" and Starting Cash is $500, 000.

Figure 3.2.1 Game Name & Basic Trading Rules

After setting basic trading rules, we have to set the game rules. Figure 3.2.2 shows

the detailed information for the game.

Figure 3.2.2 Detailed Information of Game Rules

For this project, the start date is 9/16/2019 and the end date is 11/17/2019. Last

step is to click "Create" button to create this game and invite teammates into this game.

3.3 Company Selection

In this section, we will introduce the nine companies that are selected for the stock market simulation. The introduction contains a brief history of the company and the reason that we choose this company for the simulation.

3.3.1 Google

Google LLC is an American founded in 1998 multinational technology company that includes various fields, such as online advertising technologies, search engine, cloud computing, software, and hardware. It can be considered as one of the biggest four technology companies, along with Amazon, Apple, and Facebook. Its headquarters are in Mountain View, California. Google began as a search engine, but it separates out more than 50 other fields for now. The mission they persist is to organize the world's information and make it universally accessible and useful. The earliest fund is 100,000 dollars from Andy Bechtolsheim at August 1998. Google took an initial public offering in August 2004 with 19,605,052 shares and $85 per share [7]. Figure 3.3.1 shows the Google's stock price from 2004 to 2019.
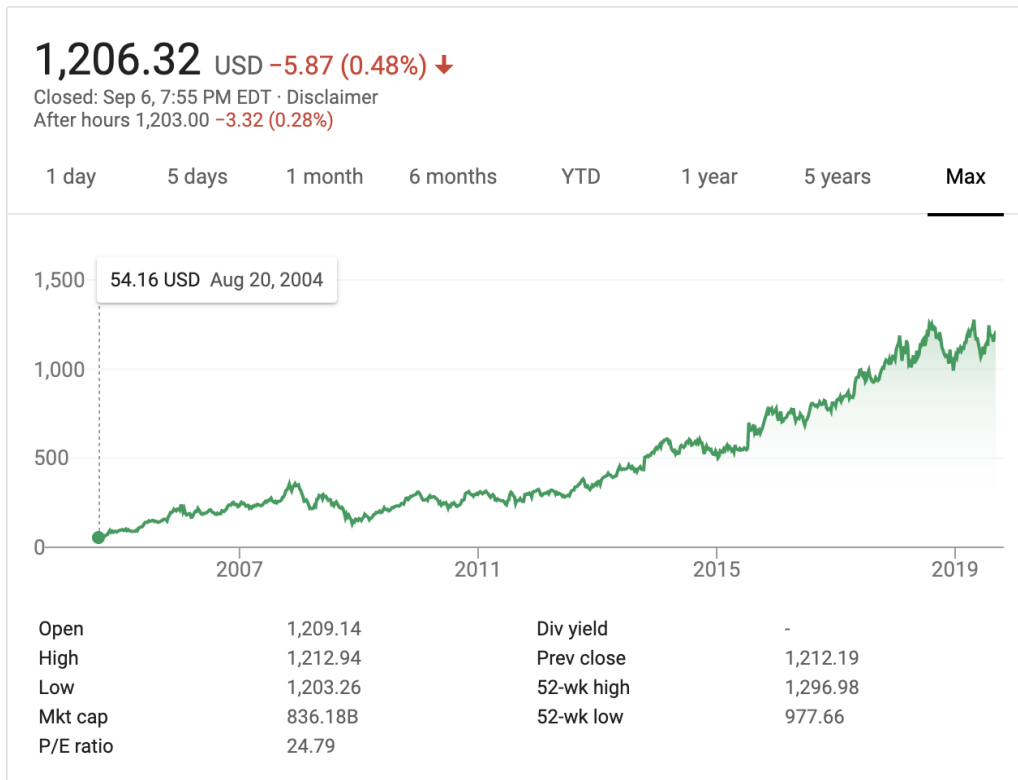
Figure 3.3.1 Google's Stock Price from 2004 to 2019

There are two major drops from past 15 years, which are November 2008 and December 2018. 2008's drop is caused by the global economy depression. In 2008, there were few companies that can keep their stock not to be depreciated. In 2018, it is the same reason, the whole American stock market was depressed. In general, google's stock price has been increased more than 15 times from the first IPO took place to now. In addition, the major drops were caused by stock market depressed. Therefore, google can be considered as a good example for us to monitor the whole stock market.

3.3.2 Apple

Apple is a multinational company that makes computer hardware (the Macintoshes), software (macOS, iOS, watchOS and tvOS), and mobile devices (iPod, iPhone and iPad) like music players [8]. Figure 3.3.2 shows the Apple Inc. stock's price

from 2014 to 2019. As we can see on the figure, in recent years Apple's enormous cash hoard has reached downright legendary levels. Apple (NASDAQ: AAPL) investors have had a rough time of it over the past few months.

Figure 3.3.2 Apple Inc. Stock's Price from 2014 to 2019

Even within Apple's disappointing preannouncement of quarterly results, there was good news: CEO Tim Cook reported the company's services segment would be over $10.8 billion in Q1 -- 28% higher than last year [9]. Services include AppleCare, Apple Music, iCloud, and App Store sales (for which Apple earns a 30% commission). Services revenue is growing. In addition, Apple should be launching its own TV streaming service later this year, which could further light a fire under the already strong services segment. Apple's installed base of over 1.4 billion devices is a good-sized one to market a streaming service of well-known Hollywood names to. For comparison, the largest streamer, Netflix, had 137.1 million subscribers as of last quarter [9]. Also, Apple's going

to have next event on Tuesday 10 September 2019, with multiple new devices and systems launched. Therefore, Apple Inc. is a worthy company to invest.

3.3.3 Alibaba Group

Alibaba group was founded in April 1999, and it is a global wholesale marketplace. In Sept 2014, Alibaba went public in New York Exchange [10]. Right now, Alibaba's revenue is about 56 billion dollars. Alibaba is one of the most retail selling places nationally and globally, and it has improved people's lives by bringing mobile payment to people's daily life. Alibaba starts with a retail platform and e-commerce, but right now it dabbles in all fields, from retail to Internet of Things platform. Figure 3.3.3 shows the Alibaba Group stock's price from 2014 to 2019. On the figure, it shows that Alibaba's stock has increasing trend in general, except the drop in 2018, which is caused by global economy depression. The first IPO of Alibaba reached 2 billion dollars with $92.7 per share which is the highest record in the world [11].

Previous Close	178.94	Market Cap	449.973B
Open	179.01	Beta (3Y Monthly)	1.87
Bid	176.95 x 1100	PE Ratio (TTM)	50.53
Ask	176.65 x 900	EPS (TTM)	3.50
Day's Range	176.21 - 179.22	Earnings Date	Oct 31, 2019 - Nov 4, 2019
52 Week Range	129.77 - 195.72	Forward Dividend & Yield	N/A (N/A)
Volume	8,195,012	Ex-Dividend Date	N/A
Avg. Volume	17,767,287	1y Target Est	222.55
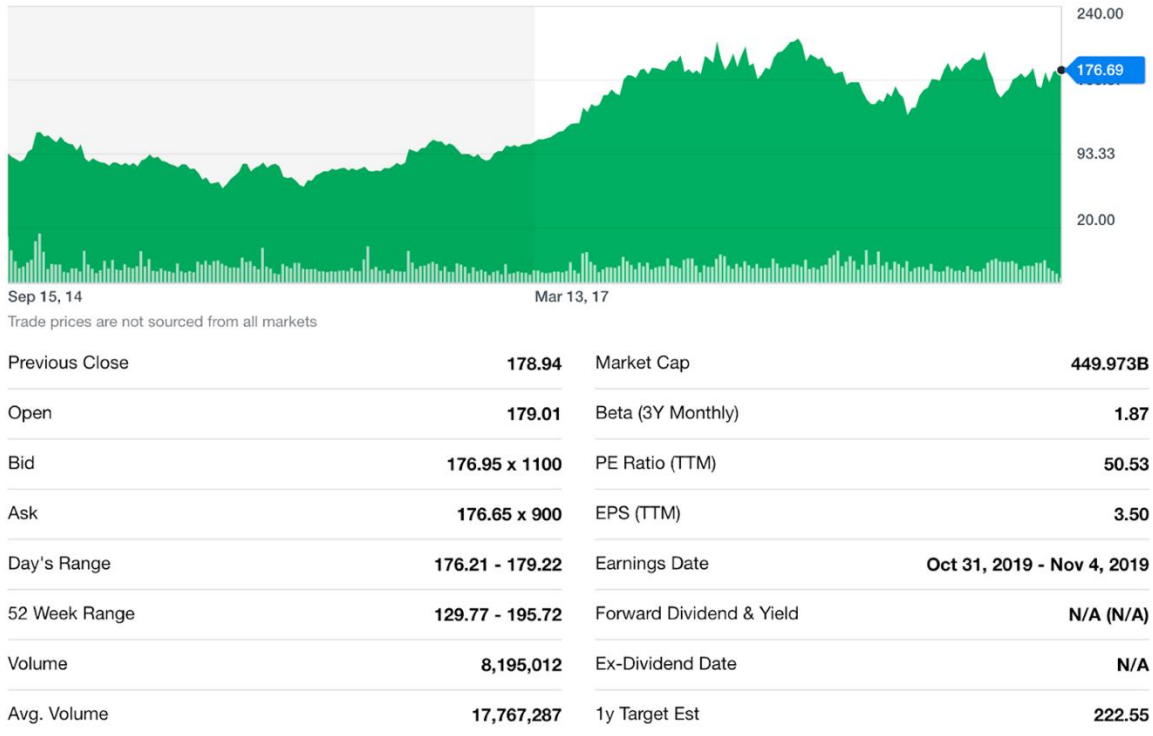
Figure 3.3.3 Alibaba Group Stock's Price from 2014 to 2019

3.3.4 Nintendo

Nintendo Co., Ltd. is a Japanese multinational consumer electronics and video game company headquartered in Kyoto. Nintendo is one of the world's largest video game companies by market capitalization, creating some of the best-known and top-selling video game franchises of all-time, such as Mario, The Legend of Zelda, and Pokémon [12]. Supplemented since the 1980s by its major divisions Nintendo of America and Nintendo of Europe, it ultimately became one of the most influential in the industry and one of Japan's most-valuable companies with a market value of over $37 billion in 2018 [13].

Figure 3.3.4 is the Nintendo stock price from 2004 to 2019. From the technical perspective, it has an upward trend in in this year. Right now, year-over-year cash flow growth for Nintendo is 217.1%, which is higher than many of its peers. In fact, the rate

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compares to the industry average of 6.7%. And the company's annualized cash flow growth rate has been 42.9% over the past 3-5 years versus the industry average of 17.5% [14]. Also, on September 20th Nintendo is going to launch Switch Lite to the US market. According to Nintendo stock price in the past 6 months, Nintendo stock has a general growing trend.

Figure 3.3.4 Nintendo Stock Price from 2004 to 2019

3.3.5 Snap Inc.

Snap Inc. is an American technology and camera company, founded on September 16, 2011, by Evan Spiegel and Bobby Murphy based in Santa Monica, California. It has three products: Snapchat, Spectacles, and Bitmoji [15].

The IBD Stock Checkup Tool shows that Snap has an IBD Composite Rating of 89 out of a best-possible 99. Snap stock ranks high in terms of several other key performance metrics and on technical strength. It has a Relative Strength Rating of 98, which reflects its strong stock market performance. Also, the stock also has a strong

Accumulation/Distribution grade of A-, suggesting heavy buying among institutional investors [16].

Wall Street is more focused on Snap's accelerating sales growth, which has gone from 36% to 39% to 48% over the past three quarters. Unprofitable IPOs can deliver substantial gains for investors if sales growth is north of 30%, especially if it's accelerating [17].

| 1 day | 5 days | 1 month | **6 months** | YTD | 1 year | 5 years | Max |

Open	15.97	Div yield	-	
High	16.64	Prev close	15.87	
Low	15.90	52-wk high	18.36	
Mkt cap	22.92B	52-wk low	4.82	
P/E ratio	-			

Figure 3.3.5 Snap Inc.'s Price from Feb 2019 to Sep 2019

3.3.6 Nike

Nike, Inc. is an American multinational corporation that it is worldwide marketing sales of footwear, apparel, equipment, accessories, and services. The headquarters of this company is near Beaverton, Oregon, in the Portland metropolitan area. Nike was founded in 1964 and went public in 1980. The success of Nike is from the support of some excellent athletes, such as Michael Jordan, Mia Hamm, Roger Federer, and Tiger Woods.

Figure 3.3.6 shows Nike's stock price from 1980 to 2019. The stock price of Nike has increased 800 times, with a starting price of $0.17. Although the starting price is relatively low, Nike went public really early, and the price of one dollar from that time is different from now. It is a great job of their stock price with 800 increments over the 39 years [18].
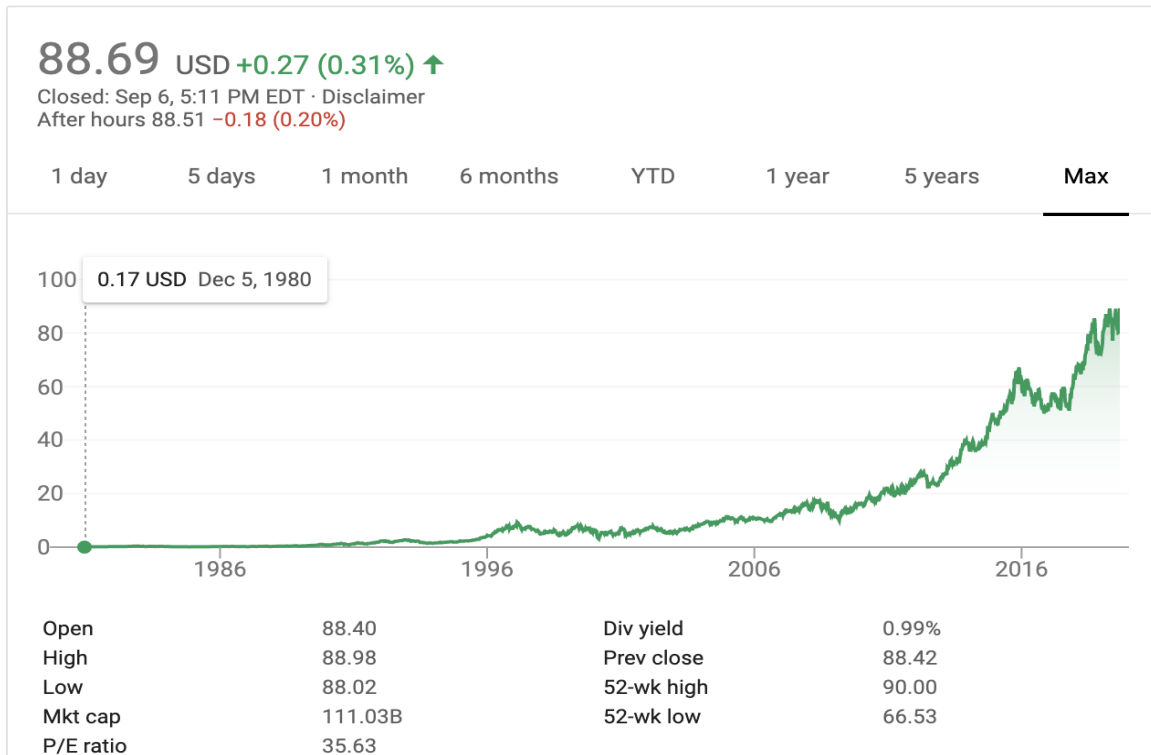
Figure 3.3.6 Nike's Stock Price from 1980 to 2019

3.3.7 Sina

Sina is a Chinese technology company. Sina operates four major business lines: Sina Weibo, Sina Mobile, Sina Online, and Sinanet. Sina has over 100 million registered users worldwide. Sina was recognized by *Southern Weekend* as the "China's Media of the Year" in 2003 [19].

Sina owns Sina Weibo, a Twitter-like microblog social network, which has 56.5 percent of the Chinese microblogging market based on active users and 86.6 percent

based on browsing time over Chinese competitors such as Tencent and Baidu. The social networking service has more than 500 million users and millions of posts per day, and is adding 20 million new users per month, says the company. The top 100 users now have over 180 million unique followers combined [19].

Figure 3.3.7 shows Sina's daily candlestick chart. From technical aspect, daily candlestick line is beyond 60-day candlestick line.

Figure 3.3.7 Sina daily candlestick chart

3.3.8 JD.com

JD.com, Inc., also known as Jingdong and formerly called 360buy, is a Chinese e-commerce company headquartered in Beijing. It is one of the two massive B2C online retailers in China by transaction volume and revenue, a member of the Fortune Global 500 and a major competitor to Alibaba-run Tmall. As of the first quarter of 2018, the platform has 301.8 million active users. JD.com, Inc. was listed on Nasdaq in the U.S. in May 2014 [20]. Figure 3.3.8 is the monthly MACD chart of JD.com. On the technical aspect, in monthly MACD chart, DIFF line has just surpassed DEA line.
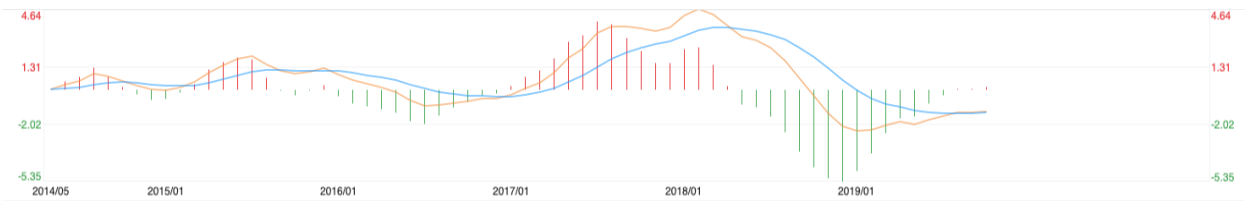
Figure 3.3.8 JD.com monthly MACD chart

3.3.9 China Mobile

China Mobile Communications Corporation d/b/a simply China Mobile is a Chinese state-owned telecommunication corporation that provides mobile voice and multimedia services through its nationwide mobile telecommunications network across mainland China. China Mobile is the largest mobile telecommunications corporation by market capitalization, and also the world's largest mobile phone operator by total number of subscribers, with over 902 million subscribers as of June 2018 [21].

The core subsidiary of the group, "China Mobile Limited", is listed on both the NYSE and the Hong Kong Stock Exchange. China Mobile also operates China Mobile Hong Kong, a subsidiary mobile network in Hong Kong. As of Auguest 2017, China Mobile's total market value stood at RMB 1.57 trillion [21].

Figure 3.3.9 is the monthly candlestick chart of China Mobile. On technical aspect, monthly k-chart has shown that five-wave down is complete. MACD chart shows divergence.

Figure 3.3.9 China Mobile monthly candlestick chart

3.4 Data Analysis Method

Fundamental analysis and **Technical analysis** are frequently used by investors to determine what stock to buy and at what price should they buy the stock.

3.4.1 Fundamental Analysis

Fundamental analysis is a method of measuring a security's intrinsic value by examining related economic and financial factors. Several factors can affect the security's value, from macroeconomic factors such as the state of the economy and industry conditions to microeconomic factors like the effectiveness of the company's management. Fundamental analysts investigate these potential factors. The end goal is to arrive at a number that an investor can compare with a security's current price in order to see whether the security is undervalued or overvalued.

For stocks, fundamental analysis uses the data from the company's financial statements to determine a company's underlying value and potential for future growth. Examples are revenues, earnings, future growth, return on equity, profit margins.

3.4.2 Technical Analysis

Fundamental analysts evaluate the company's intrinsic value, but technical analysts use analytical charting tools to examine the patterns of price movements, trading signals. Technical analysts believe past trading activity and price changes of a security can be valuable indicators of the security's future price movements.

Technical analysis can be used on any security with historical trading data. This includes stocks, futures, commodities, fixed-income, currencies, and other securities. Technical analysts may use technical analysis independent of other research efforts or in combination with some concepts of intrinsic value considerations but most often their convictions are based solely on the statistical charts of a security. The Market Technicians Association (MTA) is one of the most popular groups supporting technical analysts in their investments with the Chartered Market Technicians (CMT) designation a popular certification for many advanced technical analysts.

4 Simulation One: Swing Trading

In this chapter, we did simulation with swing trading. The simulation took eight weeks. For each week, the simulation details included the trading history for this week, followed by analysis. Finally, this chapter analyzes and displays the results of the total gain or loss after 8-week simulation.

The total starting cash for this swing trading simulation was $500,000. Companies were selected in the previous chapter.

4.1 Week One Simulation

This week I chose 3 companies to trade: Apple, Sina and Alibaba, all three of them have good reputation among people. Table 4.1.1 shows the trade history for the first week. Each of the trade cost $19.99 commission fee.

Date	Sym	Buy/Sell	Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
							500,000	
9/16	AAPL	Buy	218.32	228	49,796.95	0	450,203.05	0
9/16	SINA	Buy	45.32	500	22,679.99	0	427,523.06	0
9/17	SINA	Buy	45.47	500	22,754.99	0	404,768.07	0
9/17	SINA	Sell	44.26	500	22,110.01	-569.98	426,878.08	-569.98
9/19	BABA	Buy	182.99	500	91,514.99	0	335,363.09	-569.98
9/19	AAPL	Sell	222.15	228	50,630.21	833.26	385,993.30	263.28
9/20	AAPL	Buy	221.73	500	110,884.99	0	275,108.31	263.28

Table 4.1.1 Swing Trading History Week1

SINA:

Figure 4.1.1 is the monthly candlestick chart and MACD chart of SINA. It has shown the negative divergence. Negative divergence points to lower prices in the future.

It occurs when the price is moving higher, but a technical indicator is moving lower or showing the bearish signals. We can see this negative divergence appears in 2019.

From MACD chart, we can tell that there are two waves from 2018/5/31 to now. The lowest point of the first wave is lower than the lowest point of the second wave on MACD chart, but from candlestick chart the stock price dropped, which is a signal of buying. And the stock price is at the lowest point in recent years.

Therefore, on Sep 16th I first bought 500 shares at 45.32 and then another 500 shares at $45.47.

Figure 4.1.1 SINA monthly candlestick chart & MACD chart

Figure 4.1.2 is the daily candlestick chart and MACD chart. On Sep 17th, as shown on Figure 4.1.2, 5-day candlestick line has a trend to go down below 10-day candlestick line. On MACD chart, Diff line has a trend to go down below DEA line. Stock price has a probability to go back to 60-day stock price ($41). Therefore, I sell 500 shares of SINA and will wait to buy 500 shares back till the stock price reach $41.

Figure 4.1.2 SINA Daily Candlestick Chart & MACD Chart

APPL:

On Sep 16th, I bought 228 shares of APPL at $218.32. In a short period of time I guessed the stock price of APPL could reach $226. Figure 4.3.1 is the daily candlestick chart and MACD chart of Apple. Three days of real trading shows that the stock price will go back to 20-day candlestick line, which is $214. Therefore, on Sep 19th, I sold APPL on $222.15, gained $833.26 profit.

Figure 4.1.3 APPL Daily Candlestick Chart & MACD Chart

On Sep 20th, I bought 500 shares of APPL on $221.73 again as base since new products of Apple are released, I guess in a short period of time the stock price can reach $233. If the market INDEX goes down, there's a chance that the stock price could reach the stock price of 20-day line ($214). If that happens, I'll buy another 500 shares to lower down the basic cost. And sell all the shares when the stock price come to $233.

BABA:

Figure 4.1.4 is the daily candlestick chart and MACD chart of BABA. On the technical aspect, as shown on Figure 4.1.5, Alibaba overcomes the resistance position at

$180, the stock price has a possibility to reach $211. Therefore, on Sep 18th I bought 500 shares at $182.99.

Figure 4.1.4 BABA Daily Candlestick Chart & MACD Chart

4.2 Week Two Simulation

This week I dealt with Alibaba & Sina. Table 4.2.1 shows the trade history of this week.

Date	Sym	Buy/Sell	Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
							275,108.31	263.28
9/23	BABA	Buy	178.75	200	35,770.59	0	239,337.72	263.28
9/24	BABA	Sell	175.98	200	35,176.01	-1179.7	274,513.73	-916.42
9/24	BABA	Sell	175.46	500	87,707.51	-3181.775	362,221.24	-4098.195
9/24	SINA	Buy	40.95	500	20,502.49	0	341,718.75	-4098.195

Table 4.2.1 Swing Trading History Week2

SINA:

Figure 4.2.1 is the daily candlestick chart and MACD chart of SINA. As I expected last week, daily candlestick line of SINA (Figure 4.2.1) reached 60-day line ($41). Therefore, I bought 500 shares of SINA, lowered the cost. For now, from technical point of view, stock price of SINA has not shown the trend of going up. When the stock price is stable, I plan to buy another 500 shares to lower down the cost.

Figure 4.2.1 SINA daily candlestick chart & MACD chart

APPL:

Figure 4.2.2 shows the daily candlestick chart for Apple. From technical spec, index of APPL is at a high position and the stock price has a trend to go down below 60-week candlestick line (light orange line is the 5-day candlestick line). For now, I have 500 shares of APPL. I plan to buy another 500 shares of APPL when the stock price goes

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back to 60-day candlestick line to lower down the cost again. APPL can be hold in a long term.

Figure 4.2.2 APPL Daily Candlestick Chart

BABA:

Figure 4.2.3 is the daily candlestick chart of BABA. As shown on the daily candlestick chart (Figure 4.2.3), stock price of BABA has dropped below the support level and thus, I sold all shares to prevent further loss.

Figure 4.2.3 BABA Daily Candlestick Chart

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4.3 Week Three Simulation

This week I dealt with Sina & Apple. Table 4.3.1 shows the trade history of this week.

Date	Sym	Buy/Sell	Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
							341,718.75	-4098.195
10/1	AAPL	Sell	227.07	500	113,505.01	2620.02	455223.76	-1478.175
10/2	SINA	Buy	37.48	500	18,769.99	0	436,435.77	-1478.175
10/2	SINA	Buy	37.62	500	18,829.99	0	417,623.78	-1478.175
10/3	SINA	Sell	40.03	500	19,985.01	-373.035	437,608.79	-1851.210

Table 4.3.1 Swing Trading History Week3

APPL:

Figure 4.3.1 is the daily candlestick chart of NDAQ. On Oct 1st, I sold 500 shares of APPL to avoid risk since NDAQ dropped down below 60-day line (Figure 4.3.1). As shown on Figure 4.3.1, daily candlestick line of NDAQ went down below all lines.

Figure 4.3.1 NDAQ Daily Candlestick Chart

On Oct 3rd, the stock price of Apple went back to $215 and I hesitated whether or not I should buy Apple now since this was a good chance to buy Apple. But I decided to wait until it went down to $211. However, Apple stock went up. Therefore, I stopped buying Apple for this week trading.

NDAQ shows a downward trend and it has already gone below 60-day line. Every time NDAQ will touch two to three times of bottom point before it shows an upward trend. So, I'll consider buying Apple again after NDAQ goes down below the lowest point on this Thursday.

SINA:

On Oct 2nd, I bought 500 shares of SINA at the price of $37.48 to lower down the cost. On Oct 3rd, the stock price went up to $40, and I sold out 500 shares (1500 shares remain). For SINA, I will buy more shares when the stock price lowers down.

4.4 Week Four Simulation

This week I dealt with Sina, Apple and CHL. Table 4.4.1 shows the trade history of this week.

Date	Sym	Buy/Sell	Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
							437,608.79	-1851.21
10/9	CHL	Buy	41.65	500	20,844.99	0	416,763.80	-1851.21
10/10	AAPL	Buy	228.47	300	68,559.49	0	348,204.31	-1851.21
10/11	AAPL	Sell	233.12	300	69,906.01	1,346.52	418,110.32	-504.69
10/11	CHL	Sell	42.67	500	21,315.01	470.02	439,425.33	-34.67
10/11	SINA	Sell	41.47	500	20,715.01	535.01	460,140.34	500.34

Table 4.4.1 Swing Trading History Week4

CHL:

Figure 4.4.1 shows the stock price of CHL from February 2014 to October 2019. From the candlestick chart of CHL we can tell that the stock price of CHL ($40) is relatively low now compared to the price on Apr 30th, 2015. For now, from technical perspective, there's an uptrend of CHL. Therefore, I bought 500 shares of CHL.

Figure 4.4.2 Stock price of CHL from February 2014 to October 2019

On Oct 11th, the trade war between China and USA has finally made some good progress, which is beneficial to the stock market. From the news, "President Trump said Friday that the United States had reached an interim deal with China that would forestall a tariff increase slated for next week, providing a temporary détente in a prolonged and economically painful trade war."

The stock price of CHL went up to $42.67, and I sold all the shares of CHL. The total profit is $470.02. I'll wait until the stock price go back to 5-day candlestick line.

APPL:

Figure 4.4.2 is the daily candlestick chart for APPL. The candlestick chart of APPL has shown upward pattern for all lines. So, on Oct 10th I bought 300 shares on the price of $228.47.

Figure 4.4.3 Daily candlestick chart for APPL

On Oct 11th, I sold all shares of APPL. The total profit is $1346.52. I will wait until the stock price go back to lower point.

SINA:

On last week, I sold 500 shares, and currently 1500 shares remain. On Oct 11th, I sold 500 shares of Sina on $41.47. And I'll wait until the stock price go back to $40 to buy more shares.

4.5 Week Five Simulation

This week I dealt with Sina, Apple and CHL. Table 4.5.1 shows the trade history.

Date	Sym	Buy/Sell	Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
							460,140.34	500.34
10/14	CHL	Buy	42.20	500	21,119.99	0	439020.35	500.34
10/14	AAPL	Buy	237.83	500	118934.99	0	320085.36	500.34
10/14	CHL	Buy	42.14	500	21089.99	0	298995.37	500.34
10/14	SINA	Buy	40.93	500	20492.49	0	278502.88	500.34
10/17	SINA	Buy	41.09	500	20574.99	0	257927.89	500.34
10/18	SINA	Buy	40.59	500	20324.99	0	237602.90	500.34

Table 4.5.1 Swing Trading History Week5

AAPL:

On the technical aspect, daily candlestick, monthly candlestick both show the upward trend. Apple stock has successfully gone over $233.

CHL:

The CHL stock went from $75.52 (2015) to $39.70 (2019) in four years. The drop rate of this stock is 47%.

Figure 4.5.1 is the monthly candlestick chart of CHL. From monthly candlestick chart we can tell CHL stock has a divergence. In the short period of time, the stock price should bounce back to $45.

Figure 4.5.1 CHL monthly candlestick chart

For now, I have 1000 shares of CHL, if the price goes back, I will add more shares. And I will sell all the shares when the price becomes $45

SINA:

Figure 4.5.2 is the SINA monthly candlestick chart. From technical aspect, monthly candlestick chart of SINA has shown divergence.

Figure 4.5.2 SINA monthly candlestick chart

In a short period of time the stock price should go back to $47 (which is the 10-month line). The strategy for now is to buy more shares when the price goes back and sell all the shares when it's $47.

4.6 Week Six Simulation

This week I dealt with Sina, Apple and CHL. Table 4.6.1 shows the trade history of this week.

Date	Sym	Buy/Sell	Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
							237602.90	500.34
10/21	AAPL	Sell	239.31	500	119655.01	720.02	357,227.91	1220.36
10/23	CHL	Buy	41.27	500	20654.99	0	336,572.92	1220.36
10/23	CHL	Buy	41.27	500	20662.49	0	315,910.43	1220.36
10/23	SINA	Sell	39.35	500	19655.01	-25	335,565.44	1195.36

Table 4.6.1 Swing Trading History Week6

AAPL:

Last week (Oct 14th) I bought 500 shares of AAPL on $237.80. This week I sold it at $239.31. Since I believe that Apple stock would drop a little bit before it bounces back, I'll wait at a relatively low point of AAPL to buy more shares.

CHL:

I bought 500 shares of CHL at $42.14 and 500 shares at $42.20 last week. This week the stock price dropped and therefore I bought 1000 shares of CHL at $41.27. Currently I have 2000 shares of it. Figure 4.6.1 shows the monthly candlestick chart of CHL. CHL has just went through the five waves. As shown on the candlestick chart, CHL is currently forming its base, and this could take some time. I'll keep it for now and wait until it reaches a relatively high point and sell all the shares.

Figure 4.6.1 CHL monthly candlestick chart

SINA:

The retained profit of Sina has raised 32.5%, operation revenue raised 3.08% in the last half year. Figure 4.6.2 shows the daily candlestick chart of SINA. From the technical aspect, daily candlestick line is stable, monthly candlestick chart has shown the divergence. In a short period of time the price should bounce back to $47, so I'll keep it for now.

Figure 4.6.2 SINA daily candlestick chart

4.7 Week Seven Simulation

This week I dealt with Sina, Apple and CHL. Table 4.7.1 shows the trade history of this week.

Date	Sym	Buy/Sell	Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
							335,565.44	1195.36
10/28	CHL	Sell	41.26	1000	41235.01	-500	376,800.45	695.36
10/28	SINA	Sell	41.62	2000	83200.01	1900	460,000.46	2595.36
10/28	AAPL	Buy	248.47	500	124254.99	0	335,745.47	2595.36
10/29	SINA	Buy	40.78	1000	40809.99	0	294,935.48	2595.36
10/29	AAPL	Buy	246.78	200	49374.99	0	245,560.49	2595.36
10/30	AAPL	Buy	243.11	300	72952.99	0	172,607.5	2595.36
10/30	CHL	Buy	40.44	500	20249.99	0	152,357.51	2595.36
10/31	AAPL	Sell	246.97	500	123463.51	235	275,821.02	2830.36
11/01	AAPL	Sell	250.62	200	50094.01	824	325,915.03	3654.36
11/01	CHL	Sell	40.92	500	20430.01	-185	346,345.04	3469.36
11/01	AAPL	Sell	252.77	200	25247.01	1254	371,592.05	4723.36
11/01	CHL	Sell	41.19	1000	41170.01	-100	412,762.06	4623.36
11/01	SINA	Sell	40.90	700	28600.01	84	441,362.07	4707.36

Table 4.7.1 Swing Trading History Week7

SINA:

On Oct 28th, I sold 2000 shares of SINA at the price of $41.62 (cost before the transaction: $40.67). Since Sina's stock price has been bouncing between $39.2 and $42, I sold all the shares near $42 (which is $41.62).

Figure 4.7.1 shows the daily candlestick chart of SINA. On Oct 29th, the stock price went back to 5-day candlestick line, and I bought 1000 shares of SINA at $40.78. On Oct 31st, I sold 700 shares of SINA at $40.90, 300 shares remained till now. I plan to sell the rest of the shares next week on a relatively high price.

Figure 4.7.1 SINA's daily candlestick chart

China concept stock is not performing well these days, so we should trade cautiously. In this situation, waiting for the uptrend of 60-day line and the trend of short-term line going beyond the medium-term & long-term line to buy in should be a good strategy.

CHL:

Figure 4.7.2 shows the daily candlestick line of CHL. From the technical aspect, daily candlestick line is still bouncing at the bottom. There's chance that the stock price went down, so we should trade carefully and wait till short-term line goes beyond the long-term line to buy in.

Figure 4.7.2 CHL's daily candlestick line

AAPL:

On Oct 28th, I bought 500 shares of AAPL at $248.47. And on Oct 29th, the stock price bounced back to $246.78, so I bought 200 shares of AAPL. Afterwards, the stock price went up to $246.9 and I sold 500 shares. Since I believe on the technical aspect, the stock price has the chance to went back to relatively lower price again, I lowered the volume of AAPL and plan to buy more once the lower point appears.

On Nov 1st, Apple announced the financial results for its fiscal 2019 fourth quarter, the stock price went up and therefore, I sold 200 shares at $250.62. And afterwards I sold 100 shares at $252.77. Till now, 200 shares remained.

Apple is a top tech company with good financial result every year. On the technical aspect, candlestick lines show the pattern of short-term line going beyond the middle-term & long-term line. So, every time the stock price went back to 20-day line, 30-day line and 60-day line, it's good opportunity to buy in.

Next week, if there's a relatively high stock price, I'll sold all shares. If there isn't, then I'll wait the stock price goes down to buy more in.

4.8 Week Eight Simulation

This week I dealt with Sina and Apple. Table 4.7.1 shows the trade history of this week.

Date	Sym	Buy/Sell	Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
							441,362.07	4707.36
11/04	SINA	Sell	40.78	300	12821.59	588.01	45,4183.66	5295.37
11/04	AAPL	Sell	247.90	200	51389.01	277.3	50,5572.67	5572.67

Table 4.8.1 Swing Trading History Week8

SINA:

On Nov 14th, I sold all shares of SINA at $42.84. Figure 4.8.1 shows the SINA's lowest stock price and highest price form 2018 till now. The stock price fell from $124 (highest point) to $33 (lowest point), and this is considered as a large drop for a stock.

Figure 4.8.1 SINA's recent lowest stock price and highest stock price

From the technical point of view, SINA is currently bouncing up and down at the bottom. Once 5-day candlestick line goes beyond 10-day candlestick line, the stock will show an uptrend. Since this week is the end of the trading week, we cannot buy more stocks, but when the situation described above happens, we should consider buy in.

AAPL:

For now, from technical point of view, Apple shows a pattern of short-period candlestick line going beyond the long-period candlestick line. Therefore, Apple is in a big-increase trend. Since this week in the last week of trading, we cannot buy more Apple stock. But once the stock price goes back to 20-day candlestick line or 5-week candlestick line, we should consider buy Apple in.

CHL:

The reason that I didn't buy CHL this week is because from technical aspect, CHL's stock price is still bouncing up and down at the bottom. Figure 4.8.2 shows the CHL's

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recent stock price. In this period, the stock price is under 5-day candlestick line (light orange line).

Figure 4.8.2 CHL's recent stock price

With the increasing utilization of 5G technology, the company performance will increase with a steady pace. Therefore, the strategy is waiting for the time that multiple lines going upward and then buy CHL in.

4.9 Summary

For a summary of the 8-week trading, I mainly traded with CHL, AAPL and SINA. And the profit was $5572.67.

The swing trader is a more technical based trader, and normally swing traders have a specific area that they deem as being a sign the trade is working against them. Because of this, one can know exactly when the trade isn't working and can limit the damage a bad trade can do.

Also, from the trading experience, I sensed that swing trades have to be well-versed in technical analysis, which means extra work compared to other trading methods. Basically, anyone can tell the trend on a chart that is going from the lower left to the upper right over time, but swing traders need to identify entry and exit points. Learning this can take time.

The market index has been increasing for nearly 10 years. Interests are reduced globally to defense the economic recession. The growth rates of listed companies are mostly retarded. In a situation like this, we should trade more carefully. Therefore, waiting for the market index to be back to normal and then buying stocks in high-tech and promising companies like Apple is a good strategy.

With the adjustment of Chines market, China concept stocks (like SINA, CHL and JD) have relatively large decreases on stock price. At this time, we should wait for the bottom of Chinese market until it shows an upward trend. China concept stocks, normally, will show a relatively large increase in stock price. Therefore, we should watch stocks like SINA, CHL and JD that will touch the bottom of stock price (and show the upward trend).

5 Simulation Two: News Trading

For News Trading simulation, we decided to use Investopedia with the settings that we showed above, with news searching on yahoo.com. We kept eyes on the news of each company and bought shares when there was good news coming out, and sold the shares when there was bad news, or at appropriate time. For example, company's report from any quarter with increased profit. In addition, shares were traded at market price after the news release within at most 9 hours.

The total starting money was 500,000 dollars, and reports of each week's simulation are listed below along with the explanations of each trade. At the end of the weekly report, we found the most profitable trade so far throughout the eight-week simulation and analyzed it shortly.

5.1 Week One Simulation

This week we dealt with Google, Apple and Snap. Table 5.1.1 shows the news trading history in week 1.

Date	Sym	Buy/Sell	Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
9/17	GOOGL	Buy	1232.33	30	36969.9	0	463010.11	0
9/17	APPL	Buy	220.12	100	22012	0	440978.12	0
9/20	SNAP	Buy	17.09	1000	17090	0	423868.13	0

Table 5.1.1 News Trading History Week1

This week, a lot of companies got their last quarter results out which is able to be considered as a guide for our trading. After reading the 3rd quarter report of Snap, we found out that for last three months ended at September 30th, 2019, the revenue is $446,199, and that is a 50% increasing relative to those months of 2018. [22] Snap

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definitely did a great job, so that 1000 shares were bought based on that, and the current

price is $17.09. Below is the stock price of SNAP for this week.

Figure 5.1.1 SNAP Stock Price of Week One

Apple released a new generation of products, and based on the trend from 2018,

which clearly showed the stock price raised in September 2018 and stayed high for 2

months. Therefore, this would be a good choice to buy Apple stock now, 100 shares of

stock with price of $220.12 were purchased. Figure 5.1-2 is the stock price of Apple for

this week. Figure 5.1-3 is the stock price of Apple from 2018.

Figure 5.1.2 Apple Stock Price of Week One

Figure 5.1-3 Apple Stock Price of 2018

Google was investing different fields in Europe, which may cause good or bad, so only 30 shares were bought. Below is the stock price of Google for this week.

Figure 5.1-4 Google Stock Price of Week One

For rest of companies, they either had no news coming out, or had some non-positive news, for example Alibaba, Chairman Ma had retired. Therefore, there were no trades for the rest of them. This week, there is no selling trade, so we cannot find the better trading yet.

5.2 Week Two Simulation

This week we dealt with JD, Apple and Google. Table 5.2.1 includes the news trading history in week 2.

Date	Sym	Buy/Sell	Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
9/25	JD	Buy	29.97	3000	89910	0	333938.14	0
9/25	APPL	Sell	221.1	100	22110	98	356028.15	98
9/25	GOOGL	Sell	1246.73	30	37401.9	432	393410.06	530

Table 5.2.1 News Trading History Week2

Google apologized for keeping the voice record, this was an ambiguous news on September 25th, but we found out that the current price of the stock is higher than what we bought from the first place, so we sold all of them. The reason that we think this is an ambiguous is that once they apologize for anything, they are committing it. However, this apology did show their attitude about the mistakes that they made, and they were willing to take responsibility of it. This trade gained $432 which is 1.16% of its cost. Below is the stock price of Google for this week.

Figure 5.2.1 Google Stock Price of Week Two

Apple analysts had a decline in average selling prices for iPhones, so we sold all the shares from apple. This trade made $98 profit, and which is 0.44% of its cost. Below is the stock price of Apple for this week.

Figure 5.2.2 Apple Stock Price of Week Two

JD.com counters Pinduoduo in the social shopping market, and the price of each share is relative cheaper comparing to Google and Apple, so that 3000 shares with price of $29.97. Below is a table of JD.com's stock price from this week.

Figure 5.2.3 JD.com Stock Price of Week Two

For now, of course, we only have two competitors, Google has won the game with $432 of profits, with news of investing money to different fields.

5.3 Week Three Simulation

This week I dealt with CHL, Google and JD. Table 5.3.1 shows the news trading history in week 3.

Date	Sym	Buy/Sell	Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
10/3	CHL	Buy	41.85	1200	50220	0	343170.07	0
10/3	GOOGL	Buy	1179.35	20	23587	0	319563.08	0
10/3	JD	Buy	28.13	2000	56260	0	263283.09	0

Table 5.3.1 News Trading History Week3

Google committed to white house job training initiative, it is a positive news for any company to work with government, so that 20 shares were purchased with price of $1179.35. Figure 5.3-1 is the stock price of Google for this week.

Figure 5.3.1 Google Stock Price of Week Three

Xiaomi announced that the price of their phones will be slightly catted in JD.com, this makes JD.com has advantage in phone market this season and based on this news

2000 shares were bought from JD.com with price of $28.13. Below is the stock price of JD.com for this week.

Figure 5.3.2 JD.com Stock Price of Week Three

China Mobile LTD. won the Best Enterprise Service Award at Telecoms World Middle East, so that 1200 shares were traded from CHL with price of $1179.35. Below is the stock price of CHL for this week.

Figure 5.3.3 China Mobile Stock Price of Week Three

Because other companies had no news coming out, no stock trades had made for other companies. This week, again, we did not sell any stock, so no further rank. For now, the winner is still Google with investing in variety of fields.

5.4 Week Four Simulation

This week we dealt with Alibaba, Google and Apple. Table 5.4.1 shows the news trading history in week 4.

Date	Sym	Buy/Sell	Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
10/10	BABA	Buy	164.96	80	13196.8	0	250066.3	530
10/10	AAPL	Buy	229.49	50	11474.5	0	238571.81	530
10/10	GOOGL	Sell	1207.49	20	24149.8	562.8	262701.62	1092.8

Table 5.4.1 News Trading History Week4

Apple removed police-tracking app in Hong Kong from apple store after facing pressure from state-run media, so that 50 shares were purchased with unit price of $229.49. Figure 5.4-1 is the stock price of Apple for this week.

Figure 5.4.1 Apple Stock Price of Week Four

Alibaba stopped sales of E-Cigarettes to U.S. Buyers, and Alibaba exhibited a high-tech "hotel of the future" which is run almost entirely by robots. The pervious news

showed that Alibaba takes care of teenagers' health, and the second one showed that Alibaba has a high performance on technology. Therefore, 80 shares of Alibaba's stock were purchased with price of $164.96. Below is the stock price of Alibaba for this week.

Figure 5.4.2 China Mobile Stock Price of Week Four

Google earned some money, and there was no further news showing that it is going to grow in the next week, so all of Google's stocks were sold on Thursday. Trading of Google's stock made $562.8 profit, and which is 2.3 percent of its cost. Figure 5.4-3 is the stock price of Google for this week.

Figure 5.4.3 Google Stock Price of Week Four

This week, Google beat its own record with $562.8 and we trade its stock based on news of Google committing to white house job training initiative.

5.5 Week Five Simulation

This week we dealt with JD.com and CHL. Table 5.5.1 shows the news trading history in week 5.

Date	Sym	Buy/Sell	Price	Shares	Cost/ Proceed	Profit/ Loss	Total Cash	Total Profit
10/14	JD	Sell	29.5	5000	147500	1330	410181.63	2422.8
10/14	CHL	Sell	42.25	1200	50700	480	460861.64	2902.8

Table 5.5.1 News Trading History Week5

JD and CHL earned some profits, so that 5000 shares of JD.com stock and 1200 shares of China Mobil stock were sold. On the other hand, Alibaba and Apple remained relatively stable with a few profits, and there is no news about them either positively or negatively going on, so, they were kept. For the two stock that were sold in this week, the profit respectively is $1330 and $480, which brings the total profits to about three thousand dollars. There was no other news that is worthy to buy stock from any other companies. Figure 5.5-1 and 5.5-2 are the stock price of JD.com and China Mobile for this week.
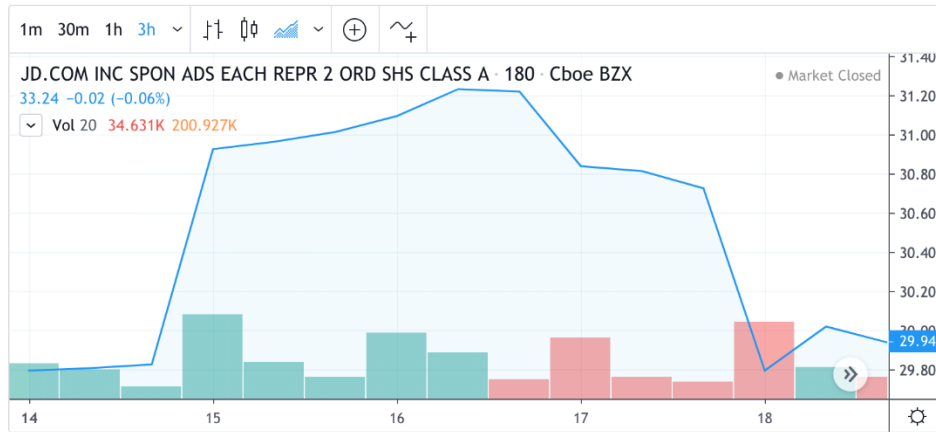
Figure 5.5.1 JD.com Stock Price of Week Five

Figure 5.5.2 China Mobile Stock Price of Week Five

A new record has been broken by JD.com, and the news is that XIAOMI gives cheaper price on JD.com, so that brings more customers.

5.6 Week Six Simulation

This week we dealt with Alibaba and Apple. Table 5.6.1 shows the news trading history in week 6.

Date	Sym	Buy/Sell	Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
10/21	BABA	Sell	172.81	80	13824.8	628	474666.45	3530.8
10/21	AAPL	Sell	240.85	50	12042.5	568	486688.96	4098.8

Table 5.6.1 News Trading History Week6

This week, Alibaba, Apple and Snap's stock were still holding on our hand, and because Snap's stock was losing money and other two earns some profit with no further news coming out, so the 80 shares of Alibaba and 50 shares of Apple were sold. $628 and $568 are the profits earned from each trading, and now the total profit has increased to around four thousand dollars. Alibaba's trading makes about 4.5 percent of profit. Apple's trading made about 4.7 percent of profits. Other companies did not have more news that is important and worthy to trade with. Figure 5.6-1 and 5.6-2 are the stock price of Alibaba and Apple for this week.

Figure 5.6.1 Apple Stock Price of Week Six

Figure 5.6.2 Alibaba Stock Price of Week Six

Until this week, the top winner is still Google with $1330 profits.

5.7 Week Seven Simulation

This week we dealt with Alibaba and Apple, China Mobil and Google. Table 5.7.1

shows the news trading history in week 7.

Date	Sym	Buy/Sell	Price	Shares	Cost/ Proceed	Profit/ Loss	Total Cash	Total Profit
10/28	CHL	Buy	41.2	800	32960	0	453708.97	4098.8
10/30	AAPL	Buy	243.11	100	24311	0	429377.98	4098.8
10/30	AAPL	Buy	243.11	100	24311	0	405046.99	4098.8
10/31	AAPL	Sell	249.87	200	49974	1352	479331.99	5450.8
10/31	GOOGL	Buy	1257.42	40	50296.8	0	429015.2	5450.8
11/1	GOOGL	Sell	1270.79	40	50831.6	534.8	479826.81	5985.6
11/1	CHL	Sell	41.12	800	32896	-64	512702.82	5921.6

Table 5.7.1 News Trading History Week7

China Mobile will offer 5G for public on Nov. 1, so 800 shares of China Mobil were

purchased. However, China Mobil's stock did not increase as we expected and instead it

kept dropping for two days, so we have to sell it before it loses more money, on November

1st when it increased a little from the dropping, it was sold. Trading of China Mobil's stock

lost $64, about 0.19 percent. Below is the stock price of China Mobile for this week.

Figure 5.7.1 China Mobile Stock Price of Week Seven

Apple released its fourth quarter results stating that their quarterly revenue was $64 billion, which is increased 2 percent from the year-ago quarter, and quarterly earnings per diluted share was $3.03, up 4 percent. Therefore, Apple's stock was purchased twice on October 30th with 200 shares in total, and they were all sold on October 31st, because the quarterly report will not have a long impact. This trading made 2.7 percent of profits. Below is the stock price of Apple for this week.

Figure 5.7.2 Apple Stock Price of Week Seven

Google purchased Fitbit with $2.1 billion, and Fitbit is a company mainly producing wearable technology, this is a good deal for Google to explore a nice and new area and extent new field of market, by integrating its existing products, so 40 shares of Google's stock were purchased and were sold at next day. Trading of Google's stock made 1.05 percent of profits. Below is the stock price of Google for this week.

Figure 5.7.3 Google Stock Price of Week Seven

For now, Apple won Google by only $22 more profits, and the trading news is the quarter result which gives great confidence to the customers.

5.8 Week Eight Simulation

This week we dealt with Snap, Google, Apple, Sina and JD.com. Table 5.8.1 contains the news trading history in week 8.

Date	Sym	Buy/Sell	Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
11/04	SNAP	Sell	15.36	1000	15360	-1730	528042.83	4191.6
11/04	GOOGL	Buy	1288.17	60	77290.2	0	450732.64	4191.6
11/05	APPL	Buy	257.2	220	56584	0	394128.65	4191.6
11/06	SINA	Buy	41.91	1000	41910	0	352198.66	4191.6
11/06	JD	Buy	32.93	1500	49395	0	302783.67	4191.6
11/07	GOOGL	Sell	1304.54	60	78272.4	982.2	381036.08	5173.8
11/07	JD	Sell	33.95	1500	50925	1530	431941.09	6703.8
11/07	SINA	Sell	43.25	1000	43250	1340	475171.1	8043.8
11/08	APPL	Sell	259.84	220	57164.8	580.8	532315.91	8624.6

Table 5.8.1 News Trading History Week8

Snap was held since week one, and there was no good timing to trade this stock, so we had to find a relatively high point of its stock in this week and sell it. Therefore 1000 shares of SNAP with price of $15.36 was sold on November 4th. This trading lost $1730 which is 11% of its total cost.

Figure 5.8.1 Snap Stock Price of Week Eight

Google map launched an incognito mode which hides your search history, so that it avoids other people see what you are doing. Therefore 60 shares were purchased, and they were sold on November 7th. This trading gained $982.2 which is 1.25% of its cost. Below is a table of Google's stock price from this week.
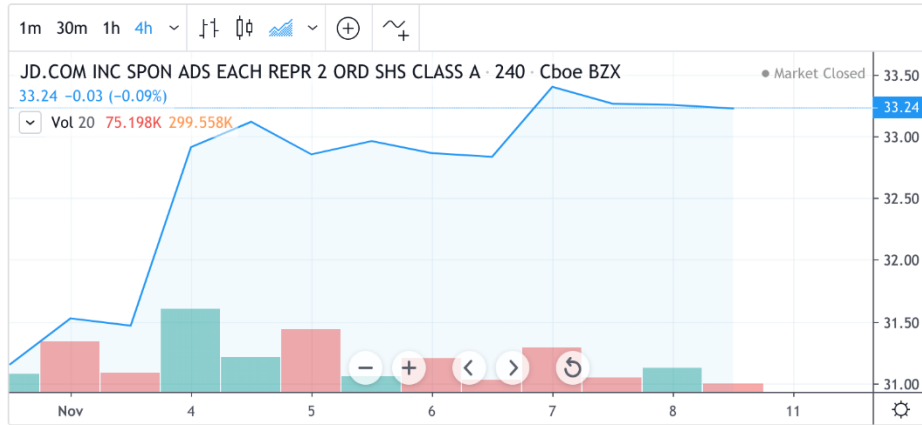
Figure 5.8.2 Google Stock Price of Week Eight

Apple announced $50 million place to help fight homelessness, which is definitely a positive news to trade, so 220 shares with price of $257.2 were purchased, and it was sold on November 8th with price of $259.84. This trade gained $580.8 which is 1.01% of its cost. Figure 5.8-3 is a table of Apple's stock price from this week.

Figure 5.8.3 Apple Stock Price of Week Eight

Sina's head office, Tecent, is planning to build virtual back after Hong Kong regulator approves license, so that 1000 shares with price of $41.91 was purchased, and

it was sold on November 7th with price of $43.25. This trade gained $1340 which is 3.1% of its cost. Below is a table of Sina's stock price from this week.

11th Singles Day is coming soon, so that it is a good time to buy stock of Chinese e-commerce company. Therefore, 1500 shares of JD.com with price of $32.93 was purchased, and it was sold on November 7th with price of $33.95. This trade gained $1530 which is 3.0% of its cost. Considering that e-commercial, right now, is only part of the program of Alibaba, on the other hand, JD.com is definitely impacted by this event. Therefore, only JD.com's stock is purchased in this week. Below is a chart of JD.com's stock price from this week.

Figure 5.8.5 JD.com Stock Price of Week Eight

At the end of this week, JD.com won the game from the total profits of $1530. The news that we used to make this trade is 11th Singles Day which brought an overwhelming profit for this the e-commercial platform.

5.9 Summary

In total eight weeks, we only lost $1730 on Snap, and all the other companies earned some profits more or less, and in this game JD.com has won with event of 11th Single Day. In a word, news trading is definitely able to make profits, however, people have to watch the news closely. Opportunities are fleeting, after first few weeks' practice, we were more familiar with short term trading like we did in last two weeks. The longest stock that we held was Snap, and we lost money in this trade. Although we only failed once, but it really hurts the total profit. Therefore, the first conclusion that we made from our simulation is that timeliness is really important for news trading, and the stock brought based on news trading is not suitable to kept for long-term.

To find some events which is able to influence the stock seasonally is important for news trading to predict market as well. For example, 11th Singles Day causes the most

profits trade and that is actually the most shopping opportunity in China, so there is a reasonable assumption that in U.S.A, at Black Friday, Amazon's or some other e-commercial platform's stock will increase.

In addition, we found out that while people doing news trading, they should include the considerations about the news spreading speed and amount of news to foreign country. In this simulation, we chose several Chinese companies, some of them went public in America some did not, as we were looking for the news for those companies, they were hard to collect data and sometimes the news was delayed even days after it had really happened.

In a word, we believe news trading really depends on the time and region, so if people can analysis and summarize some the important local events of each year, and trade them accordingly, traders are likely to earn money.

6 Simulation Three: Day Trading

The algorithm day trading is written in Python3 with pylivetrader opensource library and deployed on an Ubuntu virtual machine. I am trading on Alpaca quant trading platform that the commission for each trade is $0.005 per share. The day trading algorithm is based on the Moving Average Convergence Divergence (MACD) indicator computed by subtracting 26-minutes Exponential Moving Average (EMA) from 12-minutes EMA. A 9-minutes EMA of MACD acts as the signal line and the algorithms decides to buy when the MACD crosses above its signal line and sell the stock when the MACD crosses below the signal line.

Because of the hardware limitations of the Ubuntu virtual machine, the day trading algorithm can't track the real time relationship of the MACD line and signal line. The algorithm is called every 30 minutes and updated to every 20 minutes at start of Week3. When the algorithm is called, it will compute the MACD indicator with the 26-minutes EMA and 12-minutes EMA. With the indicator, available cash and shares, the algorithm will buy or sell as much shares with available cash. The trading commission is $0.005 for each share.

Instead of tracking the real-time relationship between MACD line and signal line and looking for next crossover, the algorithm computes the difference between the 2 lines every 30 minutes for trend reversals. When the algorithm is called, if we find the MACD line is currently above signal line and there is no open trade, no open trade implies last action was to sell assets, there must be one or more crossovers happened since last time when the algorithm was called, which is considered as a positive signal to enter an trade.

If the MACD line is currently below signal line, and the is an open trade, then the MACD line must have crossed below the signal line for one or more times, which indicates the end of bullish pattern and to exit the current trade.

6.1 Week One Simulation

The $500,000 is fairly shared to buy stocks of 8 companies that we can spend at most $62,500 on each company's stock. In Week1, the algorithm is called every 30 minutes from 9:30 AM.

On 09/16, from 9:00 AM when the algorithm was first called, the signal line was always above the MACD line and there was no trading during this time, as shown in Figure 6.1.1. Then the first crossover was found before 2:00 PM and the trade was entered with unit price of $219.96 of 284 shares. Then at 3:00 PM the signal line went above the MACD line again which indicates an exit point, as a loss of $88.04 was made on this trade. On 9/17, there were 2 indicators that were not captured by the algorithm because the algorithm check for crossovers every 30 minutes, but those indicators happened within 30 minutes, so they were not captured.

Figure 6.1.1 Apple 9/16 – 9/17 Stock Price, MACD line, and signal line

On 9/18 after the opening bell, there was a sharp price increment, which led to a MACD crossover, which was a good sign to enter a trade for Apple as shown in Figure 6.1.2 At 11:00 AM the signal line crossed the MACD line downwards and the trade was exited. The second trade on 09/18 was not very successful, because the algorithm didn't capture the crossovers well. Since the algorithm was called every 30 minutes, and it was trying to capture reversal, the trade was entered at almost end of a very short increasing trend and was exited at end of another sharp decreasing trend and led to loss. Towards end of 09/18, following a sharp price increment, the MACD line crossed the signal line upwards, the third trade was entered at 3:00 PM and was held until 9/19 at 10:00 AM when the MACD cross happened again.

Figure 6.1.2 Apple 9/18 – 9/19 Stock Price, MACD line, and signal line

Table 6.1.1 shows the trading history of Apple in Week1.

Date	Sym	Buy/Sell	Unit Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
9/16	AAPL	BUY	219.96	284	62,470.06		437,529.94	
9/16	AAPL	SELL	219.66	-284	-62,382.02	-88.04	499,911.96	-88.04
9/17	AAPL	BUY	219.82	284	62,430.30		437,481.66	
9/17	AAPL	SELL	220.12	-284	-62,512.66	82.36	499,994.32	-5.68
9/17	AAPL	BUY	219.97	284	62,472.90		437,521.42	
9/17	AAPL	SELL	220.05	-284	-62,492.78	19.88	500,014.20	14.2
9/18	AAPL	BUY	221.07	282	62,343.15		437,671.05	
9/18	AAPL	SELL	221.72	-282	-62,523.63	180.48	500,194.68	194.7
9/18	AAPL	BUY	221.74	282	62,532.09		47,662.59	
9/18	AAPL	SELL	220.61	-282	-62,210.61	-321.48	499,873.20	-126.8
9/18	AAPL	BUY	220.35	283	62,360.47		437,512.74	
9/19	AAPL	SELL	223	-283	-63,107.59	747.12	500,620.32	620.3
9/19	AAPL	BUY	222.83	283	63,062.31		437,558.02	
9/19	AAPL	SELL	220.99	-283	-62,538.76	-523.55	500,096.77	96.77
9/20	AAPL	BUY	222.45	281	62,509.86		437,586.92	
9/20	AAPL	SELL	221.59	-281	-62,265.39	-244.47	499,852.30	-147.7

Table 6.1.1 Week1 Algorithm Day Trading History of Apple

For Alibaba Group, all of the trades captured the MACD crossovers, but similar problems of late entering and missing crossovers also happened to Alibaba group. The

trade that was entered on 09/18 at 12:00 PM and exited on 09/19 at 10:30 AM, as shown

in Figure 6.1.3, made a significant profit of $1252.91.

Figure 6.1.3 Alibaba Group 9/18 – 9/19 Stock Price, MACD line, and signal line

This trade was entered when the algorithm captured the reversal at 12:00 PM.

Then the algorithm failed to capture the crossovers happened later on the same day, 349

shares were held until 9/19, when the MACD line crossed the signal line before noon.

Although the algorithm failed to capture exit points on 09/18 afternoon, the output was

very successful in this single trade.

Therefore, the goal of optimizing the algorithm in next weeks is not trying to capture

each single crossover, but to make better decisions with the crossovers that we captured.

Table 6.1.2 shows the trading history of Alibaba Group in Week1.

Date	Sym	Buy/Sell	Unit Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
9/16	BABA	BUY	175.67	355	62,361.08		437,491.23	
9/16	BABA	SELL	176.02	-355	-62,485.33	124.25	499,976.55	-23.45
9/17	BABA	BUY	176.39	353	62,267.44		437,709.12	
9/17	BABA	SELL	177.18	-353	-62,542.78	275.34	500,251.89	251.89
9/17	BABA	BUY	178.7	351	62,725.46		437,526.44	
9/17	BABA	SELL	178.55	-351	-62,669.30	-56.16	500,195.73	195.73
9/17	BABA	BUY	178.84	351	62,774.60		437,421.14	
9/18	BABA	SELL	178.51	-351	-62,655.26	-119.34	500,076.39	76.39
9/18	BABA	BUY	179.53	349	62,657.72		437,418.68	
9/19	BABA	SELL	183.13	-349	-63,910.63	1,252.91	501,329.30	1329.3
9/20	BABA	BUY	183.03	349	63,879.22		437,450.09	
9/20	BABA	SELL	183.09	-349	-63,896.67	17.45	501,346.75	1346.75
9/20	BABA	BUY	179.84	356	64,024.82		437,321.93	
9/20	BABA	SELL	181.28	-356	-64,533.90	509.08	501,855.83	1855.83

Table 6.1.2 Week1 Algorithm Day Trading History of Alibaba Group

For Google, the first trade entered on 09/16 at 2:30 PM when the MACD line was above the signal line, was held overnight and exited on 09/17, as shown in Figure 6.1.4. The enter point an exit point were not perfect. The algorithm should has entered the trade at 2:00 PM but it missed the good enter point because I was restarting the machine. On 9/17 afternoon there was a price increase and made the MACD line to rise and crossed the signal line. Then the MACD line crossed signal line downwards again on 9/18 morning and exited the second trade.
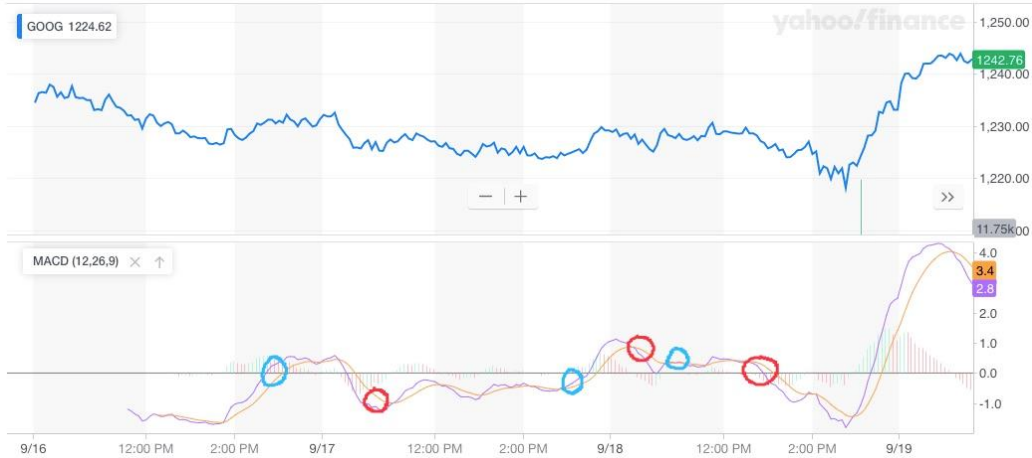
Figure 6.1.4 Apple 9/16 – 9/17 Stock Price, MACD line, and signal line

As shown in Figure 6.1.5, on 09/18 after noon, there was a very rapid price increase, but the trend was not captured by the algorithm. Then on 9/20, the rapidly fluctuating price caused the MACD line and signal line twisted. By having the algorithm only looking for signal reversal and having rapid price fluctuation affected the crossovers of the line, the algorithm made bad decisions on 9/20 morning and afternoon.

Figure 6.1.5 Google 9/18 – 9/20 Stock Price, MACD line, and signal line

Table 6.1.3 shows the trading history of Google in Week1.

Date	Sym	Buy/Sell	Unit Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
9/16	GOOG	BUY	1230.13	50	61,506.75		440,349.08	
9/17	GOOG	SELL	1227.12	-50	-61,355.75	-151.00	501,704.83	1704.8
9/17	GOOG	BUY	1224.94	50	61,247.25		440,457.58	
9/18	GOOG	SELL	1225.93	-50	-61,296.25	49.00	501,753.83	1753.8
9/18	GOOG	BUY	1228.42	50	61,421.25		440,332.58	
9/18	GOOG	SELL	1223.4	-50	-61,169.75	-251.50	501,502.33	1502.3
9/20	GOOG	BUY	1238	50	61,900.25		439,602.08	
9/20	GOOG	SELL	1237.52	-50	-61,875.75	-24.50	501,477.83	1477.8
9/20	GOOG	BUY	1229.29	50	61,464.75		440,013.08	
9/20	GOOG	SELL	1232.47	-50	-61,623.25	158.50	501,636.33	1636.3

Table 6.1.3 Week1 Algorithm Day Trading History of Google

For JD.com, the algorithm was successful in entering trades and exiting trades for most of times. However, on 9/17 morning when the price increased and the MACD line crossed above the signal line until another cross happened round 1:00 PM, the algorithm failed to enter a trade. The logs of the algorithms showed that was because failed to connect to the price history service.

Also, for JD.com, Nike and Snap Inc., because the unit price is relatively low, and the algorithm is making orders of hundreds or even thousands of shares. Due to the technical limitations with pylivetrader, the trade was broken into smaller trades and the unit price changed between the smaller trades. This will need to be fixed in next weeks.

Figure 6.1.6 JD.com 9/16 – 9/19 Stock Price, MACD line, and signal line

Table 6.1.4 shows the trading history of JD.com in Week1.

Date	Sym	Buy/Sell	Unit Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
9/16	JD	BUY	30.85	530	16,353.15		485,283.18	
9/16	JD	BUY	30.85	310	9,565.05		475,718.13	
9/16	JD	BUY	30.84	360	11,104.20		464,613.93	
9/16	JD	BUY	30.85	446	13,761.33		450,852.60	
9/16	JD	BUY	30.86	121	3,734.67		447,117.94	
9/16	JD	BUY	30.86	230	7,098.95		440,018.99	
9/16	JD	BUY	30.88	30	926.55		439,092.44	
9/16	JD	SELL	30.97	-210	-6,502.65		445,595.09	
9/16	JD	SELL	30.98	-349	-10,810.28		456,405.36	
9/16	JD	SELL	30.98	-1259	-38,997.53		495,402.89	
9/16	JD	SELL	30.97	-209	-6,471.69	238.2	501,874.57	1874.6
9/17	JD	BUY	31.18	748	23,326.38		478,548.19	
9/17	JD	BUY	31.18	438	13,659.03		464,889.16	
9/17	JD	BUY	31.19	390	12,166.05		452,723.11	
9/17	JD	BUY	31.19	438	13,663.41		439,059.70	
9/18	JD	SELL	31.09	-390	-12,123.15		451,182.85	
9/18	JD	SELL	31.07	-1575	-48,927.38		500,110.23	
9/18	JD	SELL	30.99	-49	-1,518.27	-246.1	501,628.49	1628.5
9/18	JD	BUY	30.93	707	21,871.05		479,757.45	
9/18	JD	BUY	30.95	680	21,049.40		458,708.05	
9/18	JD	BUY	30.95	230	7,119.65		451,588.40	
9/18	JD	BUY	30.98	406	12,579.91		439,008.49	
9/18	JD	SELL	30.97	-421	-13,036.27		452,044.75	
9/18	JD	SELL	30.98	-170	-5,265.75		457,310.50	
9/18	JD	SELL	30.97	-67	-2,074.66		459,385.16	
9/18	JD	SELL	30.99	-529	-16,391.07		475,776.22	
9/18	JD	SELL	30.99	-137	-4,244.95		480,021.17	
9/18	JD	SELL	30.97	-699	-21,644.54	37.21	501,665.70	1665.7
9/18	JD	BUY	30.77	1060	32,621.50		469,044.20	
9/18	JD	BUY	30.74	978	30,068.61		438,975.59	
9/19	JD	SELL	31.05	-2038	-63,269.71		502,245.30	
9/19	JD	BUY	31.83	1987	63,256.15		438,989.16	
9/19	JD	SELL	31.65	-847	-26,803.32		465,792.47	
9/19	JD	SELL	31.65	-895	-28,322.28		494,114.75	
9/19	JD	SELL	31.69	-245	-7,762.83	211.87	501,877.57	1877.6

Table 6.1.4 Week1 Algorithm Day Trading History of JD.com

For Nike, the first trade happened on 9/16 afternoon when the price started to increase and exited when a sharp price drop happened and the MACD line crossed below

the signal line again, as shown in Figure 6.1.7. For the 2nd and 3rd trades with Nike, both bullish patterns started with a slow increasing slope, and suddenly stopped because of the very rapid price drop. When the algorithm was called every 30 minutes and actions were made after the traversals were observed, the actions didn't take place at perfect timings.
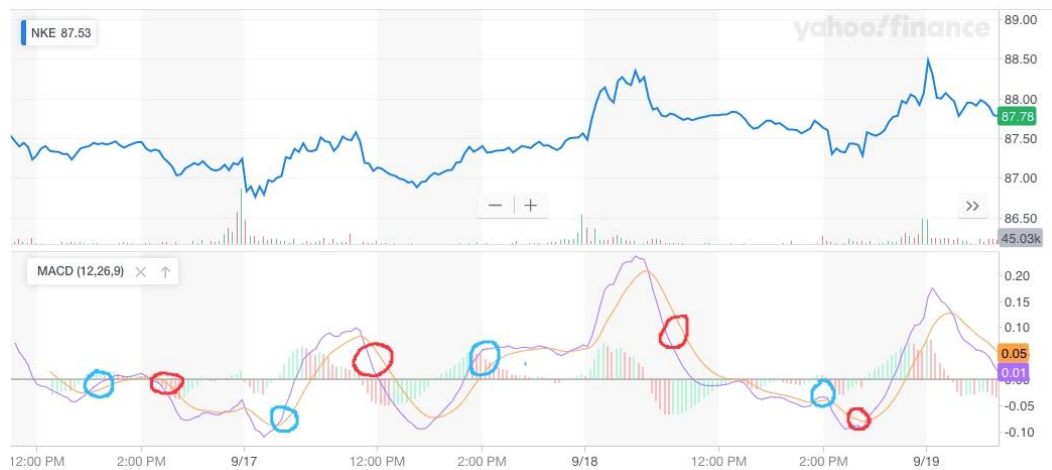
Figure 6.1.7 Nike 9/16 – 9/18 Stock Price, MACD line, and signal line

On 9/20 at opening, the price experienced a rapid increment, and the MACD line crossed above the signal line immediately and a trade was entered. Then the price experienced a sudden drop at 10:30 AM and experienced another crossover, followed with the exit of the trade.
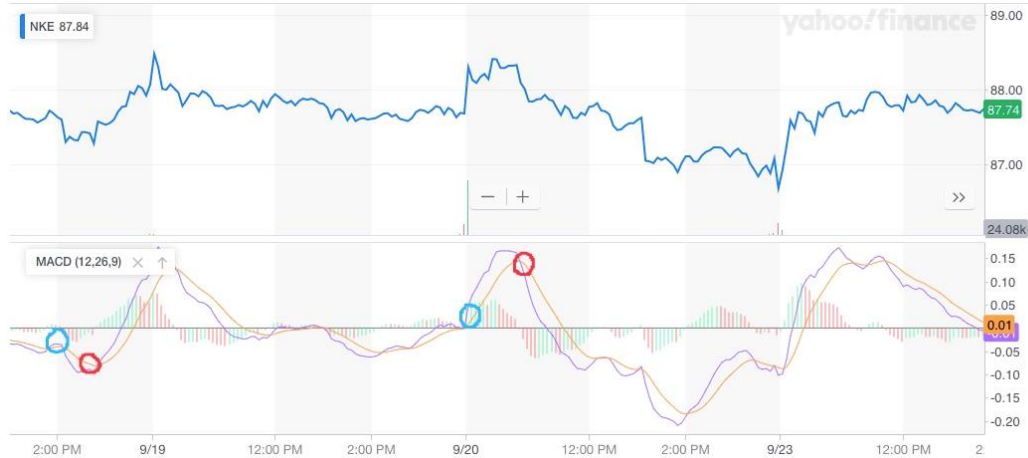
Figure 6.1.8 Nike 9/19 – 9/20 Stock Price, MACD line, and signal line

Table 6.1.5 shows the trading history of Nike in Week1.
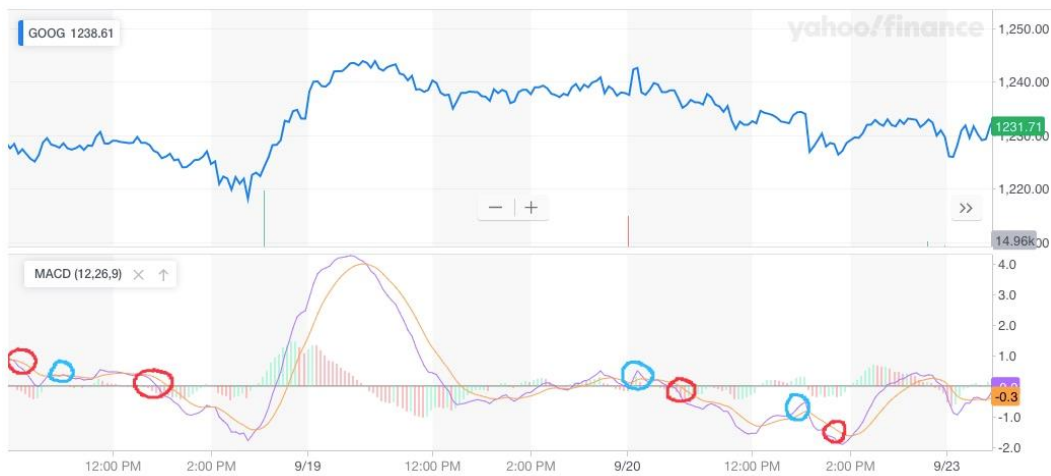
Date	Sym	Buy/Sell	Unit Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
9/16	NKE	BUY	87.36	451	39,401.62		462,475.96	
9/16	NKE	BUY	87.34	264	23,059.08		439,416.88	
9/16	NKE	SELL	87.45	-420	-36,726.90		476,143.78	
9/16	NKE	SELL	87.42	-200	-17,483.00		493,626.78	
9/16	NKE	SELL	87.42	-95	-8,304.43	53.63	501,931.20	1931.2
9/17	NKE	BUY	87.41	505	44,144.58		457,786.63	
9/17	NKE	BUY	87.39	210	18,352.95		439,433.68	
9/17	NKE	SELL	86.93	-274	-23,817.45		463,251.13	
9/17	NKE	SELL	86.93	-441	-38,333.93	-346.15	501,585.05	1585.05
9/17	NKE	BUY	87.37	330	28,833.75		472,751.30	
9/17	NKE	BUY	87.39	160	13,983.20		458,768.10	
9/17	NKE	BUY	87.41	222	19,406.13		439,361.97	
9/18	NKE	SELL	87.73	-712	-62,460.20		501,822.17	
9/18	NKE	SELL	87.77	-270	-23,696.55		525,518.72	
9/18	NKE	SELL	87.78	-326	-28,614.65		554,133.37	
9/18	NKE	SELL	87.78	-119	-10,445.23		564,578.60	
9/18	NKE	BUY	87.39	686	59,952.97		504,625.63	
9/18	NKE	BUY	87.36	29	2,533.59		502,092.04	
9/20	NKE	BUY	88.28	490	43,259.65		458,832.39	
9/20	NKE	BUY	88.38	222	19,621.47		439,210.92	
9/20	NKE	SELL	88.32	-712	-62,880.28	506.15	502,091.20	2091.2

Table 6.1.5 Week1 Algorithm Day Trading History of Nike

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For Snap Inc., as shown in Figure 6.1.9, the price is overall in an increasing trend in Week1. On 9/17 when the opening bell was ringing, the price experienced a sharp increment and the MACD line started to head up immediately and crossed the signal line, which indicates an enter point. A purchase of 3985 shares was made and was held until the crossover happens again at 10:30 AM, caused by a slow price decrease. Another significant trade was on 9/19, with the price dropped significantly at opening. Then the price started to increase, and crossover happened to the MACD line and signal line. The trade was entered and was exited in afternoon when another crossover was caused by a rapid price drop.
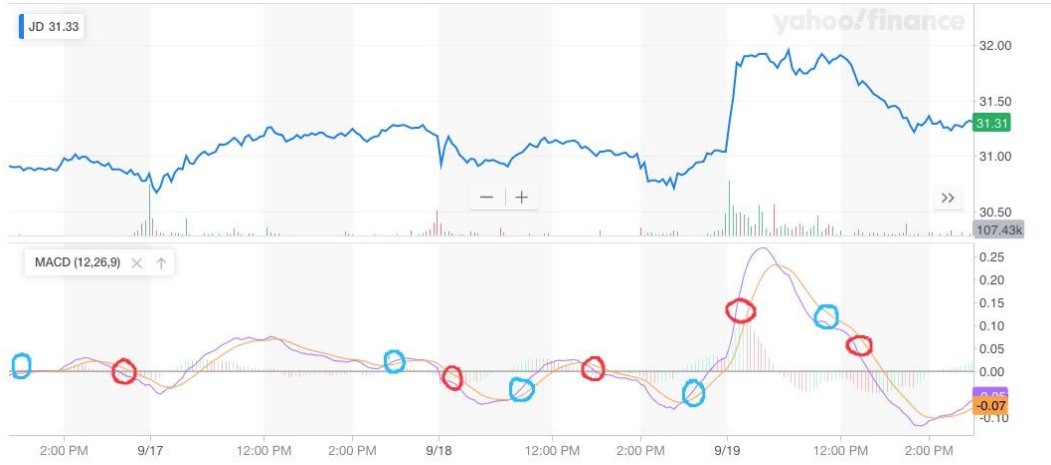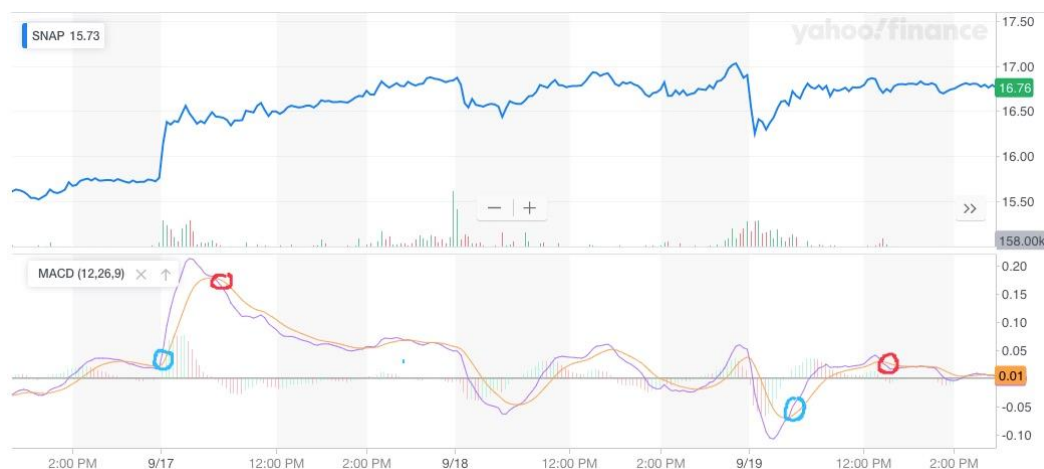

Figure 6.1.9 Snap Inc. 9/16 – 9/19 Stock Price, MACD line, and signal line

Table 6.1.6 shows the trading history of Snap Inc. in Week1.

Date	Sym	Buy/Sell	Unit Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
9/16	SNAP	BUY	15.69	3985	62,544.58		439,546.63	
9/16	SNAP	SELL	15.73	-1744	-27,424.40		466,971.03	
9/16	SNAP	SELL	15.75	-1480	-23,302.60		490,273.63	
9/16	SNAP	SELL	15.77	-761	-11,997.17	179.59	502,270.79	2270.79
9/17	SNAP	BUY	16.09	3916	63,028.02		439,242.77	
9/17	SNAP	SELL	16.3	-3916	-63,811.22	783.20	503,053.99	3053.99
9/17	SNAP	BUY	16.49	3850	63,505.75		439,548.24	
9/17	SNAP	SELL	16.59	-2096	-34,762.16		474,310.40	
9/17	SNAP	SELL	16.6	-1754	-29,107.63	364.04	503,418.03	3418.03
9/18	SNAP	BUY	16.77	2591	43,464.03		459,954.01	
9/18	SNAP	BUY	16.79	1217	20,439.52		439,514.49	
9/18	SNAP	SELL	16.71	-3808	-63,612.64	-290.90	503,127.13	3127.13
9/19	SNAP	BUY	16.69	2301	38,415.20		464,711.94	
9/19	SNAP	BUY	16.68	1518	25,327.83		439,384.11	
9/19	SNAP	SELL	16.73	-3194	-53,419.65		492,803.76	
9/19	SNAP	SELL	16.74	-625	-10,459.38	136.00	503,263.13	3263.13
9/20	SNAP	BUY	16.99	3763	63,952.19		439,310.95	
9/20	SNAP	SELL	17.06	-3230	-55,087.65		494,398.60	
9/20	SNAP	SELL	17.08	-533	-9,100.98	236.44	503,499.57	3499.57

Table 6.1.6 Week1 Algorithm Day Trading History of Snap Inc.

In Week1, Sina and China Mobile were never traded. As shown in Figure 6.1.10 and Figure 6.1.11, there were multiple crossovers for both stock that were supposed to be used as trading indicators of the algorithm. However, the algorithm always failed to buy stock for the 2 companies due to platform limitations. This will need to be fixed in next week.
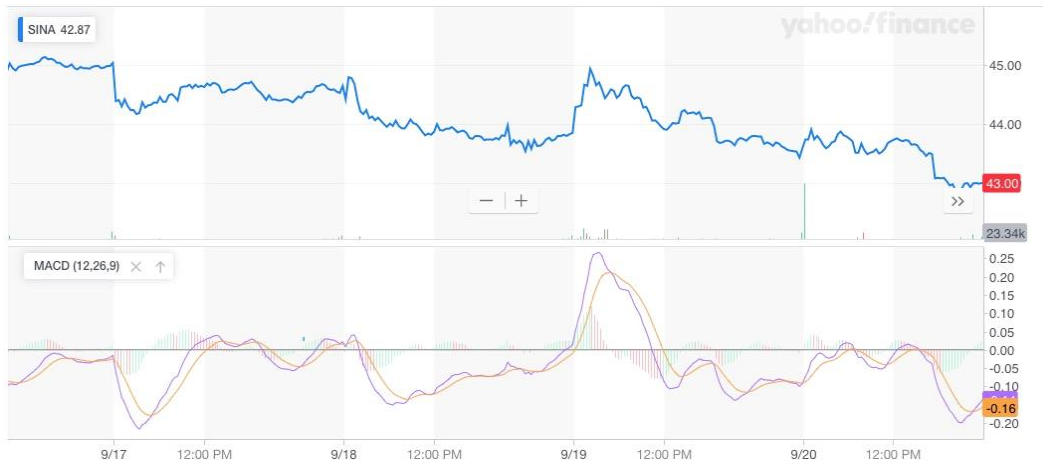
Figure 6.1.10 Sina 9/16 – 9/20 Stock Price, MACD line, and signal line
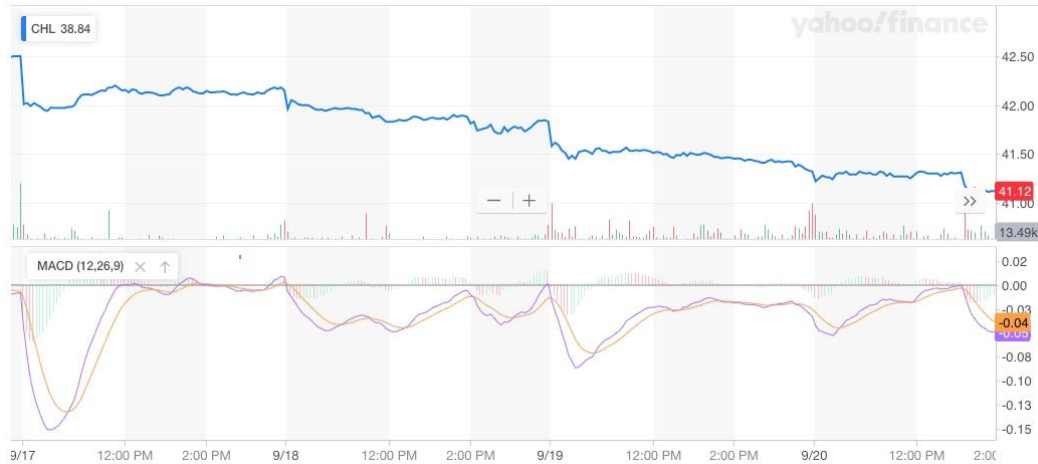
Figure 6.1.11 China Mobile 9/17 – 9/20 Stock Price, MACD line, and signal line

6.2 Week Two Simulation

At start of Week2, the current balance is $503496.02, and all trades are closed. In Week 1, Alibaba Group, Snap Inc. and Nike are making more profits than other stocks so in Week2 I am allocating more cash, each of $100,000 for those 3 companies. Sina and China Mobile are never triggered to buy or sell, but I still allocate $62,500 for them to trade and decide to remove them from trading list if they are still not triggered in Week2.

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Google, Apple, and JD.com are making less profit compare to other companies, so I am allocating less cash of $26156 for trading their stocks.

In this week, the trading is not only taking the MACD indicators, but also need take the decision of the trader. This was because the algorithm is called every 30 minutes, and in Week1, when the algorithm realized that there was a crossover happened, the actual crossover may have happened almost 30 minutes ago. The trader can help make decisions if to trade or hold the stock until next good exit point.

On 9/24 at the opening bell, Apple had a very sharp price increment and caused an upward MACD crossover, as shown in Figure 6.2.1. The first trade in Week2 was entered but the price started to drop after the enter point and a downward crossover happened soon. At 11:20 AM after a sudden price drop the trade was exited. The stock experienced another positive indicator on 9/25 at market beginning, and after a drop at 10:00, the stock started to increase again. The second trade was entered after the second upward crossover at 10:20 AM. The bullish trend continued until 12:40 PM when a large price drop happened to the price and the trade was exited at 1:00 PM after the downward crossover.

Figure 6.2.1 Apple 9/24 – 9/25 Stock Price, MACD line, and signal line

On 9/26 the market started with a big price decrement, as shown in Figure 6.2.2. Then the price started to increase and MACD line crossed above the signal line at 10:20 AM and trade was entered. The bullish trend started from 10:20 AM ended after 11:00 AM, and another bullish trend started around 12:30 PM and ended at 1:00 PM. The trade was exited after the second bullish trend, at 1:20 PM.

On 9/27 the market opened with a large decrement, and at 9:40 AM when the MACD line started to head up and was expected to make an upward crossover, a trade was entered but the MACD line started to head down again. The trade was exited very soon at 10:20 AM. Then the MACD line started to head up again and another trade was entered at 11:20 AM, but this was a very incorrect action because the price dropped again and started another decrement. The trade was exited at 12:40 PM, to avoid even more loss.

Figure 6.2.2 Apple 9/26 – 9/27 Stock Price, MACD line, and signal line

Table 6.2.1 shows the trading history in Week2 with Apple.

Date	Sym	Buy/Sell	Unit Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
9/23	AAPL	BUY	219.09	119	26,071.12		477,424.90	
9/23	AAPL	SELL	219.00	-119	-26,060.40	-10.72	503,485.30	3485.3
9/23	AAPL	BUY	219.21	119	26,085.40		477,399.90	
9/23	AAPL	SELL	219.50	-119	-26,119.90	34.5	503,519.80	3519.8
9/24	AAPL	BUY	221.22	118	26,103.37		477,416.43	
9/24	AAPL	SELL	220.11	-118	-25,972.39	-131	503,388.82	3388.82
9/25	AAPL	BUY	219.06	118	25,848.61		477,540.21	
9/25	AAPL	SELL	220.00	-118	-25,959.41	110.8	503,499.62	3499.62
9/25	AAPL	BUY	220.82	118	26,056.17		477,443.45	
9/25	AAPL	SELL	220.20	-118	-25,983.01	-73.16	503,426.46	3426.46
9/26	AAPL	BUY	220.10	118	25,971.80		477,454.66	
9/26	AAPL	SELL	219.87	-118	-25,944.07	-27.73	503,398.73	3398.73
9/27	AAPL	BUY	220.77	118	26,050.27		477,348.46	
9/27	AAPL	SELL	219.96	-118	-25,954.69	-95.58	503,303.15	3303.15
9/27	AAPL	BUY	220.31	117	25,776.15		477,527.00	
9/27	AAPL	SELL	218.97	-117	-25,168.90	-607.25	502,695.90	2695.9

Table 6.2.1 Week2 Algorithm Day Trading History of Apple

For Alibaba Group, the first trade was entered on 9/27 at market opening following

an upward MACD crossover, as shown in Figure 6.2.3. The trend was very short and the

exit point for this single was not captured. At 10:40 AM the MACD line crossed above the

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signal line again and crossed below the signal line again in 1 hour, followed by the exit of the trade.

On 9/27 afternoon, we can see that the price was keeping decreasing, but the fluctuating price caused a false positive indicator, and another trade was entered at 1:40 PM. Then the exit was decided to exit, when the trend of MACD line seemed would cross the signal line at 3:00 PM. However, we can see that the crossover didn't happen because the price started to increase after 3:00 PM.

Figure 6.2.3 Alibaba Group 9/27 Stock Price, MACD line, and signal line

Table 6.2.2 shows the trading history of Alibaba Group in Week2, with the initial available cash of $100,000.

Date	Sym	Buy/Sell	Unit Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
9/23	BABA	BUY	178.22	561	99,984.23		402,711.68	
9/23	BABA	SELL	178.24	-561	-99,989.84	5.61	502,701.51	2701.51
9/23	BABA	BUY	177.88	562	99,971.37		402,730.14	
9/24	BABA	SELL	175.44	-562	-98,594.47	-1376.9	501,324.61	1324.61
9/24	BABA	BUY	174.83	564	98,606.94		402,717.67	
9/24	BABA	SELL	172.53	-564	-97,304.10	-1302.84	500,021.77	21.77
9/24	BABA	BUY	172.51	564	97,298.46		402,723.31	
9/24	BABA	SELL	172.51	-564	-97,292.82	-5.64	500,016.13	16.13
9/25	BABA	BUY	172.38	565	97,397.53		402,618.61	
9/25	BABA	SELL	174.81	-565	-98,764.83	1367.3	501,383.43	1383.43
9/25	BABA	BUY	175.72	561	98,581.73		402,801.71	
9/25	BABA	SELL	176.16	-561	-98,822.96	241.23	501,624.66	1624.66
9/26	BABA	BUY	177.41	557	98,820.16		402,804.51	
9/26	BABA	SELL	175.34	-557	-97,661.60	-1158.56	500,466.10	466.1
9/27	BABA	BUY	175.99	555	97,677.23		402,788.88	
9/27	BABA	SELL	175.18	-555	-97,222.13	-455.1	500,011.00	11
9/27	BABA	BUY	164.95	588	96,993.54		403,017.46	
9/27	BABA	SELL	164.94	-588	-96,981.78	-11.76	499,999.24	-0.76

Table 6.2.2 Table 6.2.2. Week2 Algorithm Day Trading History of Alibaba Group

Figure 6.2.4 shows the trend of Google from 9/24 to 9/25. On 9/24 at opening, the value was valued high and caused the MACD line to cross above the signal line, followed by an immediate entering of the first trade. Then the priced started to decrease, and the trade was decided to exit at 11:20 AM to prevent even more loss. The decrement continued to 1:30 PM and experienced a positive crossover, which was noticed by the algorithm at 1:40 PM. The second trade was entered at 1:40 PM and was exited the next day at 9:40 AM when the price experienced a decrement at opening.

Figure 6.2.4 Google 9/24 – 9/25 Stock Price, MACD line, and signal line

Table 6.2.3 shows the trading history Google, with initial available cash of $26,156. From the trading history of Week1 and Week2, with the current algorithm we are not making significant profit or loss trading the stock of Google.

Date	Sym	Buy/Sell	Unit Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
9/23	GOOG	BUY	1234.56	21	25,925.66		474,073.58	
9/23	GOOG	SELL	1237.06	-21	-25,978.16	52.5	500,051.74	51.74
9/23	GOOG	BUY	1237.23	21	25,981.83		474,069.91	
9/23	GOOG	SELL	1234.93	-21	-25,933.42	-48.41	500,003.33	3.33
9/24	GOOG	BUY	1237.16	21	25,890.26		474,113.07	
9/24	GOOG	SELL	1235.12	-21	-25,937.41	47.15	500,050.48	50.48
9/24	GOOG	BUY	1221.26	21	25,646.46		474,404.02	
9/25	GOOG	SELL	1215.53	-21	-25,526.02	-120.44	499,930.04	-69.96
9/25	GOOG	BUY	1221.53	21	25,652.12		474,277.92	
9/25	GOOG	SELL	1227.85	-21	-25,784.93	132.81	500,062.85	62.85
9/25	GOOG	BUY	1232.93	21	25,891.53		474,171.32	
9/25	GOOG	SELL	1235.05	-21	-25,935.94	44.41	500,107.26	107.26
9/26	GOOG	BUY	1239.60	21	25,031.60		475,075.66	
9/26	GOOG	SELL	1241.46	-21	-26,070.55	38.95	501,146.21	146.21
9/27	GOOG	BUY	1231.72	21	25,866.14		475,280.07	
9/27	GOOG	SELL	1227.42	-21	-25,775.82	-90.32	501,055.89	55.89

Table 6.2.3 Week2 Algorithm Day Trading History of Google

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On 9/25, the price of JD.com started to rise at 2:00 PM, and caused the MACD line to cross above the signal line at 2:20 PM, followed by an immediate entering of the first trade. The MACD line crossed below the signal line before the market closed, and the trade was exited at 9:40 AM the next day, as shown in Figure 6.2.5.
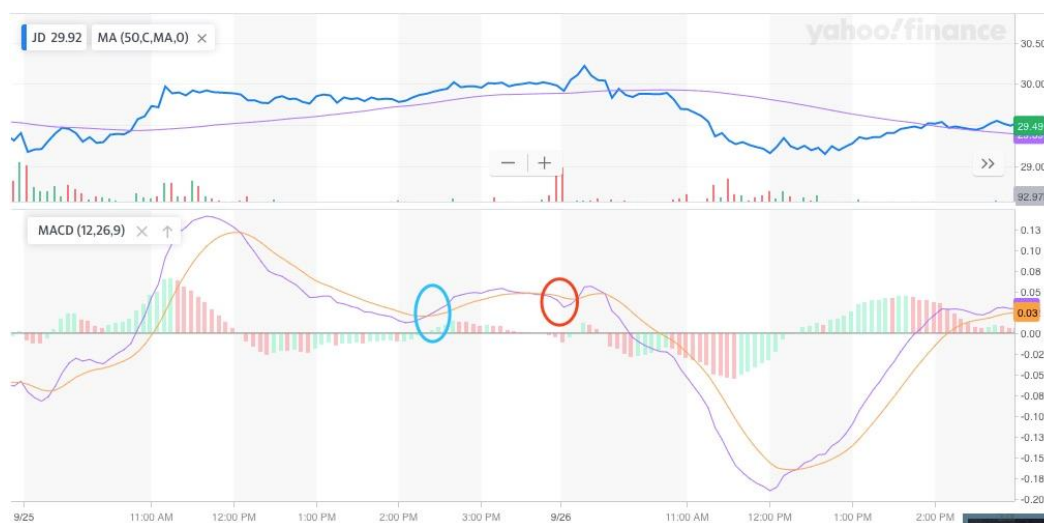
Figure 6.2.5 JD.com 9/25 – 9/26 Stock Price, MACD line, and signal line

After the exit point of the first trade, the price continued going low on 9/26, until a sharp increment on 9/27 opening, as shown in Figure 6.2.6. The second trade was entered immediately at 9:40 AM, but the increment didn't continue. The price continued to decrease, and the trade was forced to exit at 12:20 PM to prevent loss. The third trade was entered at the positive crossover at 1:20 PM, and was exited at 3:00 PM, when the trends of MACD line and signal line were likely to cross.

Figure 6.2.6 JD.com 9/27 Stock Price, MACD line, and signal line

Table 6.2.4 shows the trading history of JD.com.

Date	Sym	Buy/Sell	Unit Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
9/23	JD	BUY	31.35	834	26,150.07		474,905.82	
9/23	JD	SELL	30.58	-834	-25,499.55	-650.52	500,405.37	405.37
9/23	JD	BUY	30.57	835	25,530.13		474,875.25	
9/23	JD	SELL	30.39	-835	-25,371.48	-158.65	500,246.72	246.72
9/23	JD	BUY	30.41	834	25,366.11		474,880.61	
9/24	JD	SELL	30.10	-834	-25,099.23	-266.88	499,979.84	-20.16
9/24	JD	BUY	29.97	837	25,089.08		474,890.77	
9/24	JD	SELL	29.52	-837	-24,704.06	-385.02	499,594.82	-405.18
9/24	JD	BUY	29.69	832	24,706.24		474,888.58	
9/25	JD	SELL	29.84	-832	-24,822.72	116.48	499,711.30	-288.7
9/25	JD	BUY	29.94	808	24,195.56		475,515.74	
9/26	JD	SELL	29.11	-808	-23,516.84	-678.72	499,032.58	-967.42
9/27	JD	BUY	29.95	794	23,784.27		475,248.31	
9/27	JD	SELL	27.86	-794	-22,116.87	-1667.4	497,365.18	-2634.82
9/27	JD	BUY	27.59	800	22,076.00		475,289.18	
9/27	JD	SELL	29.59	-800	-23,668.00	1592	498,957.18	-1042.82

Table 6.2.4 Week2 Algorithm Day Trading History of JD.com

For Nike, there was a remarkable price increment on 9/25 at opining, as shown in Figure 6.2.7: the value was valued high and caused the MACD line to cross above the signal line, followed by an immediate entering of a trade at 9:40 AM. The trade was exited

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at 11:20 AM, when the price continued to head downwards, to prevent loss. However, this trade was not successful because the price increment was too sharp, and the trade was entered at a high point.

Another pair of entering and exit points was captured from 1:20 PM to 2:40 PM, but we still failed to make profit from it.

Figure 6.2.7 Nike 9/27 Stock Price, MACD line, and signal line

Table 6.2.5 shows the trading history of Nike.

Date	Sym	Buy/Sell	Unit Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
9/23	NKE	BUY	87.35	1144	99,934.12		399,023.06	
9/23	NKE	SELL	87.85	-1144	-100,494.68	560.56	499,517.74	-482.26
9/23	NKE	BUY	87.51	1148	100,467.22		399,050.52	
9/24	NKE	SELL	87.58	-1148	-100,536.10	68.88	499,586.62	-413.38
9/24	NKE	BUY	87.41	1151	100,614.67		398,971.96	
9/24	NKE	SELL	87.02	-1151	-100,154.27	-460.4	499,126.22	-873.78
9/25	NKE	BUY	92.41	1085	100,270.28		398,855.95	
9/25	NKE	SELL	91.63	-1085	-99,413.13	-857.15	498,269.07	-1730.93
9/25	NKE	BUY	91.06	1090	99,260.85		399,008.22	
9/25	NKE	SELL	91.00	-1090	-99,184.55	-76.3	498,192.77	-1807.23
9/26	NKE	BUY	91.85	1080	99,203.40		398,989.37	
9/26	NKE	SELL	91.23	-1080	-98,523.00	-680.4	497,512.37	-2487.63
9/26	NKE	BUY	91.29	1080	98,598.60		398,913.77	
9/26	NKE	SELL	91.68	-1080	-99,009.00	410.4	497,922.77	-2077.23
9/26	NKE	BUY	91.90	1076	98,889.78		399,032.99	
9/27	NKE	SELL	91.65	-1076	-98,610.02	-279.76	497,643.01	-2356.99
9/27	NKE	BUY	92.37	1070	98,841.25		398,801.76	
9/27	NKE	SELL	92.73	-1070	-99,215.75	374.5	498,017.51	-1982.49

Table 6.2.5 Week2 Algorithm Day Trading History of Nike

On 9/23 at 2:30 PM the price of Snap Inc. started to increase and the MACD line crossed above the signal line, and a trade was entered, as shown in Figure 6.2.8. The trade was hold overnight, and on 9/24 at market opening, Snap Inc. was valued high and dropped. At 10:40 AM the algorithm was called, and the trade was exited.

Figure 6.2.8 Snap Inc. 9/24 Stock Price, MACD line, and signal line

On 9/25 at market opening, Snap Inc. was valued high, and a trade was entered. The price dropped significantly, and a negative crossover happened, as shown in Figure 6.2.9. The trade was hold until another chance to exit, which happened at 11:40 AM. Another trade was entered at 12:40 PM after a positive crossover and was decided to exit at 1:40 PM, when the trend of lines was as if they would cross.

Figure 6.2.9 Snap Inc. 9/25 – 9/26 Stock Price, MACD line, and signal line

Table 6.2.2 shows the trading history of Snap Inc.

Date	Sym	Buy/Sell	Unit Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
9/23	SNAP	BUY	17.11	5851	100,139.87		397,877.65	
9/23	SNAP	SELL	17.22	-5851	-100,724.97	585.1	498,602.61	-1397.39
9/23	SNAP	BUY	17.12	5877	100,643.63		397,958.99	
9/23	SNAP	SELL	17.10	-5877	-100,467.32	-176.31	498,426.30	-1573.7
9/23	SNAP	BUY	17.06	5880	100,342.20		398,084.10	
9/24	SNAP	SELL	17.77	-5880	-104,458.20	4116	502,542.30	2542.3
9/25	SNAP	BUY	17.11	6091	104,247.47		398,294.84	
9/25	SNAP	SELL	16.85	-6091	-102,602.90	-1644.57	500,897.73	897.73
9/25	SNAP	BUY	16.79	6129	102,936.56		397,961.18	
9/25	SNAP	SELL	16.85	-6129	-103,243.01	306.45	501,204.18	1204.18
9/26	SNAP	BUY	16.92	6103	103,293.28		397,910.91	
9/26	SNAP	SELL	16.86	-6103	-102,866.07	-427.21	500,776.97	776.97
9/27	SNAP	BUY	17.02	6026	102,592.65		398,184.32	
9/27	SNAP	SELL	16.59	-6026	-99,941.21	-2651.44	498,125.53	-1874.47
9/27	SNAP	BUY	16.59	6045.00	100,316.78		397,808.76	
9/27	SNAP	SELL	16.31	-6045	-98,563.73	-1753.05	496,372.48	-3627.52
9/27	SNAP	BUY	15.94	6152	98,093.64		398,278.84	
9/27	SNAP	SELL	15.90	-6152	-97,786.04	-307.6	496,064.88	-3935.12

Table 6.2.6 Week2 Algorithm Day Trading History of Snap Inc.

6.3 Week Three Simulation

At the start of Week3, the balance is $496,064.88 and all trading are closed. Each of other companies still on the list will be allocated $80,000 for trading.

In Week3, the trading algorithm was updated that the algorithm is called every 20 minutes instead of 30 minutes. A stop-loss rule of 5% was introduced that if a trade was entered and the current price is 5% lower than the price that the enter point, the stock will be immediately exited to prevent losing more money in case the price keeps decreasing.

For Apple, on 9/30 at market opening, it was valued high and a trade was entered, as shown in Figure 6.3.1, then the trade was hold until 10/1 afternoon, and was exited

immediately after the MACD line crossed below the zero-line. The trade was exited to prevent even more loss.

Figure 6.3.1 Apple 9/30 – 10/1 Stock Price, MACD line, and signal line

The second trade was entered on 10/3 12:20 PM, as shown in Figure 6.3.2. The MACD line crossed above the signal line at 10:50 AM, but the increment was too sharp to be considered will drop soon, but the increasing trend seemed would continue, so the trade was entered, and was hold until the next week.
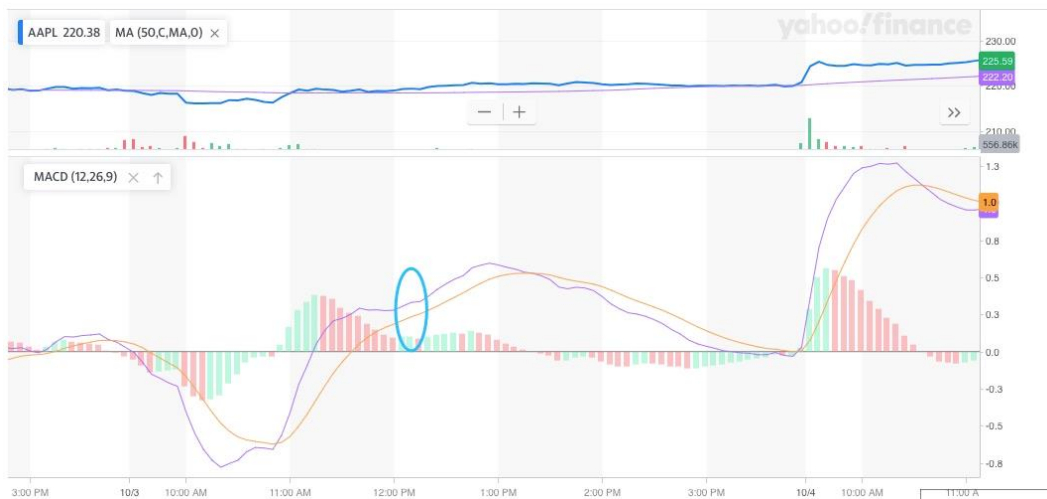
Figure 6.3.2 Apple 10/3 – 10/4 Stock Price, MACD line, and signal line

For Alibaba Group, on 9/30 morning at market opening, the stock was valued high, and the MACD line continues to go above the signal line, and a trade was entered at 9:40 AM, as shown in Figure 6.3.3. Then, the price continued to drop. On 10/1 at 11:00 AM, the trade was exited after the MACD line left the signal line below it.
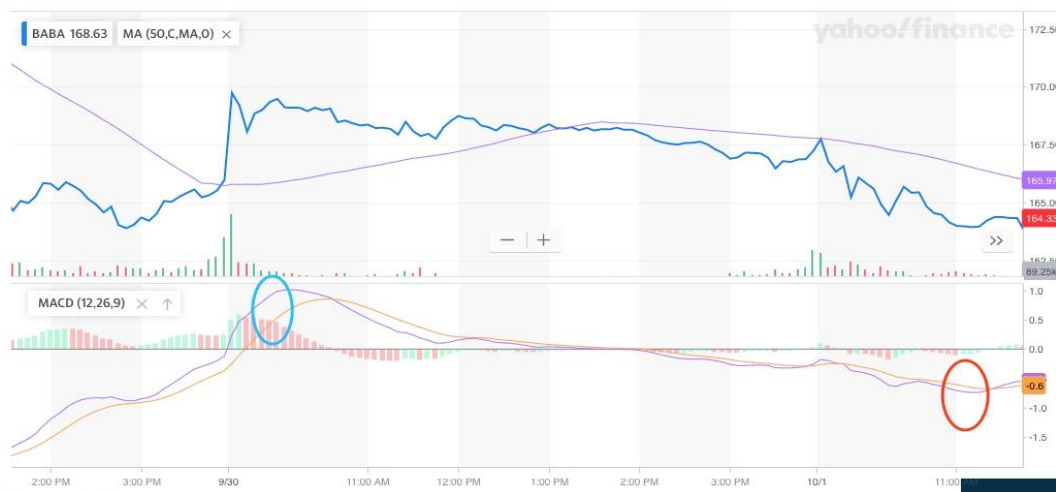
Figure 6.3.3 Alibaba Group 9/30 – 10/1 Stock Price, MACD line, and signal line

On 10/1, since 11:20 PM, the last bearish trend came to an end. The price started to increase, and the second trade was entered immediately after the MACD line crossed above the zero line.

Figure 6.3.4 Alibaba Group 10/1 – 10/2 Stock Price, MACD line, and signal line

On 10/04, at 10:30 AM, the MACD line crossed below both the signal line and the zero line, as shown in Figure 6.3.5, which strongly indicates the bullish trend since earlier in the morning came to an end. Since the price has been fluctuating significantly during the week, the last trade was exited at 10:40 AM.

Figure 6.3.5 Alibaba Group 10/4 Stock Price, MACD line, and signal line

For Google, on 9/30 at round 11:00 AM, the price started to rise, followed by a positive MACD crossover, as shown in Figure 6.3.6. A trade was entered at 12:40 PM, but the increment stop immediately after the trade was entered. The bearish trend

continued, even though there was a sharp increment on 10/1 at opening, and the trade was decided to exit on 10/1 morning to prevent loss.
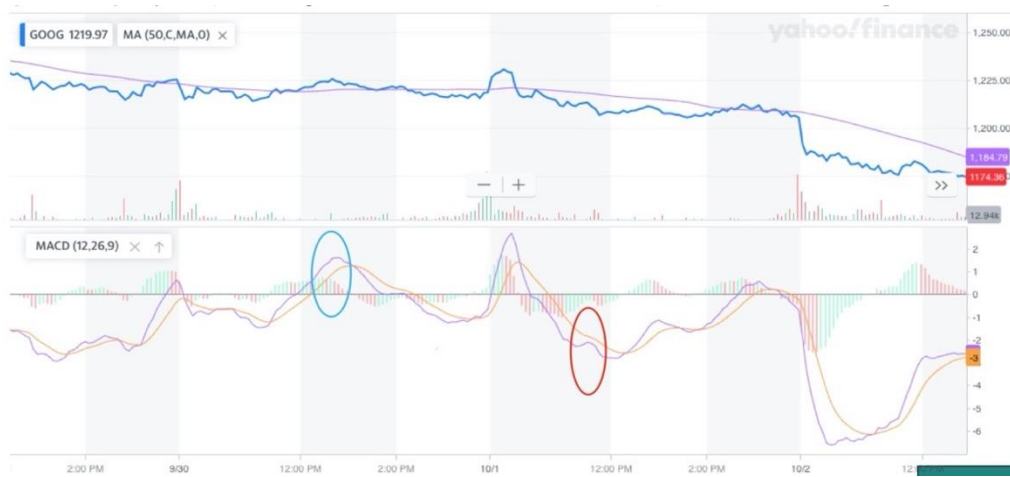
Figure 6.3.6 Google 9/30 – 10/2 Stock Price, MACD line, and signal line

For JD.com, the first trade was entered on 9/30 at 10:00 AM, as shown in Figure 6.3.7. The price experienced a drop on 9/30 morning, after the price was valued high at market opening. After the drop, the price started to increase, and the trade was entered, but the increment didn't continue. The trade was hold for the next chance.

Figure 6.3.7 JD.com 9/30 Stock Price, MACD line, and signal line

On 10/2, at market opening, the price was valued very low, as shown in Figure 6.3.8. The trade was exited at 9:40 AM when the algorithm was first called on the day.

Then the price experienced increment around 10:00 AM, and as the MACD line and signal line shows, there was an increasing trend from around 10:00 AM to around 11:20 AM. However, according to the real-time price chart, we can see that this was a false positive indicator caused by the descending triangle pattern. Then another trade was entered at 12:20 PM, indicated by a positive crossover of MACD line and signal line.

Figure 6.3.8 JD.com 10/2 Stock Price, MACD line, and signal line

On 10/3 and 10/4 the price was fluctuating, and the trade was exited on 10/4 at 2:20 PM, during a price decrement that was not sharp and seemed would continue, as shown in Figure 6.3.9.

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Figure 6.3.9 JD.com 10/4 Stock Price, MACD line, and signal line

For Snap Inc., as shown in Figure 6.3.10, the price experienced a sharp drop on 9/30 at opening. At 12:40 PM, after a short decrement, the price started to rise, and the MACD line cross above the signal line, which is a positive indicator to buy, the trade was entered. The trade was hold until the next day, as the price experience a sharp increment on 10/1 morning and started to drop during the entire day. The MACD line and signal line shows that Snap Inc. experienced decreasing trend and then increasing trend from around 12:30 PM to 2:40 PM, but from the real time price chart we should saw that the pattern was always decreasing, even in the afternoon, which was cause by the descending triangle price pattern. However, no enough attention was paid to the real time price chart, so the trade was exited at 3:40 PM, after the MACD line crossed below the signal line.

Figure 6.3.10 Snap Inc. 9/30 – 10/1 Stock Price, MACD line, and signal line

After the last trade was exited on 10/1 before the market closed, the price experienced a long decrement trend on 10/2 despite a few short increments, until 10/2 around 12:30 PM. Another trade was entered after the MACD line went above the signal line at around 12:40 PM, went down to the signal line after 3:00 PM, and crossed above the signal line again at around 3:20 PM.
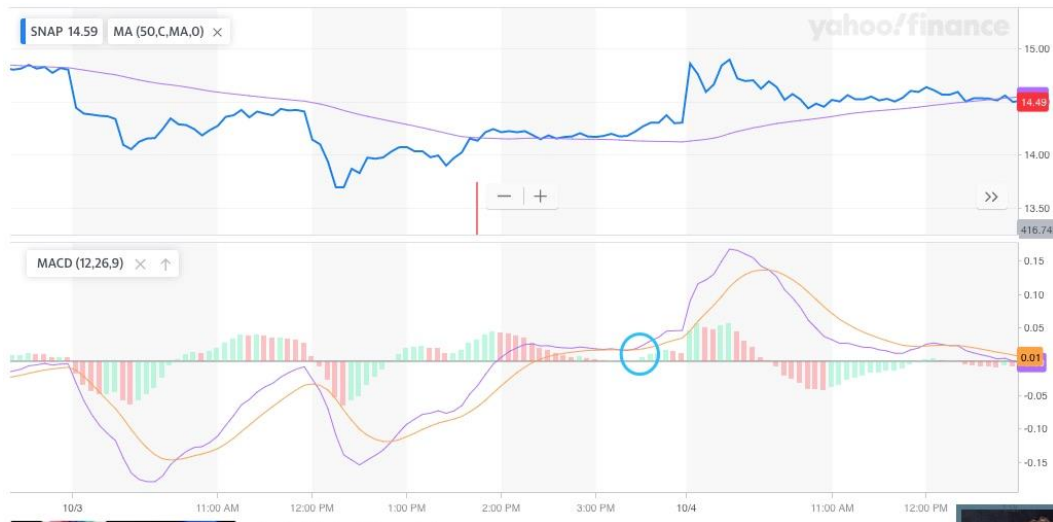

Figure 6.3.11 Snap Inc. 10/3 – 10/4 Stock Price, MACD line, and signal line

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Table 6.3.1 shows the trading history in Week3. At the start of Week3, the total profit was a loss of $3935.12 and at the end of Week3 we got a loss of $7977.74.

Date	Sym	Buy/Sell	Unit Price	Shares	Cost/ Proceed	Profit/ Loss	Total Cash	Total Profit
9/30	GOOG	BUY	1224.11	65	79,567.48		416,497.40	
10/1	GOOG	SELL	1211.38	-65	-78,739.38	-828.1	495,236.78	-4763.22
9/30	AAPL	BUY	221.58	361	79,992.19		415,244.59	
10/1	AAPL	SELL	225.16	-361	-81,280.96	1288.77	496,525.55	-3474.45
10/3	AAPL	BUY	219.63	370	81,264.95		415,260.60	
9/30	SNAP	BUY	15.84	5053	80,064.79		335,195.81	
10/1	SNAP	SELL	15.58	-5053	-78,700.48	-1364.31	413,896.29	-4838.76
10/3	SNAP	BUY	14.23	5520	78,577.20		335,319.09	
9/30	NKE	BUY	93.2	858	79,969.89		255,349.20	
10/1	NKE	SELL	93.53	-858	-80,244.45	274.56	335,593.65	-4564.2
10/2	NKE	BUY	91.71	875	80,250.63		255,343.02	
9/30	BABA	BUY	169.07	473	79,972.48		175,370.54	
10/1	BABA	SELL	164.14	-473	-77,635.86	-2336.62	253,006.40	-6900.82
10/1	BABA	BUY	164.64	471	77,547.80		175,458.60	
10/4	BABA	SELL	169.17	-471	-79,676.72	2,128.92	255,135.32	-4,771.90
10/4	BABA	BUY	169.83	469	79,652.62		175,482.70	
9/30	JD	BUY	28.25	2834	80,074.67		95,408.03	
10/2	JD	SELL	27.88	-2834	-78,997.75	-1076.92	174,405.78	-5,848.82
10/2	JD	BUY	28.05	2816	79,002.88		95,402.90	
10/4	JD	SELL	29.01	-2816	-81,678.08	2,675.20	177,080.98	-3,173.62

Table 6.3.1 Week3 Algorithm Day Trading History

6.4 Week Four Simulation

Coming to the Monday in Week 4, Apple is showing potential for growth at the market opening, and the increment slows down at noon. At 2:00 PM a downward MACD crossover comes with the price is heading down, we exited the trading of 370 shares, as demonstrated in Figure 6.4.1.

Figure 6.4.1 Apple 10/7 – 10/8 Stock Price, MACD line, and signal line

On 10/8, the overall trend of Apple is heading down, and on 10/9 the stock started with a positive MACD indicator. After the very positive indicator, the price started to decrease slowly, until around 11:30 AM comes a positive MACD indicator. A purchase of 373 shares was entered at 12:40 PM after the price has experienced another increment at 12:30 PM. In Figure 6.4.2 shows the indicators and movements of Alibaba Group stock.

Figure 6.4.2 Apple 10/9 Stock Price, MACD line, and signal line

For Alibaba Group, Week4 started with a significant decrement on Monday opening. The purchase entered in Week3 was immediately exited. The first purchase of

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the week was entered on 10/9 morning after the price experienced fluctuation on 10/7 and decrement on 10/8, after the positive indicator occurs at market opening. In Figure 6.4.3 shows the movement and indicators of Alibaba Group stock.
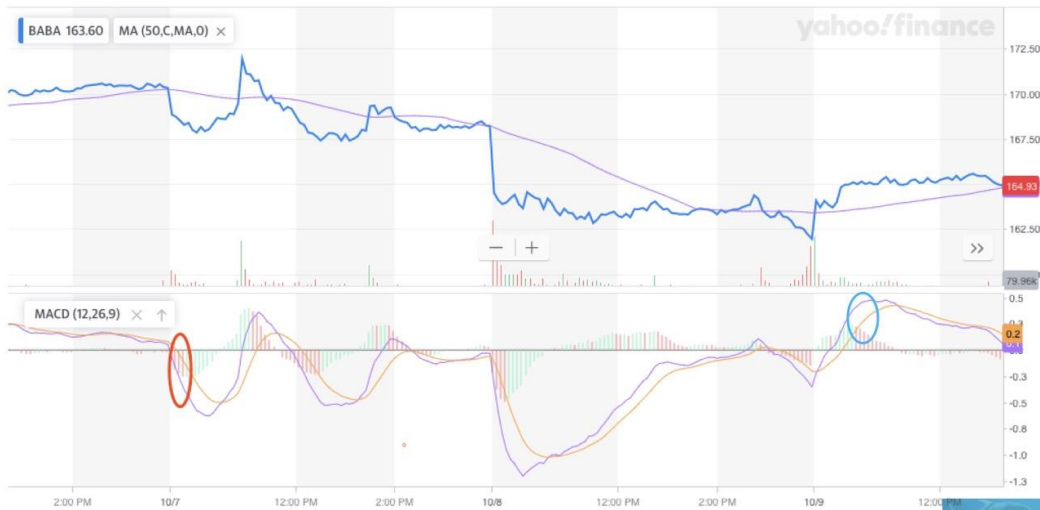
Figure 6.4.3 Alibaba Group 10/7 – 10/9 Stock Price, MACD line, and signal line

The purchase was exited at 10/10 at 1:40 PM, when the negative indicator has occurred twice in the same day, shown in Figure 6.4.4.

Figure 6.4.4 Alibaba Group 10/10 – 10/11 Stock Price, MACD line, and signal line

On 10/10 near the market close, the price started to move upward, and experienced significant momentum at the opening next day, which lead to a zero-line

cross, as demonstrated in Figure 6.4.5. A purchase was evoked immediately of 465 shares.

Figure 6.4.5 Alibaba Group 10/10 – 10/11 Stock Price, MACD line, and signal line

For Google, the first purchase was entered on 10/9, which started with positive MACD crossover and zero line cross. The first purchase of 65 shares was entered and was exited on 10/10 afternoon after the MACD line has went below zero line, as shown in Figure 6.4.6.
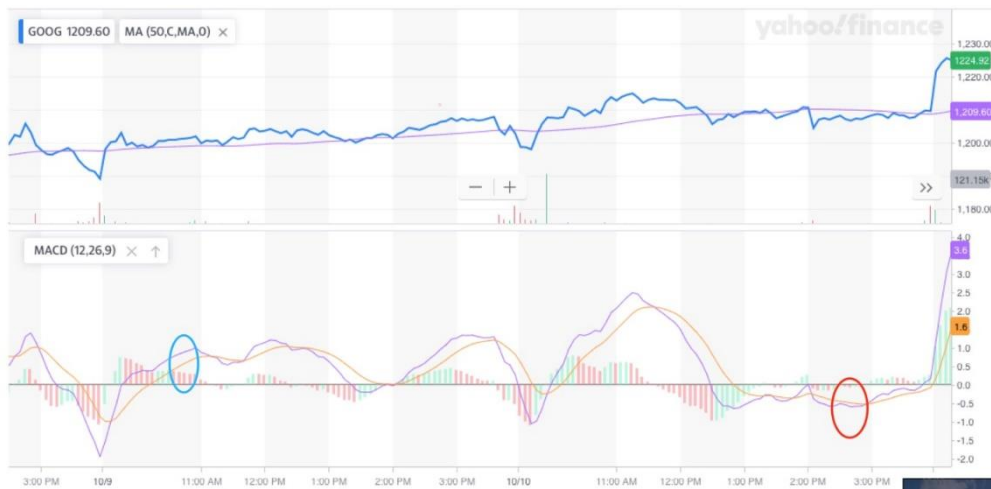
Figure 6.4.6 Google 10/9 – 10/10 Stock Price, MACD line, and signal line

The second purchase was entered on 10/11 at market opening with significant momentum, as the MACD line went above zero line, and exited when it got close to the market closing and negative zero line cross, as shown in Figure 6.4.7.

Figure 6.4.7 Google 10/11 Stock Price, MACD line, and signal line

For JD.com, Week4 started with momentum downwards, and no purchase was made on 10/7 or 10/8, as shown in Figure 6.4.8.

Figure 6.4.8 JD.com 10/7 – 10/8 Stock Price, MACD line, and signal line

On 10/9 at market opening, the price started to increase followed by a positive MACD indicator. The first purchase of the week of 2899 shares was immediately entered.

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The MACD line kept being above the zero line until 10/10 around noon, and the purchase was exited at 12:40 PM, as shown in Figure 6.4.9.

Figure 6.4.9 JD.com 10/9 – 10/10 Stock Price, MACD line, and signal line

For Snap Inc., the trade of 5520 shares entered in Week3 was exited on 10/8 morning as the price started to head downwards with significant momentum, as shown in Figure 6.4.10.

Figure 6.4.10 Snap Inc. 10/7 – 10/8 Stock Price, MACD line, and signal line

The first purchase of Week4 happened at 3:20 PM, when the price experienced a small decrement and started to face up again, and the MACD line is above zero and above the signal line, and soon was proved not to be a good decision. The price

experienced significant decrement and the decrement continued on 10/9 morning. The trade was exited then, on 10/09 morning, as shown in Figure 6.4.11.

Figure 6.4.11 Snap Inc. 10/8 – 10/9 Stock Price, MACD line, and signal line

The price came to a local minimum at 11:30 and started to head upward, with a positive MACD crossover. Another trad of 5605 shares was entered then. The price continued went upward in the rest of the day, experienced sudden decrement and increment at the opening on the next day. The trad was exited after 12:00 PM when the negative movement continued and would lead even more loss.

Figure 6.4.12 Snap Inc. 10/9 – 10/10 Stock Price, MACD line, and signal line

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On 10/11 at market opening the price experience significant growth and the MACD line went above zero line, which signals an immediate entering. At around 11:30 AM the price started to decrease, followed by a negative indicator. At 2:00 PM the MACD line crossed below the signal line again, which indicated that the price would continue to decrease. The trade was exited immediately, as shown in Figure 6.4.13.

Figure 6.4.13 Snap Inc. 10/11 Stock Price, MACD line, and signal line

Table 6.4.1. is the trading history of Week4.

Date	Sym	Buy/Sell	Unit Price	Shares	Cost/ Proceed	Profit/ Loss	Total Cash	Total Profit
10/7	AAPL	SELL	228.76	-370	-84,639.35	3,374.40	261,720.34	200.78
10/9	AAPL	BUY	227.08	373	84,702.71		177,017.63	
10/7	BABA	SELL	169.73	-469	-79,601.03	-51.59	256,618.67	149.19
10/9	BABA	BUY	165.11	480	79,255.20		177,363.47	
10/10	BABA	SELL	165.44	-480	-79,408.80	153.6	256,772.27	302.79
10/11	BABA	BUY	170.45	465	79,261.58		177,510.69	
10/9	GOOG	BUY	1200.87	65	78,056.88		99,453.81	
10/10	GOOG	SELL	1207.13	-65	-78,463.13	406.25	177,916.94	709.04
10/11	GOOG	BUY	1224.09	64	78,342.08		99,574.86	
10/11	GOOG	SELL	1224.38	-64	-78,360.00	17.92	177,934.86	726.96
10/9	JD	BUY	28.13	2899	81,563.37		96,371.49	
10/10	JD	SELL	28.38	-2899	-82,259.13	695.76	178,630.62	1,422.72
10/7	NKE	SELL	93.33	-875	-81,659.38	1,408.75	260,290.00	2,831.47
10/9	NKE	BUY	92.31	884	81,606.46		178,683.54	
10/9	NKE	SELL	92.24	-884	-81,535.74	-70.72	260,219.28	2,760.75
10/9	NKE	BUY	92.45	883	81,637.77		178,581.51	
10/8	SNAP	SELL	14.45	-5520	-79,736.40	1,159.20	258,317.91	3,919.95
10/8	SNAP	BUY	14.27	5591	79,811.53		178,506.38	
10/9	SNAP	SELL	14.16	-5591	-79,140.61	-670.92	257,646.99	3,249.03
10/9	SNAP	BUY	14.11	5605	79,114.58		178,532.41	
10/10	SNAP	SELL	14.08	-5605	-78,890.38	-224.2	257,422.79	3,024.83
10/11	SNAP	BUY	14.28	5540	79,138.90		178,283.89	
10/11	SNAP	SELL	14.21	-5540	-78,695.70	-443.2	256,979.59	2,581.63

Table 6.4.1 Week4 Algorithm Day Trading History

6.5 Week Five Simulation

At the start of Week 5, we still have an open trade of 373 shares, entered on 10/09 at around midday. For the rest of Week 4, the MACD line was almost always above zero line, until on 10/14 around midday, when the MACD line finally crossed below the zero

line, which signaled an immediate exit of the trade, as shown in Figure 6.5.1 and Figure 6.5.2.

Figure 6.5.1 Apple 10/9 – 10/14 Stock Price, MACD line, and signal line

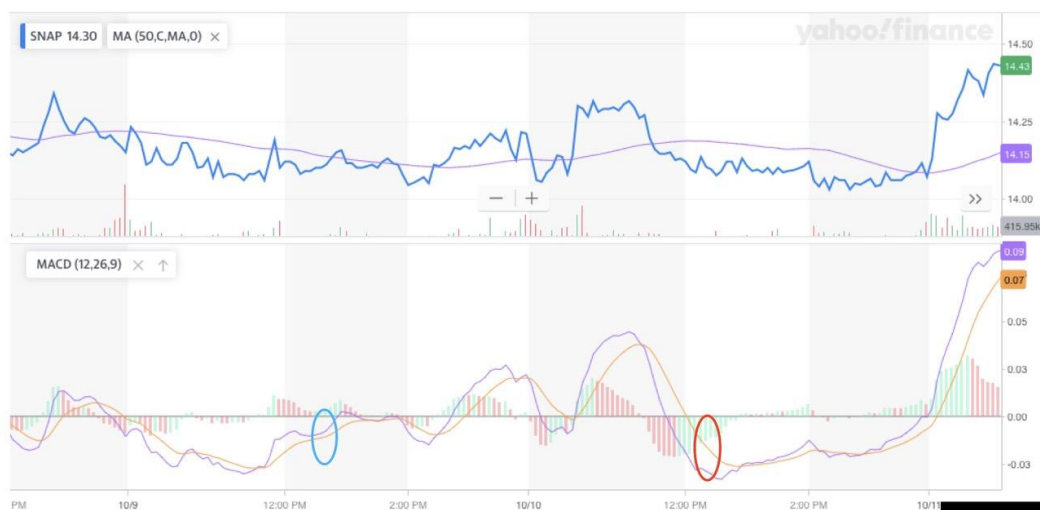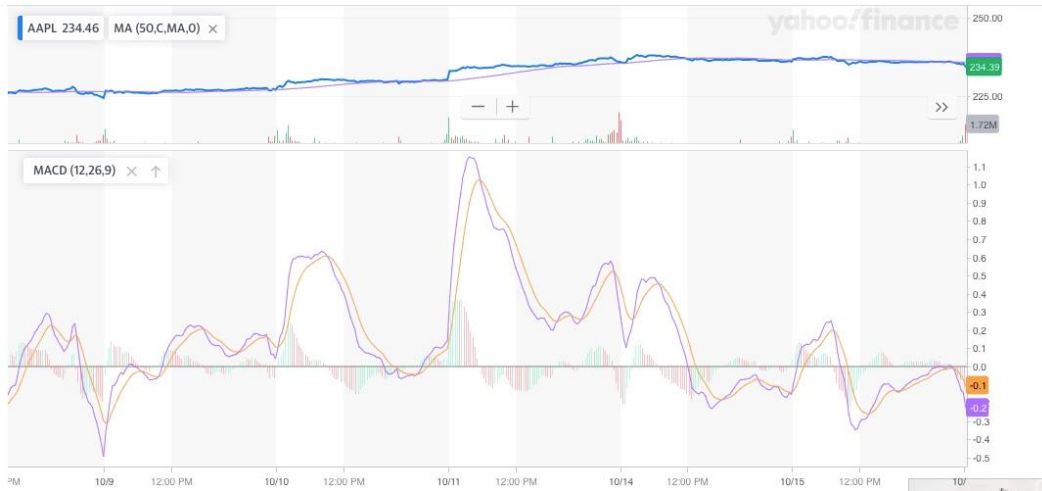*Figure 6.5.2 Apple 10/14 Stock Price, MACD line, and signal line*

On 10/17 at market opening the price experienced significant growth, and a trade was entered immediately. The growth didn't last long in the morning, but I chose to hold the trade until 10/18 around noon and exited when the MACD line crossed below the zero line, as shown in Figure 6.5.3.
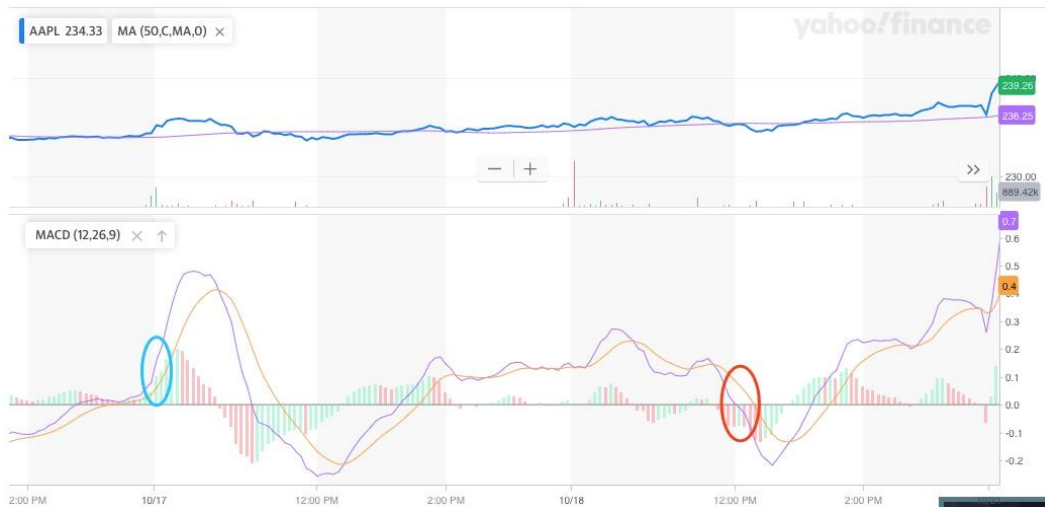
Figure 6.5.3 Apple 10/17 – 10/18 Stock Price, MACD line, and signal line

For Alibaba Group, we still have an open trade which was entered on 10/11 in Week4. On Monday at market opening, the price experienced significant decrement and the MACD line cross below the zero line, which signaled exit of the trade, as shown in Figure 6.5.4.
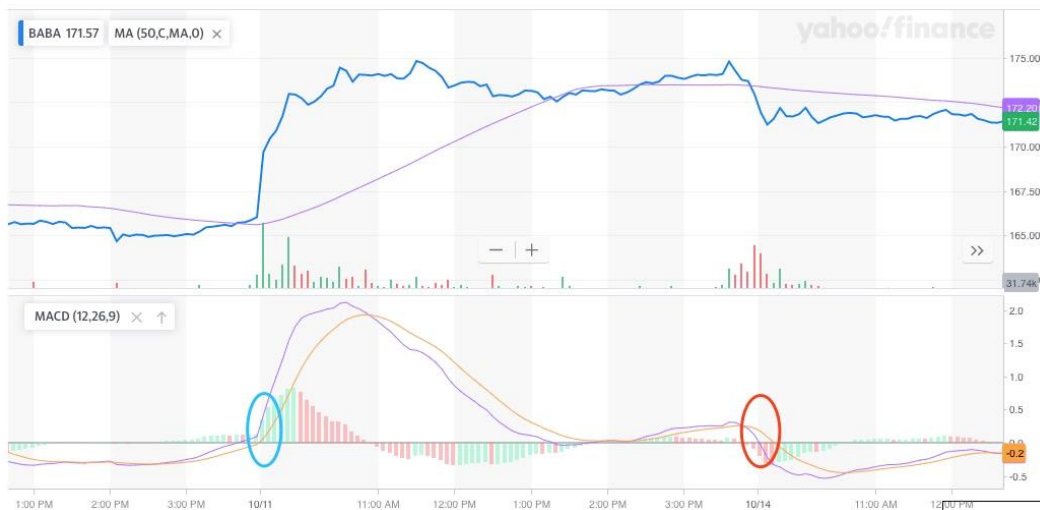
Figure 6.5.4 Alibaba Group 10/11 – 10/14 Stock Price, MACD line, and signal line

For Google, the first purchase of the week was entered on 10/15 in the morning after the MACD line crossed above the signal line and zero line. For rest of the day the

price was heading up and started to head down on 10/16 around midday. The purchase was exited on 10/16 after a zero-line cross, as shown in Figure 6.5.5.

Figure 6.5.5 Google 10/15 – 10/16 Stock Price, MACD line, and signal line

On 10/17 at market opening the price had huge growth and the MACD line went above the zero line, which signaled entering a trade. The growth didn't last long and around 10:30 AM came a negative MACD indicator, and the trade was exited, as demonstrated in Figure 6.5.6.

Figure 6.5.6 Google 10/7 Stock Price, MACD line, and signal line

For JD.com, the price experienced increment on 10/15 at market opening, and led to immediate positive MACD indicator and zero-line crossover, which indicated entering a trade. On 10/16 the price started to increase at market opening, but started to fluctuate very soon, and the trade was exited at 11:00 AM after the negative MACD indicator occurred, as shown in Figure 6.5.7.

Figure 6.5.7 JD.com 10/15 – 10/16 Stock Price, MACD line, and signal line

In rest of the week, the price of JD.com stock always headed downwards and there was no trading entered, as shown in Figure 6.5.8.

Figure 6.5.8 JD.com 10/16 – 10/18 Stock Price, MACD line, and signal line

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For Snap Inc., the first trade of the week was entered on 10/15 morning, when the MACD line crossed above the zero line, which is a strong indicator of entering, as shown in Figure 6.5.9. The trade was exited on 10/16 around midday when the price has already been going down and the MACD line crossed below the signal line again, which indicate more decrement.

Figure 6.5.9 Snap Inc. 10/15 – 10/16 Stock Price, MACD line, and signal line

The second trade of the week was entered on 10/17 morning, since the MACD line crossed above both the signal line and zero line, which strongly signaled entering. For the rest of the day the price kept going low and experienced another significant growth on the next day opening. The trade was exited around noon when the MACD line started to leave signal line below it, as shown in Figure 6.5.10, to prevent loss.
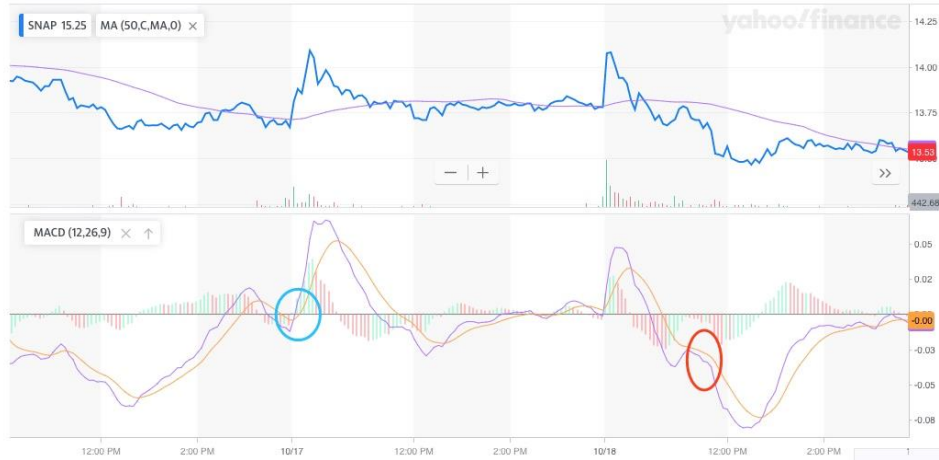
Figure 6.5.10 Snap Inc. 10/17 – 10/18 Stock Price, MACD line, and signal line

Table 6.5.1 is the trading history of Week5. At the end of Week 5, the available cash is $425,805.25 and the total profit is $9172.78.

Date	Sym	Buy/Sell	Unit Price	Shares	Cost/ Proceed	Profit/ Loss	Total Cash	Total Profit
10/14	AAPL	SELL	236.73	-373	-88298.425	3,595.71	345,278.02	6,177.34
10/17	AAPL	BUY	235.08	375	88156.875		257,121.14	
10/18	AAPL	SELL	234.65	-375	-87991.875	-165	345,113.02	6,012.34
10/15	GOOG	BUY	1231.06	64	78788.16		266,324.86	
10/16	GOOG	SELL	1247.14	-64	-79816.64	1028.48	346,141.50	7,040.82
10/17	GOOG	BUY	1253.68	63	79518.285		266,623.21	
10/17	GOOG	SELL	1253.68	-63	-79517.655	-0.63	346,140.87	7,040.19
10/14	BABA	SELL	171.24	-465	-79624.275	362.70	425,765.14	7,402.89
10/15	JD	BUY	30.46	2701	82285.965		343,479.18	
10/16	JD	SELL	31.04	-2701	-83825.535	1539.57	427,304.71	8,942.46
10/14	NKE	SELL	94.29	-883	-83253.655	1,615.89	510,558.37	10,558.35
10/14	NKE	BUY	94.76	878	83203.67		427,354.70	
10/14	NKE	SELL	94.89	-878	-83309.03	105.36	510,663.73	10,663.71
10/16	NKE	BUY	95.13	876	83338.26		427,325.47	
10/17	NKE	SELL	95.23	-876	-83417.1	78.84	510,742.57	10,742.55
10/18	NKE	BUY	95.6	872	83367.56		427,375.01	
10/15	SNAP	BUY	13.96	5605	78273.825		349,101.18	
10/16	SNAP	SELL	13.87	-5605	-77713.325	-560.5	426,814.51	10,182.05
10/17	SNAP	BUY	13.89	5607	77909.265		348,905.24	
10/18	SNAP	SELL	13.72	-5607	-76900.005	-1009.26	425,805.25	9,172.78

Table 6.5.1 Week5 Algorithm Day Trading History

6.6 Week Six Simulation

At start of Week6, the available cash is $425,805.25, and the total profit is $9172.78.

On 10/21 at the market opening, the price of Alibaba Group stock started with significant increment and the MACD line went straight above the signal line and zero line, which brought strong confidence in purchasing, as shown in Figure 6.6.1. A purchase of 462 shares was entered immediately.
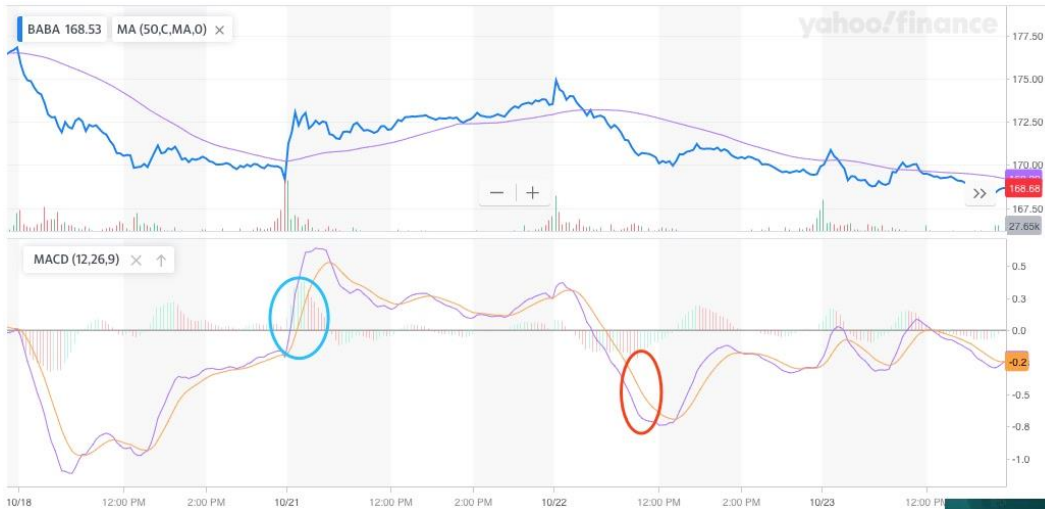
Figure 6.6.1 Alibaba Group 10/18 – 10/22 Stock Price, MACD line, and signal line

The second purchase was entered on 10/3 after the MACD line crossed above the zero line. The purchase was hold until 10/25 afternoon and when MACD line crossed below the signal line locally, as shown in Figure 6.6.2.

Figure 6.6.2 Alibaba Group 10/23 – 10/25 Stock Price, MACD line, and signal line

The entering and exiting points of Google stock is demonstrated in Figure 6.6.3. The first trade of the week was entered on 10/22 at 1:00 PM when the MACD line started to go farther above the signal line and crossed above zero line and was exited at 3:00 PM after the MACD line has already went down the signal line and continued to go lower.
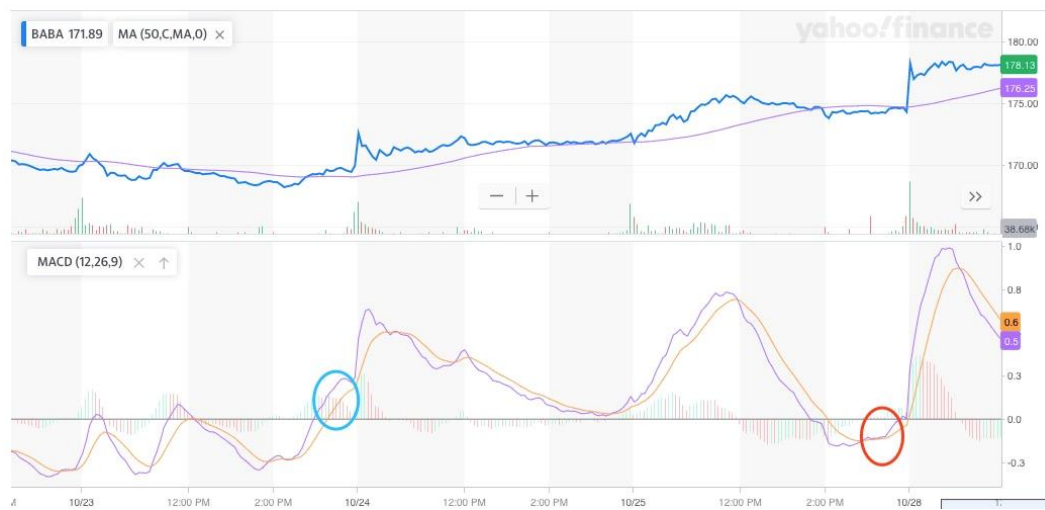
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Figure 6.6.3 Google 10/22 – 10/23 Stock Price, MACD line, and signal line

The second trade was entered on 10/23 when the price increased at opening bell. The MACD line went straight above the signal line and zero line, as shown in Figure 6.6.4. The trade was held until 10/24 afternoon and was exited after the MACD line crossed below the zero line, which suggested an exit.

Figure 6.6.4 Google 10/23 – 10/24 Stock Price, MACD line, and signal line

The third week of the week was entered on 10/25 after the price started low at market opening and started to head upwards and had the MACD line crossed above the zero line. However, this was not a good decision because soon after the entering the

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upward movement turned downward. The trade was exited in the afternoon after the

MACD line crossed below zero line, as demonstrated in Figure 6.6.5.

Figure 6.6.5 Google 10/25 Stock Price, MACD line, and signal line

For JD.com, the first trade of the week was entered with great confidence on 10/21

morning after the positive indicators were present. There was no indicator occurred for

the rest of the day, and on the next day after opening, the price started to decrease. The

trade was exited after a negative MACD indicator and the MACD line continued to move

downwards, to prevent further loss, as shown in Figure 6.6.6.

Figure 6.6.6 JD.com 10/21 – 10/22 Stock Price, MACD line, and signal line

The second trade of JD.com stock was entered after the MACD line left the signal line above it, but the upward movement didn't last long. The trade was exited on 10/24 afternoon after negative MACD crossover and MACD line continued to head downwards, as shown in Figure 6.6.7.

Figure 6.6.7 JD.com 10/23 – 10/24 Stock Price, MACD line, and signal line

On 10/25, the price of JD.com started with decrement, and started a upward trend at around 10:30 AM. The third trade of the week was entered and was exited at 2:00 PM after the MACD line crossed below zero line. The price plot and MACD indicators are demonstrated in Figure 6.6.8.
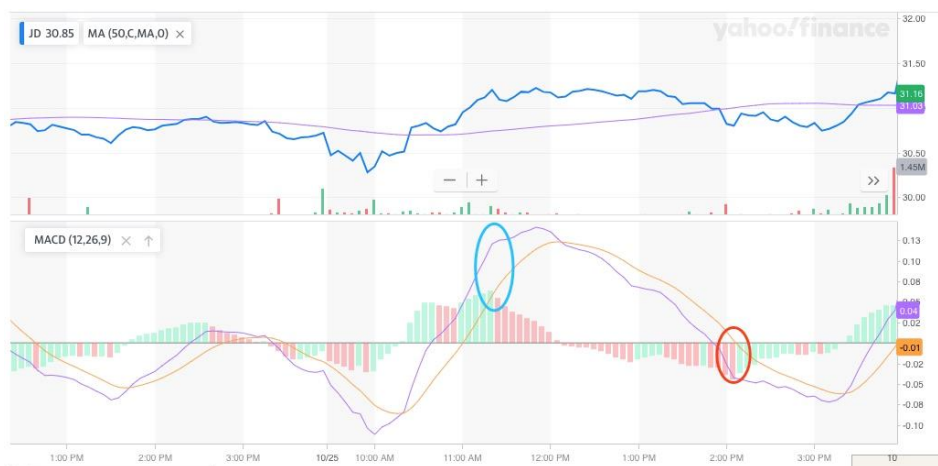
Figure 6.6.8 JD.com 10/25 Stock Price, MACD line, and signal line

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For Snap Inc. in the week, high confidence was shown, a positive MACD crossover and a positive zero line occurred on 10/21 at opening bell. A trade was immediately entered, as shown in Figure 6.6.9. Then the upward movement eventually slowed down for the majority of the day. On the next day after opening, the price started to decrease and the MACD line crossed below both signal line and zero line, which can be used as the exit point of the trade.
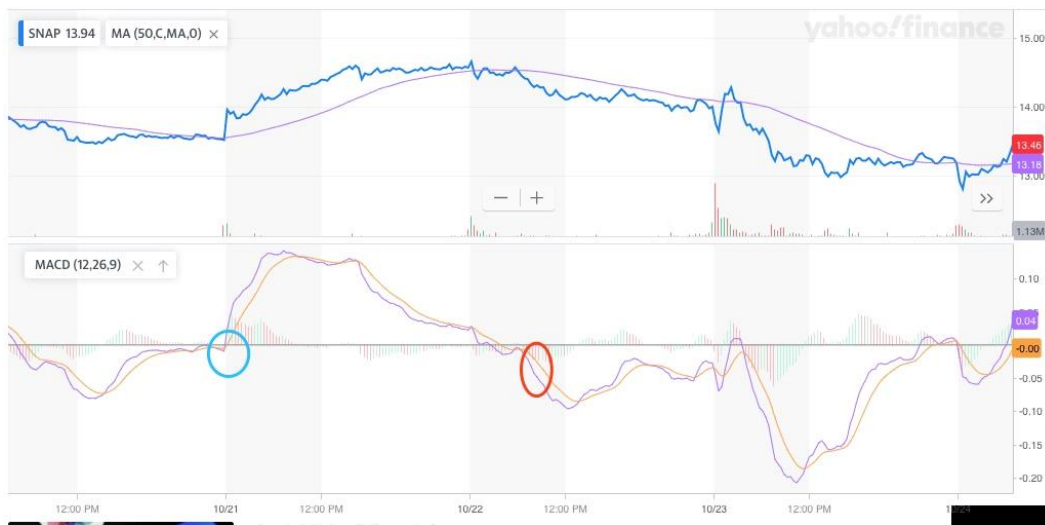
Figure 6.6.9 Snap Inc. 10/21 – 10/23 Stock Price, MACD line, and signal line

Table 6.6.1 is the trading history of week 6. At the end of this week, the available cash is $350,601.32, and the total profit is $12,461.90.

Date	Sym	Buy/Sell	Unit Price	Shares	Cost/ Proceed	Profit/ Loss	Total Cash	Total Profit
10/22	GOOG	BUY	1247.68	64	79851.84		345,953.41	
10/22	GOOG	SELL	1243.36	-64	-79574.72	-277.12	425,528.13	8,895.66
10/23	GOOG	BUY	1252.39	63	78900.885		346,627.24	
10/24	GOOG	SELL	1259.62	-63	-79355.745	454.86	425,982.99	9,350.52
10/25	GOOG	BUY	1266.25	63	79774.065		346,208.92	
10/25	GOOG	SELL	1262.73	-63	-79551.675	-222.39	425,760.60	9,128.13
10/21	BABA	BUY	172.38	462	79641.87		346,118.73	
10/22	BABA	SELL	170.69	-462	-78856.47	-785.4	424,975.20	8,342.73
10/23	BABA	BUY	169.61	465	78870.975		346,104.22	
10/25	BABA	SELL	174.19	-465	-80996.025	2125.05	427,100.25	10,467.79
10/21	JD	BUY	30.52	2749	83913.225		343,187.02	
10/22	JD	SELL	30.56	-2749	-83995.695	82.47	427,182.72	10,550.26
10/23	JD	BUY	30.59	2745	83983.275		343,199.44	
10/24	JD	SELL	30.7	-2745	-84257.775	274.5	427,457.22	10,824.76
10/25	JD	BUY	31.12	2702	84099.75		343,357.47	
10/25	JD	SELL	30.85	-2702	-83343.19	-756.56	426,700.66	10,068.20
10/21	NKE	SELL	95.88	-872	-83603	235.44	510,303.66	10,303.64
10/24	NKE	BUY	91.46	905	82775.825		427,527.83	
10/21	SNAP	BUY	13.91	5534	77005.61		350,522.22	
10/22	SNAP	SELL	14.31	-5534	-79163.87	2158.26	429,686.09	12,461.90
10/24	SNAP	BUY	13.47	5869	79084.775		350,601.32	

Table 6.6.1 Week6 Algorithm Day Trading History

6.7 Week Seven Simulation

Trading in Week7 is still basing on the MACD indicator including the stop-loss and take-profit rules.

On 10/30 at 3:00 PM when the algorithm was triggered, we can see the MACD line crossed above the signal line, which indicates the start of bullish pattern, as shown in Figure 6.7.1. The algorithm bought 363 shares of stock and still hold until end of the Week, because the bullish pattern continues until the end of Week7.

Figure 6.7.1 Apple 10/29 – 11/1 Stock Price, MACD line, and signal line.

The transactions in Alibaba Group successfully catch the MACD line and signal line crossovers, as shown in Figure 6.7.2, but still cause losses. The loss of the first trade was because the stock had a very fast acceleration in begin of day. Because the algorithm is called every 20 minutes, the purchase was made after the sharp movement, which is not the ideal timing for the trading. Losing money in the second trade was due to the false positive reversal after a sharp price movement and in a descending triangle. As shown in Figure 6.7.2, on 10/30 afternoon there was a sharp price change followed by less sharp fluctuations. The sharp increment caused the MACD line to jump high and the sideways movements caused the MACD line to head down and eventually crossed below the signal line after 12:00 PM. The crossovers indicated a bullish trend from 10/30 afternoon to 10/31 afternoon but in fact it was a bearish chart pattern.

Figure 6.7.2 Descending Triangle on 10/30 and 10/31

Similar to the case of trade in Alibaba Group, the same problem of sharp price movements and the false positive signal also happened to Google and Nike, as shown in Figure 6.7.3 and Figure 6.7.4. The problems lead to purchases and selling at bad timing and cause losses.

Figure 6.7.3 Google 10/28 – 10/31 Stock Price, MACD line, and signal line
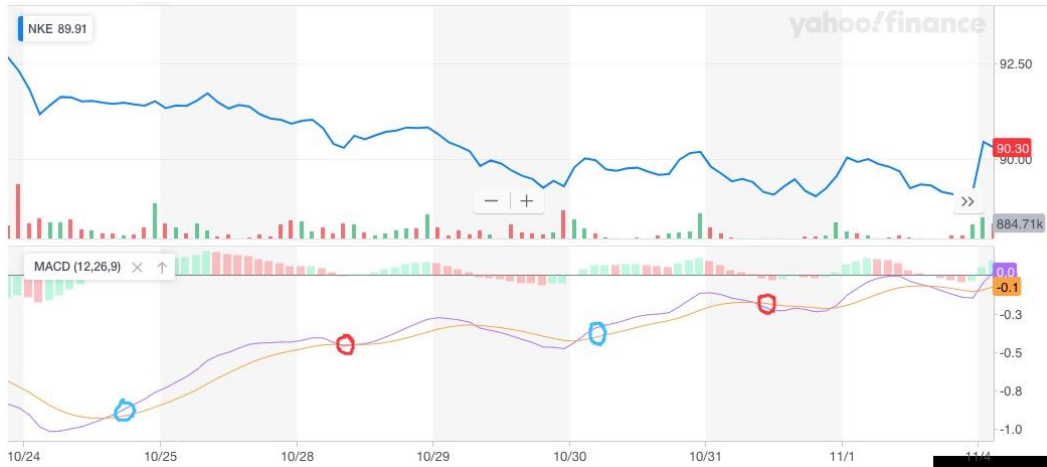
Figure 6.7.4 Nike 10/24 – 11/1 Stock Price, MACD line, and signal line

The first trade in Snap Inc. was to sell the 5869 shares we bought in last Week. On 10/29 at 9:40 AM, as shown in Figure 6.7.5, the signal line was above the MACD line so the algorithm sold all 5869 shares. Also, as we can see in Figure 6.7.5, at 9:40AM it was almost the crossover when MACD line croses below the signal line. A huge profit of $6250.485 was made in this single trade.

Figure 6.7.5 Snap Inc. 10/24 – 10/30 Stock Price, MACD line, and signal line

The second trade in Snap Inc. in Week7 was not as successful as the first trade. The algorithm bought 5684 shares right after MACD crossed above the signal line, as

shown in Figure 6.7.6. However, we can see that because the purchase and selling were

not exactly at the crossover, this trade made a loss of $795.76.

Figure 6.7.6 Snap Inc. 10/31 – 11/1 Stock Price, MACD line, and signal line

Table 6.7.1 shows the trading history of Week7.

Date	Sym	Buy/Sell	Unit Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
10/30	AAPL	BUY	242.69	363	88098.285		262,503.03	
10/28	BABA	BUY	176.95	458	81045.39		181,457.64	
10/29	BABA	SELL	176.59	-458	-80875.93	-169.46	262,333.57	12,292.44
10/30	BABA	BUY	177.25	458	81182.79		181,150.78	
10/31	BABA	SELL	175.9	-458	-80559.91	-622.88	261,710.69	11,669.56
11/1	BABA	BUY	177.92	451	80244.175		181,466.52	
11/1	BABA	SELL	178.85	-451	-80663.605	419.43	262,130.12	12,088.99
10/28	GOOG	BUY	1277.16	62	79184.23		182,945.89	
10/29	GOOG	SELL	1261.74	-62	-78227.57	-956.66	261,173.46	11,132.33
10/30	GOOG	BUY	1261.61	62	78220.13		182,953.33	
10/31	GOOG	SELL	1254.82	-62	-77798.53	-421.6	260,751.86	10,710.73
10/31	GOOG	BUY	1257.82	62	77985.15		182,766.71	
10/31	GOOG	SELL	1254.13	-62	-77755.75	-229.4	260,522.46	10,481.33
11/1	JD	BUY	31.41	2650	83249.75		177,272.71	
10/28	NKE	SELL	90.39	-905	-81798.425	-1018.125	259,071.14	9,463.20
10/30	NKE	BUY	90.06	908	81779.02		177,292.12	
10/31	NKE	SELL	89.17	-908	-80961.82	-817.2	258,253.94	8,646.00
10/29	SNAP	SELL	14.59	-5869	-85599.365	6250.485	343,853.30	14,896.49
10/31	SNAP	BUY	15.05	5684	85572.62		258,280.68	
10/31	SNAP	SELL	14.92	-5684	-84776.86	-795.76	343,057.54	14,100.73

Table 6.7.1 Week7 Algorithm Day Trading History

From the trading history of Week7, Alibaba Group, Google, Nike are losing money; Apple and JD are not available for profits or loss in Week7; Snap Inc. is making profit. There are 363 shares in Apple and 2650 share in JD.com to exit in Week8.

6.8 Week Eight Simulation

At the start of Week8, the available cash is $343,057.54 and there are 363 shares of stock in Apple available to sell. We continue to trade with the MACD indicator.

The bullish trend of Apple since 10/31 meets the negative indicator on 11/4 around noon, as shown in Figure 6.8.1. When the algorithm was called on 11/4 at 12:20 PM, the

MACD line has crossed below the signal line. Therefore, the algorithm sold 363 shares of stock in hand. The bearish trend lasted from 11/4 to 11/7, and the sudden increase on 11/7 at market opening caused another positive crossover. On 11/7 morning the algorithm made a purchase of 360 shares and exited the trading on 11/08 morning due to a negative crossover caused by the price drop in the morning.

Figure 6.8.1 Apple 10/31 – 11/8 Stock Price, MACD line, and signal line

For Alibaba Group, a sharp price increment happened on 11/04 at market opening, as shown in Figure 6.8.2, so the algorithm bought 439 shares on 11/04 at 9:40. The bullish trend continues, and a negative indicator was captured on 11/06 at 1:00 PM. Another sharp price increment happened on 11/07 morning and the MACD line experienced an upward cross with the signal line. The second trade exited on 11/7 morning at 3:20PM when the MACD line crossed back the signal line, heading negative.

Figure 6.8.2 Alibaba Group 11/4 – 11/8 Stock Price, MACD line, and signal line

For Google, the price experienced a sharp increment on 11/7 morning, as well as an immediate positive crossover of MACD line and signal line, as shown in Figure 6.8.3. Therefore, a purchase of 60 shares at price of $1305.06 was made. Then the MACD crossover happened on 11/07 after noon and the trade was exited.

Figure 6.8.3 Google 11/4 – 11/8 Stock Price, MACD line, and signal line

For JD.com, at the beginning of Week8, we still have 2650 shares to close. The bullish trend lasted from 11/1 and was ended on 11/5 morning with a price drop and led to a MACD crossover, which indicated the need for the trade to be exited, as shown in Figure 6.8.4.

Figure 6.8.4 JD.com 10/31 – 11/7 Stock Price, MACD line, and signal line

For Nike, this stock experienced a MACD crossover on 11/06 afternoon and a purchase of 896 shares of price $89.63 per share was started. Then the bullish pattern lasted from 11/06 to 11/08 morning, and a huge price decrease on 11/08 morning led to a negative MACD crossover, which made the exit point of the trade, as shown in Figure 6.8.5.

Figure 6.8.5 Nike 11/5-11/8 Stock Price, MACD line, and signal line

For Snap Inc, on 11/7 at opening, there was a sharp increment in the price and caused the MACD line to cross the signal line upwards, as shown in Figure 6.8.6. The algorithm cached this crossover and bought 5682 shares. However, later on 11/7, the

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price continues to decrease and the MACD line crossed the signal line on 11/8 morning. Then the algorithm sold all 5682 shares but still caused a loss of $3068.28. On the morning of 11/8, another sudden increment happened and led to another positive indicator, so the algorithm made another purchase of 5557 share with price of $14.40 per share.

Figure 6.8.6 Snap Inc. 11/7 – 11/8 Stock Price, MACD line, and signal line

Table 6.8.1 shows the trade history of Week8, at the end of Week8, the available cash is $442,099.54, and the total profit is $22,148.13.

Date	Sym	Buy/Sell	Unit Price	Shares	Cost/Proceed	Profit/Loss	Total Cash	Total Profit
11/4	AAPL	SELL	256.31	-363	-93038.715	4940.43	436,096.26	19,346.01
11/7	AAPL	BUY	258.65	360	93115.8		342,980.46	
11/8	AAPL	SELL	258.77	-360	-93155.4	39.6	436,135.86	19,385.61
11/4	BABA	BUY	180.87	439	79404.125		356,731.73	
11/6	BABA	SELL	183.04	-439	-80352.365	948.24	437,084.10	20,333.85
11/7	BABA	BUY	185.07	429	79397.175		357,686.92	
11/7	BABA	SELL	185.7	-429	-79663.155	265.98	437,350.08	20,599.83
11/7	GOOG	BUY	1305.06	60	78303.9		359,046.18	
11/7	GOOG	SELL	1309.71	-60	-78582.3	278.4	437,628.48	20,878.23
11/5	JD	SELL	33.03	-2650	-87516.25	4266.5	525,144.73	25,144.73
11/6	NKE	BUY	89.63	896	80312.96		444,831.77	
11/8	NKE	SELL	89.72	-896	-80384.64	71.68	525,216.41	25,216.41
11/7	SNAP	BUY	14.68	5682	83440.17		441,776.24	
11/8	SNAP	SELL	14.15	-5682	-80371.89	-3068.28	522,148.13	22,148.13
11/8	SNAP	BUY	14.4	5557	80048.585		442,099.54	

Table 6.8.1 Week8 Algorithm Day Trading History

6.9 Summary

Using the algorithm aided day trading, we made profit of $22,148.13 in the 8-week simulation. In this section, we will discuss about the pros and cons of algorithm aided day trading.

The algorithm aided day trading can help automate the decision making and trading for the traders. With the algorithm help track the MACD line and the price, traders do not need to keep always their eyes on the stock prices.

Although the trading algorithm makes trading easier and can make profits, it still has its limitations. The algorithm we used was checking the trend reversals, and it can't track the real-time MACD crossovers and zero-line crossovers. By checking the price history every 30 minutes (in Week1 and Week2) and 20 minutes (in Week3 – Week8) and look for the trend reversals, the algorithm can't promise to capture all the available

trend reversals. For reversals that the algorithm captured, and are used as enter points or exit points, there are delays that affecting the trade timings caused by the 20 minutes intervals.

To resolve the bad trading timings caused by the delays, from Week3 we reorganized the day trading algorithm to take decisions of the traders. For example, traders can help handle delay actions: when a reversal was noticed a long time period after the crossover happened, the trader can notice the delay, choose not to buy or sell, and wait for the next indicator to occur. The failure due to false positive MACD indicators should also decrease, if the trader can notice the existence of potential triangle pattern or pay more attention to the price trend, instead of only looking at the MACD line and signal line. However, this reorganization still can't solve the limitation that some good ending points and exiting points were neglected by the algorithm during the 20 minutes interval.

In a word, we believe that even with shortcomings, the algorithm aided day trading is very efficient and make trading easier. In addition, the design of the algorithm can affect how much profits that we need to be careful choosing a good algorithm.

7 Analysis and Comparison

We tested three trading strategies in this four-week simulation: swing trading strategy, news trading strategy, and day trading strategy. Day trading had been more successful and gained significant profits while swing trading and news trading got relatively low profit. The end balances were $505,572.67 for swing trading, $508,624.6 for news trading and $522,148.13 for day trading. This resulted in a return investment of 1.11% for swing trading, 1.72% for news trading and 4.43% for day trading. Comparatively, swing and news trading is not as effective as day trading.

This result is realistic and fair since the three strategies all use the company that selected from the 10 companies we determined. And these companies fall into similar industry sector, which is the tech area.

Figure 7.1 shows the weekly total value of all trading methods. As we can see on the chart, day trading has a deeper line compared to the other two trading methods.
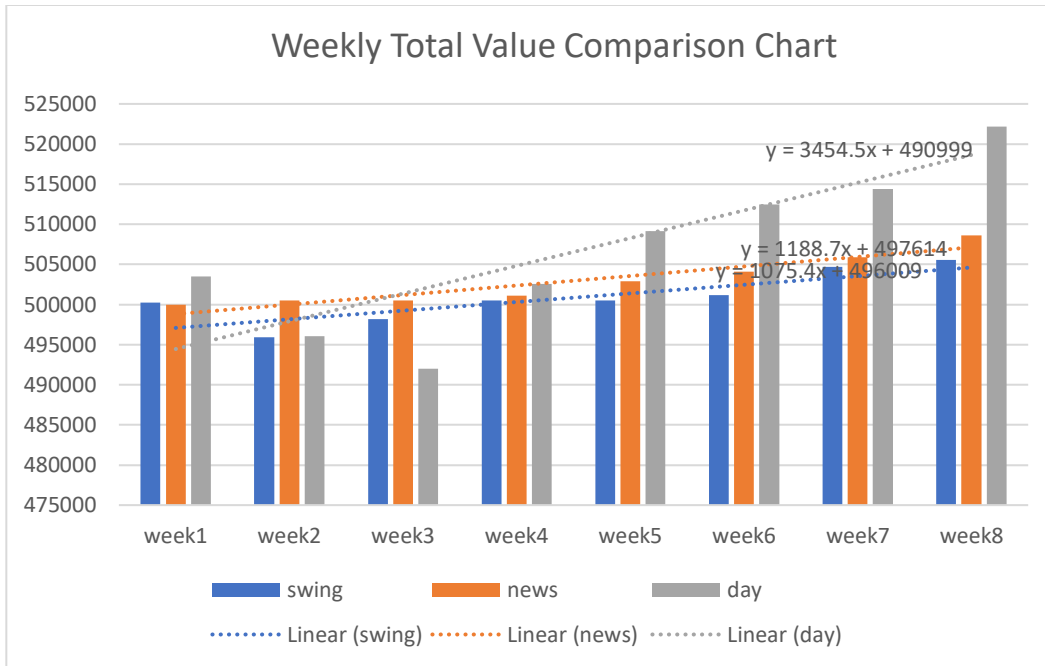
Figure 7.6.9.1 Weekly Total Value Comparison Chart with Linear Trend Line

Figure 7.2 shows the profit of all the trading methods. As we can see on the graph, day trading has a relatively big decrease on week 3 but has a steady uptrend from week 4 to week 8. The trend line for day trading matches with a linear distribution with an equation:

$$Y = 3454.5X - 9001.1$$

For news trading strategy, it has a constant upward trend and can be expressed with the equation:

$$Y = 1188.7X - 2386.4$$

However, for swing trading strategy, it has a relatively low point at week2 because of the miscalculation but gain a constant profit from then on. And the equation can be expressed as:
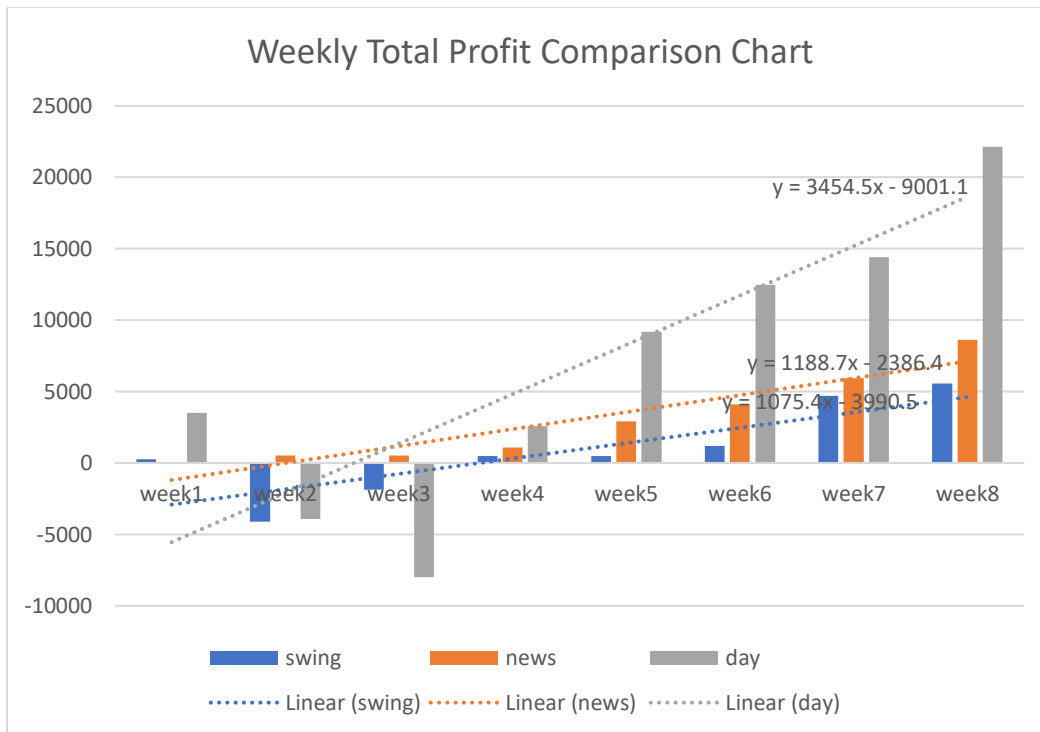
$$Y = 1075.4X - 3990.5$$

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Figure 7.6.9.2 Weekly Total Profit Comparison Chart with Linear Trend Line

Although the performance of the day trading algorithm works well, there are limitations to the algorithm we currently use. For example, it can't always track the relationship between MACD line and signal line. By checking the price history every 30 minutes (in Week1 and Week2) or 20 minutes (in Week3 – Week8) and look for the trend reversals, the algorithm can't promise to capture all the available trend reversals. For reversals that the algorithm captured, and are used as enter points or exit points, there are delays that affecting the trade timings caused by the 20 minutes intervals.

After Week2, when the day trading algorithm started to take the decisions from real-human trader before each transaction, some failures got handled by the trader. For example, traders can help handle delay actions: when a reversal was noticed a long time period after the crossover happened, the trader can notice the delay, choose not to buy or sell, and wait for the next indicator to occur. The failure due to false positive MACD

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indicators should also decrease, if the trader can notice the existence of potential triangle

pattern or pay more attention to the price trend, instead of only looking at the MACD line

and signal line.

8 Conclusion

Among the three trading strategies in our simulation – swing trading, news trading, and algorithm day trading, algorithm day trading has won the game with total profits of $22,148.13 which is 4.4% of its starting money - $500,000. Algorithm has an advantage which is much better than the other two, and that is it does not require any person to look at the stock all the time. In a word, we have not only earned decent amount of profit, but also learned a lot of financial knowledge which allows us to predict the whole market by simulate those chosen stocks.

First of all, we gained a comprehensive understanding of stock market by researching all the concepts and researches from the past. Secondly, we improved our coding skills and this model earns the most profits among the three strategies. Thirdly, we learned how can we analysis news and pick the news to trade, by trying to catch the most valuable opportunities. Finally, we have learned how can we analysis data and be aware of all the tools to help us trade, for example the stock price chart from Investopedia.

In a word, we learned a lot of basic skills to trade, analysis the stock market, and catch the most profitable moment. All of these things from this IQP project prepare us to real world stock market, and also are beneficial for our future learning of finical or marketing fields.

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