Project Number: DZT2010

Stock Market Simulation

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

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Abstract

In this project, a two-person group traded on a stock market simulator over a 9-week period using two different trading strategies. Preliminary research was performed on trading fundamentals and strategies to prepare for the simulation. Each member created a portfolio of stocks with a starting value of $100,000 cash and chose a trading strategy to adhere to. The first portfolio utilized breakout trading, and the second utilized growth trading. The first portfolio ended with $1273.45 in profit, and the second with $2,288.40. This project has been an invaluable experience in learning about the market and trading strategies and has made its participants better equipped to make smart investments in the future.

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1 Introduction

1.1 Learning Goals

Over the course of this project, the participants hope to learn various trading strategies employed by investors in real-world finance situations. They will use the academic resources available to study these strategies and identify which are the most applicable. By the end of this project, they will have gained a fundamental understanding of trading over shorter trends and understand the degree to which these skills can support personal finance.

1.2 History of Financial Markets

The idea of modern financial markets can be traced back to merchants of the Mediterranean Sea as early as the fourteenth century (Atack, J., & Neal, L., 2011). However, it wasn't until the late sixteenth century in Northern Europe, better infrastructure was applied to these ideas and a semblance of modern financial institutions emerged. A stock market is defined as "the collection of markets and exchanges where regular activities of the buying, selling, and issuance of shares of publicly-held companies take place" (Chen, J., 2020). The first market to formally fit this definition came about in the Dutch Republic, known as the Amsterdam Stock Exchange, where shares of the Dutch East India company were bought and sold (Petram, L. O., 2011). The company's registers were open for subscriptions in six different cities, each which housed its own chamber that together formed the company's governing body. The proceeds of each of the chambers were added together and allocated to the company's stock price. The way the company's shares were traded differed from than the way shares are traded today. There was no standard

denomination for a single “share”, so investors had to keep track of the total monetary value of investments being made.

Throughout Europe, several financial markets sprung up following in the footsteps of the Dutch. The resulting debt from the War of Spanish Succession and the Great Northern War led France and the UK, respectively, to attempt to imitate the innovative Dutch banking practices; large financial markets sprung up in Paris and London.

There are a multitude of exchanges throughout the world today where investors can buy and sell shares of stock. The largest of these, the New York Stock Exchange, was founded in 1792 on Wall Street in New York City (F., 2019). Today the exchange lists nearly 3,000 companies.

2 Fundamental Analysis

Fundamental analysis is the process by which an investor will determine a stock's "fair market value" by accounting for many financial and economic factors (Segal, T., 2021). There are over 8,000 stocks being traded in the US market alone. it is helpful for any trader to narrow their options, allowing them to review their selection regularly. This project allowed for up to 15 positions to be held by one person. Performing fundamental analysis identifies the factors supporting these company's' business by separating them into two categories: quantitative and qualitative. Quantitative factors deal in information that can be represented numerically, like anything on a financial statement. Qualitative factors relate to the non-numerical components of a company, such as a company's executives, brand-name recognition, and proprietary technology. A few popular methods of fundamental analysis are the William O'Neil CANSLIM method, James P. O'Shaughnessy Method, and the Richard D. Wyckoff method.

2.1 CANSLIM Method

Developed by William O'Neil, publisher of *Investor's Business Daily*, CANSLIM is an acronym which describes picking which stocks to buy which combines several quantitative and qualitative factors (Kirkpatrick, C. D., & Dahlquist, J. R., 2006). The breakdown is as follows:

C – Current quarterly earnings per share versus a year earlier

A – Annual earnings increase

N – New products, management, and stock price highs

S – Supply and demand of stock

L – Leader or laggard

I – Institutional sponsorship

M – market direction

The rationale behind CANSLIM is to identify stocks which will grow faster than the general market. O'Neil emphasizes that the M should be considered without considering news or sentiment about a stock, and ignore economic indicators as well, in favor of looking at price action exclusively.

2.2 James P. O'Shaughnessy Method

James O'Shaughnessy studied many investment strategies and their underlying fundamental principles, where he concluded that relative price strength, out of all possible variables, is the only variable that when considered, will consistently beat the market. Relative price strength is an indicator that is calculated by taking the ratio of the year-end price of a stock to the price one year prior. Taking this into account, O'Shaughnessy's methods considers three key criteria: a price-to-sales ratio below 1.5, earnings greater than the year prior, and top 50 stocks in relative strength.

2.3 Richard D. Wyckoff Method

Richard D. Wyckoff was a very prominent trader and author on the market on Wall Street during the late 18th and early 19th century. He strongly believed in the power of a small number of wealthy and influential players in determining security prices and believed that by understanding these pools of capital and their movements, one could profit heavily from the market. Wyckoff's selection method for stocks is as follows:

1. Determine the direction of the entire market. Stocks that were the most widely held and active were the ones to be traded.

2. Select stocks that harmonize with the market. Stocks that perform well during uptrends and poorly during downtrends are the most consistent and predictable.
3. Establish a stop level. For the stock to be considered, a three-to-one ratio of potential gain to potential loss is necessary.
4. Consider short-term indicators such as volume, range, and short-term momentum to determine if the stock is ready for price movement.
5. Time position entry with change of market direction to minimize risk.

3 Technical Indicators

Technical indicators are tools used in technical analysis to assist traders in the determining when they will buy and sell stocks. More specifically, technical indicators are defined as "heuristic or pattern-based signals produced by the price, volume, and/or open interest of a security or contract used by traders who follow technical analysis" (Chen, J., 2021). While not an end-all-be-all approach to determining buy and sell conditions for securities, they can be incredibly useful tools, especially for day and swing trading. Technical indicators can be separated into two categories: overlays and oscillators.

3.1 Overlays

An overlay is a technical indicator that overlay directly onto the price chart for a particular stock. Two common overlays utilized in this project are the simple moving average, exponential moving average, linear regression, and Bollinger bands.

3.1.1 Moving Average

A moving average is a tool used to identify the trend direction of a stock (Fernando, J. 2021). A rising moving average indicates an uptrend, and a falling moving average indicates a downtrend. Moving averages can be calculated for any timeframe, but the most common are 15, 20, 30, 50, 100, and 200 days. The timespan of the moving average will determine its sensitivity to price changes.

Moving averages can be calculated either via a simple moving average, which takes the arithmetic mean of all prices in the given set, or an exponential moving average, which gives more

weight to recent prices in order to more accurately reflect current price trends. Figure 3.1 shows a 50-day simple moving average for a volatile security.

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Figure 3.1 Simple 50-day simple moving average

3.1.2 Bollinger Bands

Bollinger Bands uses the simple moving average calculation to establish an upper and lower price band for a stock (Kirkpatrick, C. D., & Dahlquist, J. R., 2006). Using the simple moving average, upper and lower bands are drawn some number of standard deviations above and below the line. For the standard Bollinger Band calculation, a 20-period simple moving average is used in tandem with bands drawn two standard deviations away.

Bollinger Bands help to determine if a security is overbought or oversold. If the price line intersects with the upper band, that indicates to the trader that the security is overbought, and

conversely, if the price line intersects with the lower band, the security is oversold. Figure 3.2 shows Bollinger Bands over four months with a 20-day period and 2 standard deviations.

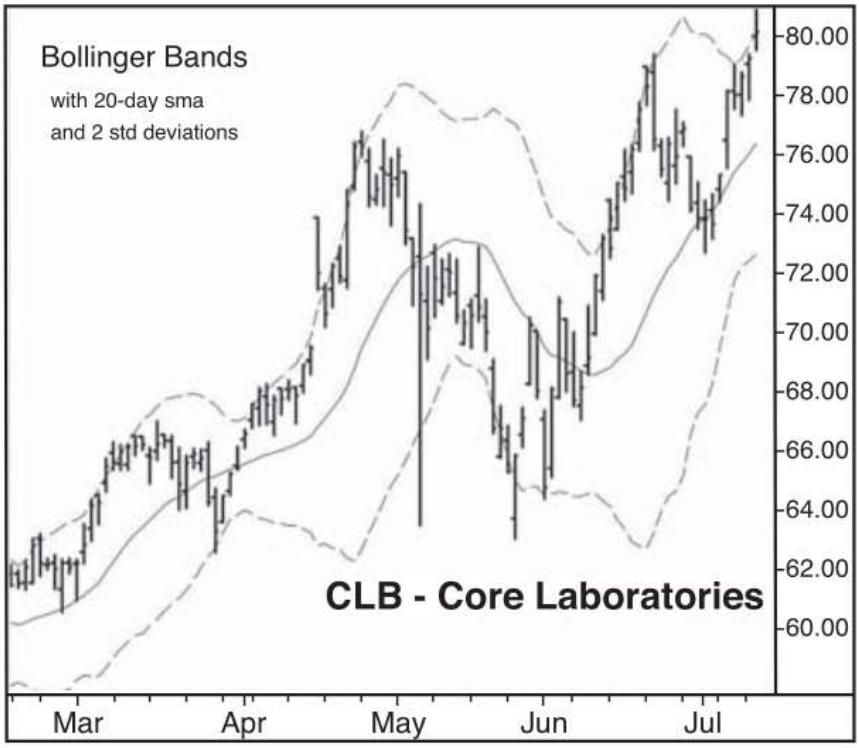


Figure 3.2 Bollinger Bands with 20-day period and 2 standard deviations

3.2 Oscillators

An oscillator is a technical indicator that is plotted below a price chart which oscillates between a local minimum and maximum (Chen, J., 2021). Two commonly used oscillators are Relative Strength Index (RSI) and Moving Average Convergence-Divergence (MACD).

3.2.1 RSI

RSI is an indicator that measures the strength of a security against its own history by comparing up and down days (Kirkpatrick, C. D., & Dahlquist, J. R., 2006). The RSI ranges between a low of 0 and a high of 100. Any value above 50 in this range indicates that the underlying

trend in prices is upward, and a value below 50 indicates that the underlying trend in prices is downward. The RSI can also indicate if a security is overbought or oversold; typically, this is achieved by bounding lines at the values of 30 and 70, where values below and above indicate the security is oversold or overbought, respectively. Figure 3.3 shows an RSI on the TSLA stock over a 5-day period.

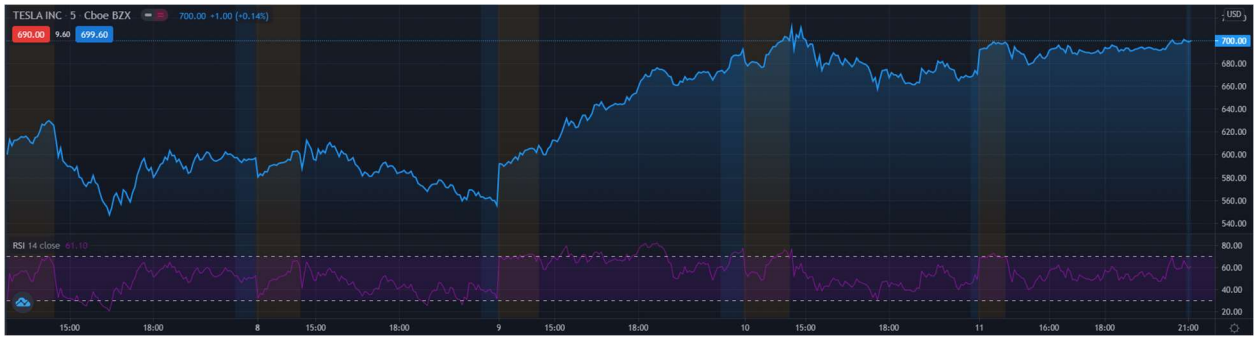


Figure 3.3 TSLA RSI over 5 days

A method of signaling with RSI is called failure swings. These occur when the oscillator exceeds the overbought/oversold threshold, then comes back into range, heads towards the threshold again without reaching it, turn back again. A failure swing indicates a decline in price momentum for t2he security. Figure 3.4 shows a 14-day RSI with several failure swings.

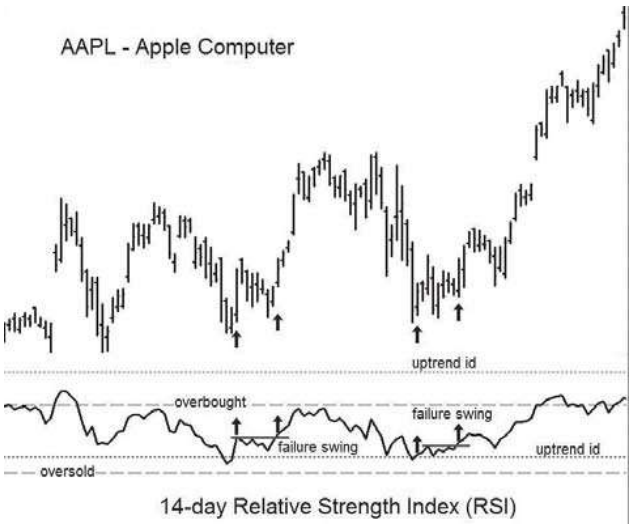


Figure 3.4 14-day RSI with failure swings (Kirkpatrick, C. D., & Dahlquist, J. R., 2006)

3.2.2 MACD

The MACD is an oscillator that is comprised of two separate lines: the first is the difference between two exponential moving averages, typically a 26-day and 12-day EMA, and the second the signal line, an exponential moving average of the MACD, typically 9-period (Kirkpatrick, C. D., & Dahlquist, J. R., 2006). The value oscillates above and below zero. When the MACD is above zero, it signals that the shorter-term moving average exceeds the long-term moving average, and when it is below zero the short-term average falls short of the long-term average. MACD can generate buy and sell signals; when it is above zero, buy signals occur when it crosses from below to above the signal line. Figure 3.5 shows a MACD plotted below the NASDAQ with buy and sell signals labeled.

Figure 3.5 MACD on the NASDAQ Farley, A. (Commodity, 2020)

4 Investment Time Horizons

Active trading is defined as the buying and selling of securities based on short-term price movements to achieve a profit (Zucchi, K., 2020). Active trading in the stock market can generally be broken down into four different time horizons: scalping, day trading, swing trading, and position trading.

4.1 Scalping

Scalping is a trading strategy that attempts to maximize on a large quantity of small profits from small price changes. Instead of seeking to achieve a large profit on a single position's growth, one will attempt to maximize the number of winning trades they make by quickly selling positions. Scalping is the most difficult of the strategies to use, because it requires extreme attention to small price changes and a fundamental understanding of technical indicators to determine entry and exit conditions.

For the very small timeframes that are dealt with in scalping, technical analysis is far more useful than fundamental analysis. One method scalpers use is an RSI indicator in tandem with a MACD indicator to generate buy and sell signals.

Figure 4.1 shows a price chart with RSI and MACD indicators with buy and sell signals labeled.

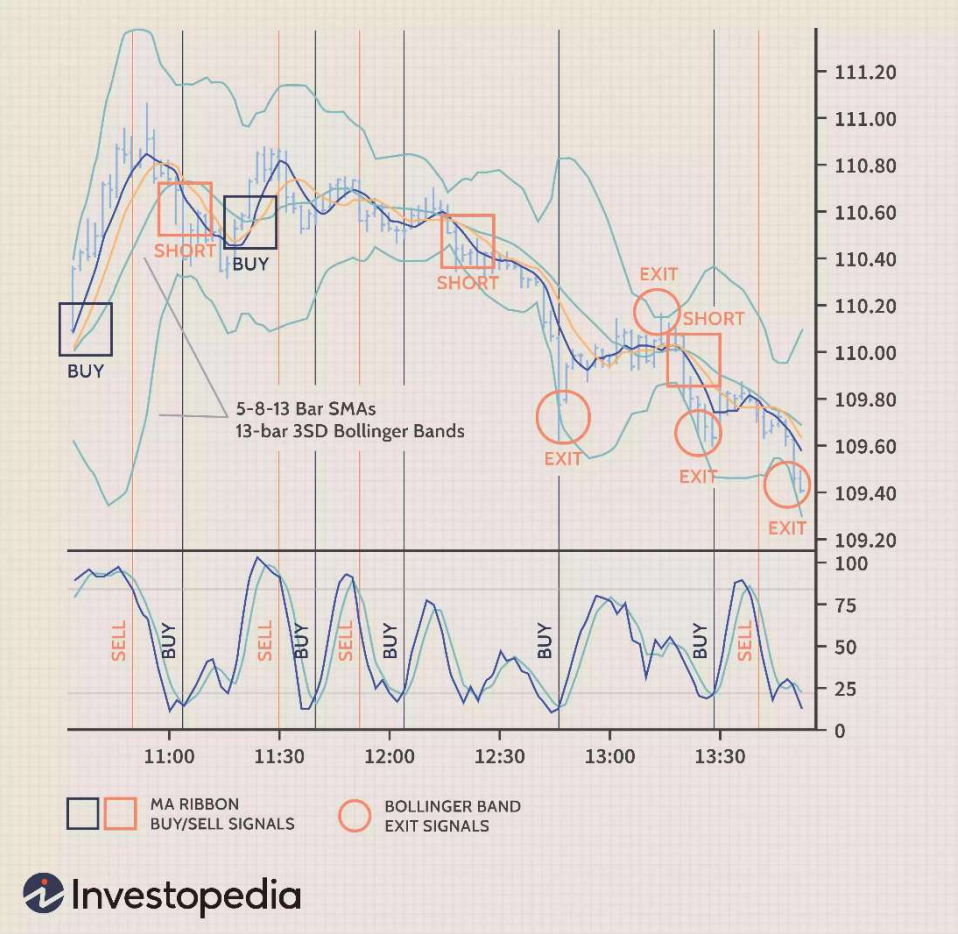


Figure 4.1 Scalping over a 2 and a half hour period

4.2 Day Trading

Day traders buy and sell securities all within the span of a single day. Day traders do not hold any positions overnight. This type of trader will pay close attention to any event that will cause short-term market movements. Day traders employ a number of strategies for their trading, such as breakout trading and pullback trading. Day trading is a very risky strategy, as large price movements over a single day can incur substantial losses for the trader. For day trading, technical

analysis also outweighs the usefulness of fundamental analysis, also technical indicators are good at tracking small changes in price.

4.3 Swing Trading

Swing traders attempt to capture short to medium-term gains in a security's price in a period of days to weeks. Swing trading heavily utilizes fundamental and technical analysis to determine hold periods. Swing traders often seek out highly volatile securities to take advantage of the large price change in a relatively short period of time. Since prices in the market can change rapidly, it is advisable to place a protective stop close to the entry point in case the price moves in an unexpected direction. Figure 4.2 shows an example of swing trading over several months, utilizing a stop loss and an exit condition.

Figure 4.2 Swing trading over a 6-month period

4.4 Position Trading

A position trader will buy securities with the intention of achieving profit via long term growth. Position traders will ignore short-term fluctuations in price and instead rely on their view of their positions in the long-term. Position traders will hold securities for several months to years. Position trading is the strategy utilized by individuals seeking a large return on their long-term investments, and less concerned with the daily or even monthly price fluctuations of securities. This kind of trader will thus take on a passive approach to the market.

5 Trading Strategies

The strategies employed in this project start with the fundamental research and analysis of the market before trading begins. Companies will fundamentally be selected based on their ability to grow in market share, their reputation, and their leadership. Technical analysis is done differently, and constantly while one is actively trading. There are basic approaches to technical trading that any investor should be familiar with.

5.1 Trend Following

Technical analysis strongly indicates that markets will regularly follow trends (Kirkpatrick, C. D., & Dahlquist, J. R., 2006). Consequently, one of the most effective trading systems involves following these trends: "Rather than attempting to catch the peaks and valleys, the trend-following system acts in the direction of the trend as soon after it can be reliably detected" (Kirkpatrick, C. D., & Dahlquist, J. R., 2006, p. 535-536). The trend-following system can be broken down into two variations: *Moving Average Systems* and *Breakout Systems*.

In the Moving Average Systems, the intersection of two moving averages is used to generate a trend. The advantage of this system is that it cuts out the "noise", or short-term fluctuations in price, of a market and allows the investor to get a better idea of which way the price is generally moving (Mitchell, C., 2021). Common time intervals for Moving Average analyses, known as the "look back period", are 10, 20, 50, 100 and 200 days.

Figure 5.1 gives a moving average sample plot.

Figure 5.1 Moving Average System Example (Mitchell, C. 2021)

Another variation of the trend-following system is the breakout system. Breakout systems generate buy and sell signals when the price moves out of a particular band (Kirkpatrick, C. D., & Dahlquist, J. R., 2006). In order to identify a good candidate for breakout trading, a stock's underlying support and resistance levels must be considered (Chen, J., 2021). The longer the stock remains within that range, the better the eventual sell. Once prices consolidate within the band after a period of volatility, various price patterns will occur.

Utilizing breakout trading requires planning an exit strategy. One effective method for achieving this is to observe the stock's recent behavior to determine a reasonable target sell price. Another is to average recent price swings to achieve a relative price target.

Figure 5.2 shows a price band over several months for a stock, where the price breaks out from below late October.

Figure 5.2 Price band visualized on a stock over several months (Chen, J., 2021)

Although quite effective, there are a number of problems with using trend following systems for trading. Due to their popularity, many investors follow the same trends, driving liquidity down and increasing transaction cost (Kirkpatrick, C. D., & Dahlquist, J. R., 2006). Another issue with these systems is the occurrence of whipsaws, or a rapid reversal in stock price trend, as the system attempts to identify the trend. To avoid whipsaws, the trend-following system will be late in the trend and miss potential profits at both ends of the trend. Finally, trend-following systems tend to accumulate small consecutive losses that produce significant drawdowns. These

drawdowns affect the account's equity in the short term, but more importantly the confidence in the system itself, lending to further complications.

5.2 Pattern Recognition Systems

Pattern recognition is a method of trading that concentrates on the configuration and characteristics of individual bars on a candlestick chart in order to identify good buys and sells (Kirkpatrick, C. D., & Dahlquist, J. R., 2006). According to Kirkpatrick and Dahlquist, a pattern is defined as "a configuration of price action that is bounded, above and below, by some form of either a line or a curve" (p. 302). All patterns are composed of an entry and exit condition, where the entry describes the behavior preceding the trend, and the exit describes the end of the pattern where action should be taken. Pattern entry and exit can be broken down into four categories: entry from above, entry from below, downward exit, and upward exit. The price patterns found in charts are fractal, meaning they can occur for any time period. Figure 5.3 demonstrates the use of a pattern recognition system, with entry from below and an upward exit.

Figure 5.3 Entry & exit strategy candlestick chart

5.3 Countertrend Systems

Countertrend systems are built on the idea of buy low and sell high; in other words, taking advantage of the short-term volatility of a price chart to incur an aggregation of small profits (Kirkpatrick, C. D., & Dahlquist, J. R., 2006). These systems take advantage of oscillator indicators to buy and sell within a specific price range.

Countertrend systems are largely considered less effective than other strategies; similar systems such as breakout trading, which also utilize price bands to perform trades, are shown to incur much better performance. Figure 5.4 shows countertrend trading in action over a two-hour period.

Figure 5.4 Countertrend trading example over a two hour period (Hill, A.)

5.4 Basic Stock Selection

This project involved two simulated stock portfolios. Each contained around ten stocks selected based on preliminary research on their growth potential. The net value of each virtual portfolio started at $100,000 and were hosted on TradingView's PaperTrade platform.

During the stock selection process, many factors were considered, across a large number of industries. Beginning with a top down approach, the search began for undervalued stocks in industries with potential for growth in the near future. This search lead to opportunities in the electric vehicle, semiconductor, and renewable energy industries. These markets have seen lots of attention recently, a trend that will hopefully persist.

6 Simulation #1: Breakout Trading

6.1 Stock Selection

The selected stocks were chosen to fit the trading strategies that the participants are most comfortable with. The goal is to identify trend reversals, then buy the dips and sell the peaks. Selecting stocks that historically have lots of attention and crazy bull runs appeared to be a simple way to make a few dollars. The industries that showed the most promise are electric vehicles, green energy solutions and e-commerce.

6.2 Selected stocks

6.2.1 Amazon (AMZN)

Amazon is the leading e-commerce retailer in the United States. It sells merchandise and content via its webstore. Additionally, Amazon is one of the leading cloud service providers in the world via Amazon Web Services. Amazon is notable for being recognized as one of the world's top companies and its steady growth as one of the most valuable stocks in the market. Amazon's share price has been largely stagnant in recent months, but it may be a great option for breakout trading due to its reputation and a reliably valuable.

6.2.2 Tesla (TLSA)

Tesla Inc. is a leading electric car manufacturer based in the United States.
The CEO, Elon Musk, has seen the company through rapid growth of both the stock price and the company itself. Tesla is positioned as the lead innovator in the expanding market of electric

vehicles (EV's) in the United States. These facts, along with the recent news of their $1.5 billion purchase of bitcoin, lend TSLA to fit in this strategy. Tesla has the potential to enter an increasingly volatile long-term uptrend, so long as the price does not sit at or under $790 in the week before trading is initiated. This may lead to a drop in price that may take the rest of its industry with it. In this case, one must observe whether the price breaks the linear regression's support line, and for how long. The concern is the presumption that "... the more frequently prices halt at a zone, the stronger and more important that zone will likely be in the future." (Kirkpatrick, C. D., & Dahlquist, J. R., 2006, p. 231). To put it another way, Tesla needs to break this shorter-term downtrend soon and justify its current price. Figure 6.1 shows TSLA's price from 2/3/21 to 2/11/21 in 30-minute increments.

Figure 6.1 TSLA 2/3/21 - 2/11/21, in 30 minute increments)

A stock as hot as TSLA requires this kind of analysis very frequently. The long-term reversal to a downtrend could pose serious losses if caution is not taken, making this a riskier choice.

6.2.3 NextEra Energy (NEE)

Nextera Energy is a company specializing in the generation, transmission, distribution, and sale of electric energy. The company is based in Florida, and since being founded in 1925, became the third largest electric utility company in the US. In 1984, it became a holdings company in efforts to diversify their business. NEE shows signs of being underbought relative to its competitors now. Figure 6.2 shows NE's price chart.

Figure 6.2 NEE price chart

Although NEE may not be a strong buy at the time of this image (2/16/2021), the current downtrend could present strong opportunities in the future.

6.2.4 NIO Inc. (NIO)

NIO Inc. is a Chinese electric vehicle (EV) producer setting its sights on the luxury EV market. The company went from trading around $10 in early 2020 to $55 at the time of this writing.

The stock entered a down trend recently, one we hope to exploit when the time is right. Morgan & Stanley recommend NIO as a good buy, believing there is a possible 33% upside from its current price to $80 (FINVIZ). NIO's competitors BYD, XPeng and Li Auto were all considered for this portfolio, but most did not make the cut. The reasons NIO stands out to us begins simply with their product design. We like NIO's cars better and believe the market feels the same way. BYD has saw higher number of sales in 2020 largely due to their sedan being half the price of NIO's. Finally, Chinese EV's like XPeng seem to have broken their support lines. In the estimation of the portfolio manager, NIO is worth its asking price of about $50 as of 2/22. The scarcity of outstanding prices, and current competition between bears and bulls gives hope that this industry will have the necessary attention to profit in the next few weeks.

6.2.5 XPeng Inc. (XPEV)

XPeng is the other Chinese EV stock we have elected to include in this portfolio. Considering the fundamentals, the fact that XPeng, like NIO, only produces EV's will benefit their stock prices. The bullish push on these stocks comes from the expectation that EV's will rapidly take over the car market. Exclusive producers of EV's will be in a better position to benefit from this pressure. Additionally, XPeng's new P7 model is reported to have a range between 562-706km. This is a very impressive figure and should be critical for widespread adoption of Xpeng cars.

6.2.6 Dominion Energy (D)

Dominion Energy is a traditional energy provider located in Richmond, VA that sells natural gas and electricity to homes, businesses, and wholesale customers. Their stock has been on the rise for the most of its existence. The YTD performance currently (2/20/2021) is -5.39%,

trading at a price of $71.15. Dominion Energy struggled to meet their earnings estimates in Q1-3 of 2020 but pulled it back in Q4. The brief rise in price in Q4 was followed by a sharp reversal into a down trend. Experts have been valuing the price of D between $80-$90 for a year, and its peak of $85 in 2018 is evidence that buyers will be comfortable with that price soon. The hope is that this down trend continues to create a larger upside for when this position is taken. Figure 6.3 shows D's price chart.

Figure 6.3 Dominion Energy price chart

6.2.7 Doordash (DASH)

Doordash specializes in delivering restaurant orders. They have an online platform that competes with companies like GrubHub and UberEats. Over the time we have been selecting our portfolio, we watched DASH swing between $226 - $189 - $206 at the time of this writing. Observing the price history of DASH further, on can observe a pattern of high volatility, giving

rise to opportunities to make large sums of money in a few days if executed properly. Figure 6.4 shows DASH's price chart.

Figure 6.4 DASH price chart

Experts have only had a few months to come up with a valuation for DASH. There are significant discrepancies in their opinions. We expect their services to only increase in demand, given their product is cheaper than UberEats and the portfolio manager believes they have a nicer feeling product than Grubhub.

6.2.8 Azure Power Global Limited (AZRE)

Azure was founded in 2008 to provide solar power across India. Since then, they went public in 2016 and have been expanding every year. AZRE saw a lot of bullish attention in the fourth quarter of 2020. So much so that some experts suggest shorting it sometime this week

(2/21/2021). AZRE has clearly entered a downtrend, but one we expect will make room for short periods of bullish behavior we plan to capitalize on. Figure 6.5 shows AZRE's price chart.

Figure 6.5 AZRE price chart

6.2.9 Fusion Fuel Green Limited (HTOO)

Fusion Fuel Green Limited is located in Dublin, Ireland. As a producer of green hydrogen, they have gotten a lot of bullish attention recently. The industry is expected to draw increasing interest as new and established companies compete to deliver superior products. After due diligence on a large variety of green hydrogen projects, HTOO was selected as a stock with significant potential in the near, and long-term future. Figure 6.6 shows HTOO's price chart.

Figure 6.6 HTOO price chart

6.3 Trading Activities

6.3.1 Week 1

The first week of trading did not go exactly as expected. By the end, 25% of the portfolio was still liquid, and had lost $1,405. This week saw a NYT headline covering a 2.5% drop in the S&P 500, a record for those with short memories. $30,000 was spent the first day, and $32,500 the next day. By the end of the week, it was apparent most rallies were very short and not profitable. Moving forward, it would be pertinent to be more critical when determining where a stock will bottom. Table 6.1 shows the first week's trades.

Date	Symbol	Buy/ Sell	Price	Shares	Cost/ Proceeds	Profit/ Loss	Cash Available	Total Profit/ Loss
2/22	FSLR	Buy	$84.48	94	$7,941.12		$92058.88	0
2/22	FCEL	Buy	$16.03	125	$2,003.75		$90055.13	0
2/22	BE	Buy	$26.44	76	$2,009.44		$88045.69	0
2/22	AZRE	Buy	$30.49	65	$1,981.85		$86063.84	0
2/22	DASH	Buy	$175.32	12	$2,103.84		$83960.00	0
2/22	XPEV	Buy	$36.14	395	$14,275.3		$69684.70	0
2/23	NIO	Buy	$47.00	43	$2021		$67663.70	0
2/23	AZRE	Buy	$30.00	65	$1950		$65713.70	0
2/23	HTOO	Buy	$17.00	118	$2006		$63707.70	0
2/23	DASH	Buy	$175.50	15	$26232.5		$37475.20	0
2/24	ADN	Buy	$14.39	138	$1985.82		$35489.38	0
2/24	ADN	Buy	$14.00	140	$1960		$33529.38	0
2/24	HTOO	Buy	$16.15	50	$807.5		$32721.88	0
2/24	HTOO	Buy	$15.99	32	$511.68		$32210.20	0
2/24	HTOO	Buy	$15.50	80	$1240		$30970.20	0
2/24	AMZN	Buy	$3112.24	1	$3112.24		$27857.96	0
2/24	DASH	Buy	$165.00	15	$2475		$25382.96	0

Table 6.1 Week 1 Ledger

6.3.2 Week 2

The second week of trading was defined by removing emotion from our trades and a harsh bear market that took prices down across the board.

Table 6.2 shows the second week's trades.

Date	Symbol	Buy/ Sell	Price	Shares	Cost/ Proceeds	Profit/ Loss	Cash Available	Total Profit/ Loss
3/4	NEE	Buy	$70.00	20	$1400		$23982.96	0
3/5	DASH	Buy	$155.50	15	$2332.5		$21650.46	0
3/5	TSLA	Buy	$602.5	4	$2410		$19240.46	0
3/5	XPEV	Buy	$27.50	100	$2750		$16490.46	0

Table 6.2 Week 2 Ledger

There was an opportunity to get in on NEE at $70, a price that has not seen since September-October 2020. Adding to the argument for NEE, the next day of trading produced a decent cup & handle pattern. Figure 6.7 and Figure 6.8 show the long-term and short-term prices of NEE.

Figure 6.7 NEE Long-term (3/4/21)

Figure 6.8 NEE Cup & Handle (short-term)

Friday showed signs of the bear market potentially ending, signaling an opportunity to protect some of our current positions and get in on anything else at a good price. TSLA bounced right off a support line we drew before week 1 of trading, giving us hope that the bullish whales may be taking over. Figure 6.9 shows TSLA's price as of 3/5/21.

Figure 6.9 TSLA (3/5/21)

This trade carries an air of speculation, however, based on historical bull markets it would be wise to be ready for the prices to shoot up questionably high. Expanding current short-term buying trends shows the price going back up to around $700 on Monday. Figure 6.10 shows TSLA's price projection

Figure 6.10 TSLA projection

The state of the MACD (AO) and RSI oscillators quelled doubts that this may be a false flag market reversal. The expectation is that the MACD crosses into positive territory (similar to February), and RSI reaches overbought conditions very fast. The exit strategy values TSLA around $700, translating to a 16% ROI. XPEV and DASH positions were protected by adding a little more cash as the price lowers. The total value did not drop significantly, however, indicating the initial investment may have been too heavy. XPEV is simply selling for prices that seem much lower than what many people value the company at. "Technical analysis presumes that prices will expand beyond equilibrium for emotional reasons and eventually will revert to the mean and then expand beyond the mean in the opposite direction, constantly oscillating back and forth with excessive

investor sentiment." (Kirkpatrick, C. D., & Dahlquist, J. R., 2006, p. 19). The exit strategy for XPEV is based on an expert valuation of $70, translating to 50% ROI.

DASH is historically volatile, so taking advantage of a dip may pay off quickly. Alternatively, we are worried the market has settled on a price for DASH, meaning it may be wiser to cut losses now, or double down later when we expect the period of low volatility to come to an end. DASH gets a lot of stock value from its brand, something this bear market seems to have discounted heavily. DASH encompasses many of the concerns about this bear market and make it a position that isn't particularly enjoyable to hold. Figure 6.11 shows DASH's price chart as of 3/5/21.

Figure 6.11 DASH (3/5/21)

There is about $16,500 liquid cash left in this portfolio. The investment of what is left will be defined by which stocks are most likely to peak first within the next 5 weeks. These investments will likely occur Monday to get in early on a new bull market.

6.3.3 Week 3

The third week of trading during this project saw the market reverse to a bull market. It is the first time since the very start that this portfolio has been out of the red. There were some very clear learning opportunities this week. Buying low and selling high becomes more achievable after getting experience of trading during a week like this one. Table 6.3 shows this week's trades.

Date	Symbol	Buy/ Sell	Price	Shares	Cost/ Proceeds	Profit/ Loss	Cash Available	Total Profit/ Loss
3/8	NEE	Buy	$71.97	50	$3598.5		$12891.96	0
3/9	XPEV	Buy	$29.50	150	$4575		$8316.96	0
3/10	NIO	Buy	$41.00	30	$1230		$7086.96	0

Table 6.3 Week 3 ledger

To begin, the position with the best timing so far goes to the four chares of TSLA at $602.50. It would have been nicer to have seen the stock at its recent low of $550, and to have bought more of it. The plan from last week was also to put a limit sell on TSLA at $700 and take a quick profit. So far, no profits have been taken. The most significant positions at this time are TSLA, which would make this portfolio $364 if it was sold now, and XPEV which is over 25% of this portfolio and would yield $1,072.95. Besides those two, the strategy for next week is essentially plugging leaks. Likely, most of the remaining liquidity in this portfolio will go towards a better position on DASH. The price of DASH is 9.25% above its 52-week low, and -44.54% below the 52-week high. Although there are serious concerns of it being an overvalued tech stock, there are also serious reasons to consider that DASH may be a leak turned big moneymaker.

Figure 6.12 shows DASH's performance as of 3/14/21.

Figure 6.12 DASH (3/14/21)

Investing the remaining money would lower the price of the position to around $155. The hope is to sell around $180 for a 16% ROI. Getting out of this position sooner rather than later would feel good, so it will be pertinent to make a limit sell well in advance. Liquidity will be scarce soon, so it must be used properly, and acquired at the right time. The position next most likely to be liquidated is FCEL. If Fuel Cell Energy continues to move upward and nears $24, it will be liquidated for a 50% ROI. Figure 6.13 shows FCEL's price chart as of 3/14/21.

Figure 6.13 FCEL (3/14/21)

6.3.4 Week 4

The fourth week marked the passage of half of the allocated trading period. After fully riding the dip in week 2, the game has simply been about consolidating positions. TSLA was the first position to yield a profit. The execution was alright, on the graph it shows it was bought on a low and sold on a high. Figure 6.14 shows TSLA's entry and exit.

Figure 6.14 TSLA Entry & Exit

This trade could have gone better if the bet were larger, and the price was monitored more carefully as the approached the support line. There was almost $20,000 cash available after the TSLA purchase, and the price bouncing off the support line was anticipated.

Table 6.4 shows this week's trades.

Date	Symbol	Buy/ Sell	Price	Shares	Cost/ Proceeds	Profit/ Loss	Cash Available	Total Profit/ Loss
3/15	TSLA	Sell	$707.5	4	$2830	+ $420	$9916.96	+ $420
3/17	ADN	Buy	$13.21	200	$2642		$7274.96	+ $420
3/21	ADN	Sell	$15.13	400	$6124	$612.35	$13398.96	+ $1032.35

Table 6.4 Week 4 Ledger

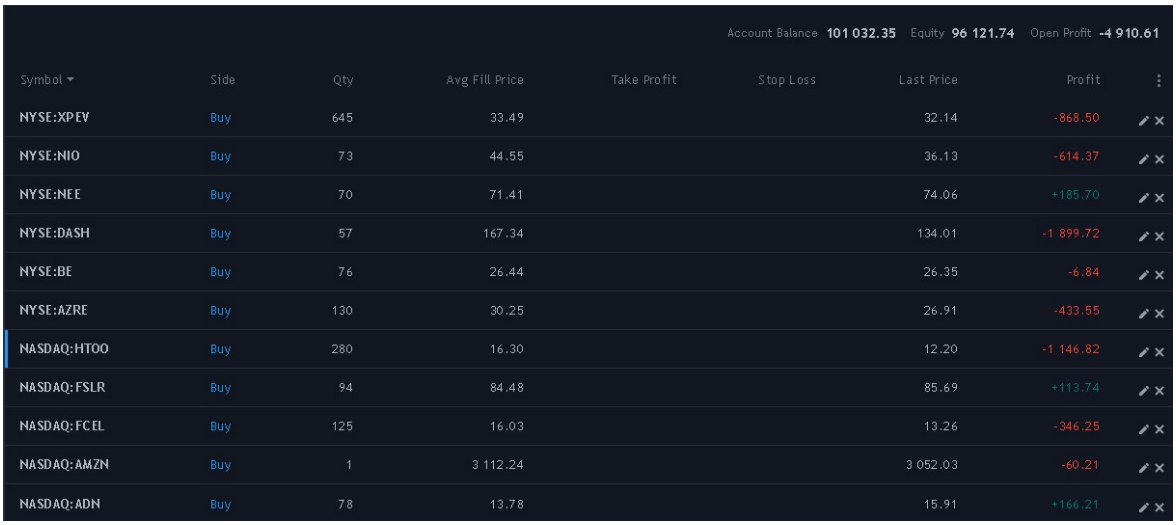
The end goal at this point is to have around $7,000 total profit. This would be a 7% ROI which is generally acceptable, especially given the blow this portfolio took. The strategy is to take meager profits from overvalued positions, and hopefully do better with the gained liquidity.

6.3.5 Week 5

The market conditions of the fifth week of trading were not one many people would feel comfortable operating with. Inexperienced investors have plenty of reason to be worried about the future of the stock market. The conflict on everyone's mind is as follows. The stock market was created to regulate good & bad public companies via public opinion. As a result, participants expect the market to reflect the whole American economy. On that note, anyone with a healthy dose of skepticism has every reason to be bearish on the NASDAQ right now. The fiasco at the Suez Canal this week may very well be what pushes the economy into another crisis like the housing crisis of 2008. Anyone who believes heavily in the economic (business / trade) cycle theory would most definitely be bearish right now, as represented by the image below. Figure 6.15 shows an economic cycle theory found on TradingView.

Figure 6.15 Economic Cycle Theory - thanks to peacefuljustin on TradingView

Based on this, buying stock would seem foolish, but sitting on the sidelines is a better method to guarantee minimal returns. The only position that may have been worth continuing to invest in at this point is HTOO. FINVIZ reports a good analyst recommendation, and there is lots of bullish activity online. Because there were no new trades this week, an image of this portfolio's positions will be presented below in Figure 6.16



Account Balance 101 032.35 Equity 96 121.74 Open Profit -4 910.61

Symbol	Side	Qty	Avg Fill Price	Take Profit	Stop Loss	Last Price	Profit
NYSE:XPEV	Buy	645	33.49			32.14	-868.50
NYSE:NIO	Buy	73	44.55			36.13	-614.37
NYSE:NEE	Buy	70	71.41			74.06	+185.70
NYSE:DASH	Buy	57	167.34			134.01	-1 899.72
NYSE:BE	Buy	76	26.44			26.35	-6.84
NYSE:AZRE	Buy	130	30.25			26.91	-433.55
NASDAQ:HTOO	Buy	280	16.30			12.20	-1 146.82
NASDAQ:FSLR	Buy	94	84.48			85.69	+113.74
NASDAQ:FCEL	Buy	125	16.03			13.26	-346.25
NASDAQ:AMZN	Buy	1	3 112.24			3 052.03	-60.21
NASDAQ:ADN	Buy	78	13.78			15.91	+166.21

Figure 6.16 Week 5 Ledger

6.3.6 Week 6

With the end of the trading period closing in, real profits are required to have this portfolio be a success. Roughly $6000 remain to be earned to reach an average goal. Table 5.4 shows the positions that were taken this week in hopes of turning a quick profit. Table 6.5 shows this week's trades.

Date	Symbol	Buy/ Sell	Price	Shares	Cost/ Proceeds	Profit/ Loss	Cash Available	Total Profit/ Loss
3/28	HTOO	Buy	$12.20	320	$3904		$9494.96	+ $1032.35
3/29	NIO	Buy	$35.02	30	$1050.6		$8444.36	+ $1032.35

Table 6.5 Week 6 Ledger

The focus, however, is XPEV. Since the start of the trading period, most of this portfolio has been caught up in the Chinese EV company. With $2,233.95 in potential profits, this position could have been one worth cashing out on. Instead, the decision was to gamble on the outcome of the wedge presented in Figure 6.17 below.

Figure 6.17 XPEV Wedge

This stock has been closely monitored on a variety of platforms that include message boards where people voice their thoughts. It is through a mix of these opinions, and the authors' opinion of the Chinese EV market potential that led to the decision to hold in this case. The success of this portfolio now lies heavily in the success of XPEV and HTOO.

6.3.7 Week 7

The feeling of managing this portfolio in week 7 felt like scraping food out of the bottom of a barrel. Eight out of the twelve stocks that were a part of this portfolio would lose money if they were sold. This contributed to a feeling that there were not really any good prices anywhere.

Table 6.6 shows this week's trades.

Date	Symbol	Buy/Sell	Price	Shares	Cost/ Proceeds	Profit/ Loss	Cash Available	Total Profit/ Loss
4/2	NEE	Sell	$77.39	70	$5317.30	$418.80	$13761.66	+ $1451.15
4/7	DASH	Buy	$128.94	30	$3868.20		$9893.46	+ $1451.15
4/7	AMZN	Sell	$3289.29	1	$3289.29	$177.05	$13182.75	+ $1628.20

Table 6.6 Week 7 Ledger

The position in DASH was reinforced (Figure 6-18), but clearly not by enough, given the average price in this portfolio is still $154.10. Figure 6.18 shows a protecting DASH position.

Figure 6.18 protecting DASH position

The strategy of buying a good stock on the way to the dip was not executed as well with this position. This purchase only lowered the average holding price to what I had bought it for a month earlier. One would expect to either reverse this position if it gets inflated quickly or be forced to hold the bag.

6.3.8 Week 8

The final week of trading made it clear that the stock market is highly unpredictable. While more experienced investors may have a good sense of general market sentiment, newer players will inevitably make poor predictions and valuations. While this portfolio feels like it is in a better place than last week, it is expected that most these positions will only be profitable nearing the fourth fiscal quarter of this year, or possibly never. At this rate, HTOO may be worthless if hydrogen fuel is never adopted widely. Table 6.7 shows this week's trades.

Date	Symbol	Buy/Sell	Price	Shares	Cost/ Proceeds	Profit/ Loss	Cash Available	Total Profit/ Loss
4/11	FCEL	Buy	$12.15	300	$3645		$9537.75	+ $1628.20
4/12	DASH	Sell	$150.02	87	$13051.74	-$354.75	$22589.49	+ $1273.45
4/14	XPEV	Buy	$32.98	200	$3289.29		$19300.20	+ $1273.45
4/15	ADN	Buy	$12.50	172	$2150		$17150.20	+ $1273.45
4/15	NIO	Buy	$37.01	58	$2146.58		$15003.62	+ $1273.45

Table 6.7 Week 8 Ledger

6.3.9 Results

The historical return for the S&P 500 between February 22nd and April 15th was calculated to be 5.81%. The total returns for this portfolio was only 1.27%, or $1273.45 with $15000 in available cash.

$$\left(\left(\frac{413}{389}\right) - 413\right) * 100 = 5.81$$

This trading period saw a reversal in the Chinese EV market and the energy sector. Many positions were taken staunchly at a high price, but there were plenty of examples where a local dip was bought into. The most noteworthy of this trading period was the TSLA projection. The stock performed exactly as expected, although the countertrend system could have been played more heavily by shorting and reinvesting. The biggest let down by far was XPEV. This portfolio had lots of money invested in XPEV, in hopes that it would break through the resistance line. This day

never came, and as of the publishing of this paper the price has only continued its slow decline. The most important lesson this portfolio has provided was about managing liquidity and reflecting true confidence with how the money is distributed.

7 Simulation #2: Growth Trading

7.1 Selection Criteria and Strategy

For the selection of stocks in this portfolio, stocks with bullish performance in recent months that growth at a rate exceeding the market were chosen. Consequently, the portfolio was composed of many technology stocks, as technology stocks have been propelled to further heights by the ongoing pandemic and are a prime candidate for growth investment due to their above-market rates of growth.

The portfolio used a simple swing trading strategy that relies largely on the Relative Strength Index (RSI) indicator. Every day during trading hours at least once a day, each stock in the portfolio was screened. If the RSI indicates that a particular stock was in the overbought/oversold range of above 70 or below 30, and if market trends indicated good timing, then a trade was performed.

7.2 Selected Stocks

7.2.1 Square (SQ)

Market cap: $119.2 billion

Square is a financial services company that markets hardware and software payments. Founded in 2009 by Twitter CEO Jack Dorsey, the company has cemented itself as the leader in the mobile payment space, as well as a top competitor elsewhere.

Figure 7.1 gives SQ's price chart.

Figure 7.1 SQ Price Chart

The company has experienced a strong uptrend in recent months and is projected to continue its growth due to its recent investment in Bitcoin, which has surged in recent months. This growth makes Square a prime candidate for growth investment.

7.2.2 Advanced Micro Devices (AMD)

Market cap: $106.89 billion

Advanced Micro Devices is one of the leading global semiconductor manufacturers in the world. Founded in 1969 and headquartered in Santa Clara, California, AMD stands out for its exceptionally high earnings per share this year (604.70%) versus the past five years (34.80%). Additionally, the company has shown a strong bullish trend for about a month prior with a bearish downtrend as of recent, thus it is a good time to buy and capitalize on the company's strong year and its recent dip.

Figure 7.2 give's AMD's price chart over recent months.

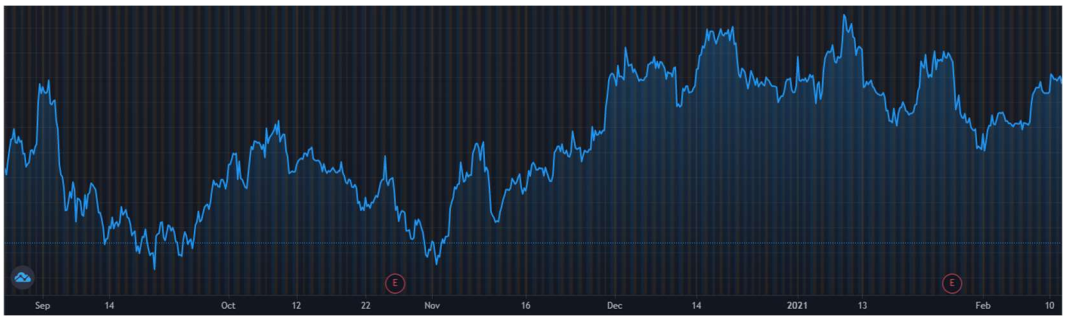


Figure 7.2 AMD price chart

7.2.3 MercadoLibre (MELI)

Market cap: $95.23 billion

MercadoLibre is an Argentine e-commerce company that has made waves in Latin America in recent years. The company is the leading e-commerce retailer in Latin America and is expanding its ventures into the digital payment space with its newly launched service MercadoPago. Figure 7.3 shows MELI's price chart over recent months.

Figure 7.3 MELI price chart

MercadoLibre is another example of a stock which has been propelled by the move of commerce online accelerated by the COVID-19 pandemic. The company demonstrates an

incredible annual earnings increase, reporting a $1.11B in September 2020, a 85.02% increase from the year prior (Macrotrends).

7.2.4 Qualcomm (QCOM)

Market cap: $164.65 billion

Qualcomm is a semiconductor company based in San Diego, California. Established in 1985, the company manufactures a variety of semiconductor devices, particularly embedded components for larger devices such as smartphones. Recently, the company has ventured into the 5G technology space and has begun manufacturing components for 5G-enabled devices. Figure 7.4 shows QCOM's price chart over recent months.

Figure 7.4 QCOM price chart

7.2.5 Qorvo, Inc. (QRVO)

Market cap: $20.31 billion

Qorvo is a semiconductor manufacturing company based in North Carolina. The company focuses on the manufacturing of core technologies and frequency radio solutions for mobile, infrastructure, aerospace, and defense.

Figure 7.5 shows QRVO's price chart over recent months.

Figure 7.5 QRVO price chart

7.2.6 Plug Power Inc. (PLUG)

Market cap: $28.09 billion

Plug Power Inc. is a company that manufactures hydrogen fuel cell systems for vehicles conventionally powered by electrical cells. The company is based in Latham, NY, and has achieved several contracts for joint ventures with other companies, including a contract with French automobile maker Renault. Figure 7.6 shows PLUG's price chart over recent months.

Figure 7.6 PLUG price chart

The company's share price has demonstrated bearish behavior since it peaked in late January, but the company's solid financials and recent bullish behavior lead us to believe that Plug Power is a good short-term growth investment.

7.2.7 Eaton (ETN)

Market cap: $50.941 billion

Eaton is an American Irish-domiciled power company based in Dublin, Ireland. The company provides energy-efficient solutions for various types of power. Figure 7.7 shows ETN's price chart over the last couple of years.

Figure 7.7 ETN price chart

7.2.8 NIO Inc. (NIO)

Market cap: $85.80 billion

NIO Inc. is an electrical vehicle manufacturer based in Shanghai, China. The company is highly engaged in the development of next-generation technologies for consumer vehicles including autonomous driving and artificial intelligence.

Figure 7.8 shows NIO's price chart over recent months.

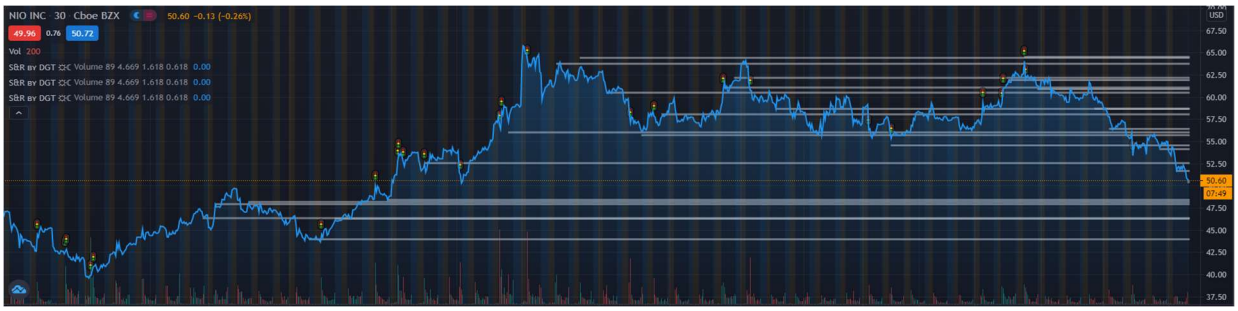


Figure 7.8 NIO price chart

7.2.9 Bloom Energy Corporation (BE)

Market cap: $4.76 billion

Bloom Energy Corporation is an energy company based in San Jose, California. The company provides solid oxide fuel cell technology. The company's primary product is the Bloom Energy Server, which is a solid oxide technology server that provides electricity at the customer site. Figure 7.9 shows BE's price chart over recent months.

Figure 7.9 BE price chart

7.2.10 Apple Inc. (AAPL)

Market cap: $2.065 trillion

Apple Inc. is a technology company based in Cupertino, California and is one of the most valuable companies in the world. The company sells an array of consumer electronics: a line of

smartphones, personal computers, as well as accessories and home streaming devices; additionally, the company has a large software presence coupled with their devices. Figure 7.10 shows Apple's price chart over the last 6 months.

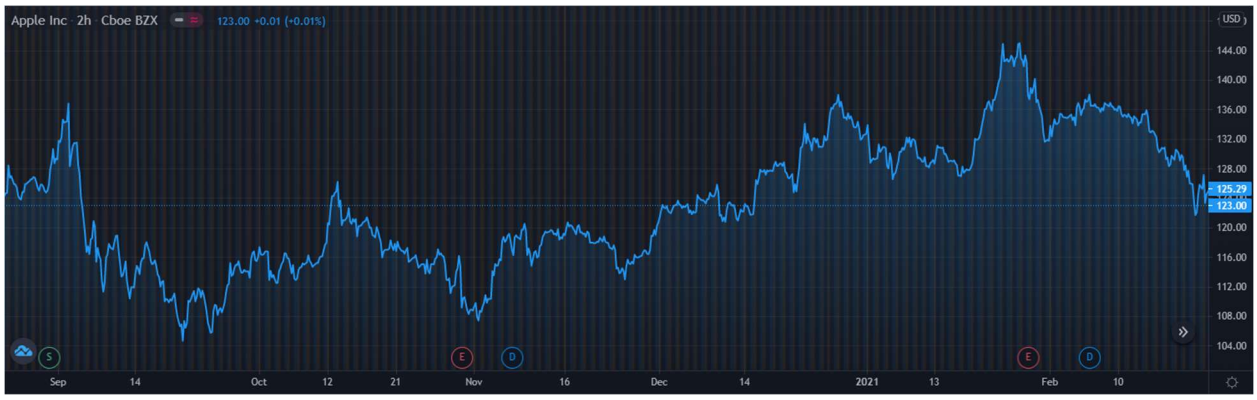


Figure 7.10 AAPL price chart

7.3 Trading Activities

7.3.1 Week 1

Table 7.1 shows the trades performed during the first week of trading.

Date	Symbol	Buy/ Sell	Price	Shares	Cost/ Proceeds	Profit / Loss	Total Cash	Total Profit
2/24	QCOM	Buy	$139.32	179	$24,938.28		$75,061.72	
2/24	BE	Buy	$29.30	679	$19,894.70		$55,167.02	
2/24	SQ	Buy	$240.07	10	$2,400.70		$52,766.32	
2/25	MELI	Buy	$1,600.00	10	$16,000.00		$36,766.32	

Table 7.1 Week 1 Ledger

During week 1 of trading, the aim was to keep the portfolio relatively liquid to become acclimated with TradingView's paper trading environment and to hedge risk related with the potential mistakes that could be made. Many of the stocks purchased rallied on Wednesday (2/24) and Thursday (2/25), only to go into the red for the remainder of the week. For future weeks it will

be pertinent to utilize limit and stop orders to keep positions only for as long as they are optimal to hold.

Figure 7.11 shows QCOM's performance for the week.

Figure 7.11 QCOM Feb 22-26

QCOM was bought at $139.32, where the RSI indicated that the stock was heavily oversold, in addition to the price line touching the lower Bollinger Band.

Figure 7.12 shows BE's performance for the week.

Figure 7.12 BE Feb 22-26

BE was bought at $29.30, and unfortunately saw negative price action immediately following the trade. The price recovered in the latter half of the week, before recovering to a price comparable to where it was bought.

Figure 7.13 shows MELI's performance over the week.

Figure 7.13 MELI Feb 22-26

MELI saw consistent downwards price movement throughout the week. It was bought at around a local price minimum of $1600.

Figure 7.14 gives SQ's price chart for the week.

Figure 7.14 SQ Feb 22-26

A position was entered at around $240.00 per share on the 24th. The stock saw negative price movement immediately following and for the remainder of the week, closing on Friday at around $225 per share.

7.3.2 Week 2

Table 7.2 shows the trades performed during the second week.

Date	Symbol	Buy/ Sell	Price	Shares	Cost/ Proceeds	Profit/ Loss	Total Cash	Total Profit
3/01	MELI	Sell	$1,680.00	10	$16,800.00	$800.00	$53,566.32	$800.00
3/02	PLUG	Buy	$48.93	100	$4,893.00		$48,673.32	
3/02	NIO	Buy	$43.27	250	$10,817.50		$37,855.82	
3/02	SQ	Sell	$253.43	10	$2,534.30	$133.60	$40,390.12	$933.60
3/04	AMD	Buy	$77.37	200	$15,474.00		$24,916.12	
3/04	AMD	Sell	$77.30	200	$15,460.00	-$14.00	$40,376.12	$919.60
3/04	AMD	Buy	$77.32	150	$11,598.00		$28,778.12	
3/04	QRVO	Buy	$164.41	20	$3,288.20		$25,489.92	

Table 7.2 Week 2 Ledger

The second week of trading saw a bear market for most of the week, before stocks began to rally. The NASDAQ had dropped nearly 4% from the open of the market on March 3rd to close on March 4th, only to rally in the latter half of Friday. Consequently, this week saw several large buys as the bear market gave the perception of a local price minimum. Among the buys were PLUG, NIO, and AMD, whose prices saw their minimum around 4:00 on the fourth.

Figure 7.15 gives MELI's price chart for the week.

Figure 7.15 MELI Mar 1-5

MELI was one of the few stocks that was sold during this week of trading due to its strong price on the market opening on Monday. All shares were sold for a net profit of $800.

Figure 7.16 shows PLUG's performance for the week.

Figure 7.16 PLUG Mar 1-5

PLUG was one of several stocks that was bought on Tuesday when the market entered a bear run. Unfortunately, as was the case with the other buys, the prices dropped continually throughout the week after the position was entered.

Figure 7.17 shows NIO's performance for the week.

Figure 7.17 NIO Mar 1-5

NIO saw similar price action to PLUG did this week and was bought right around the same time at $48.93 per share.

Figure 7.18 shows SQ's performance for the week.

Figure 7.18 SQ Mar 1-5

SQ's price action differed from the rest of the portfolio in that on the second, it saw a price increase as opposed to a steadfast downward trend. Consequently, it was sold on Tuesday for $253.43 per share, for a $133.60 profit.

Figure 7.19 shows AMD's performance for the week.

Figure 7.19 AMD Mar 1-5

AMD was one of two positions that saw a profit by the end of this trading week. AMD was bought Thursday for $77.32 per share, right when its price began to rally into the end of Friday.

Figure 7.20 shows QRVO's performance for the week.

Figure 7.20 QRVO Mar 1-5

QRVO saw similar performance to AMD this week. The position was entered on Thursday with the price at $164.41 per share, and by close on Friday the price had exceeded $170.

7.3.3 Week 3

Table 7.3 shows the trades performed during the third week.

Date	Symbol	Buy/Sell	Price	Shares	Cost/ Proceeds	Profit/ Loss	Total Cash	Total Profit
3/09	QRVO	Sell	$171.00	20	$3,420.00	$131.80	$28,909.92	$1,051.40
3/11	NIO	Sell	$45.46	250	$11,365.00	$547.50	$40,274.92	$1,598.90
3/11	PLUG	Sell	$48.19	100	$4,819.00	-$74.00	$45,093.92	$1,524.90
3/12	AAPL	Buy	$120.12	100	$12,012.00		$33,081.92	
3/12	MELI	Buy	$1,536.27	10	$15,362.70		$17,719.22	
3/12	AMD	Sell	$80.94	150	$12,141.00	$543.00	$29,860.22	$2,067.90

Table 7.3 Week 3 Ledger

Figure 7.21 shows QRVO's price chart for the week.

Figure 7.21 QRVO Mar 8-12

QRVO saw modest gains throughout the week with some small dips. All the shares were sold on 3/9 at $171 per share, at about the time when the RSI indicator broke the oversold range. The stock saw a price surge on market open on the 11th, but at this point all the shares had been sold.

Figure 7.22 shows NIO's price chart for the week.

Figure 7.22 NIO Mar 8-12

NIO saw steady gains throughout the week. By the end of the week, its share price was up nearly $10 from market open on Monday. All shares were sold right around its price peak, at $45.46 per share for a total profit of $547.50.

Figure 7.23 show's AAPL's price chart for the week.

Figure 7.23 AAPL Mar 8-12

AAPL saw modest gains throughout the week and was bought on the 12th when the RSI reached oversold levels.

Figure 7.24 shows MELI's price chart for the week.

Figure 7.24 MELI Mar 8-12

MELI's share price rose over 5% throughout the course of the week. The position was entered at the end of the week on the 12th at a price of $1536.27 per share. Figure 7.25 shows AMD's price chart for the week.

Figure 7.25 AMD Mar 8-12

AMD saw a dip in share price early in the week, before rallying back to and above its starting price for the week. All shares were sold at a share price of $80.94 per share, for a total profit of $543.00.

7.3.4 Week 4

Table 7.4 shows the trades performed over the course of the fourth week.

Date	Symbol	Buy/Sell	Price	Shares	Cost/ Proceeds	Profit/ Loss	Total Cash	Total Profit
3/16	AAPL	Sell	$126.00	100	$12,600.00	$588.00	$42,460.22	$2,655.90
3/16	QCOM	Sell	$133.89	179	$23,966.31	-$971.97	$66,426.53	$1,683.93
3/18	MELI	Buy	$1,480.32	10	$14,803.20		$51,623.33	

Table 7.4 Week 4 Ledger

Figure 7.26 shows AAPL's price chart for the week.

Figure 7.26 AAPL Mar 15-19

AAPL's price peaked on the 16th, before experiencing losses for the remainder of the week. All shares were sold just short of its price high for the week, for a total profit of $588.00.

Figure 7.27 shows QCOM's price chart for the week.

Figure 7.27 QCOM Mar 15-19

QCOM is a stock which had not been in the green for the entirety of its holding period. Consequently, when the price had a small spike on the 16th, all shares were sold to make room in the portfolio for other positions, for a net loss of $971.97.

Figure 7.28 shows PLUG's price chart for the week.

Figure 7.28 PLUG Mar 15-19

PLUG was bought on the 16th at a share price of $42.94, when it experienced a price dip. Unfortunately, the stock saw negative price action throughout the remainder of the week, where on market close on Friday the price sat just around $36.

Figure 7.29 shows MELI's price chart for the week.

Figure 7.29 MELI Mar 15-19

MELI was entered on the 18th at a share price of $1480.32. Much like PLUG it was modest negative price action for the remainder of the week.

7.3.5 Week 5

Week 5 saw minimal trading activities with positions in the red for the entirety of the week. Several positions were entered but quickly sold due to stop losses being used to prevent the mistakes of previous weeks. Table 7.5 shows the trades conducted this week.

Date	Symbol	Buy/Sell	Price	Shares	Cost/ Proceeds	Profit/ Loss	Total Cash	Total Profit
3/24	NIO	Buy	$38.10	500	$19,050.00		$32,573.33	
3/24	NIO	Sell	$37.62	500	$18,810.00	-$240.00	$51,383.33	$1,443.93
3/25	AMD	Buy	$76.22	150	$11,433.00		$39,950.33	
3/25	AMD	Sell	$75.71	150	$11,356.50	-$76.50	$51,306.83	$1,367.43

Table 7.5 Week 5 Ledger

Figure 7.30 shows NIO's price chart for the week.

Figure 7.30 NIO Mar 22-26

The position was entered on the 24th at a share price of $38.10. A stop loss was utilized 50 pips below the entry price, which was triggered shortly thereafter, selling all shares at a price of $37.62 per share.

Figure 7.31 shows AMD's price chart for the week.

Figure 7.31 AMD Mar 22-26

The position was entered on the 25th at $76.22 per share with a stop loss. It was triggered when the share price reached $75.51, triggering a sale for a total loss of $76.50.

7.3.6 Week 6

This week markets saw record highs. The S&P 500 index crossed the 4,000 mark for the first time ever on Thursday. Positions that were in the red previous week began to see bullish price behavior once again; consequently, minimal trades were made as prices made recoveries. Table 7.6 shows the trades conducted for the week.

Date	Symbol	Buy/Sell	Price	Shares	Cost/ Proceeds	Profit/ Loss	Total Cash	Total Profit
4/01	BE	Sell	$28.13	679	$19,100.27	-$794.43	$70,407.10	$573.00
4/02	NIO	Buy	$41.22	200	$8,244.00		$62,163.10	
4/02	NIO	Sell	$40.22	200	$8,044.00	-$200.00	$70,207.10	$373.00

Table 7.6 Week 6 Ledger

Figure 7.33 gives BE's price chart for the week.

Figure 7.32 BE Mar 29-Apr 1

BE is a stock that has performed poorly for the duration of the simulation since shares were purchased during week 1. This week its share price made some recovery, creating an ideal opportunity to sell, albeit at a loss. All shares were sold at $28.13 per share on April 1st, for a loss just shy of $800.

Figure 7.33 shows NIO's price chart for the week.

Figure 7.33 NIO Mar 29-Apr 1

NIO saw substantial gains on market open, with the share price surging to about $42.00, before dropping later in the day when the position was entered at $41.22 per share.

7.3.7 Week 7

Table 7.7 shows the trades performed this week.

Date	Symbol	Buy/Sell	Price	Shares	Cost/ Proceeds	Profit/ Loss	Total Cash	Total Profit
4/06	MELI	Sell	$1,547.89	10	$15,478.90	$395.95	$85,686.00	$768.95
4/06	MELI	Sell	$1,550.00	10	$15,500.00	$417.05	$101,186.00	$1186.00
4/07	NIO	Buy	$37.55	250	$9,387.50		$91,798.50	
4/07	NIO	Sell	$35.05	250	$8,762.50	-$625.00	$100,561.00	$570.00

Table 7.7 Week 7 Ledger

Figure 7.34 gives NIO's price chart for the week.

Figure 7.34 NIO Apr 5-9

NIO was purchased at $37.55 with a stop loss in place. The stop loss was triggered once the price dropped to $35.05 per share, incurring an unfortunate $625 loss.

Figure 7.35 gives MELI's price chart for the week.

Figure 7.35 MELI Apr 5-9

MELI had a stellar performance this week, with share prices rising nearly 10% from open on Monday to close on Friday. RSI reached overbought on April 6th and a hefty profit nearing $2,000 was incurred from selling off all shares.

7.3.8 Week 8

Table 7.8 shows the trades performed for the week.

Date	Symbol	Buy/Sell	Price	Shares	Cost/ Proceeds	Profit/ Loss	Total Cash	Total Profit
4/12	AMD	Buy	$81.69	200	$16,338.00		$84,223.00	
4/13	ETN	Buy	$138.63	100	$13,863.00		$70,360.00	
4/14	SQ	Buy	$263.01	50	$13,150.50		$57,209.50	
4/15	SQ	Sell	$267.70	50	$13,385.00	$234.50	$70,594.50	$795.50
4/16	ETN	Sell	$143.09	100	$14,309.00	$446.00	$84,903.50	$1241.50

Table 7.8 Week 8 Ledger

Figure 7.36 shows AMD's price chart for the week.

Figure 7.36 AMD Apr 12-16

The position was entered early on the 12th when the RSI indicated oversold status at a price of $81.69 per share. The price dropped before a rally on the 15th, but the position was held for the duration of the week.

Figure 7.37 shows ETN's price chart for the week.

Figure 7.37 ETN Apr 12-16

ETN saw a substantial price drop on the 13th which was capitalized on, entering the position at $138.63 per share. The price quickly saw a recovery before spiking on the 16th, at a price of $143.09 per share, where all shares were sold for a profit of $446.00.

Figure 7.38 shows SQ's price chart for the week.

Figure 7.38 SQ Apr 12-16

SQ saw volatile price action throughout the week which reflected well in the RSI. The position was entered on the 14th at a price of $263.01 per share. The shares were sold the next day when the price recovered slightly to $267.70 per share.

7.3.9 Week 9

Week 9 was the final week of trading. Consequently, all remaining held shares were sold off for a profit of just over $1,000, making this week one of the most successful yet.

Table 7.9 shows the trades performed for the week.

Date	Symbol	Buy/Sell	Price	Shares	Cost/ Proceeds	Profit/ Loss	Total Cash	Total Profit
4/20	MELI	Buy	$1,153.26	10	$11,532.60		$73,370.90	
4/20	AAPL	Buy	$132.78	120	$15,933.60		$57,437.30	
4/21	MELI	Sell	$1,590.75	10	$15,907.50	$774.90	$73,344.80	$2016.40
4/23	AAPL	Sell	$133.43	120	$16,011.60	$78.00	$89,356.40	$2094.40
4/23	AMD	Sell	$82.66	200	$16,532.00	$194.00	$102,288.40	$2288.40

Table 7.9 Week 9 Ledger

Figure 7.39 shows MELI's price chart for the week.

Figure 7.39 MELI Apr 19-23

MELI was a source of substantial gains for the final week of trading. A quick trade was made between the 20th and the 21st, where the price dipped to $1,513.26 per share on the 20th before

quickly recovering to $1,590.75 per share on the 21st, where the RSI indicated overbought and all shares were consequently sold.

Figure 7.40 shows AAPL's price chart for the week.

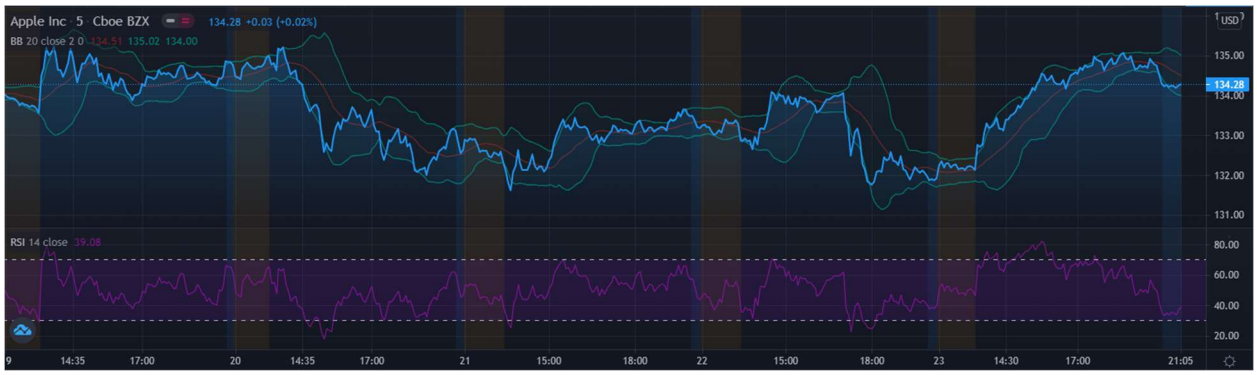


Figure 7.40 AAPL Apr 19-23

AAPL's prices were highly volatile this week. A position was entered on the 20th when the price hit $132.78 per share. After three days all shares were sold at $133.43 per share for a modest profit.

Figure 7.41 shows AMD's price chart for the week.

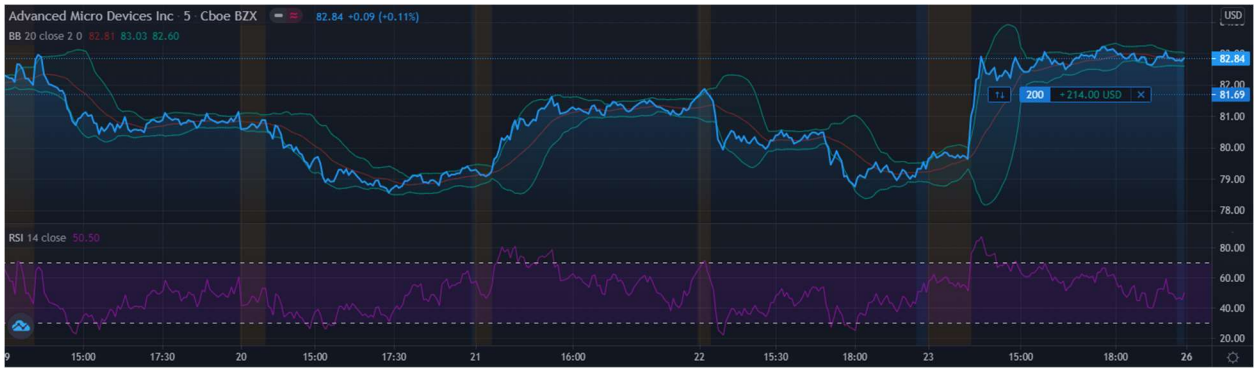


Figure 7.41 AMD Apr 19-23

AMD was a long position that saw a price rally at the latter half of the week. The price soared to $82.66 per share on the 23rd, where all shares were sold.

7.4 Results

Over the 9-week trading period, a total of forty trades were conducted across ten different stocks. The total profit accrued was $2,288.40, for a 2.28% return on investment. Table 7.10 gives the profit accrued by stock over the course of the simulation.

Stock Ticker	Last Price	Cost (Per Share)	Unrealized Gain/Loss (%)	Total Gain/Loss	Mkt Value
QCOM	$127.83	$0.00	0.0%	-$971.97	$0.00
BE	$21.12	$0.00	0.0%	-$794.43	$0.00
SQ	$220.00	$0.00	0.0%	$368.10	$0.00
MELI	$1,389.81	$0.00	0.0%	$2,387.90	$0.00
PLUG	$22.88	$0.00	0.0%	-$74.00	$0.00
NIO	$34.85	$0.00	0.0%	-$517.50	$0.00
AMD	$76.41	$0.00	0.0%	$646.50	$0.00
QRVO	$170.23	$0.00	0.0%	$131.80	$0.00
AAPL	$125.37	$0.00	0.0%	$666.00	$0.00
ETN	$144.79	$0.00	0.0%	$446.00	$0.00

Table 7.10 Profit by Stock

MercadoLibre (MELI) proved to be by far the most lucrative of the investments made. Stocks like Square (SQ), AMD, and Apple (AAPL) provided modest gains as well. On the other hand, a lot of the profit potential was mitigated by the poor performance of Qualcomm (QCOM), Bloom Energy (BE), Plug Power (PLUG), and NIO.

Several lessons were learned from this trading period. Firstly, it proved that RSI is a reliable technical indicator, but should not be used blindly in the absence of other indicators and general market trends. The losses that occurred were a testament to the importance of a stop loss; RSI may indicate a good time to enter a position, but if the stock price is trending downward for some time, it is not always advisable to hold counting on a quick recovery. A stop proved a crucial tool in avoiding this type of unnecessary loss.

8 Comparison and Analysis

The two portfolios accrued a modest profit over the trading period: a 1.27% for breakout trading, and 2.28% for growth trading. This rate of growth far exceeds that of the interest rate in a typical savings account, indicating that the stock market is, at the least, viable (Bankrate). However, in comparison, the S&P 500 grew just over 7% in the same period, indicating that the portfolios grew at a below market rate. This suggests that investing the same sum of money in something like an index fund, for example, that tracked the S&P 500, would have yielded greater returns. Figure 8.1 gives the profit by week for each portfolio.

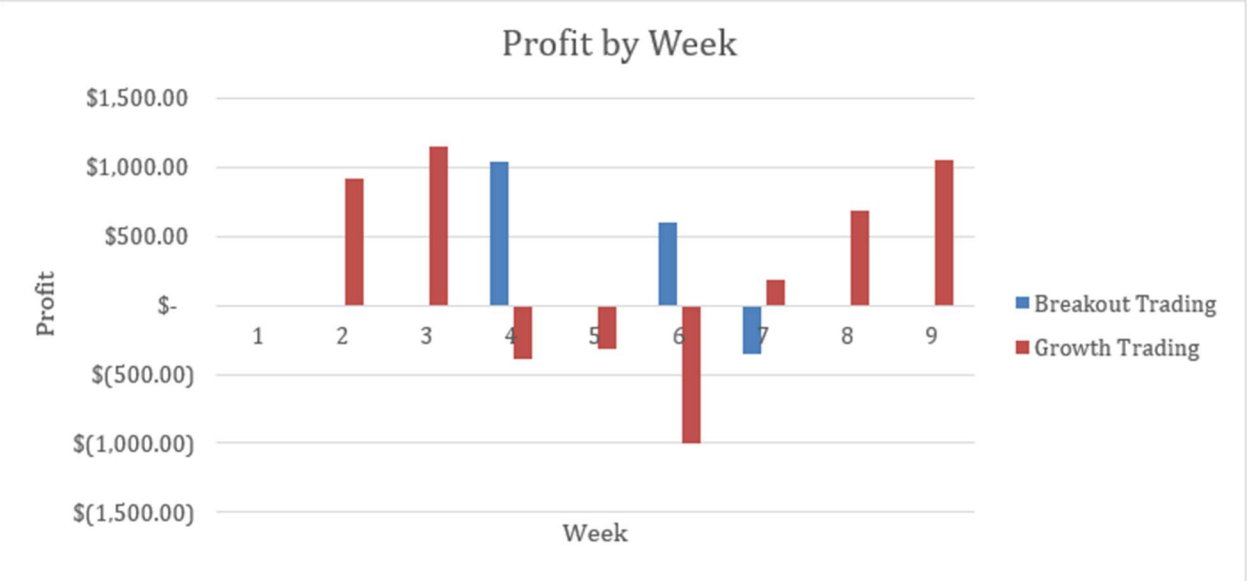


Figure 8.1 Profit by Week

The figure demonstrates that a substantial portion of the profit in the growth trading portfolio was reduced in weeks 4, 5 and 6. This is due to positions that were performing extremely poorly being sold off to cut additional losses. This kind of loss is a testament to the importance of stop losses to avoid holding a position for too long. Compared to the breakout trading portfolio, this portfolio yielded more substantial gains and losses from week to week. The adversity to taking

any losses from the breakout trading manager led to a much more liberal spending of capital, and a scarcity of it down the road. Given this juxtaposition of selling a position at a lower price to prevent losses and owning positions at a low price to facilitate profits, both managers wonder how to increase confidence in their investments.

Both simulations unearthed valuable perspectives that will support the participants' experience in the future. Profit fell short of the rate of growth of the overall stock market. Both portfolio managers, expectedly, were unable to identify as many dips and peaks as seasoned investors. Both portfolios would have benefited from implementing a stop loss upon buying QCOM, BE, NIO and HTOO. Exactly how to use the tool is still unclear, however. It clearly requires an acute understanding of the price action of a given stock. This understanding would also lead to more accurate predictions of dips and peaks. There are two methods that the participants of this project identified to deepen one's understanding: refining one's ability to fundamentally analyze a company quantitatively, and practice.

9 Conclusion

The stock market simulation was a success in that both participants had netted a profit by the end of the simulation. By the end of the first simulation, a 1.27% profit had been accrued, and by the end of the second, a 2.28% profit was accrued. The simulation was an important lesson on the speculative nature of investing in stocks. Despite the belief of being informed by background research, one must acknowledge they are on the outside looking in. Despite following popular investing techniques, misreading a situation is likely unavoidable.

This venture in investment has equipped both of its participants to make smarter and more informed investments in the future. The time spent practicing the use of countertrend systems and pattern recognition was invaluable. The managers of each portfolio have a stronger understanding of their tools, those being the MACD, RSI, Bollinger Bands, linear regression, and the SMA. The technique of assigning a dollar value to a company based on its fundamental qualities is one the participants of this project have room to improve on. They intend to continue to build their knowledge on investing and pursue a well-informed portfolio of investments in the future.

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