SCIENTIFIC TRADING

WPI Interactive Qualifying Project 2015

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ABSTRACT

Abstract

This report is a collection of the results gathered from using various methods of trading to develop a scientific method to turn a profit in multiple financial markets. The purpose of this project was to use statistics, indicators, and historical data to create a scientific system which mitigates the impact of human error that often plagues investors. Each author independently constructed their own system for trading, integrating a combination of various well-established trading techniques into their strategies. We used these traditional methods in innovative ways to gain an edge over other traders. Through the compilation of these individual systems, the group was able to create a "system of systems" which has provided a consistent return on investment.

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Introduction

Of the securities used for trading and investing, the one that immediately stands out as the oldest and most mainstream is equities (also referred to as stocks) traded on a stock market. In their purest form, stocks represent ownership stakes in a company, allowing ordinary people to own portions of multi-billion dollar corporations, with the hope that those corporations will grow. Since the inception of the first stock exchange in 1773 in London, the trading of financial assets has evolved to include currencies, equities, futures, and options (Wheeler 19). From just over 150 brokers to millions of individual traders today, the ways to trade have evolved as well. Once occurring strictly from within the confines of the stock exchange, traders today can trade from the comfort of their home, even having a computer trade for them. Trading has evolved so much that in 2013 49% of trades on United States exchanges were high frequency algorithmic computer trades (Thind).

Trading has also expanded to currencies. Foreign currency conversion was what ordinary people previously did when visiting another country, but today the Foreign Exchange market averages a daily volume of 5.3 trillion dollars (Mcleod). As opposed to the stock market, where shares of companies are bought and sold, the foreign exchange market is a place where currencies from various nations are traded. Depending on the supply and demand in the market, relative values between two currencies are determined, which is the exchange rate between these currencies (Levinson 14). Foreign exchange traders profit off the fact that these exchange rates are constantly changing. A unique advantage that the currency markets offer to traders is its massive size and current profitability. In fact, some firms trading in the currency market have raised up to 4 trillion dollars of revenue (Villamar). In addition to its profitability, its massive size ensures that no one single entity holds significant power over the market, which enables individuals to trade on an equal level with large firms.

INTRODUCTION

Another form of trading is futures contracts. Commodity markets have existed for centuries, where people would agree on a price in the present to be to pay for something in the future. At one time, farmers would bring their crops to market with no indication of demand. The commodities market arose to fix this issue and became the concept behind modern day futures contracts. The US commodities market was developed during the 1840s, during which time Chicago was becoming the center of trade and transportation of goods (Harris 49). The Board of Trade of the City of Chicago was formed in 1848 and evolved into the Chicago Mercantile Exchange by 1919 (Harris 50). Today's futures exchanges are global marketplaces for a variety of goods, ranging from agricultural products, natural resources, foreign currencies, and financial instruments such as bonds and securities. Modern technology allows for these commodities to be traded across the world. While some people and institutions, known as hedgers, are actually interested in buying and selling these goods, many are merely looking to make money off of price fluctuations, known as speculators.

In the United States although the forex and futures markets are large, the stock market reigns supreme. Indeed, about 52 million working Americans contribute to 401(k) accounts, most of which are heavily invested in the stock, or equities, market (Investment Co.). However, with this large number of investors in 401(k) plans comes an increased reliance on the expertise of financial managers. Consequently, average Americans remain uneducated in the investment market (Hamilton). Through a scientific understanding of the various securities markets, as well as the development of systematic methods to profit from them, individuals can ensure their financial independence for life. As a group, we sought to learn more about investing as a whole, creating scientific systems and gathering evidence that they consistently turn a profit, so that we do not fall into the category of non-investors, or investors who don't know how to trade properly.

INTRODUCTION

Executive Summary

The purpose of this Interactive Qualifying Project (IQP) was to learn about trading, investing, and portfolio management in order to create a profitable scientific investment system incorporating diversified strategies and asset classes. Combining US Equities, Futures, and Forex, along with manual and automated trading, our group was able to create a profitable, diversified investment system. At the beginning of this IQP, as a whole our group had little knowledge of investing. But, through the guidance of our advisors and the wealth of knowledge available about investing, we were able to create a profitable investment system. We learned about all different kinds of trading strategies, how to read the markets and avoid using "gut feeling" instead of hard statistics, and used everything we learned to make trading systems we each, as individuals, were interested in. Through trial and error each of us finalized our own strategies in order to maximize profit and sustainability. Our system is composed of four basic strategies: U.S equities manual day trading, Forex automated trading, Futures manual day trading, and U.S. Equities automated trading. This report will further elaborate on these four trading systems.

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Introduction

Before we could develop trading systems, considerable time was spent on learning about investing. The most challenging part of this IQP was that we were tasked with not only developing a profitable trading system, but also learning as much as we could about investing. Throughout the year we were given assignments such as analysis of stocks, developing a retirement account by combining different mutual funds, and analyzing different types of portfolio management software. Our group came into this IQP knowing little to nothing about stocks, currencies, futures, or investing. However, over the course of the year, and with the guidance of our advisors, we learned about the various markets and investing and, most importantly, developing a scientific trading system. What follows this introduction represents much of what we have learned from this IQP.

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Overview of Trading and Investing

TRADING AND INVESTING MARKETS

In trading and investing, there are many terms that apply to every market. In the equities, forex, and futures markets, the bid price is the maximum price that buyers are willing to pay, while the ask price is the minimum price that sellers are willing to take. The difference between these two is the spread and is inversely proportional to the volume, the number of shares/contracts/currency units bought and sold. One major advantage of currency trading is that the volume is so high that the spread is very low.

When looking to open a position in the stock, forex, or commodities markets, one can either go long or short. Buying a stock (going long) for example is profitable if the stock price goes up. Selling a stock short is profitable when the price of the stock goes down. When it is time to close a position (sell a stock with which you hold a long position for example) one can place a limit order or market order. A market order closes the position right away at whatever the market price is. A limit order sets a specific price to take. One convention to cover losses is a stop loss. A stop loss can be set and if the price of stock, currency pair, or futures contract crosses below it, the position is closed.

Stocks

A stock can be broadly defined as a share of a public corporation. A shareholder is referred to as such because he or she owns a share of the company. There are many different types of stocks belonging to different sectors, or industries. Examples of different sectors include industrials, technology, pharmaceuticals, and energy. Some stocks are traded as representations of a group of investments. A passive exchange traded fund (ETF) tracks an index, bonds, currencies, commodities, or a group of stocks. Unlike a mutual fund, it trades just like a normal stock and there are no money management fees involved. A mutual fund is similar to an ETF. Mutual funds are controlled by money managers who invest and move

assets around to make the mutual fund most profitable. Unlike an ETF, Mutual funds have fees associated with them. Options are the newest financial asset to be traded in the financial markets. Option contracts bought give the holder the right, but not the obligation, to buy a stock at a price set at the time the contract was bought. This is known as a call option, and stands in contrast to a put option. A put option gives the holder the right to sell a stock at a previously agreed upon price. As the seller (or writer) of options, these scenarios are all reversed and the seller is obligated to either sell a stock at an agreed upon price in the event of a call option being exercised, or obligated to buy a stock at an agreed upon price in the event that a put option is exercised.

Currencies

The foreign exchange (forex) market is a global decentralized market for the trading of currencies. These currencies are put in pairs, the major ones centering on the United States dollar. Currency pairs go up and down in units of pips. Pip is an abbreviation for "percentage in point." One pip denotes the smallest price change a currency pair can make. For most currency pairs, a pip is a change in price carried out to four decimal places in the exchange rate, though for some pairs (such as the US dollar/Japanese yen pair) a pip is defined as a change in price carried out to two decimal places. Part of the reason currency pairs are measured in such small increments is that the change in relative strength of the currencies is just as small. Whereas stocks derive their value from companies, currencies derive their value from the relative economic strength of entire nations. Not surprisingly, this tends to lead to a much more stable market.

To help compensate for these small moves in the currency market, brokers introduced leverage. Leverage is a mechanism in any kind of trading that amplifies profit and loss by having brokers trade multiples of their client's actual investments. For example, 50:1 leverage indicates for 1 unit trade requested by an individual, his broker actually trades 50 units. In this particular example, this results in 50 times the risk and the potential, which

means that a 2% rise results in doubling the initial investment while a 2% fall would completely wipe out the investment. Though the potential to make money using leverage is indeed magnified over traditional trading, the risk associated with trading borrowed money is usually discouraged for all but the most experienced traders. Even then, trading using leverage is a very risky and often destructive practice.

The most commonly used unit of trade in the forex market is a standard lot, which is 100,000 units of a currency pair. Mini, Micro, Nano lots are consecutively smaller by a factor of 10. Other than the US dollar/Japanese Yen pair mentioned above, major currency pairs are Australian dollar/US dollar pair, Euro/US dollar pair, Great Britain pound/US dollar pair, New Zealand/US dollar pair, US dollar/Canadian dollar pair, and US dollar/Swiss franc pair.

Futures

In the futures markets, trades are performed by buying or shorting contracts. Contracts are agreements traded on an organized exchange to buy or sell assets like commodities or shares. These trades are agreed upon at a fixed price that is to be delivered and paid for later. The commodities don't actually get delivered to you unless you never resell or cover the contract (called open contracts). It is also impossible to put in an order for a future's contract unless the trader has sufficient capital to cover the margin required by the broker.

Cash commodities are the actual physical product from which the price of a futures contract is based off of. These products range from agricultural commodities, financial instruments, and even cash equivalents. Financial futures is the name given to contracts that are based on interest-rate instruments like foreign currencies and indexes. Index futures specifically are easier to trade because they are cash-settlement contracts based on the value of indexes such as the S&P 500. Agricultural commodities are that are traded in the futures markets are typically natural resources that are essential throughout the entire world such as coffee, corn, gold, and oil.

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There are only a limited amount of commodities that qualify to be traded via the futures market. In order for a cash commodity to be successfully traded in the future's market, it must meet the following three conditions. It must be standardized, in a basic, raw, unprocessed state (i.e. there are futures contracts for wheat but not flour). The commodity must have a substantial shelf life because the delivery on futures contracts are deferred so that a trader can have the opportunity to close an open contract and make profit on the commodity without actually having it transported. The price must fluctuate enough to create uncertainty in the market, signifying both the potential risk and potential profit.

TRADING VS. INVESTING

Oftentimes, people consider the purchase and sale of securities such as stocks, futures, and options as investments. While this is generally correct, many people purchase these types of securities not with the intent of realizing a long-term return on their investment, but to capitalize on shorter-term fluctuations in the market to make money. These people generally do not consider themselves investors, but rather as traders. As an example, we can consider the stock market. Investors see themselves as partial owners of the companies whose stocks they hold, and tend to invest in companies that they believe will grow and become more profitable over time. They follow news releases from the companies that they invest in, and continually attempt to forecast the future success of the company. Traders on the other hand do not see themselves as owners of the companies whose stocks they hold, but rather look for stocks which exhibit certain pre-determined profitable characteristics. Traders look for opportunities to exploit certain recurring phenomena and are either successful or unsuccessful within a short period of time. While investors might tend to wait out periods of unprofitability with the hope that the stock will rebound, traders would more likely recognize the loss and reset their system on another stock.

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FUNDAMENTAL VS. TECHNICAL ANALYSIS

As the purchase and sale of securities can be split into the categories of investing and trading, so too can analysis be separated into fundamental analysis and technical analysis. These two methods of analysis represent fundamentally different philosophies when it comes to making money, and are used under very different circumstances.

Fundamental analysis is the method by which investors can determine the value of a security they wish to purchase, whether it be a stock, currency pair, or other type of holding, by analyzing the underlying makeup of the security being considered. Fundamental analysis of a particular stock, for example, would likely involve reading through the company's recent press releases to gain a better understanding of the future direction of the company, as well as the company's financial statements to determine future potential profitability. Warren Buffett, one of America's wealthiest individuals, is a well-known value investor. As a value investor, which is a form of fundamental investing, Buffett looks for stocks which are considered to be undervalued based on his fundamental analysis of the company. He has described his investment philosophy by arguing "Most people get interested in stocks when everyone else is. The time to get interested is when no one else is. You can't buy what is popular and do well." (Warren Buffett). Though Buffett and others are notable for making money through fundamental analysis of the stock market, similar techniques can be applied to the Forex market as well as the Futures market.

In contrast to fundamental analysis, technical analysis focuses more on recurring patterns in prices than on the fundamentals underpinning the security being analyzed. A technical analyst would be looking to capitalize on "predictable" market characteristics such as opening gaps in price, price breakouts, and levels of price support and resistance. When choosing which securities to purchase, they would be less concerned with which symbols have the best outlook for long-term growth but rather which symbols have previously

demonstrated the propensity to exhibit the conditions under which the trader's system will be profitable. As such, technical analysis is closely aligned with trading while fundamental analysis is more closely related to investing, though there are certainly successful long-term investors who utilize technical analysis techniques and day traders who incorporate fundamental analysis strategies.

FUNDAMENTAL ANALYSIS

Stocks

There are many variables that can affect the price of a stock. In general, the American economy is one of the biggest market movers. However, foreign affairs can also stagnate or spur the stock market. News of unemployment, the Federal Reserve, or terrorism all have a large effect on the stock market. This is primarily because the market does not only move on company performance, but also what is referred to as animal spirits. In its simplest form, animal spirits are instincts, proclivities, and emotions that drive a trader to action (Keynes 103). This can be detrimental to investors, as strong economic news not relating to the company can move its stock; for example the Federal Reserve threatening to raise interest rates. However, by and large, a company's stock is moved by its news and earnings report.

Each quarter, every publicly traded corporation releases an earnings report detailing profit or loss per share over the previous quarter as well as an update on the company and any news it may have. For new companies, earnings reports are a large part of their stocks success. For well-established company like Apple, one poor earnings report will not have a large effect on the stock. The second piece of information that can send a stock soaring or crashing is corporation news. For example, pharmaceutical stocks rely heavily on news from the studies of their drugs. In the summer of 2014, Puma Biotechnology Inc. stock

soared due to positive reports from one of its drug trials. For industrial and financial stocks, news of a new or expiring contract can also cause investors to buy or sell.

Currencies

Largely, strength in a currency is determined by the economic state of the nation. As a result, economic indicators like GDP, interest rates, and inflation greatly influence the currency market. For instance, when US GDP is released and it is higher than projected, this strengthens the US dollar in relation to other currencies. While good news is great for a country and bad news is bad, it does not swing the market. It must be noted that the forex market moves off of "worse than expected" or "better than expected" news.

Interest rates also directly impact how profitable it is to hold a currency. High interest rates yield high return on the currency, thus strengthening the currency relative to others. On the other hand, high inflation negatively impacts the strength of a currency because it indicates the currency is losing its value more rapidly than other countries. Therefore, a currency's strength or weakness is entirely relative to the other major currencies in the world and is analyzed as such.

Futures

Typically the cost of carry (storing a commodity) explains the pricing of futures from cash, but there are several other factors that also affect a futures contract's price while the market is active and open. Of course, the supply and demand of the commodity will have the most influential role in the outcome of a future's price. Fortunately, in today's futures market there are usually never ***huge*** surpluses or shortages, meaning that the market is not volatile (it does not crash or soar).

Regardless of what influences the pricing of the contract, futures contracts have finite lives that limit how long people will trade it for. A futures market will become popular depending on the time of year and how much relevance that certain market has to the time

of year. For example, the E-mini for the S&P 500 that will close sometime in December of 2015 will most likely only have a high trading volume during the 2-3 months prior to the contract closing. Currency futures and stock index futures throughout the world are primarily influenced by policy changes and trading activity performed by the Federal Reserve, the U.S Treasury, and other major foreign central banks.

TECHNICAL ANALYSIS

Technical analysis for stocks, currencies, and futures contracts is, for all intents and purposes, the same. Technical analysis relies on technical indicators, and these indicators rely on data from the market. Technical analysis does not take into account the news or earnings report, only measurable data. One common technical analysis technique that can utilized in variety of different strategies is the moving average shown in figure 1 below.

Figure 1: Moving Average Example

A moving average takes the price of a stock, currency, or futures contract over the past week, month, year, or any period of time and creates an average. Instead of calculating moving averages over time constants, trading platforms calculate the moving averages over a specified amount of bars, typically only considering the closing price of each bar.

This creates a smooth curve instead of the bars shown while trading. This can be used to show the trend of a market over a set time period.

Technical analysis allows for exploitation of certain patterns, which can be exploited to make a profit. For example, looking at the chart USD/JPY and noticing 7 up bars followed by a large down bar occurring 3 times in a row, the 4th time that there are 7 up bars in a row the currency pair can be shorted for an expected profit. There many different kinds of trends that can be observed throughout all markets and all symbols. Uptrends, downtrends, sideways trends are just a few patterns that can be observed and predicted through technical analysis. Technical analysis can also be used to estimate and predict support and resistance values that can serve as a temporary floor and ceiling for market's price. Technical analysis can be incredibly trustworthy and reliable to trade with for certain markets that tend to repeat behavior.

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Overview of Trading Systems

AUTOMATIC VS. MANUAL TRADING

Manual and automatic trading have risen to be the two most general competing investing strategies. The two systems are very similar, but also very different. Manual trading allows the trader to base some of his decisions off of instinct. For an experienced intelligent trader who knows the market well, this small amount of instinct, when used in accordance to the rules he has in place, can be beneficial. However, instinctual trading that defies the manual trader's rules will always be detrimental to his system. For example, an experienced trader may choose not to enter a trade because he sees volatility that his system does not account for. While an inexperienced manual trader will be told by his rules to exit a trade, but he won't in hopes of greater profit due to the appearance of an uptrend. Automatic trading eliminates the issues that often plague young investors. An automated system will enter and exit the market based on a set of rules that it won't deviate from at all. As mentioned before, this can be helpful or detrimental to a system. Overall, for younger more inexperienced traders, or for those who are not strong willed enough to stay within their rules would benefit from an automatic trading system. However, an experienced strong willed trader would benefit from a manual system so that they can use their instinct and years of experience to complement their system

SET-UP, ENTRY, AND EXIT

Before a position will be taken in the market, a good manual or automated strategy has a set of conditions that must be met. This is called the set-up. Algorithmically speaking, the set-up must be met for a strategy to get ready to buy or sell. The next step is the trigger. If the conditions for the trigger, which confirm the conditions of the set-up, are met, then the strategy will try to enter the market. A good system does not trade on every set-up, but

only when it can enter at the right time. A trigger has 2 main goals: the price should confirm the direction indicated by the set up, and the entry should guarantee that the position will capture exactly what the strategy was designed for (Wright 46). The final piece of a successful trading system is the exit. It is important not to get out of the market too early or too late. It could be argued that the exit is the trickiest part of any strategy, as it relies most heavily on the trader's strict adherence to his pre-developed set of rules. Those rules need to be restrictive enough that not too much money is lost if the market goes in the wrong direction (usually through use of a stop loss), but not so restrictive that the system is "faked out" and the trader exits the position too early. This is a very difficult balance to strike, and one that traders spend years perfecting.

In order for a strategy to be successful, the set-up, trigger, and exit all must not only be tested and proven, but also align with the overall goals of the strategy. After an automated strategy is crafted, it can be back-tested, meaning testing it on previous data in the market. Once all final changes are made, the strategy can then be optimized on previous data. This means that over a set period of time in the past, the system will change its parameters in order to find the combination that is most profitable. One important note is that optimization is not to make a losing system win, but make a winning system better and more consistent. A question that will naturally occur is how far back should I back test and optimize for, and for how long is my data applicable to use. Walk-forward testing is used to test this. For manual traders, strategies are tested by placing "paper trades." These trades are not made with money, but act just like real trades, and allow for manual traders to test their systems.

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SYSTEM ANALYSIS

Back Testing and Walk Forward Analysis

In an effort to ensure that an unprofitable system is not mistaken for a profitable one, special attention should be given to analyzing the results of back-tested trades. Through back-testing, a trader can look at what would have happened over a given time period in the past had he been trading the system being tested. Of course, the more trades included in the study the more likely back-testing will accurately determine whether or not the system is profitable. Certainly, if a system loses money over a given time period, it should be re-evaluated before being put into use. Additionally, traders can perform walk-forward analysis, which attempts to simulate what will happen when the trader launches the system. In essence, walk-forward testing attempts to simulate what will happen when a system trades live, rather than simply optimizing over the time period on which you are back testing. If given enough parameters to optimize, almost any system could prove to be profitable in the past. However, unless history exactly repeats itself, this same system could lose money when traded in real time. An example of this would be walk forward testing over the past year; the software would optimize parameters over the time period from one year ago to approximately three months ago. At that point, the system would then run on the remaining three month interval (which it had not considered during the optimization process). If the system is indeed profitable, similar profits would be seen during the three month testing window as were during the nine month window on which the parameters were optimized. If the system proved to be less profitable walking forward, it may need modification before being traded for real.

Expectancy, Expectunity, and System Quality

As a simple way of measuring the profitability of a system, one can look at both its expectancy and its expectunity. Expectancy is the average profit or loss per dollar risked per trade, while expectunity is simply annualized expectancy. Though measures of

expectancy and expectunity are by nature relative metrics, a positive expectancy is necessary to achieve a profitable system. These measures are particularly useful in determining the long-term profitability of a system, which may not always be apparent through looking at individual trades. A system with positive expectancy and expectunity can be said to be profitable, even though there may be a few losing trades in a row that might lead the average observer to believe it isn't. It should also be noted that expectunity takes into account the total number of trades in a year, which is essential when comparing the profitability of different systems. Through a combination of expectancy and expectunity, an analyst can determine with very little effort whether or not a system will make money over time as well as its value relative to other systems.

Expectancy is calculated with two approaches. The first sums the R-Multitudes determined by each trade's profit or loss divided by the largest loss of the system. The second sums the R-Multitudes determined by each trade's profit or loss divided by the average loss of the system. It should come as no surprise that using the largest loss of the system will yield a more conservative estimate than using the average loss, however this more conservative estimate will likely give the trader more confidence in the result by being as pessimistic as possible. Expectunity is calculated by multiplying expectancy by the opportunities a system has to trade per year. With these calculations, system quality can be derived by multiplying expectancy and the square root of the number of trades and then dividing by the standard deviation of the R-Multitudes. It represents the total profit or loss per dollar risked relative to the total variability of the profit or loss per dollar risked. System quality is a dimensionless figure that takes into account system variability. Put another way – a system that produces profits and losses that are fairly consistent would have a better system quality than a system whose profits and losses are much further apart, even if both systems have the same expectancy.

Monte Carlo Analysis

Traders can also perform Monte Carlo analysis, which constructs thousands of randomized scenarios to develop estimates for the system's profitability under a variety of conditions. More specifically for this project, this form of analysis can yield a confidence interval over such metrics as rate of return and maximum drawdown, among others. Though a simple back-tested system may show a certain rate of return, Monte Carlo analysis allows the trader to have a certain level of confidence about the characteristics of a trading system. Put another way, if we develop a 95% confidence interval for rate of return from 2 to 50, we can say that we are 95% confident that the system's actual rate of return will be between 2% and 50%.

CHARLIE WRIGHT

In general, market behaviors are categorized into one of the three types described in a book titled: "Trading as a Business" by Charlie Wright. There are trending markets, directionless markets, and volatile markets; each of these market types are determined by their market movement patterns.

Trending markets sustain a large increase or decrease in price over a considerable amount of bars (Wright 20). Although the price will most likely have intervals where it reverses its direction, this type of market is characterized by the price moving in one direction over time. Strategies designed for trending markets are centered on the goal not to miss the big move (Wright 23). These strategies take positions when signals indicate a big trending move of the price. "Stop" or "stop loss" orders are popular with such strategies as means of entering and exiting the market. Stop orders allow the trader to either enter or exit at a specific price. Stop loss orders can be used to keep the trader from accumulating loss greater than he is willing to risk.

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Directionless markets are identified as having various insignificant or misleading up and down movements in price while the overall movement of the price is sideways within a certain small range (Wright 22). When analyzing a directionless market through a technical approach, it is unclear whether it is experiencing a lack of trade volume or overall indecisiveness of the traders in the market. Support and Resistance strategies focus on hitting the price swings that tend to occur in directionless markets (Wright 26). The starting premise assumes that the market swings within a specific interval, thus the strategies assume that once the price reaches either end of the interval, it is likely to reverse its direction. These types of strategies typically make high number of winning trades that each yield small profits. However, they will often miss an entire trend of price movement because it will exit early in case a market starts getting overbought or oversold, which makes them unsuitable for trending markets.

Volatile markets are characterized by having large movements in price within a small amount of bars/time (Wright 22). These types of markets typically come hand in hand with either a high trade volume or orders that involve a high number of shares/contracts. There is no textbook strategy for such markets because they are unpredictable (Wright 28).

Zachary's System

SYSTEM DEVELOPMENT

One of the most renowned investing experts in the world is John Bogle. Bogle got his start at a management firm and eventually moved his way up to chairman (Bogle Biography). He went on later in his career to found the Vanguard group, which grew to be the second largest mutual fund company in the world, and founded the Vanguard 500 Index (Bogle Biography). John Bogle is also a strict buy and hold type investor. This means that he believes that the best way to make money in the stock market is not to trade the fluctuations, but to buy a company and see your investment prosper along with the business, arguing that dividend yield and earnings growth matter much more than market expectation (Bogle). In the figure 2 below, there is an example of a buy and hold system with entry and exit signified with arrows and profit signified by a blue line.

Figure 2: Buy and Hold Example

Additionally in figure 3 below, there is a buy and short system where the trending stock is continuously bought and sold with profit signified by blue lines and loss by orange.

Figure 3: Automated Buy and Short Example

The profit for both is about $40, even though there is a significant difference in number of trades (Note these were completely made up and do not represent actual trades, but are to emphasize concepts). Through my trading experiences in this IQP, I have found that buying and holding allows for more profit in the long run than constantly buying and selling. In my experience investing and learning about investing, studying from different experts, it is my belief that John Bogle is correct in his belief that a buy and hold system is superior to constant trading. It is not possible, without a certain "edge" in the market, to make a profit on computer based trading. This is a fact recognized by all investors. The difference between buy and hold vs computer based traders is that the buy and hold traders believe this edge is attainable only by picking stocks or index funds they expect to beat the market based on dividends and earnings growth, while computer based traders believe a "clever" system gives them an edge. Yes, there is an infinite number of ways to design a computer trading system, but coming up with an entirely unique system design that no one has ever

done before is much like investing: it requires a lot of work and a lot of trial an error and many are unable to ever attain greatness. It is important to remember that in order to make a profit on a stock, there must be someone losing money on it because stock prices are a reflection of supply and demand. Though I do not believe that an ordinary person can create a computer trading system that continuously makes a profit, I entered this IQP to create a system based on technical, not fundamental, analysis. The market is driven by bullish and bearish sentiments towards company news and economics news as opposed to reactions to technical indicators, so why create a system that relies on technical indicators when they do not motivate the market as a whole? All of these reasons are what led me to gap trading.

A stock gap is when there is a difference from one bar to the next in stock price. This most often occurs overnight, which was where I placed my focus. A stock opens at a different price from which it closed at for many reasons: a news or earnings report came out after the market close and before the next market open or, more simply, there is just a difference in supply and demand from close to open. There are multiple ways to "play the gap" in order to make a profit. A stock that gaps will either "make a run" or "close the gap". Making a run is when a stock gaps up or down and then continues on that trend for the day. Closing the gap is when a stock gaps up or down and then reverses that trend at some point during the day. I chose gap trading because it does not rely on indicators but on pure market data. In other words, whether a stock continues its trend or closes the gap is, in most cases, purely statistical. When developing my strategy, I hypothesized that a stock that closes the gap or runs, based on previous times it has done so, will do the same more often than not in the future. A tragic flaw that I see in many trading systems is that they trade only one stock. When doing statistics, it is important to have multiple diversified and stratified samples. The same is true in stock trading. A system that trades one stock may be diversified in the way it trades, but that is just one sample. Therefore the stock is one small sample of the system and not a representation of the system, statistically speaking.

Therefore, I wanted to develop a system that could trade any stock from any sector with the same relative profitability. So at this point, I had what I wanted my system to be and what stocks I wanted it to trade, next would come what parameters to use for the set-up, entry, and exit.

THE SYSTEM

Figure 4 below depicts the different strategies that I went through to get to the final product.

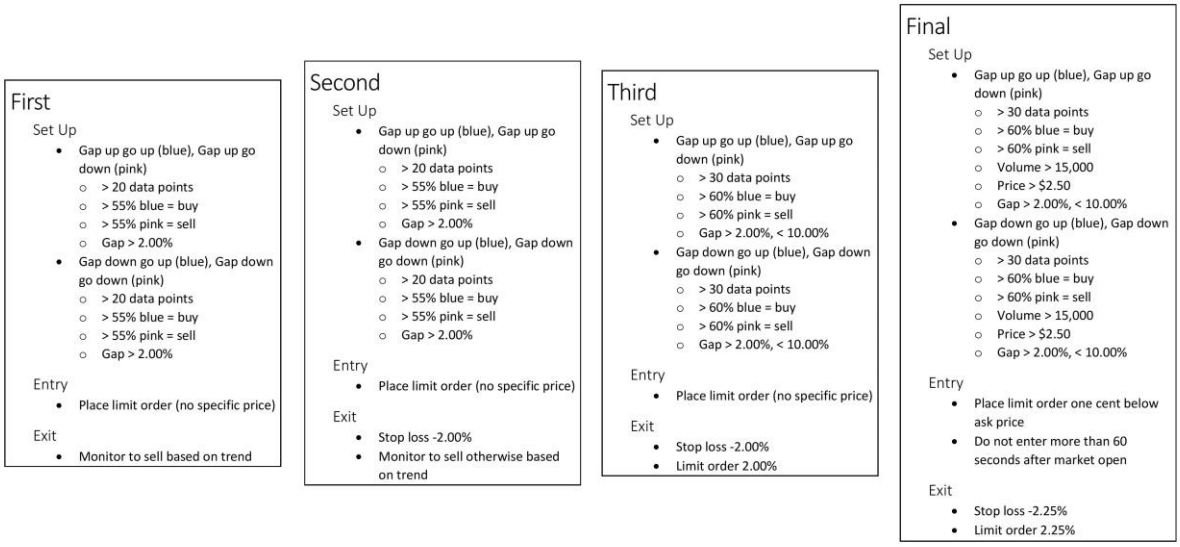


Figure 4: Zachary's Strategy Development

The first set up would be if the stock gapped up or down 2%. I coded a ShowMe study in trade station, our trading platform, which put dots when a stock had closed the gap or made a run of at least 2% at the close that day spanning over the last 2 years (if it had gapped up or down that morning), shown in figure 5 below.

Gap Up Go Up

```
if Open this bar > Close 1 bar ago * 1.02
    and close this bar > open this bar * 1.02 then
        begin
        Plot1( Open this bar, "GapUp" ) ;
        Alert ;
        end
else
    NoPlot( 1 ) ; { remove the marker }
```

Gap Down Go Up

```
if Open this bar < Close 1 bar ago * 0.98
    and close this bar > open this bar * 1.02 then
        begin
        Plot1( Open this bar, "GapDown" ) ;
        Alert ;
        end
else
    NoPlot( 1 ) ; { remove the marker }
```

Gap Up Go Down

```
if Open this bar > Close 1 bar ago * 1.02
    and close this bar < open this bar * .98 then
        begin
        Plot1( Open this bar, "GapUp" ) ;
        Alert ;
        end
else
    NoPlot( 1 ) ; { remove the marker }
```

Gap Down Go Up

```
if Open this bar < Close 1 bar ago * 0.98
    and close this bar < open this bar * .98 then
        begin
        Plot1( Open this bar, "GapDown" ) ;
        Alert ;
        end
else
    NoPlot( 1 ) ; { remove the marker }
```

Figure 5: Zachary's ShowMe Study Code

If the stock gapped up and closed the gap it would be a pink dot signaling that it was to be shorted. If the stock gapped up and ran it would be blue dot to signal a buy. If the stock gapped down and closed the gap it would be a blue dot signaling a buy. And if the stock gapped down and ran it would be a pink dot signaling a sell. ShowMe studies "Gap Up Go Up" and "Gap Up Go Down" can be shown in figure 6 below.

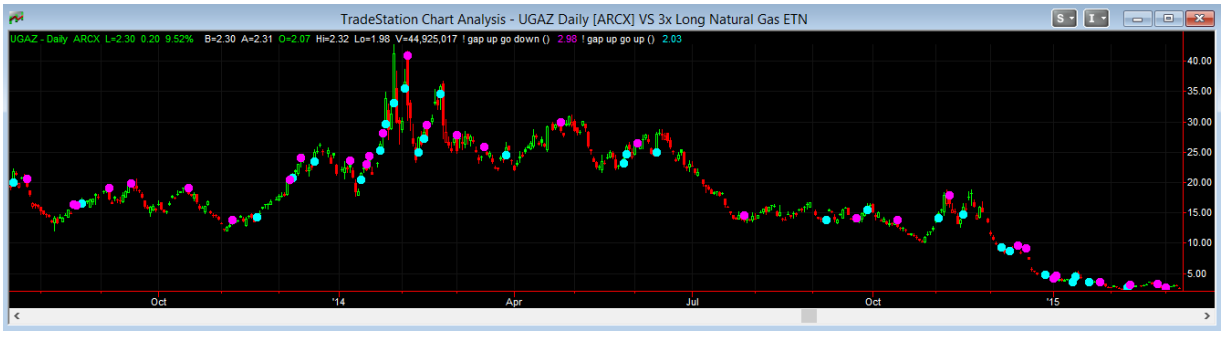


Figure 6: "Gap Up" ShowMe Study Example

ShowMe studies “Gap Down Go Up” and “Gap Down Go Down” can be shown in figure 7 below.

Figure 7: “Gap Down” ShowMe Study Example

Then, I looked for more than 20 data points, and at least 55% of the points telling me to sell short or buy long. But, after encountering stocks that would gap up in excess of 20% due to a major news report, I decided to modify this to between 2% and 10%. I also wanted to restrict the stocks I was trading to those that gave me the best chance of profit so I added more minimum data points, 30, and 60% rather than 55% for the signal to go long or short. Next, I wanted to make sure that the stock wasn’t gapping due to a few traders, so I included that the volume had to be greater than 15,000. Testing the system, I determined that stocks trading at very low prices were too unstable so I set a minimum price at $2.50. And finally, I needed support that the stock would close the gap or make a run.

The next step is the entry. Much of this step was trial and error and took practice to get a working, consistent system down. The key to the system is entering the market before the trend (whether closing or running) starts to occur. For this reason, for my final system I set a limit order to buy the stock at one cent below its ask price. Then I cancel the order if it is not filled within the first 60 seconds upon market open. This is to ensure minimum slippage and to avoid getting in too late.

The final step is the exit. This is the most complicated step because it directly determines how much and how often you get a profit or a loss. At first, I had a very poor manual system

for exiting the trade. But, over time I came up with setting a limit order at profit of 2.25% and a stop loss at loss of 2.25%. This differs from my ShowMe study code which clearly is looking at stocks that gap then close or run for only 2%. However, the study looks at the close price looking for the 2% and is not an indicator of the behavior of the stock during the trading day. That fact paired with the fact that the vast majority of stocks fluctuate above and below their eventual closing price throughout the day leads to the conclusion that the stock will more often than not touch 2.25% even when statistically I looked at gaps with a profit of more than 2%. This exit strategy begs the question why not stay in for longer or base the exit on the trend of the stock? The answer to this is that if I had more time I would have liked to find an optimal stop loss and limit order price or base the exit on moving averages or another indicator. Unfortunately due to the limited time aspect of this IQP I was not able to explore such possibilities. A list of my trades along with dates, entry, exit, and profit or loss can be found in the Appendix (page v).

SYSTEM ANALYSIS

It is one thing to have an operable trading system, it is completely different to have a profitable one. Many would say that with only 10 days of trading there is no proof that my system is profitable, but I will give reasons why that may not hold true. I traded my system for 10 days because it was what I had time for. Over those 10 separate days I had 49 trades with an average of 5, a maximum of 7, and minimum of 2 trades per day. If taken full time, my system would trade over all 252 open market days per year. I ran a simulation in Microsoft Excel on total profit if my system was traded with the exact trades I had over a 250 day period, instead of 252 to avoid fractions of a day (See Appendix page xiii). This is based on starting with a $70,000 account trading 1/7 of its sum on each trade (due to the maximum number of trades in a day being 7). My 10 day system was multiplied 25 times to get 250 days. The result was a 117.83% profit. Through this is a great profit percentage,

this simulation is based on having the exact trades of my 10 day trading reoccur over 250 days, which is impossible. However, if the trades in the future are similar to the ones I made, then the results of the simulation would be a ballpark figure on profit.

Though only 10 days, I made 49 trades on 11 different ETF's and 17 different stocks belonging to 5 different sectors and 3 different exchanges. This represents a larger portion of the market than the typical trading system that trades 1-3 stocks or currencies. For that reason, a smaller number of trades is necessary for statistical significance, however consultation of a statistician was unobtainable so a numerical value on how much smaller of a sample is necessary could not be determined. Also, when dealing with a multitude of stocks and ETFs from different sectors and exchanges, trends become a non-factor. The next analysis step I took was computing averages, standard deviations, and confidence intervals per trade and also per day. The average profit per trade was $45.10, with a standard deviation of $229.34. This yields 95% confidence that profit will be between -$19.11 and $109.32. The average made per day was $245.55 with a standard deviation of $493.42. This yields 95% confidence that profit per day will be between -$76.82 and $567.92. Equations for these can be seen in figure 8.

$$\bar{X} = Sample\ Mean = Average$$

$$X_i = Each\ Individual\ Measurement$$

$$n = sample\ size$$

$$Standard\ Deviation = \sigma = \sqrt{\frac{\sum_{i=1}^{n}(X_i - \bar{X})^2}{n}}$$

$$Confidence\ Interval = \bar{X} \pm z_{\propto/2} * \frac{\sigma}{\sqrt{n}}$$

Figure 8: Statistical Equations

Although an ideal lower bound in a confidence interval for profit is 0, the drawdown is not much and there is a large area for profit. However, I am not satisfied with what these results represent. Based on the rules of my system, the outcome of my profit is discrete: either a 2.25% loss or a 2.25% gain. This led me to the binomial distribution. Of my 49 trades, 27 were profitable and 22 were not, a success rate of 55.10%. Using a binomial distribution with number of trials equal to 49 and success rate equal to 55.10%, the probability that greater than 24 trades are profitable (which would lead to a net profit) is 76.41%. I then decided that instead of fitting my data to a defined distribution, I would create my own probability distribution function using the kernel smoothing technique. Figure 9 below shows what this looks likes with all the data used. In figure 10, I omitted the data from my first two days of trading to get a more refined curve.

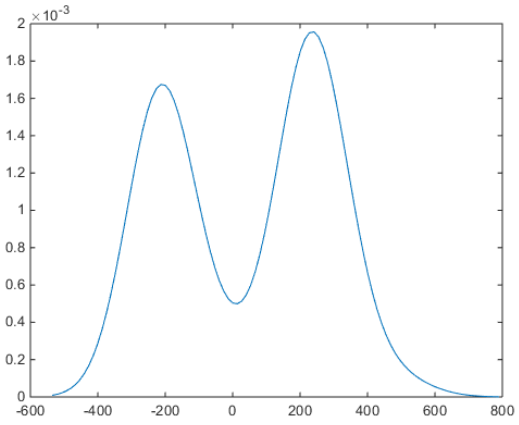


Figure 9: Kernal Smoothed PDF

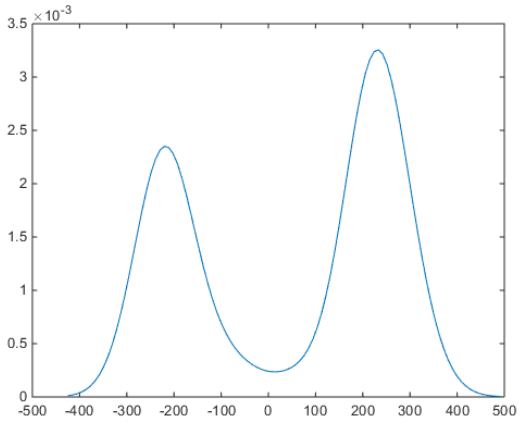


Figure 10: Adjusted Kernal Smoothed PDF

These probability distribution functions are bimodal, meaning they have 2 peaks, and look similar to two normal distribution curves placed next to each other. As you can see, the area under the right peak is greater than that of the left, showing profit. I am very confident that if this system was used for all 252 trading days in a year that it would have slightly above or slightly below the 117.83% profit margin found in the simulation. However this is not based on statistics, but only an intuition I have from trading my system that I would

be able to reproduce identical results, similar to what my simulation did which repeated the 10 days of trading over a 252 day year.

Expectancy, expectunity, and system quality spreadsheet can found in the Appendix (page v). They can be good measures of the system profit and quality. My expectancy is 0.22 or 0.19 depending on the method for calculating the R-Multitude. This puts expectunity at 267.12 or 232.10 and system quality at 1.36. Although I would have hoped for a higher system quality, the expectunity is very high, at 267.12 profit per dollar risked per year.

By putting data from trades into the Market System Analyzer (Adaptrade), we can see an equity curve other data about my system, shown in figure 11 below.

Figure 11: Zachary's Equity Curve

The equity curve follows a linear progression that results in $1,474.96 in net profit. That amount of money is for 49 trades in 10 days. Multiplying by 25.2 to get a net profit based on 1 trading year (252 days) is $37,168.99. Next comes Monte Carlo Analysis which scrambles the trades in random order to come up with a lower bound for rate of return and max drawdown. As shown in figure 12, with 95% confidence, the lower bound of rate

of return for my system is -1.578% and max drawdown is 2.764%.

Trading Parameters

Initial Account Equity: $100,000.00
Trading Vehicle: Stocks
Minimum Margin Requirement: 100.0%
Slippage per side: $0.00 per trade
Commissions and fees per side: $7.50 per trade

Position Sizing Method: None
No. Shares: From input data
Number of Monte Carlo Samples: 10,000

Key Results at Select Confidence Levels

Confidence (%)	Rate of Return (%)	Max Drawdown (%)	Return-DD Ratio	Mod. Sharpe Ratio
50	0.6780	1.336	0.5111	0.05629
60	0.3184	1.496	0.2174	0.02709
70	-0.04529	1.702	0.000	-0.002540
80	-0.4754	1.967	0.000	-0.03823
85	-0.7422	2.141	0.000	-0.06024
90	-1.082	2.379	0.000	-0.08960
91	-1.160	2.437	0.000	-0.09609
92	-1.253	2.510	0.000	-0.1051
93	-1.346	2.577	0.000	-0.1129
94	-1.463	2.670	0.000	-0.1222
95	-1.578	2.764	0.000	-0.1330
96	-1.728	2.860	0.000	-0.1464
97	-1.913	2.996	0.000	-0.1623
98	-2.127	3.173	0.000	-0.1814
99	-2.390	3.457	0.000	-0.2053
100	-3.987	4.750	0.000	-0.3684

Monte Carlo Results at 95.00% Confidence

Total Net Profit: ($1,577.83)
Final Account Equity: $98,422.17
Return on Starting Equity: -1.578%
Profit Factor: 0.7564

Max Number of Shares: 35,714
Minimum Number of Shares: 122
Average Number of Shares: 2,454

Largest Winning Trade: $480.00
Largest Winning Trade (%): 0.4812%
Average Winning Trade: $244.64
Average Winning Trade (%): 0.2442%

Largest Losing Trade: ($254.94)
Largest Losing Trade (%): -0.2571%
Average Losing Trade: ($222.64)
Average Losing Trade (%): -0.2218%

Average Trade: ($32.20)
Average Trade (%): -0.03217%
Trade Standard Deviation: $267.28
Trade Standard Deviation (%): 0.2658%

Win/Loss Ratio: 1.135
Win/Loss Ratio (%/%): 1.137
Max Consecutive Wins: 2
Max Consecutive Losses: 8

Worst Case Drawdown: ($2,789.89)
Worst Case Drawdown (%): 2.764%
Average Drawdown: ($1,070.97)
Average Drawdown (%): 1.063%

Return/Drawdown Ratio: 0.000
Modified Sharpe Ratio: -0.1330

Figure 12: Zachary's Monte Carlo Analysis

I was expecting this based on the confidence interval that was previously created giving a lower bound that was negative. With a larger sample (more days of trading) this number would turn positive assuming the same profit was made. Market System Analyzer (Adaptrade) then constructs a confidence cone, shown in figure 13 below, which shows where the profit could fall with 95% confidence (in green) and where my trades did fall.

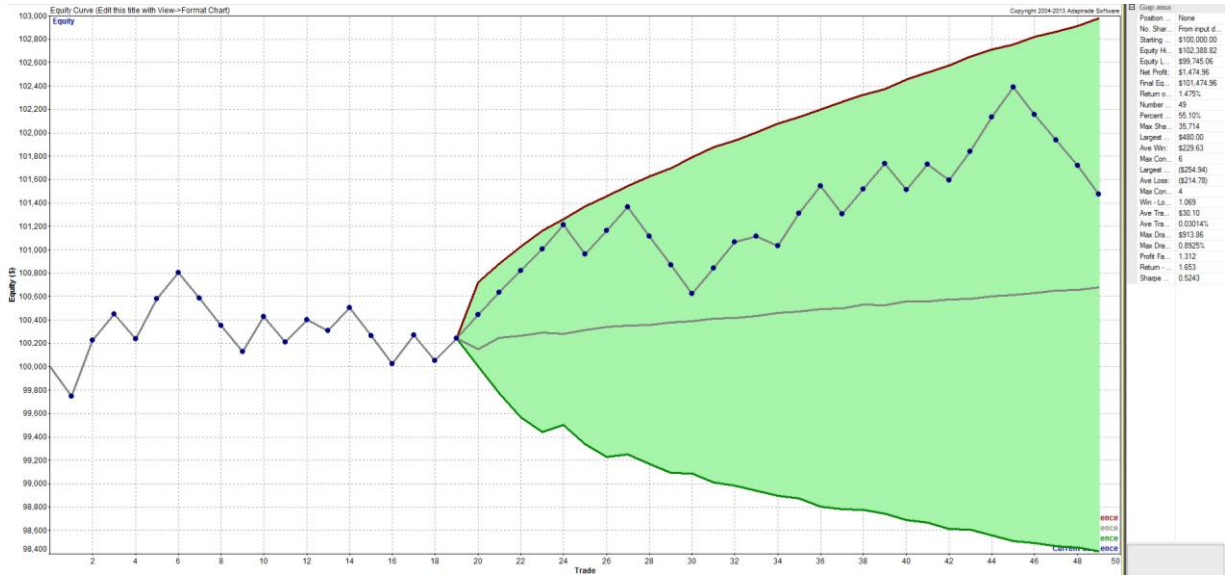


Figure 13: Zachary's Confidence Cone

As you can see my trades fell on the higher side of the confidence cone. This is due to the fact that the cone is very wide due to the small number of trades (49) that my system made.

Tyler's System

SYSTEM DEVELOPMENT

Bollinger Bands were first developed by John Bollinger in the late 1970's. In essence, Bollinger Bands represent a "margin of volatility" around an average stock price. As a general rule, traders are cautioned against trying to predict the volatility of a stock; by definition, such volatility is random. To that end, Bollinger Bands predict the extent to which price fluctuations are simply the result of volatility, rather than significant shifts in price.

Bollinger Bands are constructed with a simple moving average, and a standard deviation. As discussed previously, a moving average is the sum of the closing price for a pre-determined number of bars, N, divided by N. This moving average is denoted $\bar{X}$. From this moving average, a standard deviation is calculated as

$$\sigma = \sqrt{\sum_{j=1}^{N} \frac{(X_j - \bar{X})^2}{N}}$$

From these two values, we can define the upper band as $\bar{X}+c\sigma$, the middle band as $\bar{X}$, and the lower band as $\bar{X}-c\sigma$, where c is a constant that generally takes a value of two. Standard deviation is defined as the average variance around the mean, which means we would generally expect volatility to fall within one standard deviation above the mean and one standard deviation below the mean. For the purposes of constructing Bollinger Bands, we most frequently say that volatility would be expected to fall within two standard deviations of the moving average. If a bar closes outside of this range, then it is assumed to be a statistically significant occurrence worth acting upon. (Bollinger) If asset prices are normally distributed, then certain properties of this distribution show that 95% of them

will fall within two standard deviations of the mean (with 68% falling within only one standard deviation of the mean and 99.7% falling within three standard deviations of the mean). As such, we can be 95% confident that any deviation outside of two standard deviations from the mean represents a significant shift in asset value.

Based on these definitions, Bollinger Bands can be used in two unique ways in trading strategies. In some systems, a "Bollinger Squeeze" is used as an indicator for potential future growth. This hypothesis assumes that a prolonged period of stability, characterized by the contraction of the two bands, will eventually be followed by a period of growth. As such, if one hopes to capitalize on this indicator, a system would be developed which generates a "buy" signal when the bands are sufficiently contracted for a prolonged period of time. The advantage of this type of system is that if there is indeed a large spike in price, the trader will not have missed the signal. Conversely, there is always the possibility that a contraction of the bands does not actually lead to a period of growth. This phenomenon is illustrated in figure 14 below (Forex Easy).

Figure 14: Bollinger Squeeze Example

Traders have also used Bollinger Bands as part of a breakout strategy, which involves initiating a trade when a stock closes above the upper band or below the lower band. Statistically speaking, a stock that is not trending up or down has a 95% chance of staying within the two bands. As such, a bar's closing price outside of that range tends to indicate a trend either up or down. This system in particular uses Bollinger Bands to determine a potential breakout by monitoring whether or not a stock closes above the upper band, or below the lower band. In addition, it requires that the stock close outside of the range for three consecutive bars in order to confirm that the stock is actually trending, and that it isn't simply a false breakout. The advantage of a breakout strategy as opposed to a pure Bollinger Squeeze strategy is that it includes a definitive entry point based on evidence that the stock is actually moving in the correct direction. Figure 15 below demonstrates a Bollinger Band breakout strategy (Harvey).

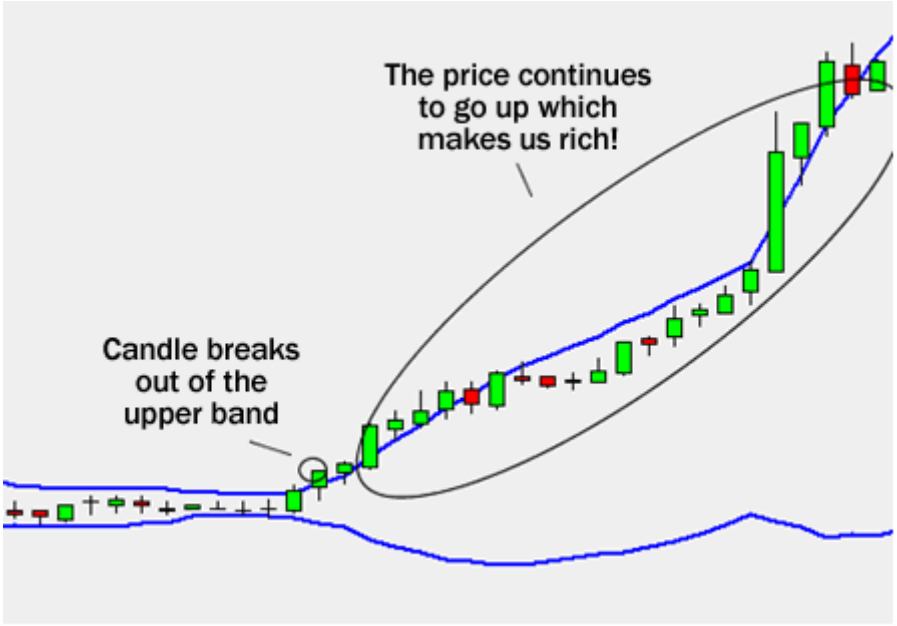


Figure 15: Bollinger Breakout Example

As someone who is pursuing a career in statistics, I was not-surprisingly drawn to the idea of finding a system that uses past experience to determine the likelihood of a certain event

occurring, such as a stock price rising or falling, and capitalizing on that knowledge. I've long been convinced that it is important to have a strong theoretical foundation on which to base trading decisions, rather than simply using arbitrary trading rules that are based on a traders individual thoughts, feelings, and reactions to the market. As such, I was intrigued by the idea that we could say with a certain degree of certainty whether or not a stock was trending. To that end, I felt that a Bollinger Band breakout strategy would be most profitable for me, and decided to base my strategy around them. I chose a breakout strategy rather than a "Bollinger Squeeze" strategy due to lingering doubts that such a squeeze was reliably indicative of future growth. Though it could be argued that a breakout strategy has the potential to miss out on much of the initial growth, or miss out on the entire trend if it is too gradual, I felt that I would rather enter a trend late than enter a non-existent trend early.

THE SYSTEM

Initially, it was difficult to differentiate between my system and a typical commercialized Bollinger Band system. In fact, the only "twist" that I had put on my system was the requirement that a stock close outside of the range for three consecutive bars to ensure that any spike or drop was a trend rather than an anomaly. I chose sixty minute bars due to their relative frequency, as well as their greater trading volume leading to lesser volatility. Due to the possibility of my system generating a false positive, I was particularly concerned with making sure that the bars were as representative of actual market behavior as possible, and were minimally reactive to market anomalies.

As a next step, I sought to introduce another condition as part of my set-up. The purpose behind this was twofold: first, I found that my system was trading too frequently, and was too often being "faked out" by market fluctuations. Additionally, I wanted to differentiate

my system from the hundreds of other Bollinger Band systems currently in use, as a way to gain a competitive edge in a business where an edge is an absolute necessity in order to get ahead. To address both of these concerns, I introduced the further condition that a trade will only be made if the market is biased in the direction of the proposed trade. I accomplished this through the use of two moving averages – a long and a short. Essentially, if the short moving average is higher than the long moving average at the bar in question, the system classifies the market as biased long, based on the signal from the moving averages that the market is performing better than would be expected. If the opposite is true, the system would consider the market biased short. When the Bollinger Band portion of the system then attempts to buy or buy to cover, it first confirms that the market is biased in favor of the trade being considered. Figure 16 below illustrates an example of a Bollinger Band system, though neither moving average indicator is visible. The short position taken in the figure is a result of three consecutive bars closing below the lower band, as well as the short moving average being below the long moving average (not pictured).

Figure 16: Tyler's Bollinger Bands Example

After determining the specifics of how my system would operate, I had to develop a process by which I could determine stocks that would trade well on my system. When considering what types of stocks I hoped to trade, I was looking for two primary characteristics: liquidity and trending. Though liquidity is always important, it is especially so when trading intra-day due to the increased importance of being able to exit a position quickly if needed. I also sought to trade stocks that were trending, rather than directionless or overly volatile. In particular, I was looking for stocks that had recently broken above or below their fifty two week high or low, which would indicate that a stock is trending as well as that it has a propensity for breakout behavior. I used the Hot Lists function built into TradeStation to identify the top twenty five stocks that broke above their fifty two week high, as well as the top twenty five that broke below their fifty two week low. Of those twenty five in each category, I isolated those with trading volume greater than or equal to five hundred thousand shares. Largely through a process of elimination, I determined that this was a reasonable threshold as it was both liquid enough that I could exit a position, as well as indicative of a symbol that was less volatile than normal.

At this point, I ranked each symbol in decreasing order of volume. I then briefly researched each symbol on the list to determine to what extent each symbol's recent price fluctuation was caused by a fundamental shift in the company's value, and to what extent it represented market volatility. From the list, I eliminated any stocks that did not have any substantial news developments supporting the spike or drop in price. For example, on April 19, 2015, Netflix Inc. (NFLX) was listed as the stock with the second highest increase over its fifty two week high. A quick search of the company revealed that the company had just released its first quarter earnings results, with very impressive results. Additionally, Netflix had just released a new TV series that had received outstanding critical reviews. Based on this information, combined with its price hike and high trading volume, I added NFLX to my list of stocks to trade. In contrast, Transition Therapeutics (TTHI) also broke above its fifty two week high, however it does not seem to have done much from a

fundamental perspective to warrant the spike that it displayed. That information, combined with very low trading volume, would be enough for me to eliminate it from my list of potential stocks.

As it's written, my strategy automatically trades one hundred shares of each stock. As such, to enter a position would cost one hundred times the share price of the stock. That being the case, before trading for the day, I would first determine how much money I would be willing to spend that day. With that ceiling established, I would then run my system on as many stocks as I could, working from the top of the list to the bottom, without breaching the established ceiling. This is certainly an area that could benefit from future enhancement, as there is no built-in way to take a larger or smaller position based on the quality of the indicators under observation. Depending on the sizes of positions taken, this method could also exclude some stocks that would end up being detrimental to overall profitability. However, it could also lend itself to a system that includes more stocks than would otherwise be included, which could boost profitability. Though the system is still proving to be profitable as it stands, it could certainly be improved in this area.

It was also imperative that I determine early on whether this system would be traded manually, semi-automatically, for fully automatically. I learned early on in the process of developing a system that too many traders do not take lifestyle and "mental toughness" restrictions into consideration when trading; both of these weighed heavily on the decision to trade automatically or manually, as manual systems unsurprisingly take up more of the trader's time to operate than automatic ones. For that reason, I chose to make this system fully automatic with some manual pieces weaved in. More specifically, I chose to have this system run without any supervision. I elected not to have it alert me or ask for my approval before making a trade, but instead to simply follow the rules that I established to make it run. Unfortunately, I simply don't have the time to approve each proposed trade, and I certainly don't have the time in the day to follow each individual stock to see whether it is

exhibiting any of the desired characteristics for the system. I did choose, however, to manually select which stocks to trade and at what point to discontinue trading of the stock. I believe that this fundamental analysis, though not overly time consuming, gives me a slight edge on other trading systems that tend to focus solely on technical analysis.

SYSTEM ANALYSIS

Of course, the hallmark of a good trading system is one that is consistently profitable. While it is impossible to determine if a system will be profitable one hundred percent of the time, we can use certain statistical techniques to determine the likelihood that it will remain profitable under certain conditions. Though I used a number of stock symbols to analyze system profitability, I looked most closely at Google (GOOG) for the purposes of conducting the deepest analysis.

One of the most robust measures of overall system profitability is expectancy, which measures a system's average profit or loss per dollar risked per trade. Though a system will certainly not turn out to be profitable with a negative expectancy, intuitively a higher expectancy is better than a lower expectancy. For eighty nine trades from 2013 to 2015 of GOOG (see Appendix page xxiv), my system had an expectancy of $0.34, which means I could expect a profit of $0.34 for each dollar risked on each trade. Though it is in fact a positive number, this is lower than I had hoped. From a risk standpoint, this does not offer much reassurance that the system is in fact profitable over time. Annualized Expectancy, or Expectunity, does better at $15.72. This means that for every dollar risked per year, I can expect a profit of $15.72. Based on this, I know that the profitability of my system is characterized by infrequent "homeruns," or very profitable trades, as opposed to consistent less profitable trades. A quick glance at my list of trades confirms this, as the majority of my trades lost money. System quality is 1.25, which represents expectancy

relative to the total variability of profit or loss per dollar risked. Though I would have liked to have seen this number higher, I am still happy with the overall profitability of the system, with the knowledge that it is profitable over time (though not necessarily all at once).

I also used the program Market System Analyzer (Adaptrade) to conduct a more robust analysis of my system. In particular, I performed Monte Carlo analysis as well as position sizing analysis to determine to what extent order of trades and trade size respectively affected overall profitability. Figure 17 is the base diagram from the program, which includes an equity curve, its line of best fit, and the number shares involved in each trade.

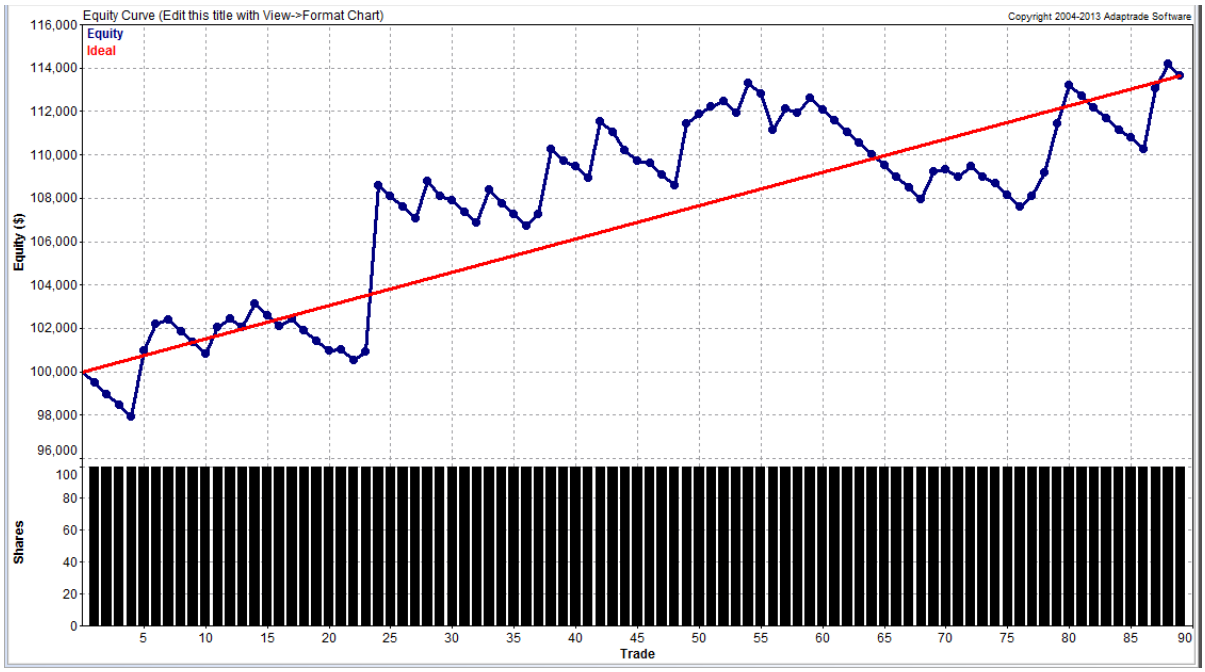


Figure 17: Tyler's Equity Curve

Based on this graph alone, the first obvious takeaway is that my system was in fact profitable. Based on a starting equity of $100,000, I generated a 13.65% return on investment, or $13,650. This, however, only shows one scenario with parameters that have been optimized to that scenario. For that reason, it is important to perform Monte Carlo analysis to determine to what extent the system's profitability was as a result of the order

of the trades. The Monte Carlo Analysis in Market System Analyzer (Adaptrade) generated the report in figure 18, which shows rate of return and the confidence with which we can expect to generate those rates.

Market System: Team 3 Portfolio.msa

Trading Parameters

Initial Account Equity: $100,000.00
Trading Vehicle: Stocks
Minimum Margin Requirement: 100.0%
Slippage per side: $0.00 per trade
Commissions and fees per side: $7.50 per trade

Position Sizing Method: None
No. Shares: From input data
Number of Monte Carlo Samples: 5,000

Key Results at Select Confidence Levels

Confidence (%)	Rate of Return (%)	Max Drawdown (%)	Return-DD Ratio	Mod. Sharpe Ratio
50	18.15	3.408	5.401	0.1517
60	16.19	3.826	4.456	0.1388
70	14.35	4.323	3.487	0.1262
80	12.15	4.951	2.596	0.1107
85	10.86	5.417	2.198	0.1013
90	9.559	6.118	1.701	0.09100
91	9.299	6.302	1.603	0.08808
92	8.885	6.448	1.507	0.08533
93	8.479	6.632	1.385	0.08205
94	8.085	6.827	1.278	0.07896
95	7.678	7.118	1.159	0.07512
96	7.140	7.465	1.043	0.07045
97	6.467	7.847	0.8775	0.06531
98	5.479	8.398	0.7120	0.05563
99	4.249	9.132	0.4883	0.04487
100	-2.354	13.82	0.000	-0.01697

Monte Carlo Results at 95.00% Confidence

Total Net Profit: $7,678.00
Final Account Equity: $107,678.00
Return on Starting Equity: 7.678%
Profit Factor: 1.245

Max Number of Shares: 100
Minimum Number of Shares: 100
Average Number of Shares: 100

Largest Winning Trade: $7,692.00
Largest Winning Trade (%): 7.623%
Average Winning Trade: $1,226.81
Average Winning Trade (%): 1.156%

Largest Losing Trade: ($1,635.00)
Largest Losing Trade (%): -1.480%
Average Losing Trade: ($553.32)
Average Losing Trade (%): -0.5072%

Average Trade: $86.27
Average Trade (%): 0.09003%
Trade Standard Deviation: $1,701.96
Trade Standard Deviation (%): 1.539%

Win/Loss Ratio: 2.330
Win/Loss Ratio (%/%): 2.380
Max Consecutive Wins: 4
Max Consecutive Losses: 10

Worst Case Drawdown: ($8,165.00)
Worst Case Drawdown (%): 7.118%
Average Drawdown: ($2,303.64)
Average Drawdown (%): 2.109%

Return/Drawdown Ratio: 1.159
Modified Sharpe Ratio: 0.07512

Figure 18: Tyler's Monte Carlo Analysis

For example, we can say with ninety nine percent confidence that the system will generate a 4.25% rate of return or better, based on five thousand variations on the original order of the trades. If we require one hundred percent confidence, then we lose the certainty that the system is in fact profitable.

At the 95% confidence level, this analysis also confirms my suspicion that the system relies on infrequent profitable trades, as opposed to more frequent less profitable trades, as the ten max consecutive losses is more than double the eight max consecutive wins. This also shows that the return to drawdown ratio is 1.159, which means that the return is about 16% greater than the max drawdown percentage. This is significant as max drawdown is generally considered to be a deterrent for many traders, even if it doesn't necessarily represent pure loss. Put another way – it doesn't mean much to ultimately make $100 over the course of a month if the system was down $1,000 at one point mid-month. Though this system is providing a greater rate of return than the drawdown rate, I would have liked to have seen a greater return for every dollar drawn down.

Figure 19 graphically illustrates this Monte Carlo analysis.

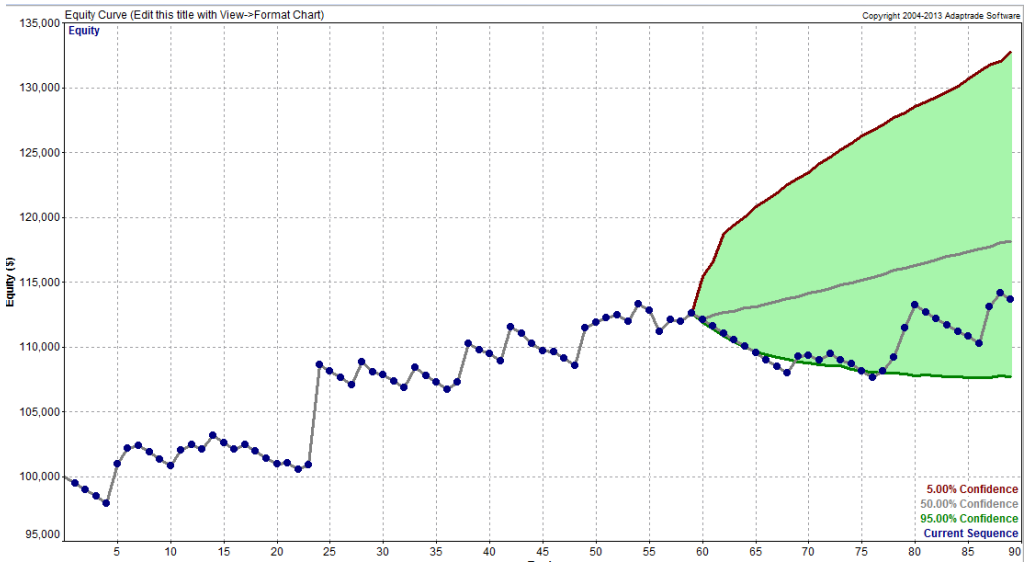


Figure 19: Tyler's Confidence Cone

The green shaded region represents a 95% confidence interval of the equity curve based on the various combinations of trade orderings. What is concerning is that the actual sequence of trades is in the lower half of that region, indicating that my system is not performing as well as would have been expected. More specifically, it is not capitalizing on the potential return for those trades, and is likely either not recognizing trends early enough or is not exiting trends early enough.

In addition to Monte Carlo Analysis, I also used Market System Analyzer (Adaptrade) to look at position sizing. This analysis showed what the optimal number of shares would have been for each trade. The bar graph at the bottom of figure 20 illustrates these optimized values, which have been optimized for the best possible return-drawdown ratio.

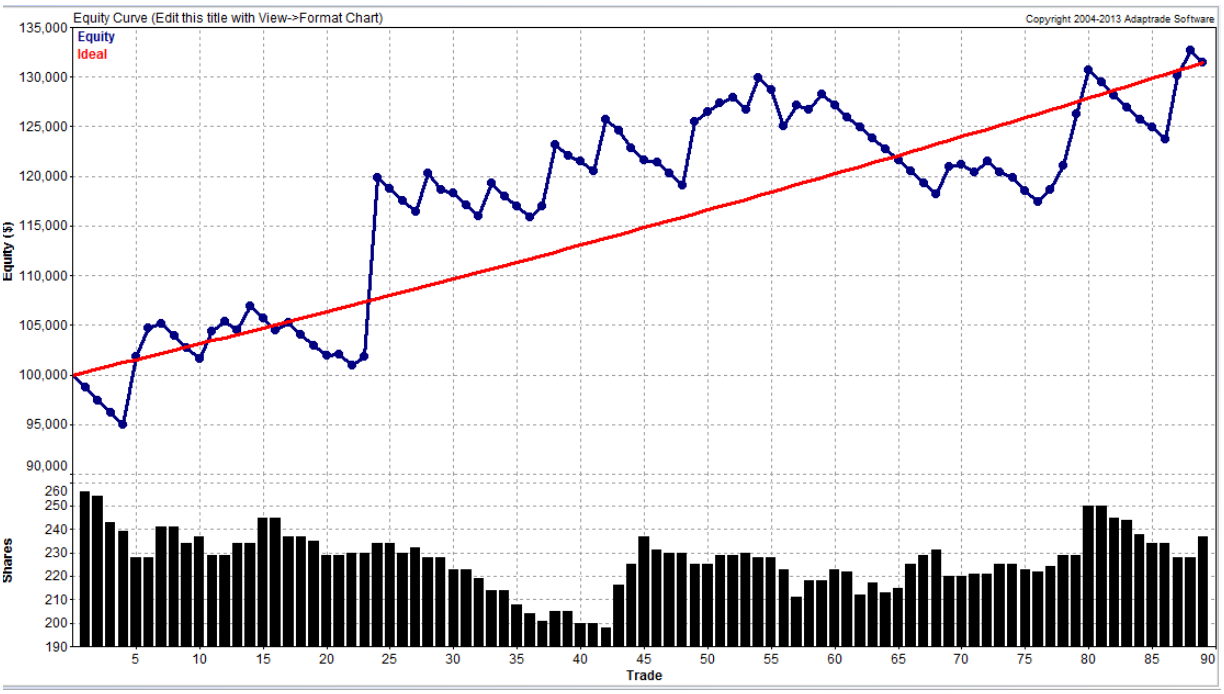


Figure 20: Tyler's Equity Curve with Optimized Position Sizing

According to these results, had my trades been for 200-250 shares rather than 100, my net profit could have more than doubled. My return on equity would have also doubled

correspondingly. As an area for future enhancement, I could now look at the trades that were recommended to have lower share volume than the others to determine what it was about those trades that triggered such an indication. By doing so, I could then program my system to trade a more dynamic number of shares based on information that I'll be able to glean from further digging. However, as a simple takeaway, it would be beneficial to change each of my trades from one hundred shares to two hundred shares. This would involve making sure that my account can support such an increase in required funds, and would also have implications for a combined system of systems.

In addition to these analyses, a successful trader must also perform walk-forward analysis to assess the robustness of a system. In essence, rather than optimizing parameters over an entire set of data, walk-forward optimization allows a trader to optimize parameters to a subset of the total available data, and then test the performance of the system on the remaining subset that the optimization testing never saw. This allows the trader to simulate actual trading conditions by testing optimized parameters on "unknown" future data. In addition, it helps ensure that a system does not become overfit by testing whether or not the parameters conform too closely to historical anomalies such that they are ineffective for future trading.

In TradeStation, there are two methods of performing this type of analysis. While a user can simply use the default settings for the percentages representing in-sample data and out-of-sample data, a more effective method is known as cluster analysis. Under this method, TradeStation constructs a matrix with percentage of data that is out-of-sample on the y axis, and the number of possible runs on the x axis. Following this analysis, the user can determine which combination produces maximum profit and can then run that specific analysis at specified intervals in the future to re-optimize parameters as needed. Figure 21 below shows the results of the walk-forward analysis on my system.

OOS% \ Runs	5	10	15	20	25	30
10	8,127.99	13,809.76	7,541.27	8,758.55	6,045.46	4,414.22
15	1,611.44	7,292.58	**7,979.61**	7,434.72	6,915.86	6,139.59
20	1,020.38	-493.50	7,107.96	5,826.01	3,640.79	4,575.72
25	8,491.36	6,040.39	7,114.60	6,850.18	-577.17	-1,730.76
30	8,035.21	4,657.62	191.25	3,240.28	316.42	-5,428.31

Figure 21: Tyler's Walk Forward Analysis Results

The y axis contains the percentage of the data that is out-of-sample, while the x axis is the number of runs that were done on the sample. In the middle of the matrix is max total profit under for each OOS% and run count. Highlighted in green is the cluster that is most profitable for my system. While this may look promising, a closer look at another walk-forward report is more troubling. Figure 22 below is the walk-forward efficiency report, which measures the extent to which out-of-sample data performs as profitably as in-sample data.

OOS% \ Runs	5	10	15	20	25	30
10	60.2%	193.9%	33.9%	35.7%	22.2%	14.7%
15	14.6%	**32.8%**	30.5%	23.9%	21.3%	16.5%
20	10.1%	-1.9%	22.5%	15.3%	8.7%	9.7%
25	43.5%	19.8%	19.0%	15.4%	-1.1%	-2.8%
30	36.4%	14.2%	0.5%	6.6%	0.5%	-6.7%

Figure 22: Tyler's Walk Forward Efficiency Report

A value of 100% means that the system performs just as well on data it has not yet seen as it does on data that it has optimized to, while any value less than 100% means it performs worse. For my system, in only one scenario did out-of-sample data perform equally to or

better than in-sample data. This indicates that my system may be overfit, which means it will likely not be as profitable going forward as it appears to have been in the past.

I've always seen this IQP as a step towards financial independence and as a way to control my financial future. However, I've also learned that the key to successful trading often lies more in understanding your own limitations than coming up with a highly profitable strategy. If I were to trade with others' money, I would likely trade some variation on my system based on what I've learned from analyzing its performance. For trading my own money, however, I would likely not trade it at all. In fact, I would likely not trade any system myself, due primarily to a fear that I could not remain objective and level-headed. I would rather relinquish some control over my money to a professional in exchange for the peace of mind that comes from knowing it's well tended. Put more simply, I doubt that I could ever find or create a system that I would be comfortable trading my own money on. I simply don't believe I have the mental willpower to do it!

Hyunsoo's System

SYSTEM DEVELOPMENT

When the advisors introduced various types of strategies at the beginning of the project, one particular type that utilized the Bollinger bands stood out. Below in figure 23 is an AUDUSD chart with the Bollinger Bands.

Figure 23: Hyunsoo's Bollinger Bands Example

It stood out because, first, it was visually appealing to see the bands move along with the chart. It offered more information than what is typically available on a chart in a clear and intuitive manner. Also, unlike support and resistance lines, they are dynamic, meaning that they adapt to the movement continuously without having to be reformed. After a strategy

utilizing the Bollinger bands was developed, the bands were interchanged with the Keltner channels to diverge from another strategy that uses the Bollinger bands, and it made my system more profitable. Below in figure 24 is the same chart except the Bollinger bands are replaced with the Keltner channels.

Figure 24: Hyunsoo's Keltner Channel Example

Comparing above charts, it is evident that the Bollinger bands and the Keltner channels share the same idea of designating some boundaries around the moving averages. However, there are several key differences. Jim Wyckoff, a proprietor of a trading advisory service, does a great job explaining what Keltner channels are and how it compares to other bands such as the Bollinger bands.

> "… [The Keltner Channel] is a volatility-based indicator that makes use of the "envelope theory." Moving average bands (or channels), like the Keltner Channel, fall into the general category of envelopes. These envelopes consist of three lines: a middle line and two outer lines. Envelope theory states that the market price will generally fall between the boundaries of the envelope (or channel). If prices move outside the envelope, it is a trading signal or trading opportunity. … The Keltner Channel can be used to help identify overbought and oversold conditions in a market. When a market's price is close to the upper band, the market is considered overbought. Conversely, when a market's price is close to the bottom band, the market is considered oversold. … An advantage of Keltner Channel compared to other channel indicators is that market lag is not as pronounced because Keltner Channels are extremely sensitive to fluctuations in volatility. …"

I chose to use an "envelope" to trade currencies because "envelopes" are well posed to tackle volatile markets such as currency markets, which have been historically more volatile than trend following.

THE SYSTEM

In the actual coding and implementation of the strategy, the Keltner channels are not explicitly used. However, the essence of the indicator is utilized by incorporating functions and calculations used to obtain Keltner channel into the strategy. In other words, the strategy will not refer to the Keltner channel directly, but all functions and variables used to calculate the channel is used in the strategy (see Appendix page xliii).

The strategy enters the market when the price crosses either the lower band or the upper band. If the price crosses the lower band, it indicates critical oversell, which means the traders in the market sold or shorted more than what would be typical. If the price crosses

the upper band, it indicates critical overbuy, which means the traders in the market bought more than what would be typical. Historically, oversell is followed by sharp rise in price and overbuy is followed by sharp fall. In short, when the price crosses the lower band, the strategy enters the market by going long, expecting the price to rise. When the price crosses the upper band, the strategy enters the market by going short, expecting the price to drop.

The strategy closes the trade when the reverse condition is met. While long, if the price crosses above the upper band, it closes the trade and goes short. While short, if the price crosses below the lower band, it closes the trade and goes long. As a result, the strategy is always in the market.

My strategy was developed through several stages:

1. A strategy using a standard Bollinger bands was developed. At this stage, the bands are comprised of a moving average at the center, plus and minus two standard deviations as the boundaries. The number of bars the moving average function and the standard deviation function refers to were optimized by the TradeStation to maximize the profit and it will continued to be optimized throughout the later stages.
2. The strategy was altered to use flexible multiples of standard deviations rather than just two. The multiples were optimized and the upper band and the lower band did not necessarily utilize the same multiple, resulting in asymmetric bands. The rationale behind the decision was that the market does not seem to react to overbuy and oversell condition equally and the strategy must adjust accordingly.
3. The strategy was divided into two: one for only going long, another for only going short. After analyzing the performance of the strategy, it was shown that it performs exceptionally well going short while going long barely breaks even. However, when the strategy was separated into two, neither of them performed compared to the

original. It was a surprise that the shorting half did not perform; it was because automatic re-entry to the market in the shorting half was either hasty or lagging compared to the original. It turns out, successful shorts in the original can be attributed to timings created by the longs.

4. After the strategy was reverted back to combination of longs and shorts, it was modified to utilize the Keltner channels instead of the Bollinger bands. This change started as an experiment after the advisor's suggestion. It was kept in because it made the strategy more profitable. One advantage the Keltner channels have over the Bollinger bands is its immunity to false entry. Because the Bollinger bands are formed using standard deviations, once the market stabilizes around a price the bands become smaller rapidly. It was shown this can result in entry to the market with the slightest fluctuations that does not necessarily indicate overbuy or oversell condition. Because the Keltner channels are formed with average true ranges, the bands preserve their size for longer periods.

There are also several improvements I have planned for my future use of the strategy.

1. The strategy can be modified to trade consecutively in the same direction. Currently, the strategy does not trade once it is in the market unless it is closing the trade and re-entering in the opposite direction. The strategy can be changed to keep buying/shorting if the oversell or the overbuy conditions are repeatedly being met. While this is trading against the market, which is not advisable, it may be successful in currency markets because the currency markets are so volatile. For every consecutive trade in a direction, the market is more likely to reverse.
2. The strategy can be modified to close the trade if the overbuy and oversell condition are suspected to be false. It has been observed that if the market does not reverse within a day after the oversell or overbuy condition is supposedly met, it goes back

to its natural volatile state. Rather than counting on the volatile state to act as desired, it is wise to close the trade and wait for the next opportunity.

3. The strategy can be modified to verify overbuy and oversell condition by referring to a corresponding volumetric chart. If the overbuy or oversell condition is met by a small volume of trading, it is statistically insignificant and such condition should be reflected by smaller position size or not entering the market.

SYSTEM ANALYSIS

The following analysis of my strategy includes walk forward analysis, expectancy and expectunity, and Monte Carlo analysis.

In cluster analysis, a part of walk forward analysis shown in figure 25, my strategy does not pass the majority of the tests, partly because the analysis is performed in a strict manner without downgrading any criteria.

OOS% \ Runs	5	10	15	20	25	30
10	FAILED	FAILED	PASS	FAILED	FAILED	FAILED
15	FAILED	FAILED	FAILED	FAILED	FAILED	FAILED
20	FAILED	FAILED	FAILED	FAILED	FAILED	FAILED
25	FAILED	FAILED	FAILED	FAILED	FAILED	FAILED
30	FAILED	FAILED	FAILED	FAILED	FAILED	FAILED

Re-optimization schedule: (In-Sample=441 days, Out-Of-Sample=49 days)

	Current	OOS+1	OOS+2	OOS+3	OOS+4	OOS+5	OOS+6	OOS+7	OOS+8	OOS+9
Date	2015/03/20	2015/05/08	2015/06/26	2015/08/14	2015/10/02	2015/11/20	2016/01/08	2016/02/26	2016/04/15	2016/06/03

Figure 25: Hyunsoo's Walk Forward Cluster Analysis

However, one combination does pass the test. It optimizes the strategy over 441 days and uses these parameters for the next 49 days. Below in figure 26 is a more detailed grade of this combination of optimization and trading.

Walk-Forward Analysis Results : OOS=10% WFRuns=15

Symbol: AUDUSD_60min Strategy: audusd-keltner

	Test Criteria	Result	Comment
1	Overall Profitability	Pass	Total Profit > 0. System is likely
			to perform profitable on unseen data
2	Walk-Forward Efficiency	Pass	Walk-Forward Efficiency >= 50%. System is likely to perform in future
			at a rate between 50-100% of those achieved during optimization
3	Consistency of Profits	Pass **	80%+ of walk-forward runs were profitable.
			System is most likely to be successful in future.
4	Distribution of Profits	Pass	No individual time period contributed more than 50%
			of Total Net Profit.
5	Maximum Drawdown	Pass	No individual run had a drawdown of more than 40%
			of initial capital.
	OVERALL RESULT	PASS	Walk-Forward Efficiency >= 0%. System is likely to perform in future

Figure 26: Hyunsoo's Detailed Cluster Analysis Results

Not only does it pass all of the test criterion, it does so exceptionally on consistency of profits, which means this combination of optimization is statistically future proof. Below in figure 27 is the equity graph of this combination had it been trading for the past two years.

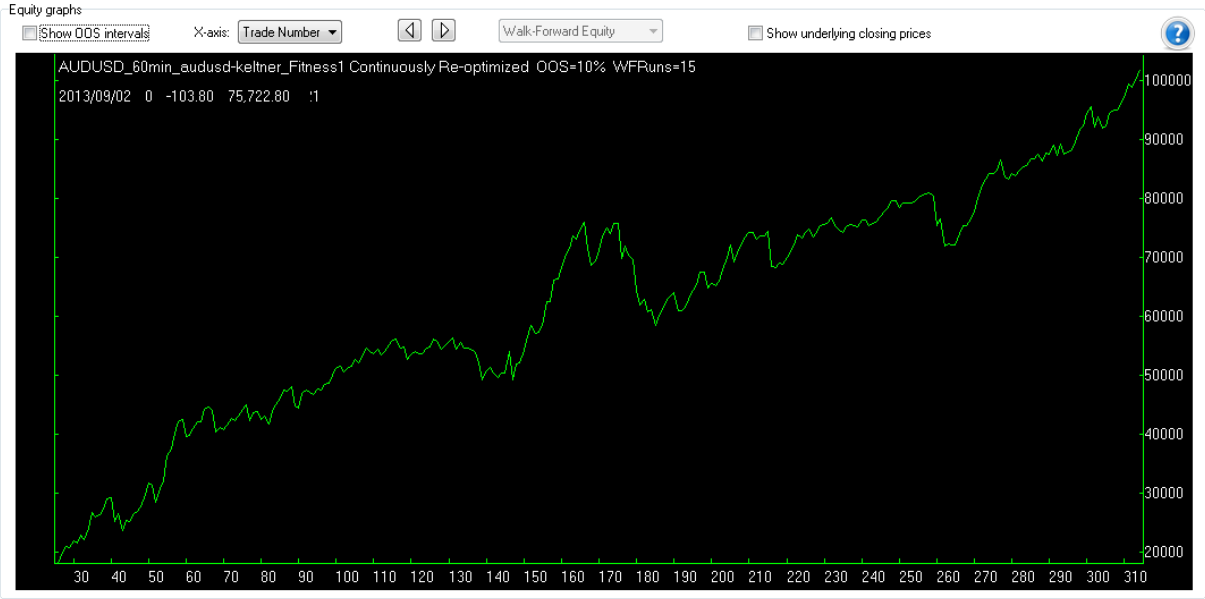


Figure 27: Hyunsoo's Optimized Equity Curve based on Walk Forward Analysis

There are a few places where the strategy loses, but for the most part it shows continuous profitability.

Expectancy, expectunity, and system quality can found in the Appendix (page xxxix). My expectancy is 1.00 or -0.06 depending on the method for calculating the R-Multitude. This puts expectunity at 88.98 or 5.22 and system quality at 2.63. The smaller of the expectancy and expectunity numbers is calculated using the largest loss of my system, which is an outlier and thus an unrealistic number. The larger two measures are calculated with average risk, a better representation of my system.

Below in figure 28 is the Monte Carlo analysis of my strategy. The analysis was performed with 10000 samples.

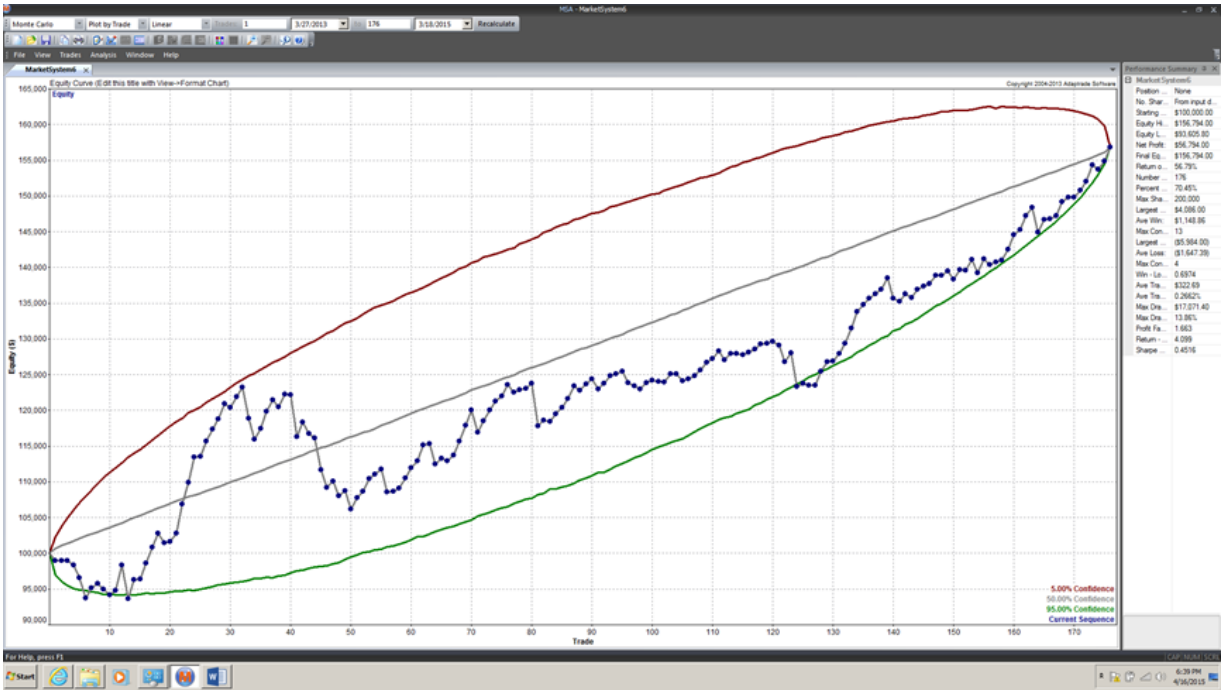
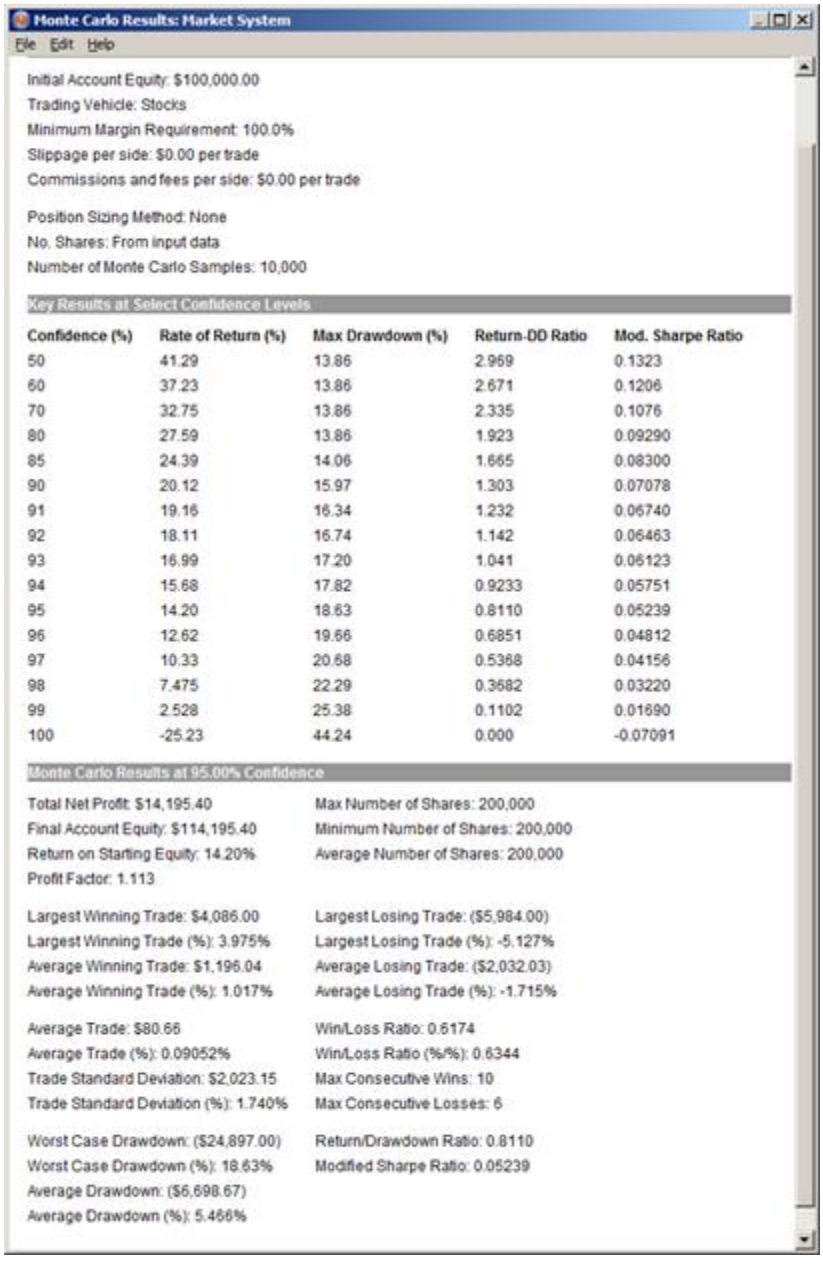


Figure 28: Hyunsoo's Monte Carlo Equity Curve

The graph shows that there is a 5% that the trades will go over the red boundary, 50% over the grey boundary, and 95% over the green boundary. One significant point is the 50th trade point of the green boundary. That is the point where the strategy will at least break even with 95% certainty. Given that there are 176 trades over two years, this means worst case scenario for 95% of all possible scenarios would be the strategy losing for about the first 7 months, then becoming profitable. Although this is very statistically unlikely, the fact that this is a possibility reflects poorly on the strategy unless the strategy is employed for

personal use, or there is enough capital and mental fortitude to endure the possibility of drawdown. Below in figure 29 is the list of key results at each confidence levels.



Monte Carlo Results: Market System

File Edit Help

Initial Account Equity: $100,000.00
Trading Vehicle: Stocks
Minimum Margin Requirement: 100.0%
Slippage per side: $0.00 per trade
Commissions and fees per side: $0.00 per trade

Position Sizing Method: None
No. Shares: From input data
Number of Monte Carlo Samples: 10,000

Key Results at Select Confidence Levels

Confidence (%)	Rate of Return (%)	Max Drawdown (%)	Return-DD Ratio	Mod. Sharpe Ratio
50	41.29	13.86	2.969	0.1323
60	37.23	13.86	2.671	0.1206
70	32.75	13.86	2.335	0.1076
80	27.59	13.86	1.923	0.09290
85	24.39	14.06	1.665	0.08300
90	20.12	15.97	1.303	0.07078
91	19.16	16.34	1.232	0.06740
92	18.11	16.74	1.142	0.06463
93	16.99	17.20	1.041	0.06123
94	15.68	17.82	0.9233	0.05751
95	14.20	18.63	0.8110	0.05239
96	12.62	19.66	0.6851	0.04812
97	10.33	20.68	0.5368	0.04156
98	7.475	22.29	0.3682	0.03220
99	2.528	25.38	0.1102	0.01690
100	-25.23	44.24	0.000	-0.07091

Monte Carlo Results at 95.00% Confidence

Total Net Profit: $14,195.40
Final Account Equity: $114,195.40
Return on Starting Equity: 14.20%
Profit Factor: 1.113

Max Number of Shares: 200,000
Minimum Number of Shares: 200,000
Average Number of Shares: 200,000

Largest Winning Trade: $4,086.00
Largest Winning Trade (%): 3.975%
Average Winning Trade: $1,196.04
Average Winning Trade (%): 1.017%

Largest Losing Trade: ($5,984.00)
Largest Losing Trade (%): -5.127%
Average Losing Trade: ($2,032.03)
Average Losing Trade (%): -1.715%

Average Trade: $80.66
Average Trade (%): 0.09052%
Trade Standard Deviation: $2,023.15
Trade Standard Deviation (%): 1.740%

Win/Loss Ratio: 0.5174
Win/Loss Ratio (%/%): 0.6344
Max Consecutive Wins: 10
Max Consecutive Losses: 6

Worst Case Drawdown: ($24,897.00)
Worst Case Drawdown (%): 18.63%
Average Drawdown: ($6,698.67)
Average Drawdown (%): 5.466%

Return/Drawdown Ratio: 0.8110
Modified Sharpe Ratio: 0.05239

Figure 29: Hyunsoo's Monte Carlo Results

This list can be interpreted cumulatively. For example, 50% of the samples have rate of returns greater than or equal to 41.29%. The next 10% have rate of returns between 37.23% and 41.29%, and so on. It has to be noted the max drawdown is measured proportional to the total capital. There is huge disparity between 99% and 100% confidence intervals because that is the place where most outliers lie. Below in figure 30 shows the cone of expected trades.

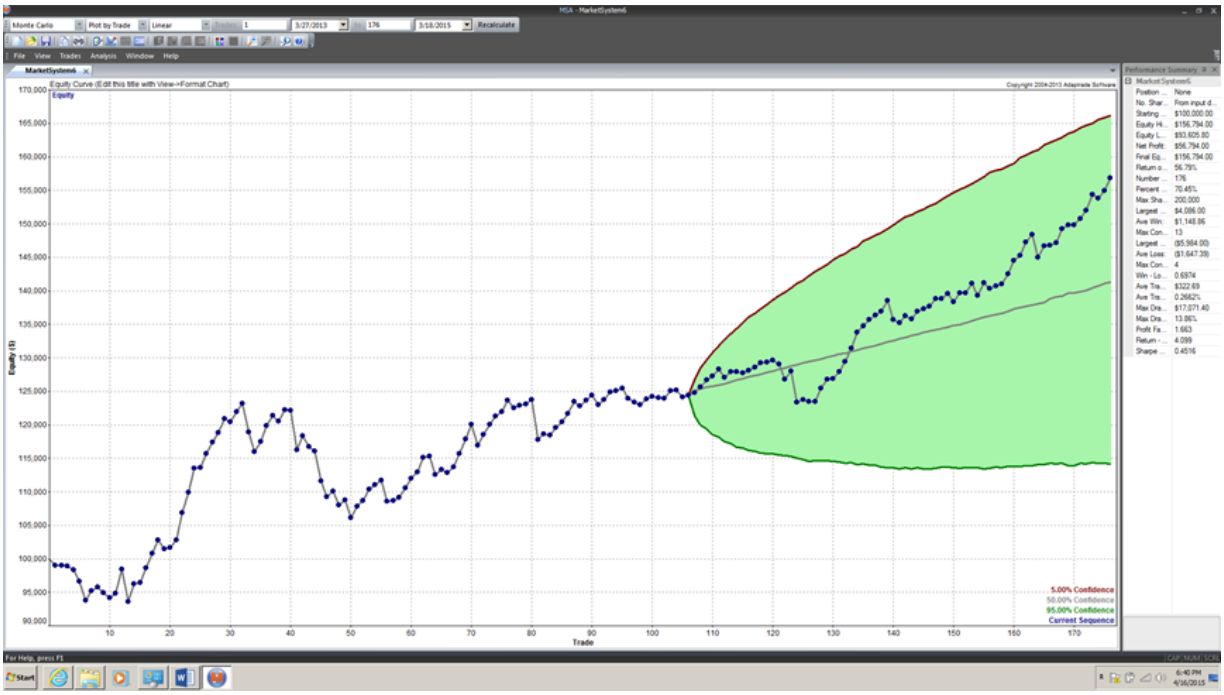


Figure 30: Hyunsoo's Confidence Cone

The cone is formed using trades before the cone and it expects later trades to lie inside the cone. If they do not, it means the analysis was not able to correctly predict the future trades and its analysis is more likely to be false. It is shown that the analysis was able to correctly predict the later trades and the strategy is coherent. Below in figure 31 is the summary of position size optimization.

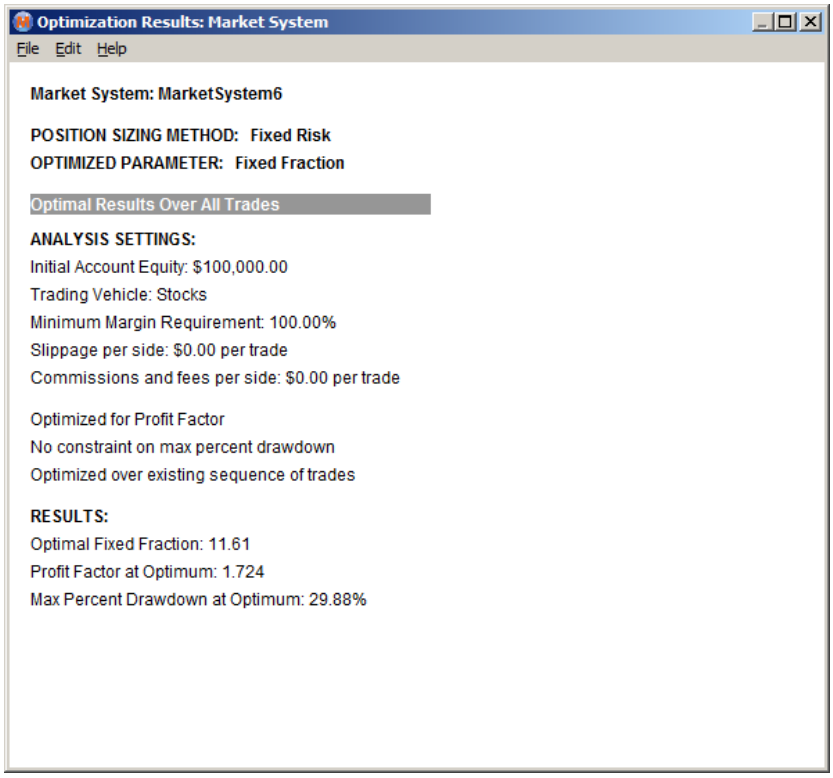


Figure 31: Hyunsoo's Position Sizing Optimization Results

The position size is optimized for highest profit factor. It indicates this particular position sizing will maximize profit proportional to the risk. Other kinds of optimization were performed such as highest net profit. However, all of them suggested the strategy to trade 100% of the total capital for every trade, which is not viable. In short, if the strategy trades 11.61% of its capital for each trade, the profit factor is optimized to 1.724. This means that for every dollar risked, 1.724 dollars are made. Below in figure 32 is the equity curve with such optimized position sizing.

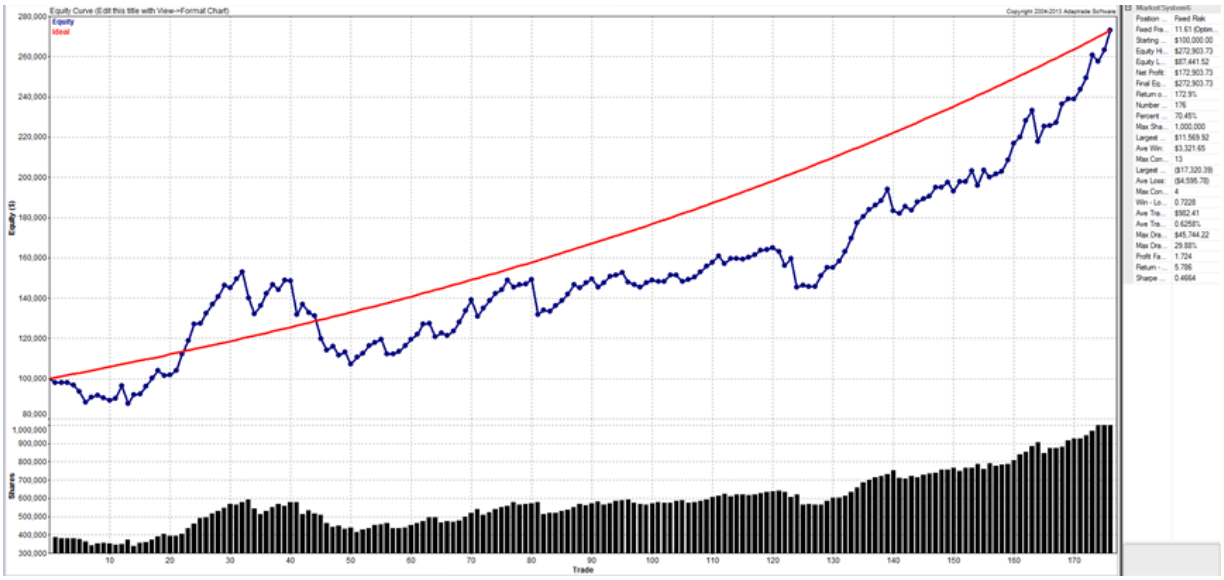


Figure 32: Hyunsoo's Equity Curve with Optimized Position Sizing

Below in figure 33 is without such position sizing optimization.

Figure 33: Hyunsoo's Equity Curve

It is shown, that the profit troughs are much more denounced when the position sizing is optimized for the profit factor and that the strategy is substantially more profitable when optimized for the profit factor ($172,903.73 vs $56,794.00 net profit).

Nicolas' System

SYSTEM DEVELOPMENT

I tried to focus on creating a strategy that would help me familiarize myself with trading a market that would be financially feasible for me to implement once I'm out of college and have a steady income. I started off the project by spending the first semester of the year learning how to use the TradeStation trading platform and experimenting with different share sizes and different markets. I was not sure at first whether I wanted to develop a manual or automated trading strategy, but I already knew that I wanted to base it around a purely analytic perspective. I didn't want to spend time considering external news that will often stimulate the market and sometimes cause unexpected or unordinary behavior in the price movement, as it is always a safer decision to avoid the market during these kinds of occurrences. So at first I spent a lot of time simply getting experience analyzing market movements, trading many different kinds of stocks and a few of the major currency pairs. I would take note of patterns and recurring behaviors in my trading journal and come up with temporary strategies to make short-term trades that could last from only 30 seconds to a few days. My first experiments made me aware of the many kinds of mistakes a trader can make, and therefore have contributed to several adjustments to my strategy throughout its development. A majority of these adjustments were geared towards helping me mold my strategy into something that would fit the times that I would be available to trade during a term. Time management was one of the harder things to accomplish for this project because every term my schedule changes so the times that I was available to trade would change. I have found that each individual market has certain times of the day where you can expect there to be more volatility, so this meant the market behaviors that I experienced would change and my strategies would yield inconsistent results. Including this, I knew I had to identify all of the other individual problems I was having with developing a concrete and reproducible scientific strategy.

OUR PROJECT

In the beginning of the developmental process for my personal trading strategy, as I described previously, I was experimenting with different rules, different markets, but usually made the decision to press the button to buy or short based on a gut feeling. This is definitely a problem when the goal is to have a scientific strategy with a defined set of rules by which the trader must trust and abide by. Doing so allows the strategy to be analyzed statically so that its performance and value as a functional strategy can be critiqued. In order to improve my understanding of how to guide myself as a manual trader, I learned and utilized trading rules as outlined in "Trading Rules that Work – The 28 Essential Lessons Every Trader Must Master" by Jason Alan Jankovsky. The rules Jankovsky talks about in his book served as guidelines for my approach in developing a strategy. I realized that I had to start somewhere, and the book pointed me towards focusing first on knowing my time frame, defining my risk, and knowing my trading plan. Various other sources of information I have learned from include trading blogs and trading encyclopedias online. The information I would encounter on trading blogs and forums usually consisted of people implementing their own strategies and talking about problematic components of the strategy. People also post questions on how to execute a certain technique with code for automated strategies. The trading encyclopedias introduced0 me to terms and popular ideas that exist in the trading circle. The research done for development of my strategy helped me to acquire a better of understanding of various aspects of the trading and investment world and how to trade efficiently and consistently.

As I was learning about trading and different strategies to use, I knew that there were a number of variables that I needed to decide first and foremost if I was to build a strategy, so I established the following variables to be defined: number of chart analysis windows, time intervals, market type, risk, time in the market, position size, and number of markets.

The first two variables are heavily dependent on each other, so I had to decide on a number of chart analysis and the bar time-intervals jointly. I decided I wanted to have 3 chart analysis windows, the first with daily bars, the second main window with 5 minute bars and the third window with 1 minute bars. The purpose of the daily chart is to have a general idea of the direction in which the specific market is moving. The 5 minute charts are the main bars for observing and analyzing in order to trade throughout the day. I have found that I can recognize a higher amount of opportunities to open a position with the 5 minute charts in exchange for a small sacrifice of increased variability and unpredictability in the price movements. With that being said, the 1 minute bars are used for give me a better understanding of how exactly instances of volatility are behaving. Consider the following charts from 9:00 AM to 12:30 PM in figure 34 below.

Figure 34: Nicolas' TradeStation Charts

Both graphs show data from the E-mini S&P 500 June 2015 market. From 9:30 to 10, the market was on a strong uptrend up until the price started to oscillate and generally seemed indecisive almost until noon, where in one bar, the contract value increased from 2100.75 to 2108.00, a total of 29 ticks which is a considerable amount for a 5 minute timespan. To get a better idea of what happened during that 5 minute bar, the 1 minute chart shows that throughout the entire 5 minutes, the price was consistently increasing and not oscillating

dramatically, which in will do in some cases. This information can be used to support the argument that since the value consistently went up throughout the five minutes, then this market is showing strong indications of continuing to uptrend, which it did until about 3:15. Using more than 1 chart analysis windows with varied time intervals is desirable because it can provide the trader with a variety of different perspectives on a specific market's performance. For example, if I am tracking a contract and all three of the chart analysis windows I am using are suggesting an uptrend is occurring, I can be more confident in my decision to open a buy position in that market. This reasoning also applies similarly to downtrends, reversals, and other behaviors.

After some time experimenting with different symbols for stocks, currencies, and futures, I decided to exclusively trade futures contracts. Although futures markets have a relatively high risk of loss due to the inflated contract values, they do have some leverage. This is ideal for someone who wants trade that has some money saved up to be able to make investments, which is what I hope my situation will be after a few years out of college. I wanted to develop a strategy that I could realistically use, so I focused on tailoring many factors about my strategy around that possibility. In order to trade futures one must also have a high risk tolerance. Someone investing the same amount of money needed to leverage 1 contract in the E-Mini S&P 500 into stocks or currencies will not make as much profit. Stocks and currencies require a larger amount of capital in order to make the same amount of profit or loss one would make trading futures. Although it is riskier, I feel comfortable taking that risk later on in the future when I have more money that I will be able to allocate investments.

By having my main trading window consist of 5 minute time intervals, this gives me plenty of opportunities to catch profitable market trends throughout the day. The market is generally most active from 8:00 AM to 4:00 PM as opposed to other hours of the day. I knew that I would have a reasonable number of free hours throughout every week during my

second semester to have time to sit and observe the market in order to implement my strategy, so I decided to try to be in the market when I could during the day. The positions I hold can last from a few minutes to a few days. I don't have any criteria for this because during the week, futures markets only close on weekends, so I feel comfortable letting trades stay open overnight.

I limited the amount of contracts I would hold for any position to 1 contract in order to maintain consistency throughout all my trades. I knew that it would be easier to gauge my system's performance and expectancy with less independent variables to account for. I also only actively traded a handful of markets at a time, and most of the time I preferred to have 1 or 2 positions open at a time. I carried this mindset into my current strategy as well. I believe that a simple strategy is not necessarily worse than a more complicated strategy. Being able to stick to one or two trades helps me focus on following my trade rules and allows me to make better decisions.

Throughout the development of my system, all of the experimentation done with different markets and strategies and indicators, has led me to establish the mindset and rules that I have adopted for my personal strategy for trading futures that I have described. The strategy itself implements these rules and concepts to popular trading techniques in order to have a means of identifying possible opportunities to make some money. The final strategy utilizes the basics about trading that I have learned from Professors Hakim and Radzicki.

THE SYSTEM

The final trading strategy consists of 2 main techniques for which the rules established are based around. The first main component involves the use of two different moving averages, one simple moving average (SMA) and one exponential moving average (EMA). The SMA

is computed by taking the average of the closing price over a specified number of bars, and in this case it is 8 bars. The EMA spans 30 bars. I use both moving averages as a part of the strategy in order to alert me of crossovers which can indicate market trend reversals. Below in figure 35 is the Easy Language code written for my moving average indicator.

```
inputs:
    Price(Close),
    SlowLength(8),
    Length(30),
    Displace(0) ;

variables:
    SlowAvg( 0 ) ,
    AvgExp( 0 ) ;

AvgExp = XAverage( Price, Length ) ;
SlowAvg = AverageFC( Price, SlowLength ) ;

if Displace >= 0 or CurrentBar > AbsValue( Displace ) then
    begin
    Plot1[Displace]( SlowAvg, "SlowAvg", Yellow) ;
    Plot2[Displace]( AvgExp, "AvgExp", Magenta) ;

    { Alert criteria }
    if Displace <= 0 then
        begin
        if AvgExp crosses over SlowAvg then
            Alert( "Downtrending" )
        else if AvgExp crosses under SlowAvg then
            Alert( "Uptrending" ) ;
        end ;
    end ;
```

Figure 35: Nicolas' Easy Language Code

These indications are not always correct, but they give the trader a better idea of market behavior. Futures markets are very volatile throughout the day, so making trades just based off the moving averages would result in many losing trades. Moving averages are not good representations of the volatile markets, but the way they can be used to analyze the markets can be adapted according to the markets behavior.

The second component of my strategy utilizes support and resistance lines to predict when a reversal is going to happen. I define my support/resistance lines as value regions that the

market consistently reverses at, and these reversals create local minimums and maximums. My criteria for creating support and resistance lines for my strategy is a series of at least 3 consecutive local minimum or maximums within 24 hours. However, if the market is inactive and volatility is low, I go back 36 hours. I also tend to leave past support and resistance lines saved onto the symbol because another common occurrence that happens in futures markets is that these past support and resistance regions return if the contract price returns to that level days later. Consider the graph below in figure 36 for an analysis of the second trade.

Figure 36: Nicolas' Trading Charts Example

Within the markets history, about 12 hours, the market had rebounded at least 3 times around 2067.00 prior to the 4th hit around 2:15 PM. I watched as the market drastically and violently declined towards that value. As soon as it hit, I realized the market would be likely to repeat what it had done just a few hours prior, and opened a long position. A few minutes later I closed the position and profited about $500.

I use the moving averages as an additional indicator to differently predict a reversal. Whenever the absolute value of the difference between the EMA and SMA is 1 block (either 4 or 8 ticks depending on the symbol), not only is there a strong trend occurring, but after much time analyzing the behavior of various futures markets, it often tries to correct itself and a reversal occurs at some point. The SMA/EMA difference at which the market decides to reverse always changes depending on how much movement has occurred in the symbol throughout the week, which is why it can be hard to read the market in the beginning of a week to find an opportunity to make a trade. Unfortunately this gap is not sufficient to predict when the market is reversing, which is why I use support and resistance lines and only use these moving averages as indicators, not entry points. The trades in the above examples along with my other trades completed on the TradeStation software that followed my strategy can be found in the expectancy expectunity system quality spreadsheet in the Appendix (page lxvi).

SYSTEM ANALYSIS

My system was profitable, and displays some very impressive statistics, but unfortunately, the system does not provide for many opportunities to find trades and therefore has a skewed expectancy which raises questions of its reliability, mostly due to the small number of trades. My system traded 26 times over 72 days, an average of 0.36 trades per day. There have been some weeks where I would find an opportunity for a trade every few days and sometimes I was able to find multiple trades in a day, which represents the market's complete unpredictability and variability.

The following chart in figure 37 displays a graphical representation of my total equity over the number of trades I made.

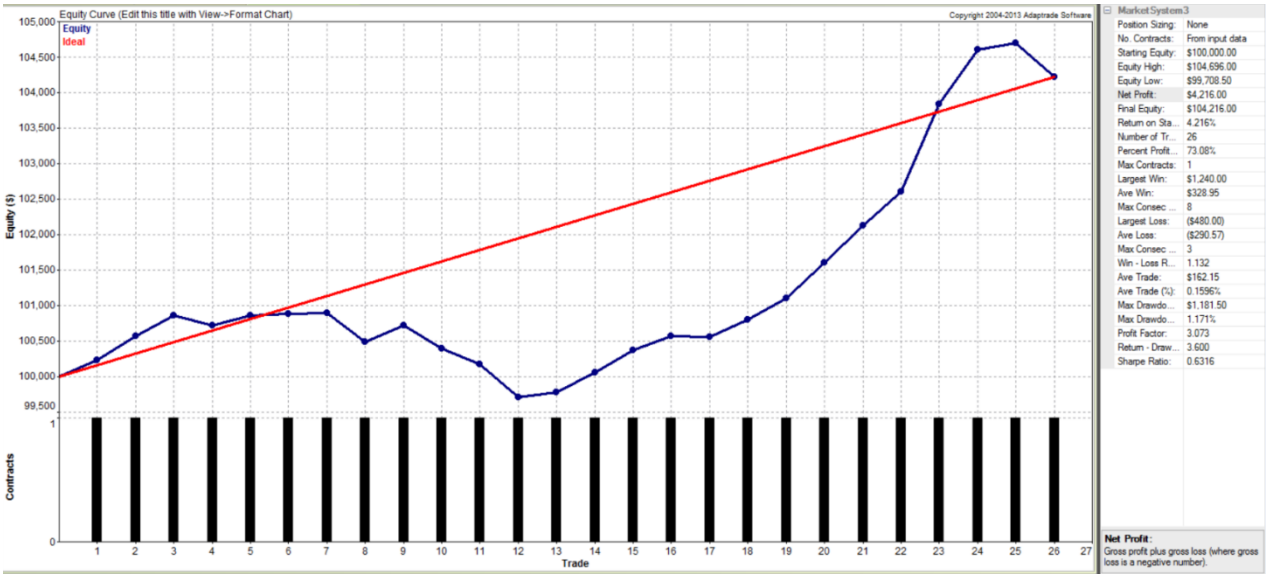


Figure 37: Nicolas' Equity Curve

The total net profit was only $4,216.00, but this is because I kept the amount of contracts I traded to 1 in order to ensure reproducibility and consistency of the strategy. This also made sure there could be never an outlying profit or loss that could skew and misrepresent the performance of the system. Although there were not enough trades to be fully analyzed, this consistency allowed the performance of the strategy to be accurately displayed.

Monte Carlo analysis was also performed on my strategy in order to gauge future performance of the system and to optimize it. The following graph in figure 38 shows how the system performed worse than expected results that had a 95% expectancy of occurring.

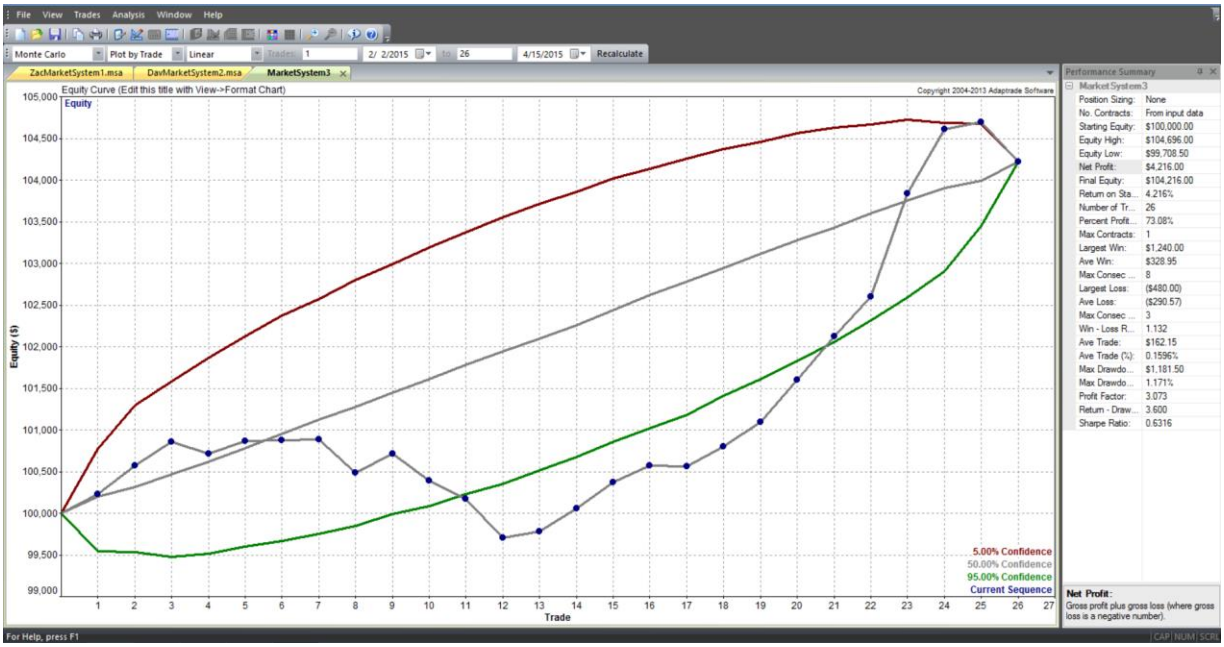


Figure 38: Nicolas' Monte Carlo Equity Curve

I believe this happened once again, because there weren't enough trades made on the system with the given time and strategy used to produce results that would normalize the equity curve to perform within expectancy, because according to Monte Carlo analysis, this performance should not have happened. There was also one outlying trade where I made 3 consecutive trades on the same reversal, which yielded fantastic profits and another where I made 3 consecutive losing trades in a row. Maybe I could have had worse performing trades if I had made more trades and over more time. Though the graphs behind the Monte Carlo analysis look questionable, the numbers are solid based on figure 39 below.

Market System: MarketSystem3

Trading Parameters

Initial Account Equity: $100,000.00
Trading Vehicle: Futures
Initial Margin: $0.00
Round-turn slippage per contract: $0.00
Round-turn commissions and fees per contract: $0.00

Position Sizing Method: None
No. Contracts: From input data
Number of Monte Carlo Samples: 10,000

Key Results at Select Confidence Levels

Confidence (%)	Rate of Return (%)	Max Drawdown (%)	Return-DD Ratio	Mod. Sharpe Ratio
50	4.216	0.7686	5.485	0.4243
60	4.216	0.8295	5.082	0.4237
70	4.216	0.8790	4.796	0.4231
80	4.216	0.9545	4.417	0.4224
85	4.216	1.027	4.105	0.4220
90	4.216	1.120	3.763	0.4214
91	4.216	1.142	3.691	0.4213
92	4.216	1.163	3.625	0.4211
93	4.216	1.188	3.549	0.4210
94	4.216	1.215	3.470	0.4208
95	4.216	1.248	3.377	0.4206
96	4.216	1.288	3.273	0.4203
97	4.216	1.327	3.177	0.4200
98	4.216	1.384	3.046	0.4196
99	4.216	1.475	2.858	0.4190
100	4.216	1.912	2.204	0.4148

Monte Carlo Results at 95.00% Confidence

Total Net Profit: $4,216.00
Final Account Equity: $104,216.00
Return on Starting Equity: 4.216%
Profit Factor: 3.073

Max Number of Contracts: 1
Minimum Number of Contracts: 1
Average Number of Contracts: 1

Largest Winning Trade: $1,240.00
Largest Winning Trade (%): 1.202%
Average Winning Trade: $328.95
Average Winning Trade (%): 0.3215%

Largest Losing Trade: ($480.00)
Largest Losing Trade (%): -0.4800%
Average Losing Trade: ($290.57)
Average Losing Trade (%): -0.2886%

Average Trade: $162.15
Average Trade (%): 0.1596%
Trade Standard Deviation: $383.11
Trade Standard Deviation (%): 0.3796%

Win/Loss Ratio: 1.132
Win/Loss Ratio (%/%): 1.125
Max Consecutive Wins: 5
Max Consecutive Losses: 3

Worst Case Drawdown: ($1,271.50)
Worst Case Drawdown (%): 1.248%
Average Drawdown: ($678.00)
Average Drawdown (%): 0.6666%

Return/Drawdown Ratio: 3.377
Modified Sharpe Ratio: 0.4206

Figure 39: Nicolas' Monte Carlo Analysis Results

With 95% confidence, the return to drawdown ratio is a high 3.4 and the rate of return is a solid 4.2%. The following Monte Carlo expectancy chart in figure 40 shows what the boundaries within which my system is project to have occurred for the last 10 trades.

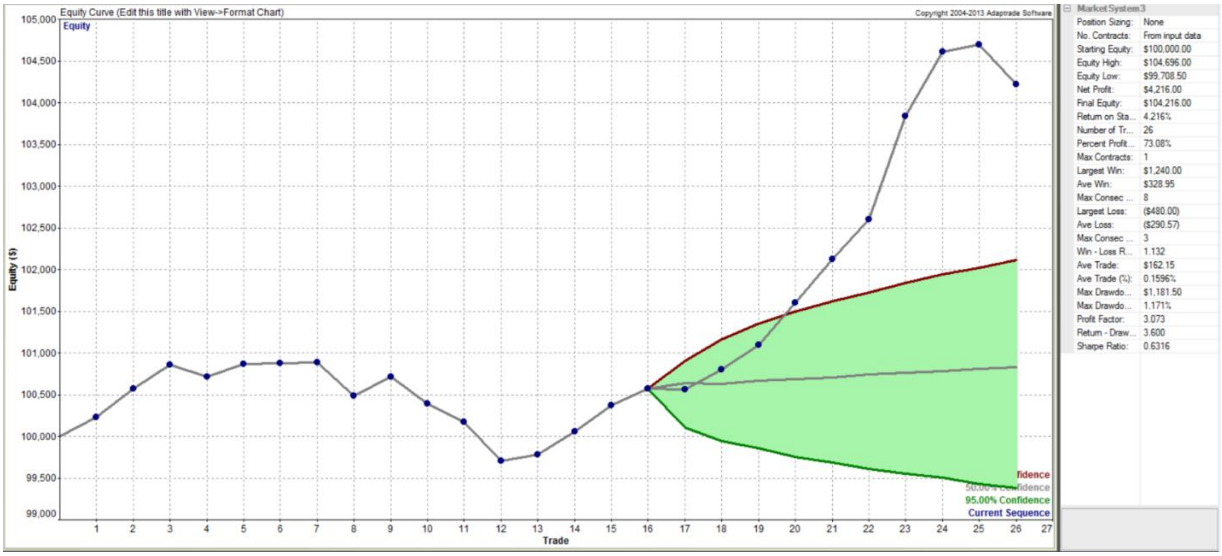


Figure 40: Nicolas' Confidence Cone

Although the system clearly shows signs of increased profitability over the last 10 trades, I also believe that this is representative of the trader improvement in being better able to identify good opportunities to implement the strategy. After I developed my strategy, I noticed that I got better at being able to find trades to open a position the more I looked at the market and observed its behavior which following the strategy. I think that this strategy should analyzed over a longer period of time with more trades in order to obtain a wider range of trades, which be more likely to provide a clearer picture of the potential of the system, but unfortunately I ran out of time.

System of Systems

PROJECTED PROFIT OF OUR COMBINED SYSTEM

Though each system has proven to be profitable in its own right, a truly successful system leverages the strengths of a variety of other systems to ensure maximum profitability. In other words, some of the most profitable systems are in fact systems of other systems. The challenge with a system of systems is determining how much money to allocate to each individual system, and under what conditions each system trades best. Though we analyzed each individual system, we also made sure to analyze the portfolio containing all four systems, with the hope of better understanding some of the underlying characteristics of our system of systems.

As each system is written, a combination of the four of them yields a return of 7.396%. More significantly, however, it should be noted that the equity curve for our portfolio is much more stable than that of any one individual system. This curve is illustrated in figure 41.

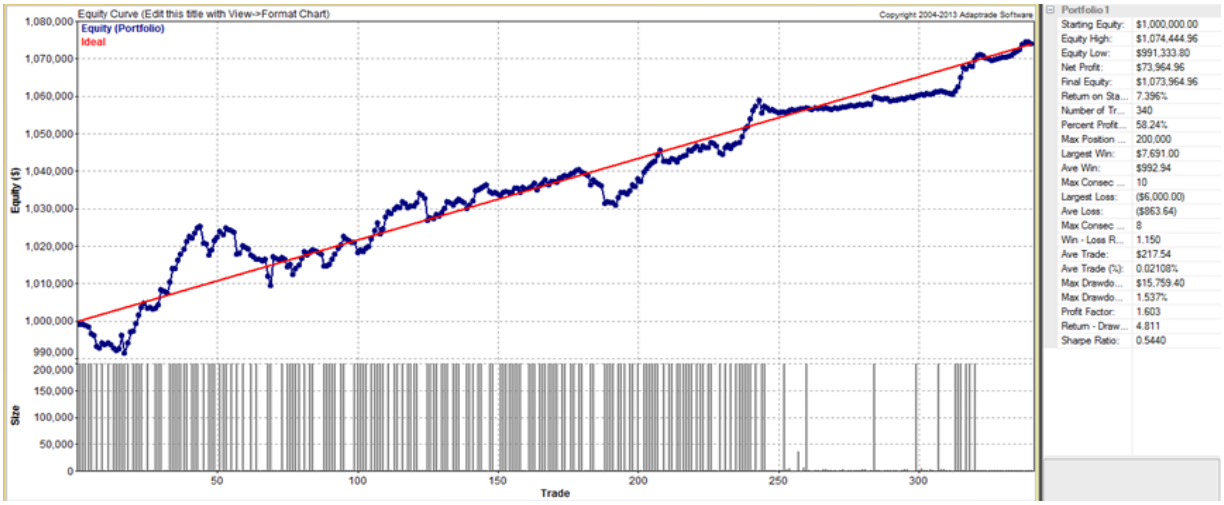


Figure 41: System of Systems Equity Curve

This lack of volatility indicates that an investment in this system of systems, is a much safer one than in any individual system. Unfortunately, our portfolio also has a maximum drawdown of more than fifteen thousand dollars. At more than fifteen percent of the total portfolio, this would likely be an unacceptable risk for anyone deciding whether or not to invest their money with this system. While the system is profitable overall, this would likely be a deal breaker for anyone for anyone who is even slightly risk averse.

To that end, we ran a position sizing optimization scenario with the intent of raising the return to drawdown ratio, signifying a greater return for each dollar that has been drawn down. This optimization returned the percentage of the total portfolio that should be allocated to each individual system, in a way that would lead to the highest return to drawdown ratio. In this case, it was determined that Hyunsoo's Keltner Channel system should receive 54% of the portfolio, while Nick's support and resistance system should get 104% of the portfolio. As this is greater than 100%, this is an indication that we could reduce the overall return to drawdown ratio by increasing the starting size of our portfolio. The optimization also indicated that Zachary's gap strategy should receive 7% of the portfolio, while Tyler's Bollinger Band system should only get 1%.

Though the return to drawdown metric is important, rate of return is also an essential metric for any potential investor. If we perform the same optimization exercise as before, but rather optimize for maximum rate of return, we learn that Nick's, Hyunsoo's, Tyler's, and Zachary's systems should be allocated 117%, 50%, 32%, and 28% of the overall account respectively. Under these conditions, the system generates a 2365% overall rate of return. This is certainly more robust than the 7% rate of return without any position sizing adjustments, and would not-surprisingly be preferable to our initial version, but keep in mind this is only attained through using 227% of our available capital, which is not possible.

We also used the Monte Carlo technique that we used on each of our individual systems on our portfolio of systems as well, to develop a range for expected rate of return. Figure 42 contains the Monte Carlo channel, with the red and green bars representing a 95% confidence range where equity would be expected to fall.

Figure 42: System of Systems Monte Carlo Equity Curve

Figure 43 illustrates this same phenomenon moving forward, based on the system's most recent one hundred trades.

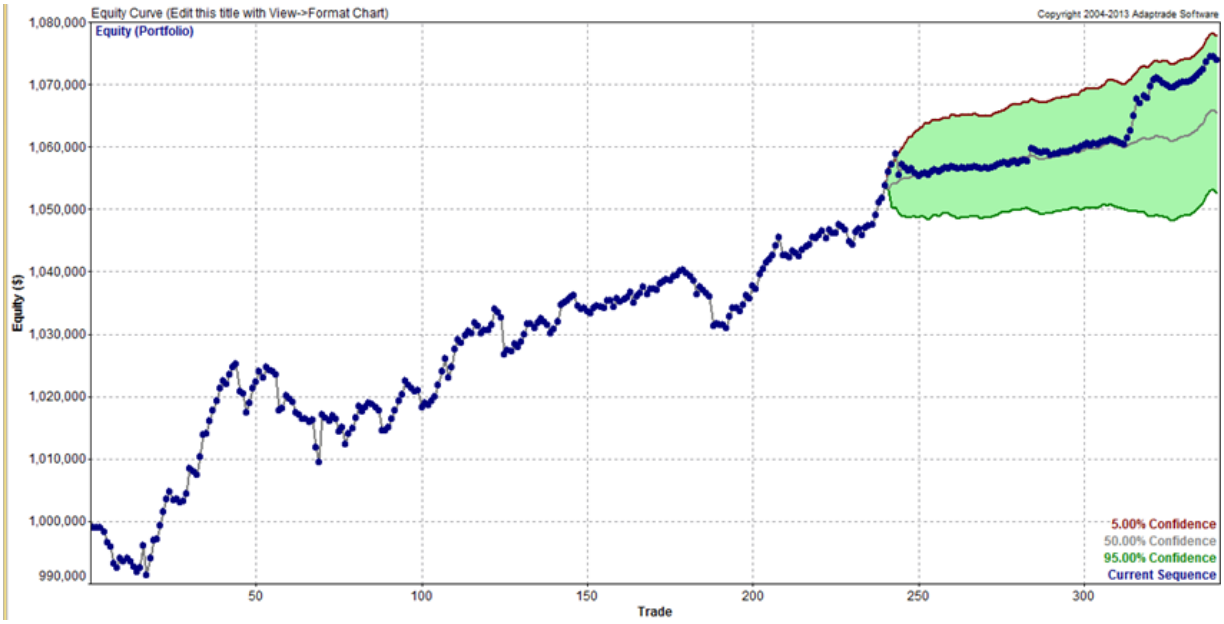


Figure 43: System of Systems Confidence Cone

This analysis revealed that we can say with 95% certainty that our system of systems will have at least a 5.27% rate of return. While this is on the low side, the fact that our equity curve is in the upper half of the confidence "cone" in figure X is a promising indicator that our system is in fact performing better than expected.

It's also worth noting that the system has a maximum of eight consecutive losing trades, as well as a maximum of eight consecutive winning trades. In addition, the average winning trade is only slightly higher than the average losing trade. This tends to suggest that the system's underlying profitability stems not from trades consistently being profitable, but from profitable trades being very profitable.

In addition to the MSA tools to analyze our system of systems, we also did mathematical analysis of our own. By taking the data we used in the MSA software, we were able to come

up with the average profit per dollar risked (using average and maximum loss), average profit per capital wagered, and rate of return with yearly compounding based on average number of trades per day and average length per trade. These can be seen in figure 44.

	Zac	Tyler	Hyunsoo	Nick		System of Systems
Days of Trading	10	730	730	72		
Number of Trades	49	89	176	26		
Trades Per Day	4.9	0.1219	0.2411	0.3611		1.6144
Average Length of Trade (Days)	0.7959	6.5831	3.8894	0.8027		1.7676
Compounding Period (Days)	1	14.7853	8.0371	3.5719		2.3870
Average Capital Per Trade	$10,002.09	$51,727.25	$221,768.90	$8,762.00		
Max Risked Per Trade	$239.94	$1,620.00	$5,984.00	$480.00		
Average Risked Per Trade	$208.49	$495.69	$1,647.39	$290.57		
Average Profit Per Trade	$45.10	$168.37	$322.69	$162.15	% of system	
Average Profit Per Max Dollar Risked	0.1880	0.1039	0.0539	0.3378	15	0.2445
Average Profit Per Average Dollar Risked	0.2163	0.3397	0.1959	0.5580	35	0.4065
Average Profit Per Capital Wagered	0.0045	0.0033	0.0015	0.0185	10	0.0113
Rate of Return with Yearly Compounding	4.1660	0.0835	0.0683	5.5128	40	4.5963
Amount of System Dedicated (%)	28.48	12.87	7.22	51.43	100.00	100

Figure 44: Our Systems' Mathematic Analysis

By taking average profit per maximum dollar risked, average profit per average dollar risked, average profit per capital wagered, and rate of return and weighting each with 15%, 35%, 10%, 40% respectively, we came up with an allocation of 28.48% for Zachary's system, 12.87% for Tyler's system, 7.22% for Hyunsoo's system, and 51.43% for Nick's system in our system of systems. We came up with these weights because we think profit per capital wagered is just as important as per risk, but that average risk is more important than maximum risk and factoring in average profit per capital wagered gives more preference to systems that trade less. This gives our system of systems 24% average profit per maximum dollar risked, 41% average profit per average dollar risked, 1% return on investment for every dollar wagered, and 460% yearly return on investment. Our system of system under this analysis trades an average of 1.61 times per day with an average trade length of 1.77 days. The 460% yearly rate of return is astounding (this factors in reinvesting profit).

SPLITTING UP THE CAPITAL

Based on the information from our trades that we have gathered, we have concluded that Hyunsoo's and Tyler's systems are always in the market. They will make trades at a specified percentage of the fund. Zac and Nicks systems are only occasionally in the market. Zachary's system trades many different stocks weekday mornings, most trades occurring between 930-11am. His system will trade stocks at a fixed percentage of the fund, with each stock at a fixed percentage of the amount dedicated to his system. Nicks system trades at different times, but he is only in one futures contract at a time, so his system will also trade a fixed fraction of the fund. Additionally, a fixed percentage will be in cash reserves to reduce risk of large drawdowns.

As a last step in the process, we used a combination of information gleaned from Market System Analyzer (Adaptrade) as well as our own analysis to come up with a final allocation of money to each system. To accomplish this, we weighted each of the parameters from the three fixed fractional position sizing runs (optimized for net profit, rate of return, and return to drawdown ratio) at 20%, and our manual analysis at 40% to come up with a reasonable allocation for each system. Figure 45 illustrates these calculations.

	Zac	Tyler	Hyunsoo	Nick	% of system
Amount of System Dedicated (%)	28.48	12.87	7.22	51.43	0.4
MSA Net Profit	12.3441	0	31.5561	56.0998	0.2
MSA Return-DD	4.1713	0.4975	32.7893	62.5419	0.2
MSA Rate of Return	12.3956	14.1626	21.8813	51.5604	0.2
TOTAL % OF SYSTEM DEDICATION	17.17	8.08	20.13	54.61	

Figure 45: System of Systems Capital Division

Ultimately, we will want to keep one month's worth of earnings on cash reserves (valued at 460% compounded annually) which would consist of about 15% of our total equity. This would be to reduce the burden of potential drawdown. This would leave 85% in our investment fund. Based on the figures, we will use 17% of our investment fund on

Zachary's system, and 8% on Tyler's system. We would also allocate 20% to Hyunsoo's system, and 55% to Nick's system. As these figures are based on historical, scientific data, we are confident that this system of allocating funds would yield us the most effective system of systems possible.

CONCLUSION

Conclusion

At the beginning of this project, the goal was described as trying to build a casino: a trading system that may not be profitable 100% of the time, but ultimately is guaranteed to make profit in the long run. (Radzicki) If you look at what makes a casino profitable, you will likely discover that every game found in one has its odds of winning tipped in favor of the casino. Though a player may occasionally win big, the majority of players will walk away having fallen victim to the casino's mathematical likelihood of winning. In relation to trading, we attempted to do the same as a casino: come up with a scientific way of tipping the odds in our favor, thereby making long-term profitability a much more likely scenario. No casino has ever made money on intuition, however the majority of inexperienced investors and traders rely on theirs to predict when they think a symbol will increase in value. Through this project, we were able to develop individual systems, as well as a system of those individual systems, that consistently makes money in a variety of markets along with laying the foundation of why this occurs. To understand the value of using historical trading data to construct a trading system, one need look no further than billionaire investor Warren Buffet, who once argued that "In the business world, the rearview mirror is always clearer than the windshield." We would certainly tend to agree.

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APPENDIX

Zachary

EXPECTANCY, EXPECTUNITY, SYSTEM QUALITY SPREADSHEET

Stock	Entry Date	Entry Price	Exit Date	Exit Price	Long/Short	Profit/Loss	No. of Shares	Average Loss	Largest Loss	R Mult 1	R Mult 2
DGAZ	2/18/2015 8:44	7.15	2/18/2015 9:57	7.32	1	238	1400	$208.49	$239.94	$1.14	$0.99
ATOS	2/18/2015 9:30	2.05	2/18/2015 9:39	1.95	-1	495	4950	$208.49	$239.94	$2.37	$2.06
CUR	2/18/2015 9:30	3.75	2/18/2015 9:38	3.84	-1	-239.94	2666	$208.49	$239.94	-$1.15	-$1.00
NBG	2/18/2015 9:30	1.5	2/18/2015 10:13	1.53	-1	-199.98	6666	$208.49	$239.94	-$0.96	-$0.83
RUSS	2/18/2015 9:30	11.37	2/18/2015 9:39	11.1	-1	238.68	884	$208.49	$239.94	$1.14	$0.99
UCO	2/18/2015 9:30	9.06	2/18/2015 9:42	9.24	-1	-197.28	1096	$208.49	$239.94	-$0.95	-$0.82
GEVO	2/18/2015 9:30	0.28	2/18/2015 9:53	0.29	1	357.14	35714	$208.49	$239.94	$1.71	$1.49
DGAZ	2/20/2015 8:55	5.95	2/20/2015 9:30	5.82	1	-218.4	1680	$208.49	$239.94	-$1.05	-$0.91
GENE	2/20/2015 8:58	8.6	2/20/2015 9:30	8.42	1	-209.16	1162	$208.49	$239.94	-$1.00	-$0.87
FRO	2/20/2015 9:30	2.65	2/20/2015 14:46	2.67	-1	-75.18	3759	$208.49	$239.94	-$0.36	-$0.31
DUST	2/20/2015 9:30	14.45	2/20/2015 9:38	14	-1	312.3	694	$208.49	$239.94	$1.50	$1.30
EPRS	2/20/2015 9:30	8.88	2/20/2015 11:29	8.7	-1	202.68	1126	$208.49	$239.94	$0.97	$0.84
RUSS	2/20/2015 9:30	11.94	2/20/2015 9:51	12.18	-1	-200.88	837	$208.49	$239.94	-$0.96	-$0.84
SCO	2/23/2015 8:57	81.9	2/23/2015 9:39	80.04	1	-226.92	122	$208.49	$239.94	-$1.09	-$0.95
UVXY	2/23/2015 8:57	20.39	2/23/2015 11:58	19.86	-1	259.7	490	$208.49	$239.94	$1.25	$1.08
PLUG	2/23/2015 9:30	3.32	2/23/2015 9:35	3.25	-1	212.1	3030	$208.49	$239.94	$1.02	$0.88
JNUG	2/23/2015 9:30	26.21	2/23/2015 9:50	26.8	-1	-225.97	383	$208.49	$239.94	-$1.08	-$0.94
AMPE	2/25/2015 9:30	5.9	2/25/2015 9:32	5.78	-1	203.4	1695	$208.49	$239.94	$0.98	$0.85
NUGT	2/25/2015 9:30	14.4	2/25/2015 11:12	14.69	1	201.26	694	$208.49	$239.94	$0.97	$0.84
BLDP	2/25/2015 9:30	2.78	2/25/2015 9:39	2.72	-1	215.82	3597	$208.49	$239.94	$1.04	$0.90
GENE	2/25/2015 9:30	6.56	2/25/2015 9:30	6.43	1	-198.12	1524	$208.49	$239.94	-$0.95	-$0.83
DUST	2/25/2015 9:30	14.44	2/25/2015 11:12	14.15	-1	200.68	692	$208.49	$239.94	$0.96	$0.84
JDST	2/25/2015 9:30	9.28	2/25/2015 10:25	9.09	-1	204.63	1077	$208.49	$239.94	$0.98	$0.85
MHR	2/27/2015 9:30	2.78	2/27/2015 9:55	2.72	-1	215.82	3597	$208.49	$239.94	$1.04	$0.90
PBR.A	2/27/2015 9:30	6.44	2/27/2015 10:44	6.58	1	217.28	1552	$208.49	$239.94	$1.04	$0.91
GENE	2/27/2015 9:30	5.9	2/27/2015 9:39	6.03	1	220.35	1695	$208.49	$239.94	$1.06	$0.92
FRO	2/27/2015 9:33	2.6	2/27/2015 9:42	2.66	-1	-230.76	3846	$208.49	$239.94	-$1.11	-$0.96
NUGT	3/2/2015 9:30	15.85	3/2/2015 9:47	15.49	1	-227.16	631	$208.49	$239.94	-$1.09	-$0.95
GENE	3/2/2015 9:30	5.85	3/2/2015 9:33	5.99	-1	-239.26	1709	$208.49	$239.94	-$1.15	-$1.00
RUSS	3/2/2015 9:30	12	3/2/2015 11:46	12.28	1	233.24	833	$208.49	$239.94	$1.12	$0.97
JDST	3/2/2015 9:30	8.7	3/2/2015 9:50	8.9	-1	-229.8	1149	$208.49	$239.94	-$1.10	-$0.96
RUSL	3/3/2015 9:30	25.98	3/3/2015 3:59	26.15	1	65.45	385	$208.49	$239.94	$0.31	$0.27
BIOC	3/3/2015 9:30	4.06	3/3/2015 9:33	3.94	-1	295.56	2463	$208.49	$239.94	$1.42	$1.23
PBR	3/3/2015 9:30	6.59	3/3/2015 10:58	6.44	1	-227.55	1517	$208.49	$239.94	-$1.09	-$0.95
RUSS	3/3/2015 9:30	11.5	3/3/2015 3:27	11.23	-1	234.63	869	$208.49	$239.94	$1.13	$0.98
PLUG	3/3/2015 9:30	3	3/3/2015 9:30	3.02	-1	-66.66	3333	$208.49	$239.94	-$0.32	-$0.28
SBGL	3/3/2015 9:30	10.07	3/3/2015 10:57	9.82	-1	248.25	993	$208.49	$239.94	$1.19	$1.03
UVXY	3/12/2015 9:30	19.13	3/12/2015 9:44	18.69	-1	229.68	522	$208.49	$239.94	$1.10	$0.96
TVIX	3/12/2015 9:30	2.14	3/12/2015 11:15	2.09	-1	233.65	4673	$208.49	$239.94	$1.12	$0.97
UCO	3/13/2015 9:30	7.15	3/13/2015 10:49	6.93	-1	307.56	1398	$208.49	$239.94	$1.48	$1.28
UGAZ	3/13/2015 9:30	2.52	3/13/2015 9:44	2.55	-1	-119.04	3968	$208.49	$239.94	-$0.57	-$0.50
SCO	3/13/2015 9:30	86.9	3/13/2015 10:48	89.18	1	262.2	115	$208.49	$239.94	$1.26	$1.09
ONVO	3/13/2015 9:31	4.77	3/13/2015 9:33	4.66	-1	230.56	2096	$208.49	$239.94	$1.11	$0.96
GENE	3/13/2015 9:31	4.78	3/13/2015 9:32	4.88	-1	-209.2	2092	$208.49	$239.94	-$1.00	-$0.87
SBGL	3/18/2015 9:30	8.34	3/18/2015 11:25	8.53	-1	-227.81	1199	$208.49	$239.94	-$1.09	-$0.95
UCO	3/18/2015 9:30	5.95	3/18/2015 10:26	6.07	-1	-201.6	1680	$208.49	$239.94	-$0.97	-$0.84
UGAZ	3/18/2015 9:30	2.73	3/18/2015 10:01	2.79	-1	-219.78	3663	$208.49	$239.94	-$1.05	-$0.92
SCO	3/18/2015 9:30	103.01	3/18/2015 10:26	100.9	1	-204.67	97	$208.49	$239.94	-$0.98	-$0.85
ATNM	3/18/2015 9:30	3.34	3/18/2015 9:30	3.25	-1	269.46	2994	$208.49	$239.94	$1.29	$1.12

			Expectancy (Profit or Loss Per Dollar Risked Per Trade)	0.22	0.19			
Days Per Year	252	1st Trade 2/18/2015						
		Last Trade 3/18/2015						
	Strategy Days	10	Opportunities (Trades/Year)	1,234.80		Std Dev R Multiples	1.111415498	
	Number of Trades (Trades)	49	Annualized Expectancy (Expectunity) (Profit or Loss Per Dollar Risked Per Year)	267.12	232.10	System Quality	1.362486271	Total profit/loss per dollar risked relative to the total variability of the profit/loss per dollar risked => Dimensionless

APPENDIX

TRADING JOURNAL

A Term

8/30 – Downloaded TradeStation and began using charts and learning the different research tools TradeStation has.
9/2 – Messed around with orders now that the account is fixed. Bought and sold Apple.
9/4 – Tried to learn all the things I could about TradeStation in preparation for the quiz in class today.
9/11 – Intrigued in class about reading charts using algorithms and indicators to invest in the market when conditions are met possibly oscillation in stocks that are reliable. I prefer the buy high sell higher strategy but I don't think blue chip companies should be bought low and sold high.
9/13 – Began research on currency to trade. Don't really know much about the currency market. I've traded and researched the stock market. Euro seems to still be doing poorly against the US dollar but may rise with the US interest rate uncertainty. Watching the Euro USD chart.
9/15 to 9/17 – Traded EUR/USD - After reading many articles I decided to buy 100,000 Euro against the US dollar. Investing.com predicts the Euro to find resistance at 1.3015 and Fxstreet.com is rating EUR/USD as slightly bearish. In a wall street journal article I happened to see, I learned that the USD's rally was stalling and that there would be news Wednesday from the Fed about interest rate rise, and news Thursday from the European central bank about loans it would give out to regional banks. With this uncertainty looming I hoped for fluctuations in the EUR/USD and, if timed correctly, profit. There was a small spike in the EUR compared to USD over the weekend. After watching the movement of the currency over a few days I decided when I would buy. After it had a small run on Monday September 15th at 7:41pm it had a small pullback then started to rise again so I bought in at 1.29402. Since Monday it has hit 1.29944 at 12:35pm Tuesday September 16th and was down to 1.29541 at 8:35pm on Tuesday September 16th. I sold all 100,000 Euro on September 17th at 8:30am on a limit trade set at 1.2970. I thought based on the chart that the Euro would be able to hit this mark before declining, if it declined, and if it instead rose further, I would be poised to make 298 dollars. A small earning but still a great learning experience. Personally I have a better understanding of and prefer equity trading, possibly due to more experience with it, but I look forward to learning more about forex in the future.
9/20 – I like the EUR/USD pair. It seems to keep going down so I think I'm going to short it this week.
9/22 – Noticed Forexlive.com economic calendar. Many weren't impacting EUR/USD greatly are occurring this week.
9/23 to 9/24 – Traded EUR/USD - Looking at this week's economic calendar on forexlive.com, I noticed two important events happening on September 24th. First, at 4am (our time) the German IFO business climate index, which rates the current German business climate and measures expectations for the next 6 months, was being announced. Second, at 10am US new home sales for the month were being announced. I took note of the past German IFO business climate indexes and also the past US new home sales. German IFO index was predicted to drop while US new home sales was expected to rise. Both were considered to be possible very large market movers to the Euro and USD respectively. I consulted a few internet sources and they pointed towards a higher than expected US new home sale (due to the lower than expected US existing home sale released 2 days prior) and a lower than expected German IFO index. I decided on September 23rd to short the EUR/USD pair in preparation for a disappointing German IFO index and a positive US home sales number. I sold 100,000 Euro at 9:42 on September 23rd at a price of 1.28500 and bought back on September 24th at 11:42am at a price of 1.27899 making a profit of 601 pips. The German IFO index came in at 1 (104.7 vs 105.7) point lower than the forecast while the US new home sales came in at 74 (504 vs 430) points higher than the expected.
9/27 – Looking into a few currency pairs. Australian and New Zealand and Euro all look good to short against the USD which is going strong. I'll be looking for a good time to trade.
9/29 – No big movers in the week for USD until unemployment rate Frida. Potential market movers for EUR. Not much going on for AUD or NZD in terms of reports coming out.
– AUD/USD, EUR/USD, NZD/USD all still seem to be going down. USD/CAD stable around 1.11600.

APPENDIX

– Nothing is catching based solely on charts (Moving average crossovers and RSI).

9/30 – Bought EUR/GBP, EUR/AUD. I had read an article on forexlive.com that said that the EUR/AUD and EUR/GBP were going to bounce back from a long period of down trending as the USD was starting to slow down with interest rate news and the AUD and GBP were beginning to performing worse than the EUR. Australia's retail sales scheduled to come out at 9:30pm on September 30th were originally predicted to be the same as the month before, 0.4%, but just hours before the release of this data, the National Australia Bank analysts said to expect less than the country was predicting, that the actual value would be near 0.1%. The EUR/AUD responded with an upswing which I rode to the top then sold. When the release of the data did come out, the retail sales were at 0.4% and the currency pair resumed to below what it was before the news of a lower expectancy came out. At the same time as buying the EUR/AUD I also bought EUR/GBP. I was very nervous about this pair after I bought it because it had a down spike about 300 pips. But I was patient and it eventually rallied with the ECB interest rate decision and meeting 7:30-8:45am on October 2nd. The pair moved up and up and I sold it just before coming to class otherwise I would have stuck with it longer. When watching these two pairs, I kept the simple moving average (2 lines) analysis on the chart along with the RSI down bottom. Looking for crossovers of the moving averages and the RSI (whether the stock was overbought or oversold) in order to predict what others were analyzing and to decide what to do with the currency pair. I knew a wide gap between the two moving averages meant a sharp increase or decrease in the price and crossovers meant a change in direction.

10/2 – Sold

10/4 – Watched TradeStation EasyLanguage videos on youtube. Began making strategies.

– Made one to trade moving average crossovers when RSI was overbought/sold.

- Didn't trade at all – Scrapped the idea.

– Started one in moving average crossovers and open price gaps.

- Trades well – Didn't do exit strategies, just entries.

10/6 – Started exit strategies on trade system – Found online EasyLanguage codes that are helping. Still can't figure out how to trade a list of stocks.

10/7 to 10/9 – Traded AUD/USD, USD/JPY. Studying the chart of USD/JPY, I noticed that the currency pair was directionless and volatile over the last 3 weeks. I noticed a sharp increase in price late October 3rd, followed by a down trend until late October 7th when I noticed it had also trended down to this point a week earlier so I was thinking it could possibly be a floor and bought long. The pair rose in price for a day until the US Federal Reserve released the content of last month's meeting which discussed their fear of the strong US dollar and also desire to wait much longer for interest rates. Then the USD/JPY sharply dropped and has since trended downwards. A similar thing occurred with the AUD/USD. It was volatile and directionless for about the past 3 weeks so I sold short on October 7th when it had hit a peak that it had 1 week prior then fell. It began to fall but when after the Fed release, rose sharply, but has since trended downwards. Bought long USD/JPY: 108.025, Sold: 107.920, Loss: 105 pips. Sold short AUD/USD: 0.88133, Bought to cover: 0.87839, Profit: 294 pips. I am unsure as to exactly why the USD fell and I couldn't find a new source on it, but I am assuming because the fed was fearful of a strong US dollar that meant they would try to weaken.

10/10 – Decided moving average crossovers would be my basic trading algorithm.

– Coming up with exit strategies.

10/11 – Decided on a stop loss, closing the trade on X consecutive losing bars of n amount.

– Having trouble writing a recursive function so just going to do 2 consecutive bars.

10/13 – Finished the trading algorithm.

– Optimizing and back testing.

– Seems to work better on more volatile stocks when using daily bars.

APPENDIX

B Term

11/3 – Alibaba reporting earnings tomorrow.
- Election may spur stock rally.

11/4 – Statistically stock market up trends heavily on midterm election years in winter.
- Alibaba strong earnings report.
- Oil continues to go down, causing market to go down.
- Japan stimulus influencing US markets positively.

11/5 – Republicans gained control of the senate overnight.
- Midterm elections boosted markets in the US and Europe.

11/6 – Bought Alibaba (100 shares at $109.44 each).
- Stock poised to go higher based on strong earnings report and ability for growth.
- Jobless claims are lowest in years – Economy is improving.

11/7 – Growing US economy doesn't necessarily mean a growing stock market (new study).
- Jobs report was better than the previous quarter, but missed estimates
- New non-transparent ETF's where it doesn't follow an index or disclose holidays is allowed by securities exchange commission.
  - Could set a new form of ETF that may out pace mutual funds and managed accounts.
- Bought ProQR Therapeutics (42 shares at $12.36 each).
  - Stock projected by major analysis to rise to $30 - $40 range.
  - IPO was recent – It is a drug company specializing in Cystic Fibrosis.
  - Working on a drug to complete with the bigger Vertex Pharmaceuticals.

11/10 – China trying to inspire investors by opening stock market to overseas investors.
- US stock market still pushing forward setting new records.

11/11 – Real Estate Company's stocks are doing well in markets, getting more attention in retirement portfolios and individual traders.
- Alibaba "Singles Day" sales exceed expectations

11/12 – Twitters recent crash after bad earnings report expected to bounce back due to bullish sentiments from analysis.
- Republicans may shield online business from sales tax.

11/13 – US stock market is in "Santa Clause rally mode."
- Alibaba wants billion dollar bond sale.
- New "non-transparent" ETF's approved by SEC are not allowed to be called ETF's even though they are exchange traded.

Buffet buys Duracell for 4.7 Billion.

11/14 – Many big money managers are beginning to buy Alibaba.
- Sluggish growth in European GDP, US economy still doing well.
- Some fed directors want increase in interest rates soon and are speaking out in contrast to Yellen's delay on rate raises.
- Performance summary this week:
  - Alibaba up 5.17% to $115.10.
  - ProQR Therapeutics up 4.05% to $12.86

11/17 – Global investors flocked to Chinese companies on the first day of the new trading link.
- Over $100 Billion in takeover/merger deals today – Stocks soared for these companies.

APPENDIX

11/18 – SEC trying to approve new rule aimed at preventing market glitches.
- – Paramount group to become largest ever REIT – IPO as real estate continues to do well this year.
- – Goldman Sachs cements itself as top firm on wall street with over $900 billion in announced deals this year (next is $700 Morgan Stanley).
- – Bought 248 shares of Twitter (TWTR) at $40.32 each
- – Stock has a bright outlook and is down because of a poor earnings report.
- – Bought 124 shares of Carters (CRI) at $80.52 each.
  - Children's clothing store does well every holiday season.
- -Bought 556 shares of Merrimack Pharmaceuticals (MACK) at $8.99 each.
- – Biotech Company specializing in pancreatic cancer.
  - New drug in the works.

11/19 – Merrimack Pharmaceuticals receives FDA fast track designation for pancreatic cancer drug.
- – Interest in Hong Kong - Shanghai stock trading link fades.
- – SEC approves new stringent safe guards on computer stock trading.
- – 18% of portfolio managers focusing in large cap stocks are beating benchmarks this year (small cap 55%) – due to low volatility.
- – Japan's stimulus seems to be working

11/20 – Goldman Sachs reveals next year's stock market outlook.
  - Predict S&P 500 to close 2015 at 2100 (2.5% up from today).
  - Focus on dividend stocks.
  - Low volatility will yield S&P 500 index funds best investment.
- – Senate meeting with executives from Banks (Wall Street's largest) discussing market power and if their large size puts the market at risk.

11/21 – Quiet Friday – PRQR ↑15%, BABA ↓3.8%, MACK ↑.4%, CRI ↑2%, TWTR ↓.7%.

11/24 – PRQR announces 3rd Q losses higher than expected (bad).
- – S&P 500 goal in 2014 is 11+%, predicted 2015 is 50% (average among firms).
  - This could be okay – 2014 was predicted only 5% a year ago.
- – More and more valuable, IPO's this year than an before it (recently).

11/25 – Apples market cap tops $700 billion – world's largest company.
- – Global stag nation, but continued US growth is driving stock market.
- – Twitter may buy selfie app "Shots."

11/26 – This sale season may be bad for consumer stocks due to new access to the internet which is pushing sale prices lower thus decreasing profits for retailers – greater competition.
- – Foreign demand rising for US government bonds – US debt is better than global stagnation.

11/28 – Performance report this week:
  - BABA ↑ .82%
  - PRQR ↑ 2.5%
  - CRI ↑ 1.25%
  - MACK ↑ 1.44%
  - TWTR ↑ 4.27%

12/1 – Biggest fall this past month.
- – MACK will present at upcoming 25th annual Oppenheimer healthcare conference.
- – US retailers seek closing of tax loopholes for online foreign retailers (Alibaba).
- – Retail sales on black Friday are lowest in a very long time.

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12/2 – Oil prices still falling – how low will it take to hurt stocks? – people are worrying that falling prices will begin to hunt the US economy (not necessarily true but the bears are out).
- Brought MPC (Marathon Petroleum) – noticed a pattern on their chart that signaled an uptrend of 105 shares at 94.75%.

12/3 – Fed report – low gas prices are stimulating the economy – jobs and spending are up.
- US companies added 208,000 jobs (via a surey).
- Higher demand for high skill jobs, US education lacking – college education not growing in the US – leading to further wealth splitting.

12/4 – US jobless claims are down this month
- Minimum average protests .
- Analysts thinking oil will soon hit a bottom.
- Analysts saying S&P 500 is a bubble that will pop in late 2015/2016.

12/5 – Performance since inception:
- BABA ↓ 1.79%
- PRQR ↑ 47.09%
- TWTR ↓ 7.79%
- MPC ↓ 7.19%
- MACK ↑ 14.2%
- CRI ↑ .32%

- ECB brushes off monetary policy ideas – will reevaluate in 2015.
- November job gains up, on pace for greatest growth since '99
  - UP 321,000 jobs – most gain in 3 years.
- This leads some to believe fed will raise rates sooner, but the market surged anyways today (usually a surge followed by sell-off and close down).

12/8 – Goldman Sachs sets contingency on their evaluation/prediction of next year's stock market gains – will go up 11% if interest rates stay low.
- Correlations are down between individual stock performance and S&P 500 – stocks aren't just moving with the market – stock pickers can rise again.

12/9 – Tesla is having record setting declines – I think it's mostly due to bearish sentiments and not a reflection of the company and I think it will bounce back soon.
- Bought 46 TSLA at 216.48.
- Chinas stock market has been tanking.
- European stocks are down as well.

12/10 – US stocks now falling with oil prices.
- Bears are afraid of interest rate rises.

12/11 – US retail sales in November led by online, auto, electronics.

12/12 – Stocks resume plummet on oil sell-off and poor Chinese industrial data signaling a global economics lowdown.
- Us consumer sentiment hits 8 year high – improved prospects for jobs and wages and lower gas and overall prices.
- Performance this week:
  - BABA ↓ .82%
  - PRQR ↑ 2.29%
  - MACK ↑ 9.80%
  - MPC ↓ 8.82%

- CRI ↓ 1.04%
- TSLA ↓ 4.38%
- S&P 500 ↓ 3.49%
- TWTR ↓ 2.57%

12/15 – Market is weary as fed begins rate talks.
- US stocks continue to fall with oil prices.
- Russia raises ruble rate to try to save currency's collapse.

12/16 – Oil reaches $59 a barrel for first time since '09.
- Russia's ruble policy looks like that of 1998, which caused a US stock market crash.
- Momentums stocks get hit hard today.
- Oil continues to negatively affect stocks and positively affect consumers.

12/17 – Consumer inflation posts largest decline in 6 years.
- US banks relax loan standards.
- Many think fed rate increase is imminent.

12/18 – Jobless claims lowest in 6 years.
- First 2% increase in market 2 days in a row since March 2009.
- The "Santa Clause" rally finally appears.
- Putin reassumes people on Russian economy, blames UN sanctions that resulted from invasion of Ukraine.
- Oil continues to decline but now stocks going up based on fed saying they will be patient with rate increases.

C Term

1/21 – Starting to formulate parameters for my gap trading system.

1/23 – Found the hot list on TradeStation which shows stocks that are up or down that day, but if looking premarket it shows stocks that are up or down from the previous days close (a gap).

1/26 – Decide to enter a stock premarket if it has gapped more than 2%, then watch to see what it does.

1/28 – Starting to create the code for my system. I decide to go with a ShowMe study to show how many times a stock has gapped up/down in the past to predict its future gap behavior.

1/30 – Decide on parameters of 2% gap up or down from beginning of day to end. I have finalized the code and am ready to trade.

2/2 – Decide to run the ShowMe studies on stocks that have gapped up or down more than 2% and buy or sell them based on number of previous data points supporting its future prediction.

2/4 – First day of trading: Opened positions in CTSH, TVIX, and ODP at 9:30 for $10,000 each, left them and came back to view them at 12:00 and sold them. I am trying to get a feel for gap trading.

2/6 – Adjust my trading parameters to include more than 55% data points (blue=buy, pink=short) in support of a buy or short and more than 20 data points.

2/9 – Second day of trading: Still trying to get a feel for the market. Trade 10 stocks between 9:00 and 9:30. Gap Ups: GASL 18 blue 25 pink, TVIX 33 blue 42 pink, UVXY 33 blue, 44 pink, GSB 11 blue 27 pink, and NUGT 61 blue 46 pink. Gap Downs: NBG 14 blue 31 pink, JDST 38 blue 51 pink, RUSS 25 blue 36 pink, GENE 22 blue 15 pink, and DUST 42 blue 64 pink.

2/11 – I am not impressed with my system, I need to tighten up the parameters based on my previous trades.

2/13 – I decide to set a stop loss to prevent loss greater than 2%.

APPENDIX

2/18 – Third day of trading: Trade 7 stocks between 9:00 and 9:30. Gap Ups: DGAZ 51 blue 41 pink, ATOS 15 blue 41 pink, CUR 13 blue 28 pink, and NBG 16 blue 28 pink. Gap Downs: RUSS 25 blue 38 pink, UCO 14 blue 21 pink, and GEVO 24 blue 15 pink. Profit on DGAZ, ATOS, RUSS, GEVO.

2/20 – Fourth day of trading: Trade 6 stocks between 9:00 and 9:30. Gap Ups: DGAZ 52 blue 41 pink, GENE 23 blue 16 pink, FRO 12 blue 31 pink, and DUST 40 blue 64 pink. Gap Downs: EPRS 17 blue 32 pink and RUSS 24 blue 39 pink. Profit on DUST and EPRS.

2/22 – I decide to implement limit orders at 2% profit to close the position rather than monitoring to make my system even more automated and scientific. I also decide that I want more than 30 data points in order to increase accuracy, along with changing the threshold from 55% to 60% for a buy or short, and added the additional parameter of the pre-market gap being less than 10% in order to prevent news from influencing the gap reading success rate.

2/23 – Fifth day of trading: Trade 4 stocks from 9:00 to 9:30. Gap Ups: SCO 18 blue 13 pink, UVXY 33 blue 48 pink, and PLUG 40 blue 80 pink. Gap Downs: JNUG 30 blue 51 pink. Profit on UVXY and PLUG.

2/24 – I decide that my system is not built to handle the fluctuations of the pre-market and thus I would enter only at market open, not in pre-market.

2/25 – Sixth day of trading: Trade 6 stocks at 9:30. Gap Ups: AMPE 8 blue 23 pink, NUGT 62 blue 44 pink, and BLDP 28 blue 56 pink. Gap Downs: GENE 25 blue 16 pink, DUST 42 blue 67 pink, and JDST 39 blue, 54 pink. Profit on all but GENE.

2/27 – Seventh day of trading: Gap Ups: MHR 10 blue 20 pink and PBR.A 21 blue 12 pink. Gap Downs: GENE 23 blue 17 pink and FRO 14 blue 30 pink. Profit on all but FRO.

3/1 – I decide that stocks under $2.50 are too volatile and thus would exclude them and that the volume must be more than 15,000 in order to ensure that it's not just a small group moving the stock price. I also am now setting orders to buy at 1 cent below the ask price and canceling open orders 60 seconds after market open. I also changed my limit orders and stop loss from 2% to 2.25% to factor in more volatility.

3/2 – Eighth day of trading: Gap Ups: GENE 18 blue 79 pink, NUGT 63 blue 48 pink, and RUSS 44 blue 30 pink. Gap Downs: JDST 40 blue 54 pink. Profit on RUSS.

3/3 – Ninth day of trading: Gap Ups: RUSL 38 blue 29 pink, BIOC 19 blue 47 pink, and PBR 20 blue, 10 pink. Gap Downs: RUSS 26 blue 38 pink, PLUG 18 blue 27 pink, and SBGL 14 blue 21 pink. Profit on all but PBR and PLUG.

3/6 – In entering my trades into excel, I am excluding the first 2 days of trading because my system was too raw and is not representative of what I am trying to accomplish.

3/12 – Tenth day of trading: Only 2 stocks fit my requirements. I had to resist temptation in not adjusting my system to get more trades for today. Gap Downs: UXVY 38 blue 54 pink and TVIX 27 blue 40 pink. Profit on both.

3/13 – Eleventh day of trading: Gap Ups: GENE way more pink than blue, ONVO 18 blue 29 pink, and SCO 20 blue 13 pink. Gap Downs: UGAZ 37 blue 57 pink and UCO 14 blue 22 pink. Profit on UCO, SCO, and ONVO.

3/18 – Twelfth day of trading: Gap Ups: ATNM 12 blue 34 pink and SCO 20 blue 12 pink. Gap Downs: UGAZ 38 blue 57 pink, UCO 14 blue 23 pink, and SBGL 14 blue 20 pink. Profit on ATNM.

APPENDIX

TRADE SIMULATION

There are 252 trading days per year
My system has 10 days of paper trades
Will start with $70,000 due to trades never going over 7 per day
Will trade 1/7 of fund per stock traded per day
Will run for 250 days, repeating my current trades 25 times
Note: Color is to distinguish different days

Stock	Entry Price	Exit Price	Long/Short	Profit/Loss	No. of Shares	Account Total	Stock	Entry Price	Exit Price	Long/Short	Profit/Loss	No. of Shares	Account Total
DGAZ	7.15	7.32	1	$237.76	1399	$70,000.00	DGAZ	7.15	7.32	1	$245.28	1443	$72,214.25
ATOS	2.05	1.95	-1	$487.80	4878		ATOS	2.05	1.95	-1	$503.24	5032	
CUR	3.75	3.84	-1	-$240.00	2667		CUR	3.75	3.84	-1	-$247.59	2751	
NBG	1.5	1.53	-1	-$200.00	6667		NBG	1.5	1.53	-1	-$206.33	6878	
RUSS	11.37	11.1	-1	$237.47	880		RUSS	11.37	11.1	-1	$244.98	907	
UCO	9.06	9.24	-1	-$198.68	1104		UCO	9.06	9.24	-1	-$204.96	1139	
GEVO	0.28	0.29	1	$357.14	35714		GEVO	0.28	0.29	1	$368.44	36844	
DGAZ	5.95	5.82	1	-$220.61	1697	$70,681.50	DGAZ	5.95	5.82	1	-$227.59	1751	$72,917.31
GENE	8.6	8.42	1	-$211.34	1174		GENE	8.6	8.42	1	-$218.03	1211	
FRO	2.65	2.67	-1	-$76.21	3810		FRO	2.65	2.67	-1	-$78.62	3931	
DUST	14.45	14	-1	$314.45	699		DUST	14.45	14	-1	$324.40	721	
EPRS	8.88	8.7	-1	$204.68	1137		EPRS	8.88	8.7	-1	$211.15	1173	
RUSS	11.94	12.18	-1	-$202.96	846		RUSS	11.94	12.18	-1	-$209.38	872	
SCO	81.9	80.04	1	-$228.69	123	$70,489.51	SCO	81.9	80.04	1	-$235.93	127	$72,719.24
UVXY	20.39	19.86	-1	$261.75	494		UVXY	20.39	19.86	-1	$270.03	509	
PLUG	3.32	3.25	-1	$212.32	3033		PLUG	3.32	3.25	-1	$219.03	3129	
JNUG	26.21	26.8	-1	-$226.68	384		JNUG	26.21	26.8	-1	-$233.85	396	
AMPE	5.9	5.78	-1	$204.87	1707	$70,508.20	AMPE	5.9	5.78	-1	$211.35	1761	$72,738.53
NUGT	14.4	14.69	1	$202.85	699		NUGT	14.4	14.69	1	$209.27	722	
BLDP	2.78	2.72	-1	$217.39	3623		BLDP	2.78	2.72	-1	$224.27	3738	
GENE	6.56	6.43	1	-$199.61	1535		GENE	6.56	6.43	1	-$205.92	1584	
DUST	14.44	14.15	-1	$202.29	698		DUST	14.44	14.15	-1	$208.69	720	
JDST	9.28	9.09	-1	$206.23	1085		JDST	9.28	9.09	-1	$212.75	1120	
MHR	2.78	2.72	-1	$219.97	3666	$71,342.22	MHR	2.78	2.72	-1	$226.92	3782	$73,598.93
PBR.A	6.44	6.58	1	$221.56	1583		PBR.A	6.44	6.58	1	$228.57	1633	
GENE	5.9	6.03	1	$224.56	1727		GENE	5.9	6.03	1	$231.67	1782	
FRO	2.6	2.66	-1	-$235.19	3920		FRO	2.6	2.66	-1	-$242.63	4044	
NUGT	15.85	15.49	1	-$232.88	647	$71,773.11	NUGT	15.85	15.49	1	-$240.25	667	$74,043.45
GENE	5.85	5.99	-1	-$245.38	1753		GENE	5.85	5.99	-1	-$253.14	1808	
RUSS	12	12.28	1	$239.24	854		RUSS	12	12.28	1	$246.81	881	
JDST	8.7	8.9	-1	-$235.71	1179		JDST	8.7	8.9	-1	-$243.16	1216	
RUSL	25.98	26.15	1	$66.65	392	$71,298.39	RUSL	25.98	26.15	1	$68.76	404	$73,553.71
BIOC	4.06	3.94	-1	$301.05	2509		BIOC	4.06	3.94	-1	$310.57	2588	
PBR	6.59	6.44	1	-$231.84	1546		PBR	6.59	6.44	1	-$239.17	1594	
RUSS	11.5	11.23	-1	$239.14	886		RUSS	11.5	11.23	-1	$246.70	914	
PLUG	3	3.02	-1	-$67.90	3395		PLUG	3	3.02	-1	-$70.05	3503	
SBGL	10.07	9.82	-1	$252.87	1011		SBGL	10.07	9.82	-1	$260.87	1043	
UVXY	19.13	18.69	-1	$236.11	537	$71,858.35	UVXY	19.13	18.69	-1	$243.58	554	$74,131.38
TVIX	2.14	2.09	-1	$239.85	4797		TVIX	2.14	2.09	-1	$247.43	4949	
UCO	7.15	6.93	-1	$317.95	1445	$72,334.31	UCO	7.15	6.93	-1	$328.01	1491	$74,622.40
UGAZ	2.52	2.55	-1	-$123.02	4101		UGAZ	2.52	2.55	-1	-$126.91	4230	
SCO	86.9	89.18	1	$271.12	119		SCO	86.9	89.18	1	$279.70	123	
ONVO	4.77	4.66	-1	$238.30	2166		ONVO	4.77	4.66	-1	$245.84	2235	
GENE	4.78	4.88	-1	-$216.18	2162		GENE	4.78	4.88	-1	-$223.02	2230	
SBGL	8.34	8.53	-1	-$237.00	1247	$72,822.48	SBGL	8.34	8.53	-1	-$244.50	1287	$75,126.01
UCO	5.95	6.07	-1	-$209.81	1748		UCO	5.95	6.07	-1	-$216.45	1804	
UGAZ	2.73	2.79	-1	-$228.64	3811		UGAZ	2.73	2.79	-1	-$235.87	3931	
SCO	103.01	100.9	1	-$213.09	101		SCO	103.01	100.9	1	-$219.83	104	
ATNM	3.34	3.25	-1	$280.33	3115		ATNM	3.34	3.25	-1	$289.19	3213	

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DGAZ	7.15	7.32	1	$253.04	1488	$74,498.55	SCO	81.9	80.04	1	-$251.09	135	$77,392.54
ATOS	2.05	1.95	-1	$519.15	5192		UVXY	20.39	19.86	-1	$287.38	542	
CUR	3.75	3.84	-1	-$255.42	2838		PLUG	3.32	3.25	-1	$233.11	3330	
NBG	1.5	1.53	-1	-$212.85	7095		JNUG	26.21	26.8	-1	-$248.88	422	
RUSS	11.37	11.1	-1	$252.73	936		AMPE	5.9	5.78	-1	$224.93	1874	$77,413.06
UCO	9.06	9.24	-1	-$211.44	1175		NUGT	14.4	14.69	1	$222.72	768	
GEVO	0.28	0.29	1	$380.09	38009		BLDP	2.78	2.72	-1	$238.68	3978	
DGAZ	5.95	5.82	1	-$234.79	1806	$75,223.84	GENE	6.56	6.43	1	-$219.16	1686	
GENE	8.6	8.42	1	-$224.92	1250		DUST	14.44	14.15	-1	$222.10	766	
FRO	2.65	2.67	-1	-$81.10	4055		JDST	9.28	9.09	-1	$226.42	1192	
DUST	14.45	14	-1	$334.66	744		MHR	2.78	2.72	-1	$241.51	4025	$78,328.76
EPRS	8.88	8.7	-1	$217.83	1210		PBR.A	6.44	6.58	1	$243.26	1738	
RUSS	11.94	12.18	-1	-$216.01	900		GENE	5.9	6.03	1	$246.56	1897	
SCO	81.9	80.04	1	-$243.39	131	$75,019.51	FRO	2.6	2.66	-1	-$258.23	4304	
UVXY	20.39	19.86	-1	$278.57	526		NUGT	15.85	15.49	1	-$255.69	710	$78,801.85
PLUG	3.32	3.25	-1	$225.96	3228		GENE	5.85	5.99	-1	-$269.41	1924	
JNUG	26.21	26.8	-1	-$241.25	409		RUSS	12	12.28	1	$262.67	938	
AMPE	5.9	5.78	-1	$218.03	1817	$75,039.40	JDST	8.7	8.9	-1	-$258.79	1294	
NUGT	14.4	14.69	1	$215.89	744		RUSL	25.98	26.15	1	$73.18	430	$78,280.64
BLDP	2.78	2.72	-1	$231.37	3856		BIOC	4.06	3.94	-1	$330.53	2754	
GENE	6.56	6.43	1	-$212.44	1634		PBR	6.59	6.44	1	-$254.54	1697	
DUST	14.44	14.15	-1	$215.29	742		RUSS	11.5	11.23	-1	$262.56	972	
JDST	9.28	9.09	-1	$219.48	1155		PLUG	3	3.02	-1	-$74.55	3728	
MHR	2.78	2.72	-1	$234.10	3902	$75,927.02	SBGL	10.07	9.82	-1	$277.63	1111	
PBR.A	6.44	6.58	1	$235.80	1684		UVXY	19.13	18.69	-1	$259.23	589	$78,895.43
GENE	5.9	6.03	1	$239.00	1838		TVIX	2.14	2.09	-1	$263.34	5267	
FRO	2.6	2.66	-1	-$250.31	4172		UCO	7.15	6.93	-1	$349.09	1587	$79,418.00
NUGT	15.85	15.49	1	-$247.85	688	$76,385.61	UGAZ	2.52	2.55	-1	-$135.06	4502	
GENE	5.85	5.99	-1	-$261.15	1865		SCO	86.9	89.18	1	$297.67	131	
RUSS	12	12.28	1	$254.62	909		ONVO	4.77	4.66	-1	$261.63	2378	
JDST	8.7	8.9	-1	-$250.86	1254		GENE	4.78	4.88	-1	-$237.35	2374	
RUSL	25.98	26.15	1	$70.93	417	$75,880.37	SBGL	8.34	8.53	-1	-$260.21	1370	$79,953.98
BIOC	4.06	3.94	-1	$320.40	2670		UCO	5.95	6.07	-1	-$230.36	1920	
PBR	6.59	6.44	1	-$246.74	1645		UGAZ	2.73	2.79	-1	-$251.03	4184	
RUSS	11.5	11.23	-1	$254.51	943		SCO	103.01	100.9	1	-$233.96	111	
PLUG	3	3.02	-1	-$72.27	3613		ATNM	3.34	3.25	-1	$307.78	3420	
SBGL	10.07	9.82	-1	$269.12	1076		DGAZ	7.15	7.32	1	$269.30	1584	$79,286.19
UVXY	19.13	18.69	-1	$251.29	571	$76,476.32	ATOS	2.05	1.95	-1	$552.52	5525	
TVIX	2.14	2.09	-1	$255.26	5105		CUR	3.75	3.84	-1	-$271.84	3020	
UCO	7.15	6.93	-1	$338.39	1538	$76,982.87	NBG	1.5	1.53	-1	-$226.53	7551	
UGAZ	2.52	2.55	-1	-$130.92	4364		RUSS	11.37	11.1	-1	$268.97	996	
SCO	86.9	89.18	1	$288.54	127		UCO	9.06	9.24	-1	-$225.03	1250	
ONVO	4.77	4.66	-1	$253.61	2306		GEVO	0.28	0.29	1	$404.52	40452	
GENE	4.78	4.88	-1	-$230.07	2301		DGAZ	5.95	5.82	1	-$249.88	1922	$80,058.10
SBGL	8.34	8.53	-1	-$252.23	1328	$77,502.41	GENE	8.6	8.42	1	-$239.38	1330	
UCO	5.95	6.07	-1	-$223.30	1861		FRO	2.65	2.67	-1	-$86.32	4316	
UGAZ	2.73	2.79	-1	-$243.34	4056		DUST	14.45	14	-1	$356.17	791	
SCO	103.01	100.9	1	-$226.79	107		EPRS	8.88	8.7	-1	$231.83	1288	
ATNM	3.34	3.25	-1	$298.34	3315		RUSS	11.94	12.18	-1	-$229.89	958	
DGAZ	7.15	7.32	1	$261.05	1536	$76,855.10	SCO	81.9	80.04	1	-$259.03	139	$79,840.63
ATOS	2.05	1.95	-1	$535.58	5356		UVXY	20.39	19.86	-1	$296.47	559	
CUR	3.75	3.84	-1	-$263.50	2928		PLUG	3.32	3.25	-1	$240.48	3435	
NBG	1.5	1.53	-1	-$219.59	7320		JNUG	26.21	26.8	-1	-$256.75	435	
RUSS	11.37	11.1	-1	$260.72	966		AMPE	5.9	5.78	-1	$232.04	1934	$79,861.81
UCO	9.06	9.24	-1	-$218.13	1212		NUGT	14.4	14.69	1	$229.76	792	
GEVO	0.28	0.29	1	$392.12	39212		BLDP	2.78	2.72	-1	$246.23	4104	
DGAZ	5.95	5.82	1	-$242.22	1863	$77,603.34	GENE	6.56	6.43	1	-$226.09	1739	
GENE	8.6	8.42	1	-$232.04	1289		DUST	14.44	14.15	-1	$229.12	790	
FRO	2.65	2.67	-1	-$83.67	4183		JDST	9.28	9.09	-1	$233.59	1229	
DUST	14.45	14	-1	$345.24	767		MHR	2.78	2.72	-1	$249.15	4152	$80,806.47
EPRS	8.88	8.7	-1	$224.72	1248		PBR.A	6.44	6.58	1	$250.95	1793	
RUSS	11.94	12.18	-1	-$222.84	928		GENE	5.9	6.03	1	$254.35	1957	

APPENDIX

NUGT	15.85	15.49	1	-$263.78	733	$81,294.52	UCO	7.15	6.93	-1	$371.52	1689	$84,521.79
GENE	5.85	5.99	-1	-$277.93	1985		UGAZ	2.52	2.55	-1	-$143.74	4791	
RUSS	12	12.28	1	$270.98	968		SCO	86.9	89.18	1	$316.80	139	
JDST	8.7	8.9	-1	-$266.98	1335		ONVO	4.77	4.66	-1	$278.45	2531	
RUSL	25.98	26.15	1	$75.49	444	$80,756.82	GENE	4.78	4.88	-1	-$252.61	2526	
BIOC	4.06	3.94	-1	$340.99	2842		SBGL	8.34	8.53	-1	-$276.94	1458	$85,092.22
PBR	6.59	6.44	1	-$262.60	1751		UCO	5.95	6.07	-1	-$245.16	2043	
RUSS	11.5	11.23	-1	$270.86	1003		UGAZ	2.73	2.79	-1	-$267.17	4453	
PLUG	3	3.02	-1	-$76.91	3846		SCO	103.01	100.9	1	-$249.00	118	
SBGL	10.07	9.82	-1	$286.41	1146		ATNM	3.34	3.25	-1	$327.56	3640	
UVXY	19.13	18.69	-1	$267.43	608	$81,391.06	DGAZ	7.15	7.32	1	$286.61	1686	$84,381.51
TVIX	2.14	2.09	-1	$271.67	5433		ATOS	2.05	1.95	-1	$588.02	5880	
UCO	7.15	6.93	-1	$360.13	1637	$81,930.16	CUR	3.75	3.84	-1	-$289.31	3215	
UGAZ	2.52	2.55	-1	-$139.34	4645		NBG	1.5	1.53	-1	-$241.09	8036	
SCO	86.9	89.18	1	$307.09	135		RUSS	11.37	11.1	-1	$286.25	1060	
ONVO	4.77	4.66	-1	$269.91	2454		UCO	9.06	9.24	-1	-$239.49	1331	
GENE	4.78	4.88	-1	-$244.86	2449		GEVO	0.28	0.29	1	$430.52	43052	
SBGL	8.34	8.53	-1	-$268.44	1413	$82,483.10	DGAZ	5.95	5.82	1	-$265.94	2046	$85,203.03
UCO	5.95	6.07	-1	-$237.65	1980		GENE	8.6	8.42	1	-$254.76	1415	
UGAZ	2.73	2.79	-1	-$258.97	4316		FRO	2.65	2.67	-1	-$91.86	4593	
SCO	103.01	100.9	1	-$241.36	114		DUST	14.45	14	-1	$379.05	842	
ATNM	3.34	3.25	-1	$317.51	3528		EPRS	8.88	8.7	-1	$246.73	1371	
DGAZ	7.15	7.32	1	$277.82	1634	$81,794.18	RUSS	11.94	12.18	-1	-$244.66	1019	
ATOS	2.05	1.95	-1	$569.99	5700		SCO	81.9	80.04	1	-$275.68	148	$84,971.59
CUR	3.75	3.84	-1	-$280.44	3116		UVXY	20.39	19.86	-1	$315.53	595	
NBG	1.5	1.53	-1	-$233.70	7790		PLUG	3.32	3.25	-1	$255.94	3656	
RUSS	11.37	11.1	-1	$277.48	1028		JNUG	26.21	26.8	-1	-$273.25	463	
UCO	9.06	9.24	-1	-$232.15	1290		AMPE	5.9	5.78	-1	$246.96	2058	$84,994.12
GEVO	0.28	0.29	1	$417.32	41732		NUGT	14.4	14.69	1	$244.53	843	
DGAZ	5.95	5.82	1	-$257.79	1983	$82,590.51	BLDP	2.78	2.72	-1	$262.06	4368	
GENE	8.6	8.42	1	-$246.95	1372		GENE	6.56	6.43	1	-$240.62	1851	
FRO	2.65	2.67	-1	-$89.05	4452		DUST	14.44	14.15	-1	$243.85	841	
DUST	14.45	14	-1	$367.43	817		JDST	9.28	9.09	-1	$248.60	1308	
EPRS	8.88	8.7	-1	$239.16	1329		MHR	2.78	2.72	-1	$265.16	4419	$85,999.49
RUSS	11.94	12.18	-1	-$237.16	988		PBR.A	6.44	6.58	1	$267.08	1908	
SCO	81.9	80.04	1	-$267.23	144	$82,366.17	GENE	5.9	6.03	1	$270.70	2082	
UVXY	20.39	19.86	-1	$305.85	577		FRO	2.6	2.66	-1	-$283.51	4725	
PLUG	3.32	3.25	-1	$248.09	3544		NUGT	15.85	15.49	1	-$280.73	780	$86,518.91
JNUG	26.21	26.8	-1	-$264.87	449		GENE	5.85	5.99	-1	-$295.79	2113	
AMPE	5.9	5.78	-1	$239.38	1995	$82,388.01	RUSS	12	12.28	1	$288.40	1030	
NUGT	14.4	14.69	1	$237.03	817		JDST	8.7	8.9	-1	-$284.13	1421	
BLDP	2.78	2.72	-1	$254.02	4234		RUSL	25.98	26.15	1	$80.34	473	$85,946.65
GENE	6.56	6.43	1	-$233.24	1794		BIOC	4.06	3.94	-1	$362.90	3024	
DUST	14.44	14.15	-1	$236.37	815		PBR	6.59	6.44	1	-$279.47	1863	
JDST	9.28	9.09	-1	$240.97	1268		RUSS	11.5	11.23	-1	$288.27	1068	
MHR	2.78	2.72	-1	$257.03	4284	$83,362.55	PLUG	3	3.02	-1	-$81.85	4093	
PBR.A	6.44	6.58	1	$258.89	1849		SBGL	10.07	9.82	-1	$304.82	1219	
GENE	5.9	6.03	1	$262.40	2018		UVXY	19.13	18.69	-1	$284.62	647	$86,621.66
FRO	2.6	2.66	-1	-$274.82	4580		TVIX	2.14	2.09	-1	$289.12	5782	
NUGT	15.85	15.49	1	-$272.12	756	$83,866.05	UCO	7.15	6.93	-1	$383.28	1742	$87,195.40
GENE	5.85	5.99	-1	-$286.72	2048		UGAZ	2.52	2.55	-1	-$148.29	4943	
RUSS	12	12.28	1	$279.55	998		SCO	86.9	89.18	1	$326.82	143	
JDST	8.7	8.9	-1	-$275.42	1377		ONVO	4.77	4.66	-1	$287.26	2611	
RUSL	25.98	26.15	1	$77.88	458	$83,311.34	GENE	4.78	4.88	-1	-$260.60	2606	
BIOC	4.06	3.94	-1	$351.77	2931		SBGL	8.34	8.53	-1	-$285.70	1504	$87,783.87
PBR	6.59	6.44	1	-$270.90	1806		UCO	5.95	6.07	-1	-$252.92	2108	
RUSS	11.5	11.23	-1	$279.43	1035		UGAZ	2.73	2.79	-1	-$275.62	4594	
PLUG	3	3.02	-1	-$79.34	3967		SCO	103.01	100.9	1	-$256.87	122	
SBGL	10.07	9.82	-1	$295.47	1182		ATNM	3.34	3.25	-1	$337.92	3755	
UVXY	19.13	18.69	-1	$275.89	627	$83,965.64							
TVIX	2.14	2.09	-1	$280.26	5605								

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DGAZ	7.15	7.32	1	$295.68	1739	
ATOS	2.05	1.95	-1	$606.62	6066	
CUR	3.75	3.84	-1	-$298.46	3316	
NBG	1.5	1.53	-1	-$248.72	8291	
RUSS	11.37	11.1	-1	$295.31	1094	
UCO	9.06	9.24	-1	-$247.07	1373	
GEVO	0.28	0.29	1	$444.14	44414	
DGAZ	5.95	5.82	1	-$274.35	2110	
GENE	8.6	8.42	1	-$262.82	1460	
FRO	2.65	2.67	-1	-$94.77	4738	
DUST	14.45	14	-1	$391.04	869	
EPRS	8.88	8.7	-1	$254.53	1414	
RUSS	11.94	12.18	-1	-$252.40	1052	
SCO	81.9	80.04	1	-$284.40	153	
UVXY	20.39	19.86	-1	$325.51	614	
PLUG	3.32	3.25	-1	$264.03	3772	
JNUG	26.21	26.8	-1	-$281.89	478	
AMPE	5.9	5.78	-1	$254.77	2123	
NUGT	14.4	14.69	1	$252.26	870	
BLDP	2.78	2.72	-1	$270.35	4506	
GENE	6.56	6.43	1	-$248.23	1909	
DUST	14.44	14.15	-1	$251.56	867	
JDST	9.28	9.09	-1	$256.46	1350	
MHR	2.78	2.72	-1	$273.55	4559	
PBR.A	6.44	6.58	1	$275.53	1968	
GENE	5.9	6.03	1	$279.26	2148	
FRO	2.6	2.66	-1	-$292.48	4875	
NUGT	15.85	15.49	1	-$289.61	804	
GENE	5.85	5.99	-1	-$305.15	2180	
RUSS	12	12.28	1	$297.52	1063	
JDST	8.7	8.9	-1	-$293.12	1466	
RUSL	25.98	26.15	1	$82.88	488	
BIOC	4.06	3.94	-1	$374.38	3120	
PBR	6.59	6.44	1	-$288.31	1922	
RUSS	11.5	11.23	-1	$297.39	1101	
PLUG	3	3.02	-1	-$84.44	4222	
SBGL	10.07	9.82	-1	$314.46	1258	
UVXY	19.13	18.69	-1	$293.62	667	
TVIX	2.14	2.09	-1	$298.27	5965	
UCO	7.15	6.93	-1	$395.40	1797	
UGAZ	2.52	2.55	-1	-$152.98	5099	
SCO	86.9	89.18	1	$337.16	148	
ONVO	4.77	4.66	-1	$296.34	2694	
GENE	4.78	4.88	-1	-$268.84	2688	
SBGL	8.34	8.53	-1	-$294.73	1551	
UCO	5.95	6.07	-1	-$260.92	2174	
UGAZ	2.73	2.79	-1	-$284.33	4739	
SCO	103.01	100.9	1	-$265.00	126	
ATNM	3.34	3.25	-1	$348.61	3873	
DGAZ	7.15	7.32	1	$305.03	1794	
ATOS	2.05	1.95	-1	$625.81	6258	
CUR	3.75	3.84	-1	-$307.90	3421	
NBG	1.5	1.53	-1	-$256.58	8553	
RUSS	11.37	11.1	-1	$304.65	1128	
UCO	9.06	9.24	-1	-$254.88	1416	
GEVO	0.28	0.29	1	$458.19	45819	
DGAZ	5.95	5.82	1	-$283.03	2177	
GENE	8.6	8.42	1	-$271.13	1506	
FRO	2.65	2.67	-1	-$97.77	4888	
DUST	14.45	14	-1	$403.41	896	
EPRS	8.88	8.7	-1	$262.58	1459	
RUSS	11.94	12.18	-1	-$260.38	1085	
						$87,050.68
SCO	81.9	80.04	1	-$293.40	158	$90,432.28
UVXY	20.39	19.86	-1	$335.80	634	
PLUG	3.32	3.25	-1	$272.39	3891	
JNUG	26.21	26.8	-1	-$290.81	493	
AMPE	5.9	5.78	-1	$262.83	2190	$90,456.26
NUGT	14.4	14.69	1	$260.24	897	
BLDP	2.78	2.72	-1	$278.90	4648	
GENE	6.56	6.43	1	-$256.08	1970	$87,898.18
DUST	14.44	14.15	-1	$259.52	895	
JDST	9.28	9.09	-1	$264.57	1392	
MHR	2.78	2.72	-1	$282.20	4703	$91,526.24
PBR.A	6.44	6.58	1	$284.24	2030	
GENE	5.9	6.03	1	$288.10	2216	
FRO	2.6	2.66	-1	-$301.73	5029	$87,659.42
NUGT	15.85	15.49	1	-$298.77	830	$92,079.04
GENE	5.85	5.99	-1	-$314.80	2249	
RUSS	12	12.28	1	$306.93	1096	
JDST	8.7	8.9	-1	-$302.39	1512	$87,682.67
RUSL	25.98	26.15	1	$85.50	503	$91,470.01
BIOC	4.06	3.94	-1	$386.22	3219	
PBR	6.59	6.44	1	-$297.43	1983	
RUSS	11.5	11.23	-1	$306.79	1136	
PLUG	3	3.02	-1	-$87.11	4356	
SBGL	10.07	9.82	-1	$324.41	1298	$88,719.84
UVXY	19.13	18.69	-1	$302.91	688	$92,188.39
TVIX	2.14	2.09	-1	$307.70	6154	
UCO	7.15	6.93	-1	$407.91	1854	$92,799.01
UGAZ	2.52	2.55	-1	-$157.82	5261	$89,255.69
SCO	86.9	89.18	1	$347.82	153	
ONVO	4.77	4.66	-1	$305.72	2779	
GENE	4.78	4.88	-1	-$277.34	2773	
SBGL	8.34	8.53	-1	-$304.06	1600	$93,425.29
UCO	5.95	6.07	-1	-$269.17	2243	$88,665.33
UGAZ	2.73	2.79	-1	-$293.33	4889	
SCO	103.01	100.9	1	-$273.38	130	
ATNM	3.34	3.25	-1	$359.64	3996	
DGAZ	7.15	7.32	1	$314.68	1851	$92,644.99
ATOS	2.05	1.95	-1	$645.61	6456	$89,361.69
CUR	3.75	3.84	-1	-$317.64	3529	
NBG	1.5	1.53	-1	-$264.70	8823	$89,953.58
RUSS	11.37	11.1	-1	$314.29	1164	
UCO	9.06	9.24	-1	-$262.95	1461	
GEVO	0.28	0.29	1	$472.68	47268	
DGAZ	5.95	5.82	1	-$291.98	2246	$93,546.96
GENE	8.6	8.42	1	-$279.71	1554	$90,560.66
FRO	2.65	2.67	-1	-$100.86	5043	
DUST	14.45	14	-1	$416.18	925	
EPRS	8.88	8.7	-1	$270.89	1505	
RUSS	11.94	12.18	-1	-$268.62	1119	
SCO	81.9	80.04	1	-$302.68	163	$93,292.85
UVXY	20.39	19.86	-1	$346.42	654	$89,804.28
PLUG	3.32	3.25	-1	$281.00	4014	
JNUG	26.21	26.8	-1	-$300.01	508	
AMPE	5.9	5.78	-1	$271.14	2260	$93,317.59
NUGT	14.4	14.69	1	$268.47	926	
BLDP	2.78	2.72	-1	$287.72	4795	
GENE	6.56	6.43	1	-$264.18	2032	$90,678.60
DUST	14.44	14.15	-1	$267.73	923	
JDST	9.28	9.09	-1	$272.94	1437	
MHR	2.78	2.72	-1	$291.12	4852	$94,421.41
PBR.A	6.44	6.58	1	$293.23	2095	
GENE	5.9	6.03	1	$297.21	2286	
FRO	2.6	2.66	-1	-$311.28	5188	

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NUGT	15.85	15.49	1	-$308.22	856	$94,991.70	UCO	7.15	6.93	-1	$434.12	1973	$98,762.73
GENE	5.85	5.99	-1	-$324.76	2320		UGAZ	2.52	2.55	-1	-$167.96	5599	
RUSS	12	12.28	1	$316.64	1131		SCO	86.9	89.18	1	$370.18	162	
JDST	8.7	8.9	-1	-$311.96	1560		ONVO	4.77	4.66	-1	$325.36	2958	
RUSL	25.98	26.15	1	$88.21	519	$94,363.41	GENE	4.78	4.88	-1	-$295.17	2952	
BIOC	4.06	3.94	-1	$398.44	3320		SBGL	8.34	8.53	-1	-$323.60	1703	$99,429.26
PBR	6.59	6.44	1	-$306.84	2046		UCO	5.95	6.07	-1	-$286.47	2387	
RUSS	11.5	11.23	-1	$316.50	1172		UGAZ	2.73	2.79	-1	-$312.18	5203	
PLUG	3	3.02	-1	-$89.87	4493		SCO	103.01	100.9	1	-$290.95	138	
SBGL	10.07	9.82	-1	$334.67	1339		ATNM	3.34	3.25	-1	$382.75	4253	
UVXY	19.13	18.69	-1	$312.49	710	$95,104.51	DGAZ	7.15	7.32	1	$334.90	1970	$98,598.81
TVIX	2.14	2.09	-1	$317.44	6349		ATOS	2.05	1.95	-1	$687.10	6871	
UCO	7.15	6.93	-1	$420.81	1913	$95,734.44	CUR	3.75	3.84	-1	-$338.05	3756	
UGAZ	2.52	2.55	-1	-$162.81	5427		NBG	1.5	1.53	-1	-$281.71	9390	
SCO	86.9	89.18	1	$358.83	157		RUSS	11.37	11.1	-1	$334.49	1239	
ONVO	4.77	4.66	-1	$315.39	2867		UCO	9.06	9.24	-1	-$279.85	1555	
GENE	4.78	4.88	-1	-$286.12	2861		GEVO	0.28	0.29	1	$503.06	50306	
SBGL	8.34	8.53	-1	-$313.67	1651	$96,380.54	DGAZ	5.95	5.82	1	-$310.75	2390	$99,558.75
UCO	5.95	6.07	-1	-$277.69	2314		GENE	8.6	8.42	1	-$297.68	1654	
UGAZ	2.73	2.79	-1	-$302.61	5043		FRO	2.65	2.67	-1	-$107.34	5367	
SCO	103.01	100.9	1	-$282.03	134		DUST	14.45	14	-1	$442.92	984	
ATNM	3.34	3.25	-1	$371.01	4122		EPRS	8.88	8.7	-1	$288.30	1602	
DGAZ	7.15	7.32	1	$324.63	1910	$95,575.55	RUSS	11.94	12.18	-1	-$285.88	1191	
ATOS	2.05	1.95	-1	$666.03	6660		SCO	81.9	80.04	1	-$322.13	173	$99,288.31
CUR	3.75	3.84	-1	-$327.69	3641		UVXY	20.39	19.86	-1	$368.69	696	
NBG	1.5	1.53	-1	-$273.07	9102		PLUG	3.32	3.25	-1	$299.06	4272	
RUSS	11.37	11.1	-1	$324.23	1201		JNUG	26.21	26.8	-1	-$319.29	541	
UCO	9.06	9.24	-1	-$271.26	1507		AMPE	5.9	5.78	-1	$288.57	2405	$99,314.64
GEVO	0.28	0.29	1	$487.63	48763		NUGT	14.4	14.69	1	$285.73	985	
DGAZ	5.95	5.82	1	-$301.22	2317	$96,506.05	BLDP	2.78	2.72	-1	$306.21	5104	
GENE	8.6	8.42	1	-$288.56	1603		GENE	6.56	6.43	1	-$281.16	2163	
FRO	2.65	2.67	-1	-$104.05	5202		DUST	14.44	14.15	-1	$284.94	983	
DUST	14.45	14	-1	$429.34	954		JDST	9.28	9.09	-1	$290.48	1529	
EPRS	8.88	8.7	-1	$279.46	1553		MHR	2.78	2.72	-1	$309.83	5164	$100,489.40
RUSS	11.94	12.18	-1	-$277.12	1155		PBR.A	6.44	6.58	1	$312.08	2229	
SCO	81.9	80.04	1	-$312.25	168	$96,243.90	GENE	5.9	6.03	1	$316.31	2433	
UVXY	20.39	19.86	-1	$357.38	674		FRO	2.6	2.66	-1	-$331.28	5521	
PLUG	3.32	3.25	-1	$289.89	4141		NUGT	15.85	15.49	1	-$328.03	911	$101,096.34
JNUG	26.21	26.8	-1	-$309.50	525		GENE	5.85	5.99	-1	-$345.63	2469	
AMPE	5.9	5.78	-1	$279.72	2331	$96,269.43	RUSS	12	12.28	1	$336.99	1204	
NUGT	14.4	14.69	1	$276.97	955		JDST	8.7	8.9	-1	-$332.01	1660	
BLDP	2.78	2.72	-1	$296.82	4947		RUSL	25.98	26.15	1	$93.88	552	$100,427.66
GENE	6.56	6.43	1	-$272.54	2096		BIOC	4.06	3.94	-1	$424.04	3534	
DUST	14.44	14.15	-1	$276.20	952		PBR	6.59	6.44	1	-$326.56	2177	
JDST	9.28	9.09	-1	$281.58	1482		RUSS	11.5	11.23	-1	$336.84	1248	
MHR	2.78	2.72	-1	$300.33	5006	$97,408.17	PLUG	3	3.02	-1	-$95.65	4782	
PBR.A	6.44	6.58	1	$302.51	2161		SBGL	10.07	9.82	-1	$356.18	1425	
GENE	5.9	6.03	1	$306.61	2359		UVXY	19.13	18.69	-1	$332.58	756	$101,216.40
FRO	2.6	2.66	-1	-$321.13	5352		TVIX	2.14	2.09	-1	$337.84	6757	
NUGT	15.85	15.49	1	-$317.97	883	$97,996.50	UCO	7.15	6.93	-1	$447.85	2036	$101,886.81
GENE	5.85	5.99	-1	-$335.03	2393		UGAZ	2.52	2.55	-1	-$173.28	5776	
RUSS	12	12.28	1	$326.65	1167		SCO	86.9	89.18	1	$381.89	167	
JDST	8.7	8.9	-1	-$321.83	1609		ONVO	4.77	4.66	-1	$335.66	3051	
RUSL	25.98	26.15	1	$91.00	535	$97,348.32	GENE	4.78	4.88	-1	-$304.50	3045	
BIOC	4.06	3.94	-1	$411.04	3425		SBGL	8.34	8.53	-1	-$333.83	1757	$102,574.43
PBR	6.59	6.44	1	-$316.55	2110		UCO	5.95	6.07	-1	-$295.53	2463	
RUSS	11.5	11.23	-1	$326.51	1209		UGAZ	2.73	2.79	-1	-$322.05	5368	
PLUG	3	3.02	-1	-$92.71	4636		SCO	103.01	100.9	1	-$300.15	142	
SBGL	10.07	9.82	-1	$345.26	1381		ATNM	3.34	3.25	-1	$394.85	4387	
UVXY	19.13	18.69	-1	$322.38	733	$98,112.87							
TVIX	2.14	2.09	-1	$327.48	6550								

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DGAZ	7.15	7.32	1	$345.49	2032	$101,717.71
ATOS	2.05	1.95	-1	$708.83	7088	
CUR	3.75	3.84	-1	-$348.75	3875	
NBG	1.5	1.53	-1	-$290.62	9687	
RUSS	11.37	11.1	-1	$345.07	1278	
UCO	9.06	9.24	-1	-$288.70	1604	
GEVO	0.28	0.29	1	$518.97	51897	
DGAZ	5.95	5.82	1	-$320.58	2466	$102,708.00
GENE	8.6	8.42	1	-$307.10	1706	
FRO	2.65	2.67	-1	-$110.74	5537	
DUST	14.45	14	-1	$456.93	1015	
EPRS	8.88	8.7	-1	$297.42	1652	
RUSS	11.94	12.18	-1	-$294.93	1229	
SCO	81.9	80.04	1	-$332.32	179	$102,429.01
UVXY	20.39	19.86	-1	$380.35	718	
PLUG	3.32	3.25	-1	$308.52	4407	
JNUG	26.21	26.8	-1	-$329.39	558	
AMPE	5.9	5.78	-1	$297.69	2481	$102,456.18
NUGT	14.4	14.69	1	$294.76	1016	
BLDP	2.78	2.72	-1	$315.90	5265	
GENE	6.56	6.43	1	-$290.05	2231	
DUST	14.44	14.15	-1	$293.95	1014	
JDST	9.28	9.09	-1	$299.67	1577	
MHR	2.78	2.72	-1	$319.63	5327	$103,668.10
PBR.A	6.44	6.58	1	$321.95	2300	
GENE	5.9	6.03	1	$326.32	2510	
FRO	2.6	2.66	-1	-$341.76	5696	
NUGT	15.85	15.49	1	-$338.40	940	$104,294.24
GENE	5.85	5.99	-1	-$356.56	2547	
RUSS	12	12.28	1	$347.65	1242	
JDST	8.7	8.9	-1	-$342.51	1713	
RUSL	25.98	26.15	1	$96.85	570	$103,604.41
BIOC	4.06	3.94	-1	$437.46	3645	
PBR	6.59	6.44	1	-$336.89	2246	
RUSS	11.5	11.23	-1	$347.49	1287	
PLUG	3	3.02	-1	-$98.67	4934	
SBGL	10.07	9.82	-1	$367.44	1470	
UVXY	19.13	18.69	-1	$343.10	780	$104,418.09
TVIX	2.14	2.09	-1	$348.53	6971	
UCO	7.15	6.93	-1	$462.02	2100	$105,109.71
UGAZ	2.52	2.55	-1	-$178.76	5959	
SCO	86.9	89.18	1	$393.97	173	
ONVO	4.77	4.66	-1	$346.27	3148	
GENE	4.78	4.88	-1	-$314.14	3141	
SBGL	8.34	8.53	-1	-$344.39	1813	$105,819.08
UCO	5.95	6.07	-1	-$304.88	2541	
UGAZ	2.73	2.79	-1	-$332.24	5537	
SCO	103.01	100.9	1	-$309.65	147	
ATNM	3.34	3.25	-1	$407.34	4526	
DGAZ	7.15	7.32	1	$356.42	2097	$104,935.26
ATOS	2.05	1.95	-1	$731.26	7313	
CUR	3.75	3.84	-1	-$359.78	3998	
NBG	1.5	1.53	-1	-$299.82	9994	
RUSS	11.37	11.1	-1	$355.98	1318	
UCO	9.06	9.24	-1	-$297.83	1655	
GEVO	0.28	0.29	1	$535.38	53538	
DGAZ	5.95	5.82	1	-$330.72	2544	$105,956.88
GENE	8.6	8.42	1	-$316.81	1760	
FRO	2.65	2.67	-1	-$114.24	5712	
DUST	14.45	14	-1	$471.39	1048	
EPRS	8.88	8.7	-1	$306.82	1705	
RUSS	11.94	12.18	-1	-$304.26	1268	
SCO	81.9	80.04	1	-$342.83	184	$105,669.07
UVXY	20.39	19.86	-1	$392.38	740	
PLUG	3.32	3.25	-1	$318.28	4547	
JNUG	26.21	26.8	-1	-$339.81	576	
AMPE	5.9	5.78	-1	$307.11	2559	$105,697.09
NUGT	14.4	14.69	1	$304.09	1049	
BLDP	2.78	2.72	-1	$325.89	5432	
GENE	6.56	6.43	1	-$299.23	2302	
DUST	14.44	14.15	-1	$303.25	1046	
JDST	9.28	9.09	-1	$309.15	1627	
MHR	2.78	2.72	-1	$329.75	5496	$106,947.35
PBR.A	6.44	6.58	1	$332.13	2372	
GENE	5.9	6.03	1	$336.64	2590	
FRO	2.6	2.66	-1	-$352.57	5876	
NUGT	15.85	15.49	1	-$349.11	970	$107,593.29
GENE	5.85	5.99	-1	-$367.84	2627	
RUSS	12	12.28	1	$358.64	1281	
JDST	8.7	8.9	-1	-$353.34	1767	
RUSL	25.98	26.15	1	$99.91	588	$106,881.64
BIOC	4.06	3.94	-1	$451.29	3761	
PBR	6.59	6.44	1	-$347.54	2317	
RUSS	11.5	11.23	-1	$358.49	1328	
PLUG	3	3.02	-1	-$101.79	5090	
SBGL	10.07	9.82	-1	$379.07	1516	
UVXY	19.13	18.69	-1	$353.95	804	$107,721.06
TVIX	2.14	2.09	-1	$359.55	7191	
UCO	7.15	6.93	-1	$476.64	2167	$108,434.56
UGAZ	2.52	2.55	-1	-$184.41	6147	
SCO	86.9	89.18	1	$406.43	178	
ONVO	4.77	4.66	-1	$357.23	3248	
GENE	4.78	4.88	-1	-$324.07	3241	
SBGL	8.34	8.53	-1	-$355.29	1870	$109,166.37
UCO	5.95	6.07	-1	-$314.52	2621	
UGAZ	2.73	2.79	-1	-$342.75	5713	
SCO	103.01	100.9	1	-$319.44	151	
ATNM	3.34	3.25	-1	$420.23	4669	
DGAZ	7.15	7.32	1	$367.70	2163	$108,254.59
ATOS	2.05	1.95	-1	$754.39	7544	
CUR	3.75	3.84	-1	-$371.16	4124	
NBG	1.5	1.53	-1	-$309.30	10310	
RUSS	11.37	11.1	-1	$367.24	1360	
UCO	9.06	9.24	-1	-$307.25	1707	
GEVO	0.28	0.29	1	$552.32	55232	
DGAZ	5.95	5.82	1	-$341.18	2624	$109,308.53
GENE	8.6	8.42	1	-$326.84	1816	
FRO	2.65	2.67	-1	-$117.85	5893	
DUST	14.45	14	-1	$486.30	1081	
EPRS	8.88	8.7	-1	$316.53	1759	
RUSS	11.94	12.18	-1	-$313.88	1308	
SCO	81.9	80.04	1	-$353.67	190	$109,011.61
UVXY	20.39	19.86	-1	$404.79	764	
PLUG	3.32	3.25	-1	$328.35	4691	
JNUG	26.21	26.8	-1	-$350.56	594	
AMPE	5.9	5.78	-1	$316.82	2640	$109,040.52
NUGT	14.4	14.69	1	$313.71	1082	
BLDP	2.78	2.72	-1	$336.20	5603	
GENE	6.56	6.43	1	-$308.69	2375	
DUST	14.44	14.15	-1	$312.84	1079	
JDST	9.28	9.09	-1	$318.93	1679	
MHR	2.78	2.72	-1	$340.18	5670	$110,330.32
PBR.A	6.44	6.58	1	$342.64	2447	
GENE	5.9	6.03	1	$347.29	2671	
FRO	2.6	2.66	-1	-$363.73	6062	

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NUGT	15.85	15.49	1	-$360.15	1000	$110,996.70	UCO	7.15	6.93	-1	$507.27	2306	$115,403.10
GENE	5.85	5.99	-1	-$379.48	2711		UGAZ	2.52	2.55	-1	-$196.26	6542	
RUSS	12	12.28	1	$369.99	1321		SCO	86.9	89.18	1	$432.55	190	
JDST	8.7	8.9	-1	-$364.52	1823		ONVO	4.77	4.66	-1	$380.18	3456	
RUSL	25.98	26.15	1	$103.07	606	$110,262.54	GENE	4.78	4.88	-1	-$344.90	3449	
BIOC	4.06	3.94	-1	$465.57	3880		SBGL	8.34	8.53	-1	-$378.12	1990	$116,181.94
PBR	6.59	6.44	1	-$358.54	2390		UCO	5.95	6.07	-1	-$334.74	2789	
RUSS	11.5	11.23	-1	$369.82	1370		UGAZ	2.73	2.79	-1	-$364.78	6080	
PLUG	3	3.02	-1	-$105.01	5251		SCO	103.01	100.9	1	-$339.97	161	
SBGL	10.07	9.82	-1	$391.06	1564		ATNM	3.34	3.25	-1	$447.24	4969	
UVXY	19.13	18.69	-1	$365.14	830	$111,128.51	DGAZ	7.15	7.32	1	$391.33	2302	$115,211.56
TVIX	2.14	2.09	-1	$370.92	7418		ATOS	2.05	1.95	-1	$802.87	8029	
UCO	7.15	6.93	-1	$491.71	2235	$111,864.58	CUR	3.75	3.84	-1	-$395.01	4389	
UGAZ	2.52	2.55	-1	-$190.25	6342		NBG	1.5	1.53	-1	-$329.18	10973	
SCO	86.9	89.18	1	$419.29	184		RUSS	11.37	11.1	-1	$390.84	1448	
ONVO	4.77	4.66	-1	$368.53	3350		UCO	9.06	9.24	-1	-$327.00	1817	
GENE	4.78	4.88	-1	-$334.32	3343		GEVO	0.28	0.29	1	$587.81	58781	
SBGL	8.34	8.53	-1	-$366.52	1929	$112,619.54	DGAZ	5.95	5.82	1	-$363.10	2793	$116,333.23
UCO	5.95	6.07	-1	-$324.47	2704		GENE	8.6	8.42	1	-$347.84	1932	
UGAZ	2.73	2.79	-1	-$353.59	5893		FRO	2.65	2.67	-1	-$125.43	6271	
SCO	103.01	100.9	1	-$329.55	156		DUST	14.45	14	-1	$517.55	1150	
ATNM	3.34	3.25	-1	$433.52	4817		EPRS	8.88	8.7	-1	$336.87	1872	
DGAZ	7.15	7.32	1	$379.33	2231	$111,678.92	RUSS	11.94	12.18	-1	-$334.05	1392	
ATOS	2.05	1.95	-1	$778.25	7783		SCO	81.9	80.04	1	-$376.40	202	$116,017.23
CUR	3.75	3.84	-1	-$382.90	4254		UVXY	20.39	19.86	-1	$430.81	813	
NBG	1.5	1.53	-1	-$319.08	10636		PLUG	3.32	3.25	-1	$349.45	4992	
RUSS	11.37	11.1	-1	$378.86	1403		JNUG	26.21	26.8	-1	-$373.09	632	
UCO	9.06	9.24	-1	-$316.97	1761		AMPE	5.9	5.78	-1	$337.19	2810	$116,048.00
GEVO	0.28	0.29	1	$569.79	56979		NUGT	14.4	14.69	1	$333.87	1151	
DGAZ	5.95	5.82	1	-$351.97	2707	$112,766.19	BLDP	2.78	2.72	-1	$357.80	5963	
GENE	8.6	8.42	1	-$337.17	1873		GENE	6.56	6.43	1	-$328.53	2527	
FRO	2.65	2.67	-1	-$121.58	6079		DUST	14.44	14.15	-1	$332.94	1148	
DUST	14.45	14	-1	$501.68	1115		JDST	9.28	9.09	-1	$339.43	1786	
EPRS	8.88	8.7	-1	$326.54	1814		MHR	2.78	2.72	-1	$362.04	6034	$117,420.69
RUSS	11.94	12.18	-1	-$323.81	1349		PBR.A	6.44	6.58	1	$364.66	2605	
SCO	81.9	80.04	1	-$364.86	196	$112,459.88	GENE	5.9	6.03	1	$369.61	2843	
UVXY	20.39	19.86	-1	$417.60	788		FRO	2.6	2.66	-1	-$387.10	6452	
PLUG	3.32	3.25	-1	$338.73	4839		NUGT	15.85	15.49	1	-$383.30	1065	$118,129.89
JNUG	26.21	26.8	-1	-$361.65	613		GENE	5.85	5.99	-1	-$403.86	2885	
AMPE	5.9	5.78	-1	$326.85	2724	$112,489.70	RUSS	12	12.28	1	$393.77	1406	
NUGT	14.4	14.69	1	$323.63	1116		JDST	8.7	8.9	-1	-$387.95	1940	
BLDP	2.78	2.72	-1	$346.83	5781		RUSL	25.98	26.15	1	$109.70	645	$117,348.55
GENE	6.56	6.43	1	-$318.46	2450		BIOC	4.06	3.94	-1	$495.49	4129	
DUST	14.44	14.15	-1	$322.73	1113		PBR	6.59	6.44	1	-$381.58	2544	
JDST	9.28	9.09	-1	$329.02	1732		RUSS	11.5	11.23	-1	$393.59	1458	
MHR	2.78	2.72	-1	$350.94	5849	$113,820.31	PLUG	3	3.02	-1	-$111.76	5588	
PBR.A	6.44	6.58	1	$353.48	2525		SBGL	10.07	9.82	-1	$416.19	1665	
GENE	5.9	6.03	1	$358.27	2756		UVXY	19.13	18.69	-1	$388.61	883	$118,270.18
FRO	2.6	2.66	-1	-$375.23	6254		TVIX	2.14	2.09	-1	$394.76	7895	
NUGT	15.85	15.49	1	-$371.54	1032	$114,507.77	UCO	7.15	6.93	-1	$523.31	2379	$119,053.55
GENE	5.85	5.99	-1	-$391.48	2796		UGAZ	2.52	2.55	-1	-$202.47	6749	
RUSS	12	12.28	1	$381.69	1363		SCO	86.9	89.18	1	$446.23	196	
JDST	8.7	8.9	-1	-$376.05	1880		ONVO	4.77	4.66	-1	$392.21	3566	
RUSL	25.98	26.15	1	$106.33	625	$113,750.38	GENE	4.78	4.88	-1	-$355.81	3558	
BIOC	4.06	3.94	-1	$480.30	4002		SBGL	8.34	8.53	-1	-$390.08	2053	$119,857.02
PBR	6.59	6.44	1	-$369.88	2466		UCO	5.95	6.07	-1	-$345.33	2878	
RUSS	11.5	11.23	-1	$381.52	1413		UGAZ	2.73	2.79	-1	-$376.32	6272	
PLUG	3	3.02	-1	-$108.33	5417		SCO	103.01	100.9	1	-$350.73	166	
SBGL	10.07	9.82	-1	$403.43	1614		ATNM	3.34	3.25	-1	$461.38	5126	
UVXY	19.13	18.69	-1	$376.70	856	$114,643.75							
TVIX	2.14	2.09	-1	$382.66	7653								

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DGAZ	7.15	7.32	1	$403.71	2375	$118,855.96
ATOS	2.05	1.95	-1	$828.26	8283	
CUR	3.75	3.84	-1	-$407.51	4528	
NBG	1.5	1.53	-1	-$339.59	11320	
RUSS	11.37	11.1	-1	$403.21	1493	
UCO	9.06	9.24	-1	-$337.34	1874	
GEVO	0.28	0.29	1	$606.41	60641	
DGAZ	5.95	5.82	1	-$374.59	2881	$120,013.11
GENE	8.6	8.42	1	-$358.84	1994	
FRO	2.65	2.67	-1	-$129.39	6470	
DUST	14.45	14	-1	$533.92	1186	
EPRS	8.88	8.7	-1	$347.53	1931	
RUSS	11.94	12.18	-1	-$344.62	1436	
SCO	81.9	80.04	1	-$388.31	209	$119,687.11
UVXY	20.39	19.86	-1	$444.43	839	
PLUG	3.32	3.25	-1	$360.50	5150	
JNUG	26.21	26.8	-1	-$384.89	652	
AMPE	5.9	5.78	-1	$347.85	2899	$119,718.85
NUGT	14.4	14.69	1	$344.43	1188	
BLDP	2.78	2.72	-1	$369.12	6152	
GENE	6.56	6.43	1	-$338.93	2607	
DUST	14.44	14.15	-1	$343.48	1184	
JDST	9.28	9.09	-1	$350.16	1843	
MHR	2.78	2.72	-1	$373.49	6225	$121,134.96
PBR.A	6.44	6.58	1	$376.20	2687	
GENE	5.9	6.03	1	$381.30	2933	
FRO	2.6	2.66	-1	-$399.35	6656	
NUGT	15.85	15.49	1	-$395.42	1098	$121,866.60
GENE	5.85	5.99	-1	-$416.64	2976	
RUSS	12	12.28	1	$406.22	1451	
JDST	8.7	8.9	-1	-$400.22	2001	
RUSL	25.98	26.15	1	$113.17	666	$121,060.54
BIOC	4.06	3.94	-1	$511.16	4260	
PBR	6.59	6.44	1	-$393.65	2624	
RUSS	11.5	11.23	-1	$406.04	1504	
PLUG	3	3.02	-1	-$115.30	5765	
SBGL	10.07	9.82	-1	$429.35	1717	
UVXY	19.13	18.69	-1	$400.90	911	$122,011.32
TVIX	2.14	2.09	-1	$407.25	8145	
UCO	7.15	6.93	-1	$539.87	2454	$122,819.47
UGAZ	2.52	2.55	-1	-$208.88	6963	
SCO	86.9	89.18	1	$460.35	202	
ONVO	4.77	4.66	-1	$404.62	3678	
GENE	4.78	4.88	-1	-$367.06	3671	
SBGL	8.34	8.53	-1	-$402.42	2118	$123,648.36
UCO	5.95	6.07	-1	-$356.25	2969	
UGAZ	2.73	2.79	-1	-$388.22	6470	
SCO	103.01	100.9	1	-$361.82	171	
ATNM	3.34	3.25	-1	$475.98	5289	
DGAZ	7.15	7.32	1	$416.48	2450	$122,615.63
ATOS	2.05	1.95	-1	$854.46	8545	
CUR	3.75	3.84	-1	-$420.40	4671	
NBG	1.5	1.53	-1	-$350.33	11678	
RUSS	11.37	11.1	-1	$415.96	1541	
UCO	9.06	9.24	-1	-$348.01	1933	
GEVO	0.28	0.29	1	$625.59	62559	
DGAZ	5.95	5.82	1	-$386.44	2973	$123,809.38
GENE	8.6	8.42	1	-$370.19	2057	
FRO	2.65	2.67	-1	-$133.49	6674	
DUST	14.45	14	-1	$550.81	1224	
EPRS	8.88	8.7	-1	$358.52	1992	
RUSS	11.94	12.18	-1	-$355.52	1481	
SCO	81.9	80.04	1	-$400.59	215	$123,473.07
UVXY	20.39	19.86	-1	$458.49	865	
PLUG	3.32	3.25	-1	$371.91	5313	
JNUG	26.21	26.8	-1	-$397.06	673	
AMPE	5.9	5.78	-1	$358.85	2990	$123,505.82
NUGT	14.4	14.69	1	$355.32	1225	
BLDP	2.78	2.72	-1	$380.80	6347	
GENE	6.56	6.43	1	-$349.65	2690	
DUST	14.44	14.15	-1	$354.34	1222	
JDST	9.28	9.09	-1	$361.24	1901	
MHR	2.78	2.72	-1	$385.30	6422	$124,966.73
PBR.A	6.44	6.58	1	$388.10	2772	
GENE	5.9	6.03	1	$393.36	3026	
FRO	2.6	2.66	-1	-$411.98	6866	
NUGT	15.85	15.49	1	-$407.93	1133	$125,721.51
GENE	5.85	5.99	-1	-$429.82	3070	
RUSS	12	12.28	1	$419.07	1497	
JDST	8.7	8.9	-1	-$412.88	2064	
RUSL	25.98	26.15	1	$116.75	687	$124,889.95
BIOC	4.06	3.94	-1	$527.33	4394	
PBR	6.59	6.44	1	-$406.10	2707	
RUSS	11.5	11.23	-1	$418.89	1551	
PLUG	3	3.02	-1	-$118.94	5947	
SBGL	10.07	9.82	-1	$442.93	1772	
UVXY	19.13	18.69	-1	$413.58	940	$125,870.81
TVIX	2.14	2.09	-1	$420.13	8403	
UCO	7.15	6.93	-1	$556.94	2532	$126,704.52
UGAZ	2.52	2.55	-1	-$215.48	7183	
SCO	86.9	89.18	1	$474.91	208	
ONVO	4.77	4.66	-1	$417.42	3795	
GENE	4.78	4.88	-1	-$378.67	3787	
SBGL	8.34	8.53	-1	-$415.15	2185	$127,559.63
UCO	5.95	6.07	-1	-$367.52	3063	
UGAZ	2.73	2.79	-1	-$400.50	6675	
SCO	103.01	100.9	1	-$373.27	177	
ATNM	3.34	3.25	-1	$491.03	5456	
DGAZ	7.15	7.32	1	$429.65	2527	$126,494.23
ATOS	2.05	1.95	-1	$881.49	8815	
CUR	3.75	3.84	-1	-$433.69	4819	
NBG	1.5	1.53	-1	-$361.41	12047	
RUSS	11.37	11.1	-1	$429.12	1589	
UCO	9.06	9.24	-1	-$359.02	1995	
GEVO	0.28	0.29	1	$645.38	64538	
DGAZ	5.95	5.82	1	-$398.66	3067	$127,725.74
GENE	8.6	8.42	1	-$381.90	2122	
FRO	2.65	2.67	-1	-$137.71	6885	
DUST	14.45	14	-1	$568.23	1263	
EPRS	8.88	8.7	-1	$369.86	2055	
RUSS	11.94	12.18	-1	-$366.76	1528	
SCO	81.9	80.04	1	-$413.26	222	$127,378.79
UVXY	20.39	19.86	-1	$473.00	892	
PLUG	3.32	3.25	-1	$383.67	5481	
JNUG	26.21	26.8	-1	-$409.62	694	
AMPE	5.9	5.78	-1	$370.21	3085	$127,412.57
NUGT	14.4	14.69	1	$366.56	1264	
BLDP	2.78	2.72	-1	$392.84	6547	
GENE	6.56	6.43	1	-$360.71	2775	
DUST	14.44	14.15	-1	$365.55	1261	
JDST	9.28	9.09	-1	$372.67	1961	
MHR	2.78	2.72	-1	$397.49	6625	$128,919.70
PBR.A	6.44	6.58	1	$400.37	2860	
GENE	5.9	6.03	1	$405.80	3122	
FRO	2.6	2.66	-1	-$425.01	7083	

APPENDIX

NUGT	15.85	15.49	1	-$420.83	1169	$129,698.35	UCO	7.15	6.93	-1	$592.73	2694	$134,847.18
GENE	5.85	5.99	-1	-$443.41	3167		UGAZ	2.52	2.55	-1	-$229.33	7644	
RUSS	12	12.28	1	$432.33	1544		SCO	86.9	89.18	1	$505.43	222	
JDST	8.7	8.9	-1	-$425.94	2130		ONVO	4.77	4.66	-1	$444.24	4039	
RUSL	25.98	26.15	1	$120.44	708	$128,840.49	GENE	4.78	4.88	-1	-$403.01	4030	
BIOC	4.06	3.94	-1	$544.01	4533		SBGL	8.34	8.53	-1	-$441.83	2325	$135,757.24
PBR	6.59	6.44	1	-$418.95	2793		UCO	5.95	6.07	-1	-$391.14	3259	
RUSS	11.5	11.23	-1	$432.14	1601		UGAZ	2.73	2.79	-1	-$426.24	7104	
PLUG	3	3.02	-1	-$122.71	6135		SCO	103.01	100.9	1	-$397.25	188	
SBGL	10.07	9.82	-1	$456.95	1828		ATNM	3.34	3.25	-1	$522.59	5807	
UVXY	19.13	18.69	-1	$426.67	970	$129,852.37	DGAZ	7.15	7.32	1	$457.26	2690	$134,623.37
TVIX	2.14	2.09	-1	$433.42	8668		ATOS	2.05	1.95	-1	$938.14	9381	
UCO	7.15	6.93	-1	$574.56	2612	$130,712.46	CUR	3.75	3.84	-1	-$461.57	5129	
UGAZ	2.52	2.55	-1	-$222.30	7410		NBG	1.5	1.53	-1	-$384.64	12821	
SCO	86.9	89.18	1	$489.93	215		RUSS	11.37	11.1	-1	$456.69	1691	
ONVO	4.77	4.66	-1	$430.62	3915		UCO	9.06	9.24	-1	-$382.09	2123	
GENE	4.78	4.88	-1	-$390.65	3907		GEVO	0.28	0.29	1	$686.85	68685	
SBGL	8.34	8.53	-1	-$428.28	2254	$131,594.62	DGAZ	5.95	5.82	1	-$424.28	3264	$135,934.03
UCO	5.95	6.07	-1	-$379.14	3160		GENE	8.6	8.42	1	-$406.45	2258	
UGAZ	2.73	2.79	-1	-$413.17	6886		FRO	2.65	2.67	-1	-$146.56	7328	
SCO	103.01	100.9	1	-$385.07	182		DUST	14.45	14	-1	$604.75	1344	
ATNM	3.34	3.25	-1	$506.57	5629		EPRS	8.88	8.7	-1	$393.63	2187	
DGAZ	7.15	7.32	1	$443.24	2607	$130,495.51	RUSS	11.94	12.18	-1	-$390.33	1626	
ATOS	2.05	1.95	-1	$909.38	9094		SCO	81.9	80.04	1	-$439.82	236	$135,564.78
CUR	3.75	3.84	-1	-$447.41	4971		UVXY	20.39	19.86	-1	$503.39	950	
NBG	1.5	1.53	-1	-$372.84	12428		PLUG	3.32	3.25	-1	$408.33	5833	
RUSS	11.37	11.1	-1	$442.69	1640		JNUG	26.21	26.8	-1	-$435.95	739	
UCO	9.06	9.24	-1	-$370.38	2058		AMPE	5.9	5.78	-1	$394.00	3283	$135,600.73
GEVO	0.28	0.29	1	$665.79	66579		NUGT	14.4	14.69	1	$390.12	1345	
DGAZ	5.95	5.82	1	-$411.27	3164	$131,765.98	BLDP	2.78	2.72	-1	$418.09	6968	
GENE	8.6	8.42	1	-$393.98	2189		GENE	6.56	6.43	1	-$383.89	2953	
FRO	2.65	2.67	-1	-$142.07	7103		DUST	14.44	14.15	-1	$389.04	1342	
DUST	14.45	14	-1	$586.21	1303		JDST	9.28	9.09	-1	$396.62	2087	
EPRS	8.88	8.7	-1	$381.56	2120		MHR	2.78	2.72	-1	$423.04	7051	$137,204.71
RUSS	11.94	12.18	-1	-$378.37	1577		PBR.A	6.44	6.58	1	$426.10	3044	
SCO	81.9	80.04	1	-$426.34	229	$131,408.06	GENE	5.9	6.03	1	$431.88	3322	
UVXY	20.39	19.86	-1	$487.96	921		FRO	2.6	2.66	-1	-$452.32	7539	
PLUG	3.32	3.25	-1	$395.81	5654		NUGT	15.85	15.49	1	-$447.88	1244	$138,033.41
JNUG	26.21	26.8	-1	-$422.58	716		GENE	5.85	5.99	-1	-$471.91	3371	
AMPE	5.9	5.78	-1	$381.92	3183	$131,442.91	RUSS	12	12.28	1	$460.11	1643	
NUGT	14.4	14.69	1	$378.16	1304		JDST	8.7	8.9	-1	-$453.31	2267	
BLDP	2.78	2.72	-1	$405.27	6755		RUSL	25.98	26.15	1	$128.18	754	$137,120.42
GENE	6.56	6.43	1	-$372.12	2862		BIOC	4.06	3.94	-1	$578.97	4825	
DUST	14.44	14.15	-1	$377.11	1300		PBR	6.59	6.44	1	-$445.87	2972	
JDST	9.28	9.09	-1	$384.45	2023		RUSS	11.5	11.23	-1	$459.91	1703	
MHR	2.78	2.72	-1	$410.06	6834	$132,997.71	PLUG	3	3.02	-1	-$130.59	6530	
PBR.A	6.44	6.58	1	$413.04	2950		SBGL	10.07	9.82	-1	$486.31	1945	
GENE	5.9	6.03	1	$418.64	3220		UVXY	19.13	18.69	-1	$454.09	1032	$138,197.33
FRO	2.6	2.66	-1	-$438.45	7308		TVIX	2.14	2.09	-1	$461.27	9225	
NUGT	15.85	15.49	1	-$434.14	1206	$133,800.99	UCO	7.15	6.93	-1	$611.48	2779	$139,112.69
GENE	5.85	5.99	-1	-$457.44	3267		UGAZ	2.52	2.55	-1	-$236.59	7886	
RUSS	12	12.28	1	$446.00	1593		SCO	86.9	89.18	1	$521.42	229	
JDST	8.7	8.9	-1	-$439.41	2197		ONVO	4.77	4.66	-1	$458.29	4166	
RUSL	25.98	26.15	1	$124.25	731	$132,916.00	GENE	4.78	4.88	-1	-$415.76	4158	
BIOC	4.06	3.94	-1	$561.22	4677		SBGL	8.34	8.53	-1	-$455.80	2399	$140,051.54
PBR	6.59	6.44	1	-$432.20	2881		UCO	5.95	6.07	-1	-$403.51	3363	
RUSS	11.5	11.23	-1	$445.81	1651		UGAZ	2.73	2.79	-1	-$439.72	7329	
PLUG	3	3.02	-1	-$126.59	6329		SCO	103.01	100.9	1	-$409.82	194	
SBGL	10.07	9.82	-1	$471.40	1886		ATNM	3.34	3.25	-1	$539.12	5990	
UVXY	19.13	18.69	-1	$440.16	1000	$133,959.89							
TVIX	2.14	2.09	-1	$447.13	8943								

APPENDIX

DGAZ	7.15	7.32	1	$471.73	2775	$138,881.80
ATOS	2.05	1.95	-1	$967.82	9678	
CUR	3.75	3.84	-1	-$476.17	5291	
NBG	1.5	1.53	-1	-$396.81	13227	
RUSS	11.37	11.1	-1	$471.14	1745	
UCO	9.06	9.24	-1	-$394.18	2190	
GEVO	0.28	0.29	1	$708.58	70858	
DGAZ	5.95	5.82	1	-$437.70	3367	$140,233.92
GENE	8.6	8.42	1	-$419.30	2329	
FRO	2.65	2.67	-1	-$151.20	7560	
DUST	14.45	14	-1	$623.88	1386	
EPRS	8.88	8.7	-1	$406.08	2256	
RUSS	11.94	12.18	-1	-$402.68	1678	
SCO	81.9	80.04	1	-$453.74	244	$139,852.99
UVXY	20.39	19.86	-1	$519.32	980	
PLUG	3.32	3.25	-1	$421.24	6018	
JNUG	26.21	26.8	-1	-$449.74	762	
AMPE	5.9	5.78	-1	$406.46	3387	$139,890.08
NUGT	14.4	14.69	1	$402.46	1388	
BLDP	2.78	2.72	-1	$431.32	7189	
GENE	6.56	6.43	1	-$396.03	3046	
DUST	14.44	14.15	-1	$401.35	1384	
JDST	9.28	9.09	-1	$409.16	2153	
MHR	2.78	2.72	-1	$436.42	7274	$141,544.80
PBR.A	6.44	6.58	1	$439.58	3140	
GENE	5.9	6.03	1	$445.54	3427	
FRO	2.6	2.66	-1	-$466.63	7777	
NUGT	15.85	15.49	1	-$462.05	1283	$142,399.70
GENE	5.85	5.99	-1	-$486.84	3477	
RUSS	12	12.28	1	$474.67	1695	
JDST	8.7	8.9	-1	-$467.65	2338	
RUSL	25.98	26.15	1	$132.23	778	$141,457.84
BIOC	4.06	3.94	-1	$597.29	4977	
PBR	6.59	6.44	1	-$459.98	3067	
RUSS	11.5	11.23	-1	$474.45	1757	
PLUG	3	3.02	-1	-$134.72	6736	
SBGL	10.07	9.82	-1	$501.69	2007	
UVXY	19.13	18.69	-1	$468.45	1065	$142,568.81
TVIX	2.14	2.09	-1	$475.86	9517	
UCO	7.15	6.93	-1	$630.83	2867	$143,513.12
UGAZ	2.52	2.55	-1	-$244.07	8136	
SCO	86.9	89.18	1	$537.91	236	
ONVO	4.77	4.66	-1	$472.79	4298	
GENE	4.78	4.88	-1	-$428.91	4289	
SBGL	8.34	8.53	-1	-$470.22	2475	$144,481.67
UCO	5.95	6.07	-1	-$416.27	3469	
UGAZ	2.73	2.79	-1	-$453.63	7561	
SCO	103.01	100.9	1	-$422.78	200	
ATNM	3.34	3.25	-1	$556.17	6180	
DGAZ	7.15	7.32	1	$486.65	2863	$143,274.93
ATOS	2.05	1.95	-1	$998.43	9984	
CUR	3.75	3.84	-1	-$491.23	5458	
NBG	1.5	1.53	-1	-$409.36	13645	
RUSS	11.37	11.1	-1	$486.04	1800	
UCO	9.06	9.24	-1	-$406.65	2259	
GEVO	0.28	0.29	1	$730.99	73099	
DGAZ	5.95	5.82	1	-$451.55	3473	$144,669.82
GENE	8.6	8.42	1	-$432.57	2403	
FRO	2.65	2.67	-1	-$155.98	7799	
DUST	14.45	14	-1	$643.61	1430	
EPRS	8.88	8.7	-1	$418.93	2327	
RUSS	11.94	12.18	-1	-$415.42	1731	
SCO	81.9	80.04	1	-$468.09	252	$144,276.85
UVXY	20.39	19.86	-1	$535.74	1011	
PLUG	3.32	3.25	-1	$434.57	6208	
JNUG	26.21	26.8	-1	-$463.96	786	
AMPE	5.9	5.78	-1	$419.32	3494	$144,315.11
NUGT	14.4	14.69	1	$415.19	1432	
BLDP	2.78	2.72	-1	$444.96	7416	
GENE	6.56	6.43	1	-$408.56	3143	
DUST	14.44	14.15	-1	$414.04	1428	
JDST	9.28	9.09	-1	$422.10	2222	
MHR	2.78	2.72	-1	$450.22	7504	$146,022.16
PBR.A	6.44	6.58	1	$453.48	3239	
GENE	5.9	6.03	1	$459.63	3536	
FRO	2.6	2.66	-1	-$481.39	8023	
NUGT	15.85	15.49	1	-$476.66	1324	$146,904.11
GENE	5.85	5.99	-1	-$502.24	3587	
RUSS	12	12.28	1	$489.68	1749	
JDST	8.7	8.9	-1	-$482.44	2412	
RUSL	25.98	26.15	1	$136.42	802	$145,932.45
BIOC	4.06	3.94	-1	$616.18	5135	
PBR	6.59	6.44	1	-$474.53	3164	
RUSS	11.5	11.23	-1	$489.46	1813	
PLUG	3	3.02	-1	-$138.98	6949	
SBGL	10.07	9.82	-1	$517.56	2070	
UVXY	19.13	18.69	-1	$483.27	1098	$147,078.57
TVIX	2.14	2.09	-1	$490.92	9818	
UCO	7.15	6.93	-1	$650.78	2958	$148,052.76
UGAZ	2.52	2.55	-1	-$251.79	8393	
SCO	86.9	89.18	1	$554.92	243	
ONVO	4.77	4.66	-1	$487.74	4434	
GENE	4.78	4.88	-1	-$442.48	4425	
SBGL	8.34	8.53	-1	-$485.10	2553	$149,051.94
UCO	5.95	6.07	-1	-$429.44	3579	
UGAZ	2.73	2.79	-1	-$467.98	7800	
SCO	103.01	100.9	1	-$436.16	207	
ATNM	3.34	3.25	-1	$573.77	6375	
DGAZ	7.15	7.32	1	$502.04	2953	$147,807.03
ATOS	2.05	1.95	-1	$1,030.01	10300	
CUR	3.75	3.84	-1	-$506.77	5631	
NBG	1.5	1.53	-1	-$422.31	14077	
RUSS	11.37	11.1	-1	$501.42	1857	
UCO	9.06	9.24	-1	-$419.51	2331	
GEVO	0.28	0.29	1	$754.12	75412	
DGAZ	5.95	5.82	1	-$465.83	3583	$149,246.04
GENE	8.6	8.42	1	-$446.25	2479	
FRO	2.65	2.67	-1	-$160.91	8046	
DUST	14.45	14	-1	$663.97	1475	
EPRS	8.88	8.7	-1	$432.18	2401	
RUSS	11.94	12.18	-1	-$428.56	1786	
SCO	81.9	80.04	1	-$482.89	260	$148,840.64
UVXY	20.39	19.86	-1	$552.69	1043	
PLUG	3.32	3.25	-1	$448.32	6405	
JNUG	26.21	26.8	-1	-$478.64	811	
AMPE	5.9	5.78	-1	$432.58	3605	$148,880.11
NUGT	14.4	14.69	1	$428.33	1477	
BLDP	2.78	2.72	-1	$459.03	7651	
GENE	6.56	6.43	1	-$421.48	3242	
DUST	14.44	14.15	-1	$427.14	1473	
JDST	9.28	9.09	-1	$435.46	2292	
MHR	2.78	2.72	-1	$464.46	7741	$150,641.16
PBR.A	6.44	6.58	1	$467.83	3342	
GENE	5.9	6.03	1	$474.17	3647	
FRO	2.6	2.66	-1	-$496.62	8277	

APPENDIX

NUGT	15.85	15.49	1	-$491.74	1366	$151,551.01
GENE	5.85	5.99	-1	-$518.12	3701	
RUSS	12	12.28	1	$505.17	1804	
JDST	8.7	8.9	-1	-$497.70	2489	
RUSL	25.98	26.15	1	$140.73	828	$150,548.61
BIOC	4.06	3.94	-1	$635.67	5297	
PBR	6.59	6.44	1	-$489.54	3264	
RUSS	11.5	11.23	-1	$504.95	1870	
PLUG	3	3.02	-1	-$143.38	7169	
SBGL	10.07	9.82	-1	$533.94	2136	
UVXY	19.13	18.69	-1	$498.56	1133	$151,730.98
TVIX	2.14	2.09	-1	$506.45	10129	
UCO	7.15	6.93	-1	$671.37	3052	$152,735.99
UGAZ	2.52	2.55	-1	-$259.76	8659	
SCO	86.9	89.18	1	$572.48	251	
ONVO	4.77	4.66	-1	$503.17	4574	
GENE	4.78	4.88	-1	-$456.47	4565	
SBGL	8.34	8.53	-1	-$500.44	2634	$153,766.77
UCO	5.95	6.07	-1	-$443.03	3692	
UGAZ	2.73	2.79	-1	-$482.78	8046	
SCO	103.01	100.9	1	-$449.95	213	
ATNM	3.34	3.25	-1	$591.92	6577	

TOTAL: $152,482.49
Return: 117.83%

APPENDIX

Tyler

EXPECTANCY, EXPECTUNITY, SYSTEM QUALITY SPREADSHEET

Entry Date	Entry Price	Exit Date	Exit Price	Long/Short	Profit/Loss	No. of Shares	Average Loss	Largest Loss	R Mult 1	R Mult 2
4/15/2013 14:30	390.14	4/16/2013 11:30	395.14	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
4/18/2013 11:30	387.08	4/19/2013 10:30	392.08	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
4/19/2013 15:30	399.78	4/22/2013 10:30	394.78	1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
4/26/2013 11:30	401.63	4/29/2013 10:30	406.63	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
5/2/2013 12:30	416.4	5/22/2013 15:30	446.71	1	3031	100	$495.69	$1,620.00	$6.11	$1.87
5/22/2013 15:30	446.71	6/7/2013 11:30	434.26	-1	1245	100	$495.69	$1,620.00	$2.51	$0.77
6/7/2013 11:30	434.26	6/12/2013 13:30	436.31	1	205	100	$495.69	$1,620.00	$0.41	$0.13
6/12/2013 13:30	436.31	6/14/2013 10:30	441.31	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
6/17/2013 12:30	443.98	6/21/2013 11:30	438.98	1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
6/24/2013 11:30	433.48	6/25/2013 10:30	438.5	-1	-502	100	$495.69	$1,620.00	-$1.01	-$0.31
6/27/2013 11:30	441.93	7/18/2013 16:00	454.02	1	1209	100	$495.69	$1,620.00	$2.44	$0.75
7/18/2013 16:00	454.02	8/1/2013 11:30	449.48	-1	454	100	$495.69	$1,620.00	$0.92	$0.28
8/1/2013 11:30	449.48	8/7/2013 11:30	445.68	1	-380	100	$495.69	$1,620.00	-$0.77	-$0.23
8/7/2013 11:30	445.68	8/19/2013 12:30	434.89	-1	1079	100	$495.69	$1,620.00	$2.18	$0.67
8/19/2013 12:30	434.89	8/27/2013 10:30	429.78	1	-511	100	$495.69	$1,620.00	-$1.03	-$0.32
8/27/2013 10:30	429.78	9/4/2013 12:30	434.78	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
9/5/2013 11:30	439.64	9/13/2013 11:30	443.27	1	363	100	$495.69	$1,620.00	$0.73	$0.22
9/13/2013 11:30	443.27	9/16/2013 10:30	448.27	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
9/17/2013 11:30	441.53	9/18/2013 14:30	446.53	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
9/18/2013 15:30	447.53	9/23/2013 12:30	443.21	1	-432	100	$495.69	$1,620.00	-$0.87	-$0.27
9/23/2013 12:30	443.21	10/1/2013 11:30	442.34	-1	87	100	$495.69	$1,620.00	$0.18	$0.05
10/1/2013 11:30	442.34	10/3/2013 12:30	437.34	1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
10/3/2013 13:30	437.83	10/10/2013 13:30	433.75	-1	408	100	$495.69	$1,620.00	$0.82	$0.25
10/10/2013 13:30	433.75	11/5/2013 11:30	510.82	1	7707	100	$495.69	$1,620.00	$15.55	$4.76
11/5/2013 11:30	510.82	11/5/2013 14:30	515.58	-1	-476	100	$495.69	$1,620.00	-$0.96	-$0.29
11/5/2013 14:30	515.58	11/6/2013 11:30	510.58	1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
11/7/2013 12:30	505.05	11/13/2013 11:30	510.05	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
11/13/2013 12:30	510.39	12/2/2013 13:30	527.72	1	1733	100	$495.69	$1,620.00	$3.50	$1.07
12/2/2013 13:30	527.72	12/6/2013 10:30	534.9	-1	-718	100	$495.69	$1,620.00	-$1.45	-$0.44
12/6/2013 11:30	531.74	12/13/2013 15:30	529.94	1	-180	100	$495.69	$1,620.00	-$0.36	-$0.11
12/13/2013 15:30	529.94	12/16/2013 10:30	534.94	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
12/18/2013 13:30	533.41	12/18/2013 15:30	538.41	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
12/19/2013 10:30	540.58	12/30/2013 13:30	556.18	1	1560	100	$495.69	$1,620.00	$3.15	$0.96
12/30/2013 13:30	556.18	1/7/2014 10:30	562.37	-1	-619	100	$495.69	$1,620.00	-$1.25	-$0.38
1/7/2014 11:30	566.57	1/10/2014 11:30	561.57	1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
1/13/2014 11:30	571.61	1/13/2014 14:30	566.61	1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
1/24/2014 11:30	574.49	1/30/2014 12:30	568.98	-1	551	100	$495.69	$1,620.00	$1.11	$0.34
1/30/2014 12:30	568.98	2/19/2014 16:00	599.21	1	3023	100	$495.69	$1,620.00	$6.10	$1.87
2/19/2014 16:00	599.21	2/21/2014 10:30	604.49	-1	-528	100	$495.69	$1,620.00	-$1.07	-$0.33
2/24/2014 11:30	607.65	2/28/2014 16:00	605.03	1	-262	100	$495.69	$1,620.00	-$0.53	-$0.16
2/28/2014 16:00	605.03	3/5/2014 10:30	610.03	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
3/7/2014 12:30	607.44	4/3/2014 11:30	581.17	-1	2627	100	$495.69	$1,620.00	$5.30	$1.62
4/3/2014 11:30	581.17	4/3/2014 12:30	576.17	1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
4/4/2014 12:30	551.98	4/9/2014 10:30	559.94	-1	-796	100	$495.69	$1,620.00	-$1.61	-$0.49
4/25/2014 11:30	518.22	4/29/2014 10:30	523.22	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
5/5/2014 11:30	525.8	5/12/2014 11:30	526.57	-1	-77	100	$495.69	$1,620.00	-$0.16	-$0.05
5/12/2014 11:30	526.57	5/15/2014 10:30	521.57	1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
5/15/2014 11:30	520.65	5/19/2014 10:30	525.65	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
5/19/2014 12:30	527.85	5/30/2014 14:30	556.49	1	2864	100	$495.69	$1,620.00	$5.78	$1.77
5/30/2014 14:30	556.49	6/5/2014 13:30	552.04	-1	445	100	$495.69	$1,620.00	$0.90	$0.27
6/5/2014 13:30	552.04	6/11/2014 12:30	555.97	1	393	100	$495.69	$1,620.00	$0.79	$0.24
6/11/2014 12:30	555.97	6/19/2014 10:30	553.8	-1	217	100	$495.69	$1,620.00	$0.44	$0.13
6/19/2014 10:30	553.8	6/19/2014 13:30	548.8	1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
6/23/2014 10:30	555.15	7/8/2014 11:30	569.1	1	1395	100	$495.69	$1,620.00	$2.81	$0.86
7/8/2014 11:30	569.1	7/9/2014 10:30	574.1	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
7/17/2014 11:30	576.9	7/18/2014 10:30	593.1	-1	-1620	100	$495.69	$1,620.00	-$3.27	-$1.00

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7/24/2014 16:00	592.24	8/18/2014 12:30	582.51	-1	973	100	$495.69	$1,620.00	$1.96	$0.60
8/18/2014 12:30	582.51	8/25/2014 13:30	580.73	1	-178	100	$495.69	$1,620.00	-$0.36	-$0.11
8/25/2014 13:30	580.73	9/2/2014 11:30	573.77	-1	696	100	$495.69	$1,620.00	$1.40	$0.43
9/2/2014 11:30	573.77	9/15/2014 10:30	568.77	1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
9/15/2014 11:30	570	9/16/2014 10:30	575	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
9/19/2014 11:30	593.77	9/22/2014 10:30	588.77	1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
9/29/2014 15:30	573.1	9/30/2014 10:30	578.1	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
9/30/2014 12:30	579.11	9/30/2014 14:30	574.11	1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
10/7/2014 12:30	568.9	10/8/2014 16:00	573.9	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
10/13/2014 11:30	538.49	10/13/2014 12:30	543.49	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
10/15/2014 11:30	526.05	10/15/2014 16:00	531.05	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
10/17/2014 14:30	514.97	10/20/2014 15:30	519.97	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
10/22/2014 11:30	535.16	11/5/2014 11:30	548.01	1	1285	100	$495.69	$1,620.00	$2.59	$0.79
11/5/2014 11:30	548.01	11/10/2014 12:30	547.15	-1	86	100	$495.69	$1,620.00	$0.17	$0.05
11/10/2014 12:30	547.15	11/13/2014 16:00	544.01	1	-314	100	$495.69	$1,620.00	-$0.63	-$0.19
11/13/2014 16:00	544.01	11/21/2014 11:30	538.84	-1	517	100	$495.69	$1,620.00	$1.04	$0.32
11/21/2014 11:30	538.84	12/1/2014 10:30	533.84	1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
12/1/2014 12:30	533.74	12/4/2014 14:30	536.23	-1	-249	100	$495.69	$1,620.00	-$0.50	-$0.15
12/4/2014 14:30	536.23	12/5/2014 10:30	530.55	1	-568	100	$495.69	$1,620.00	-$1.15	-$0.35
12/10/2014 10:30	533.31	12/10/2014 14:30	528.31	1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
12/12/2014 12:30	522.1	12/19/2014 16:00	516.94	-1	516	100	$495.69	$1,620.00	$1.04	$0.32
12/19/2014 16:00	516.94	12/30/2014 11:30	527.75	1	1081	100	$495.69	$1,620.00	$2.18	$0.67
12/30/2014 11:30	527.75	1/16/2015 14:30	504.95	-1	2280	100	$495.69	$1,620.00	$4.60	$1.41
1/16/2015 14:30	504.95	1/27/2015 11:30	522.79	1	1784	100	$495.69	$1,620.00	$3.60	$1.10
1/27/2015 11:30	522.79	1/30/2015 10:30	527.79	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
1/30/2015 11:30	527.9	2/2/2015 10:30	522.9	1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
2/5/2015 10:30	523.38	2/5/2015 16:00	528.38	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
2/6/2015 11:30	531.82	2/9/2015 10:30	526.82	1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
2/10/2015 16:00	536.39	2/23/2015 11:30	532.99	1	-340	100	$495.69	$1,620.00	-$0.69	-$0.21
2/23/2015 11:30	532.99	2/25/2015 10:30	537.99	-1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31
2/25/2015 11:30	542.21	3/6/2015 13:30	570.21	1	2800	100	$495.69	$1,620.00	$5.65	$1.73
3/6/2015 13:30	570.21	3/18/2015 16:00	559	-1	1121	100	$495.69	$1,620.00	$2.26	$0.69
3/18/2015 16:00	559	3/26/2015 10:30	554	1	-500	100	$495.69	$1,620.00	-$1.01	-$0.31

			Expectancy (Profit or Loss Per Dollar Risked Per Trade)	**0.34**	**0.10**		
Days Per Year	**1st Trade**	4/15/2013					
365	**Last Trade**	3/18/2015					
	Strategy Calendar Days (Days)	702	**Opportunities (Trades/Year)**	**46.27**		**Std Dev R Multiples**	**2.559359362**
Number of Trades (Trades)	89	**Annualized Expectancy (Expectunity) (Profit or Loss Per Dollar Risked Per Year)**	**15.72**	**4.81**	**System Quality**	**1.252046962**	**Total profit/loss per dollar risked relative to the total variability of the profit/loss per dollar risked => Dimensionless**

APPENDIX

EASY LANGUAGE CODE

```
Inputs:
Length(15),
Linear_Ave(1),
slow_average(10),
fast_average(5);

Variables:
Avg(0),
Stdev(0),
High_stdv(0),
Low_stdv(0),
slow_ma(0),
fast_ma(0);

Begin
Avg=Average(Close, Length);
stdev=StandardDev(Close, Length, 2);
High_stdv=avg+stdev+stdev;
Low_stdv=avg-stdev-stdev;
slow_ma=Average(Close, slow_average);
fast_ma=Average(Close, fast_average);
end;

If Close>High_stdv and close>High_stdv[1] and close>High_stdv[2]
and fast_ma>slow_ma
Then buy 100 shares next bar at market;
If Close<Low_stdv and close<Low_stdv[1] and close<Low_stdv[2]
And fast_ma<slow_ma
Then sell short 100 shares next bar at market; setstoploss(500);
```

APPENDIX

TRADING JOURNAL

Trading/Investment Journal – Tyler Keenan

9/11/2014

So far, I have invested in 500 shares (about $18,000) of Unum Group (UNM), the sole reason being that I work for Unum. This was not done with any strategy or long-term growth indicator in mind, but simply because I feel as though hopeful that some of my efforts might lead in some small way to the growth of Unum! This is definitely intended as a long-term investment, as I've already lost several hundred dollars from this purchase!

After having read some of the materials provided in class, I'm convinced that the best way to invest is to develop an investment strategy that does not take emotions into account. Nobody can predict the market, so the best option is to develop a program to always execute trades based on pre-determined successful indicators. I'm very excited to learn how to do this!

9/16/2014

Today, I made my first forex trade by purchasing one lot of EURAUD. In a literal sense, I interpret this to mean that I purchased 100,000 Euros with Australian Dollars, with the hope that either the Australian dollar will lose value relative to the Euro or the Euro will strengthen relative to the Australian dollar. That way, I can buy back more Australian dollars with my 100,000 Euros. However, I think this means that I spent more than the 100,000 Australian dollars allotted in the assignment.

I based this trade on the perceived upswing over the past few days, so I have an opportunity to buy low and sell high. Here's hoping that the value will continue to increase!

APPENDIX

9/18/2014

I was very fortunate with this trade in that I ended up with a profit of just under $1000. I exited the position today at 2:30pm, primarily because the assignment was to exit the position before class this afternoon. I monitored the price of the symbol throughout, and saw it steadily increase. This is a strategy that could not work in the long term, as its not something that I could commit to doing on a daily basis. However, for a first forex trade it was certainly interesting to follow the progress!

9/24/2014

I have traded 1 lot of the EURUSD symbol, based on the fact that I anticipate the value increasing. It seems to be a bit volatile lately, so I'm hoping to capitalize on a large uptick. Additionally, European Central Bank president Mario Draghi is scheduled to speak tomorrow morning, so I am hoping that his speech will spur an increase in value for this symbol.

APPENDIX

9/25/2014

As of right now (11am), I have lost about $500. Although, this is up from the almost $1000 I was down a few hours ago. I'm hoping the market will recover a bit from the unexpected downtick from Draghi's speech, however I'm simply hoping to break even at this point. My point of exit will be a sell limit order for a bit above my purchase price, with the hope that I'll make some small profit. I am confident in this position, however I want to make sure that I don't lose too much money.

APPENDIX

9/30/2014

At this point, I still own one lot of EURUSD (where I have lost about $1,800) and 500 shares of UNM (Unum Group, where I have lost about $1,200). I am holding on to both positions, as I'm hoping to see them bounce back. During the week, I purchased a lot of EURAUD, based primarily on my prior success with this pair. I'm not sure if this is a good reason or not, however I suppose that's why we have simulated accounts!

In more concrete news, I noticed that the Australian retail sales report was released almost immediately after placing my trade. From prior experience, I'm not even going to bother trying to predict what will be released – I simply don't have the knowledge to make an accurate prediction. Instead, I plan to try to capitalize on the trend – whichever direction it goes!

10/2/2014

Well, immediately after my trade the retail report was released, and showed numbers that were much weaker than predicted. As such, the Aussie weakened relative to the Euro which drove the value of the pair up. While I could have sold my shares immediately after the peak, I chose to hold them for a few days to see what would happen. That proved to be a very bad idea, as I'm currently out about $600.

To me, this clearly emphasizes the necessity of strategy trading. I am far too emotional to be able to effectively trade manually, so I would very much benefit from having an automated trading strategy to make the tough decisions for me. As I perceive the forex market to be relatively volatile, particularly compared to the equities market, I'm retaining my shares of EURUSD from last week as well as EURAUD from this week. Hopefully, they'll rebound in the very near future!

10/6/2014

This week, I decided to take advantage of stop orders to verify that a market was actually in an uptrend before purchasing. I chose to purchase one lot each of AUDCHF and USDCHF. Both seemed to be on an uptrend, so I hope that they will continue to climb and will trigger my stop orders.

The AUDCHF symbol in particular piqued my interest as an influential Australian employment report is slated to be released Wednesday night. I have no predictions as to how that might affect the markets, however I anticipate that there will at the very least be movement! As the news tends to have such a high impact on forex trading, I have taken a bit more of a liking to equities trading. Hopefully, the employment report will be favorable!

APPENDIX

USDCHF stop order

AUDCHF stop order

APPENDIX

10/9/2014

Once again, I find myself having lost money on another trade. While the USDCHF stop order never triggered, the AUDCHF one did. However, the trend reversed almost immediately after the stop order and plunged. I hope to start using a wider variety of indicators in my trades moving forward, as my prior strategy of simple intuition is definitely not working!

10/15/2014

Today, I closed all my outstanding positions with the hope of starting afresh. I ultimately did end up making money on EURUSD as well as EURAUD, however I lost money on AUDCHF as well as UNM. I have developed a simple trading strategy, which I hope to use to actually start making money. This system will hopefully be the first step in my "casino," which is the only real way to make money in the stock or currency markets.

11/3/2014

What a busy week! Last week alone, my trading system made close to 100 trades! Fortunately, it paid off and I am currently showing a profit of about $700 total. Because I'm trading five minute bars, there are quite a few of them. One area that I've been looking at however is the fact that I'm trading 5 minute bars, seemingly contradictory to generally accepted logic which is that Bollinger band strategies work better on longer bars. While I'm showing a profit now, I'm wondering if I might not be able to make even more money if I were to switch to a longer bar.

In the news, the mid-term elections will be taking place tomorrow. Republicans are heavily favored to take control of the United States Senate, and their economic

philosophy tends to differ significantly from that of President Obama and Fed Chairwoman Janet Yellen. Economists aren't in agreement as to just what a Republican Senate majority will mean for the Federal Reserve, but it was pointed out that the Senate Banking Committee would then become republican controlled. The banking committee is the legislative entity responsible for oversight of the Fed, so Janet Yellen may have a difficult time over the next two years getting done what she'd like to get done.

11/11/2014

There have been some rumblings coming out of Washington that the federal legislature is planning to vote on the Keystone XL pipeline, supposedly as a last ditch effort to help incumbent Louisiana Senator Mary Landrieu hold on to her seat. As this is a proposal that has been struggling to gain traction for as long as anyone can remember, I might consider investing in oil-based stocks. If this proposal passes, it would likely lead to a spike in value of these types of companies. Conversely, however, the failure of the legislature to pass the bill could also lead to a sharp decline in value of these same companies.

Yesterday, my trading indicator said that I should go long on GOOG, a symbol that I have not yet traded. Trusting in my system, I bought 100 shares and am currently showing a generous profit. My plan is to continue to trust in my trading system and to avoid emotional trading. If memory serves, it didn't work out so well in A-Term!

11/19/2014

Our IQP group has mostly gotten situated, so I've been able to focus a bit more on trading itself as opposed to organizational distractions. A recent article in the Wall Street Journal has once again touted the favorable trading environment in the equities market, due to recent statements from the Federal Reserve. This has reaffirmed what I was fairly certain about from the beginning which is that the stock market promises fairly decent returns, particularly recently.

My strategy has been running, and I am showing a profit from each symbol that I'm trading. However, an area that I'm still not entirely sure about is how to choose symbols to trade – my system was optimized on 5 minute bars, so it may behoove me to find out which symbols perform particularly well on 5 minute bars. Those which are also good with Bollinger band strategies would be a bonus!

APPENDIX

11/24/2014

On Professor Radzicki's suggestion, today I checked out the mobile app for TradeStation. Unfortunately, it does not offer the ability to trade based on an uploaded strategy, nor does it provide any notification feature to alert me when to buy or sell. I can understand how it would be useful to a manual trader, however I hope to have a completely automated strategy.

Due to my inability to consistently have an internet connection on my laptop, I have not run my strategy within the last few days. I'm currently long CSCO, UNM, and AAPL, and short FB. In total, I'm up about $1500 in total. I would anticipate that I could increase that profit if I allowed my system to run more consistently, however I'm still adapting to the idea of always having an internet connection!

12/3/2014

My biggest success as of late is Cisco, which is up $3.85 from when I opened the long position. In total, I'm up 16% or $385. This chart illustrates my Bollinger band system that has led to this return.

Conversely, however, I've been losing money in Unum. I'm starting to suspect that Unum does not trend enough for the five minute bars that I've been trading – as such I'm considering either dropping Unum from my portfolio or trading less frequent bars. I've been told that five minute bars is too fast for a Bollinger band system, so I'm hoping

to possibly look at trading across longer bars. Perhaps thirty minute bars would be good?

In recent news, analysts have released their projections for market growth in 2015, which they are projecting at 5%. However, the S&P 500 also only grew by 5% in 2014, which would indicate that the market is not picking up as much as some had hoped to see. As far as I'm concerned, 5% growth is still growth, regardless of how much more or less growth it was from the previous year. While there are those who are concerned about this latest development, I'm not one of them.

12/11/2014

This week, our group met with Prof. Radzicki to discuss our progress. Much of the conversation focused on what he expected of us at the start of C-Term, to make sure that we were aware of his expectations. We also discussed the division of the workload moving forward, however we have not yet decided who's typing, who's organizing, etc. Hopefully, that will all work itself out once we get back from winter break.

Admittedly, I have focused very little on trading this past week as I've been busy studying for my upcoming actuarial exam, which I'll be taking on December 20th. As there were no deliverables for today, I spent the time studying and taking practice exams. Fortunately, they are related in that I've learned quite a bit about options and futures contracts through this process. I've learned enough about options in particular that I briefly considered trading options rather than stocks, however I decided to keep trading stocks and to keep doing what I've been doing.

12/18/2014

Just a few minutes ago, an alert popped up on my phone: "Dow Jumps 421.28 – highest since December 2011." It would seem that this is further verification of what I and many others had already believed – that the equities market is the place to be right now!

This week, I spent more time studying for my upcoming exam. As such, I didn't get as much trading done as I'd planned, however I hope to pick it back up over Christmas break and expand it during C-Term. I also compiled a report for Professor Radzicki as to my progress over the course of the term. Finally, I was able to solidify my strategy for C-Term: I'm trading stocks using a Bollinger band strategy on thirty minute bars. This is very similar to my previous strategy, however I'm now using thirty minute bars rather than five minute bars. I also hope to use the break to come up with a good list of trend

following stocks, or stocks that tend to trend well. This will hopefully be more effective than simply choosing arbitrary stocks from companies that I've heard of.

1/20/2015

As C term starts to pick up, we met with Professor Radzicki to discuss goals for the term. In keeping with the general outline of the IQP, the focus for C term is putting the systems we developed in B term into practice and fine tuning as necessary. As my system is automatic, I have a bit more leeway in terms of making modifications, since I won't have to actually make any trades manually. When the time comes to analyze the profitability of my system, I'll be able to simply generate a list of trades for a time period that I determine.

My two primary goals for C term are to develop a method by which I'll determine which stocks to trade, and to finalize the parameters of my system. When I finalize these in C term, I'll be able to write about it in D term!

2/4/2015

Over the past few days, I've been working on coming up with a process for choosing stocks to trade. Up until now, I've primarily been trading stocks based on whether or not the company is a mainstream brand, as well as minimal fundamental analysis of companies that I've heard of. I decided that I wanted a mixture of fundamental analysis and technical analysis to develop a list of trading candidates, in an effort to differentiate myself from the rest of the market if even in some small way. To do this, I first wanted to utilize HotLists from TradeStation to find stocks that had recently broken above their fifty two week high or broken below their fifty two week low. These are the stocks that I believe are the most likely to continue to trend up or down, which makes them ideal candidates for my system. Additionally, I look for stocks that are liquid, or are at more than 500,000 share trading volume. This will ensure that I can enter and exit the market freely.

For the fundamental piece, I decided to briefly research each stock on the list to see if there was anything in the news recently that warranted its spike or dip. The rationale behind this was to determine whether a stock's upswing or downswing represented a fundamental shift in the stock's value, or whether it was a market fluctuation. At this point, I've not tested this method exhaustively. However, early indications are that it will be a good way of choosing stocks!

APPENDIX

2/18/2015

I've been spending the past week doing my best to ensure that my system is as profitable as possible, and that it will be ready for analysis in D term. I've made two adjustments to my system in that time, both of which I believe will ultimately be very beneficial. First and foremost, I added an additional condition to my setup. I've added a long moving average and a short moving average to determine the bias of the market. If the short moving average is above the long moving average, the market is biased long (and vice versa). To prevent my system from trading as frequently as it was, I added the condition that the market be biased in the direction of any trade that the Bollinger Band portion of the system is considering making. I believe that this will make sure that the system is not as easily "faked out," which will only boost profitability!

In addition to this modification, I also decided to start trading on sixty minute bars rather than thirty minute bars. This was an easy decision to make, based primarily on a comparison of the profitability of the system with each type of bars. On multiple symbols, the system traded better on sixty minute bars than thirty minute bars. Essentially, thirty minute bars were too volatile for my system to reliably pick up on future trends, and as a result was trading too frequently. I believe that the switch to sixty minute bars will prove to be very beneficial.

3/2/2015

I believe that I've managed to close the book on my trading strategy as of today! Professor Radzicki has stressed the importance of drawing a line in the sand at some point and cutting off any further modifications to the trading system. If I don't do that, I'll likely continue to tweak the system indefinitely!

The next step in the process is to analyze the system in terms of expectancy, expectunity, and other methods of analysis that Professor Radzicki will be helping us conduct. Though I'm confident that my system is profitable overall, it's still a bit nerve racking to subject it to such strict scrutiny. However, I suppose I would rather find any underlying problems now than find out its deficiencies after it starts losing money!

APPENDIX

Hyunsoo

EXPECTANCY, EXPECTUNITY, SYSTEM QUALITY SPREADSHEET

Entry Date	Entry Price	Exit Date	Exit Price	Long/Short	Profit/Loss	No. of Shares	Average Profit	Largest Loss	R Mult 1	R Mult 2
3/21/2013 8:00	1.0409	3/27/2013 7:00	1.0452	-1	-860	200000	$331.14	-$5,640.00	-$2.60	$0.15
3/27/2013 7:00	1.0452	4/2/2013 0:00	1.0452	1	0	200000	$331.14	-$5,640.00	$0.00	$0.00
4/2/2013 0:00	1.0452	4/3/2013 20:00	1.0451	-1	20	200000	$331.14	-$5,640.00	$0.06	$0.00
4/3/2013 20:00	1.0451	4/8/2013 9:00	1.042	1	-620	200000	$331.14	-$5,640.00	-$1.87	$0.11
4/8/2013 9:00	1.042	4/11/2013 0:00	1.0503	-1	-1660	200000	$331.14	-$5,640.00	-$5.01	$0.29
4/11/2013 0:00	1.0503	4/19/2013 5:00	1.0355	1	-2960	200000	$331.14	-$5,640.00	-$8.94	$0.52
4/19/2013 5:00	1.0355	4/19/2013 14:00	1.0284	-1	1420	200000	$331.14	-$5,640.00	$4.29	-$0.25
4/19/2013 14:00	1.0284	4/24/2013 23:00	1.0309	1	500	200000	$331.14	-$5,640.00	$1.51	-$0.09
4/24/2013 23:00	1.0309	5/1/2013 6:00	1.0347	-1	-760	200000	$331.14	-$5,640.00	-$2.30	$0.13
5/1/2013 6:00	1.0347	5/3/2013 11:00	1.0305	1	-840	200000	$331.14	-$5,640.00	-$2.54	$0.15
5/3/2013 11:00	1.0305	5/6/2013 4:00	1.0272	-1	660	200000	$331.14	-$5,640.00	$1.99	-$0.12
5/8/2013 23:00	1.0235	5/9/2013 16:00	1.0055	-1	3600	200000	$331.14	-$5,640.00	$10.87	-$0.64
5/9/2013 16:00	1.0055	5/20/2013 14:00	0.9812	1	-4860	200000	$331.14	-$5,640.00	-$14.68	$0.86
5/20/2013 14:00	0.9812	5/22/2013 12:00	0.9677	-1	2700	200000	$331.14	-$5,640.00	$8.15	-$0.48
5/22/2013 12:00	0.9677	5/28/2013 8:00	0.968	1	60	200000	$331.14	-$5,640.00	$0.18	-$0.01
5/28/2013 8:00	0.968	5/28/2013 21:00	0.9571	-1	2180	200000	$331.14	-$5,640.00	$6.58	-$0.39
5/28/2013 21:00	0.9571	5/30/2013 1:00	0.9681	1	2200	200000	$331.14	-$5,640.00	$6.64	-$0.39
5/30/2013 1:00	0.9681	6/5/2013 4:00	0.958	-1	2020	200000	$331.14	-$5,640.00	$6.10	-$0.36
6/5/2013 4:00	0.958	6/12/2013 5:00	0.9508	1	-1440	200000	$331.14	-$5,640.00	-$4.35	$0.26
6/12/2013 5:00	0.9508	6/18/2013 4:00	0.9492	-1	320	200000	$331.14	-$5,640.00	$0.97	-$0.06
6/18/2013 4:00	0.9492	6/19/2013 15:00	0.9547	1	1100	200000	$331.14	-$5,640.00	$3.32	-$0.20
6/19/2013 15:00	0.9547	6/19/2013 16:00	0.9343	-1	4080	200000	$331.14	-$5,640.00	$12.32	-$0.72
6/20/2013 21:00	0.9194	6/26/2013 11:00	0.9343	1	2980	200000	$331.14	-$5,640.00	$9.00	-$0.53
6/26/2013 11:00	0.9343	6/28/2013 11:00	0.916	-1	3660	200000	$331.14	-$5,640.00	$11.05	-$0.65
6/28/2013 11:00	0.916	7/4/2013 11:00	0.916	1	0	200000	$331.14	-$5,640.00	$0.00	$0.00
7/4/2013 11:00	0.916	7/5/2013 15:00	0.9054	-1	2120	200000	$331.14	-$5,640.00	$6.40	-$0.38
7/5/2013 15:00	0.9054	7/8/2013 16:00	0.9141	1	1740	200000	$331.14	-$5,640.00	$5.25	-$0.31
7/8/2013 16:00	0.9141	7/12/2013 8:00	0.9064	-1	1540	200000	$331.14	-$5,640.00	$4.65	-$0.27
7/12/2013 8:00	0.9064	7/15/2013 23:00	0.9167	1	2060	200000	$331.14	-$5,640.00	$6.22	-$0.37
7/15/2013 23:00	0.9167	7/24/2013 13:00	0.9184	-1	-340	200000	$331.14	-$5,640.00	-$1.03	$0.06
7/24/2013 13:00	0.9184	7/25/2013 16:59	0.9257	1	1460	200000	$331.14	-$5,640.00	$4.41	-$0.26
7/25/2013 16:59	0.9257	7/29/2013 15:00	0.9192	-1	1300	200000	$331.14	-$5,640.00	$3.93	-$0.23
7/29/2013 15:00	0.9192	8/6/2013 2:00	0.8971	1	-4420	200000	$331.14	-$5,640.00	-$13.35	$0.78
8/6/2013 2:00	0.8971	8/12/2013 21:00	0.9112	-1	-2820	200000	$331.14	-$5,640.00	-$8.52	$0.50
8/14/2013 22:00	0.9154	8/15/2013 11:00	0.9076	-1	1560	200000	$331.14	-$5,640.00	$4.71	-$0.28
8/15/2013 11:00	0.9076	8/16/2013 10:00	0.9193	1	2340	200000	$331.14	-$5,640.00	$7.07	-$0.41
8/16/2013 10:00	0.9193	8/19/2013 14:00	0.9112	-1	1620	200000	$331.14	-$5,640.00	$4.89	-$0.29
8/19/2013 14:00	0.9112	8/26/2013 10:00	0.9062	1	-1000	200000	$331.14	-$5,640.00	-$3.02	$0.18
8/26/2013 10:00	0.9062	8/27/2013 2:00	0.8974	-1	1760	200000	$331.14	-$5,640.00	$5.32	-$0.31
8/27/2013 2:00	0.8974	9/2/2013 0:00	0.8966	1	-160	200000	$331.14	-$5,640.00	-$0.48	$0.03
9/2/2013 0:00	0.8966	9/12/2013 3:00	0.9248	-1	-5640	200000	$331.14	-$5,640.00	-$17.03	$1.00
9/12/2013 3:00	0.9248	9/15/2013 19:00	0.9349	1	2020	200000	$331.14	-$5,640.00	$6.10	-$0.36
9/15/2013 19:00	0.9349	9/20/2013 9:00	0.942	-1	-1420	200000	$331.14	-$5,640.00	-$4.29	$0.25
9/20/2013 9:00	0.942	10/1/2013 2:00	0.9385	1	-700	200000	$331.14	-$5,640.00	-$2.11	$0.12
10/3/2013 22:00	0.942	10/23/2013 6:00	0.9624	-1	-4080	200000	$331.14	-$5,640.00	-$12.32	$0.72
10/23/2013 6:00	0.9624	11/4/2013 4:00	0.95	1	-2480	200000	$331.14	-$5,640.00	-$7.49	$0.44
11/4/2013 4:00	0.95	11/7/2013 10:00	0.9455	-1	900	200000	$331.14	-$5,640.00	$2.72	-$0.16
11/7/2013 10:00	0.9455	11/13/2013 18:00	0.935	1	-2100	200000	$331.14	-$5,640.00	-$6.34	$0.37
11/15/2013 11:00	0.9369	11/20/2013 16:00	0.933	-1	780	200000	$331.14	-$5,640.00	$2.36	-$0.14
11/20/2013 16:00	0.933	11/25/2013 20:00	0.9195	1	-2700	200000	$331.14	-$5,640.00	-$8.15	$0.48
11/25/2013 20:00	0.9195	11/26/2013 8:00	0.9113	-1	1640	200000	$331.14	-$5,640.00	$4.95	-$0.29
11/26/2013 8:00	0.9113	12/1/2013 22:00	0.9156	1	860	200000	$331.14	-$5,640.00	$2.60	-$0.15
12/1/2013 22:00	0.9156	12/3/2013 1:00	0.9068	-1	1760	200000	$331.14	-$5,640.00	$5.32	-$0.31
12/3/2013 1:00	0.9068	12/6/2013 12:00	0.9098	1	600	200000	$331.14	-$5,640.00	$1.81	-$0.11
12/6/2013 12:00	0.9098	12/11/2013 12:00	0.9061	-1	740	200000	$331.14	-$5,640.00	$2.23	-$0.13
12/11/2013 12:00	0.9061	12/20/2013 11:00	0.8901	1	-3200	200000	$331.14	-$5,640.00	-$9.66	$0.57
12/20/2013 11:00	0.8901	12/25/2013 22:00	0.8891	-1	200	200000	$331.14	-$5,640.00	$0.60	-$0.04

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12/25/2013 22:00	0.8891	12/27/2013 4:00	0.892	1	580	200000	$331.14	-$5,640.00	$1.75	-$0.10
12/27/2013 4:00	0.892	12/29/2013 19:00	0.8848	-1	1440	200000	$331.14	-$5,640.00	$4.35	-$0.26
12/29/2013 19:00	0.8848	12/30/2013 13:00	0.892	1	1440	200000	$331.14	-$5,640.00	$4.35	-$0.26
12/30/2013 13:00	0.892	1/2/2014 7:00	0.8864	-1	1120	200000	$331.14	-$5,640.00	$3.38	-$0.20
1/2/2014 7:00	0.8864	1/3/2014 1:00	0.8974	1	2200	200000	$331.14	-$5,640.00	$6.64	-$0.39
1/10/2014 11:00	0.8979	1/14/2014 11:00	0.897	-1	180	200000	$331.14	-$5,640.00	$0.54	-$0.03
1/14/2014 11:00	0.897	1/20/2014 22:00	0.8827	1	-2860	200000	$331.14	-$5,640.00	-$8.64	$0.51
1/20/2014 22:00	0.8827	1/23/2014 4:00	0.8783	-1	880	200000	$331.14	-$5,640.00	$2.66	-$0.16
1/23/2014 4:00	0.8783	1/27/2014 21:00	0.8762	1	-420	200000	$331.14	-$5,640.00	-$1.27	$0.07
1/27/2014 21:00	0.8762	1/29/2014 22:00	0.8717	-1	900	200000	$331.14	-$5,640.00	$2.72	-$0.16
1/29/2014 22:00	0.8717	1/30/2014 21:00	0.8814	1	1940	200000	$331.14	-$5,640.00	$5.86	-$0.34
1/30/2014 21:00	0.8814	1/31/2014 10:00	0.8704	-1	2200	200000	$331.14	-$5,640.00	$6.64	-$0.39
1/31/2014 10:00	0.8704	2/3/2014 12:00	0.881	1	2120	200000	$331.14	-$5,640.00	$6.40	-$0.38
2/3/2014 12:00	0.881	2/12/2014 21:00	0.8953	-1	-2860	200000	$331.14	-$5,640.00	-$8.64	$0.51
2/12/2014 21:00	0.8953	2/14/2014 5:00	0.9033	1	1600	200000	$331.14	-$5,640.00	$4.83	-$0.28
2/14/2014 5:00	0.9033	2/19/2014 22:00	0.8954	-1	1580	200000	$331.14	-$5,640.00	$4.77	-$0.28
2/19/2014 22:00	0.8954	2/24/2014 12:00	0.9016	1	1240	200000	$331.14	-$5,640.00	$3.74	-$0.22
2/24/2014 12:00	0.9016	2/26/2014 9:00	0.8981	-1	700	200000	$331.14	-$5,640.00	$2.11	-$0.12
3/2/2014 20:00	0.8902	3/4/2014 21:00	0.8983	1	1620	200000	$331.14	-$5,640.00	$4.89	-$0.29
3/4/2014 21:00	0.8983	3/9/2014 23:00	0.9037	-1	-1080	200000	$331.14	-$5,640.00	-$3.26	$0.19
3/9/2014 23:00	0.9037	3/12/2014 22:00	0.9056	1	380	200000	$331.14	-$5,640.00	$1.15	-$0.07
3/12/2014 22:00	0.9056	3/19/2014 16:00	0.9047	-1	180	200000	$331.14	-$5,640.00	$0.54	-$0.03
3/19/2014 16:00	0.9047	3/21/2014 6:00	0.9082	1	700	200000	$331.14	-$5,640.00	$2.11	-$0.12
3/21/2014 6:00	0.9082	4/15/2014 10:00	0.9362	-1	-5600	200000	$331.14	-$5,640.00	-$16.91	$0.99
4/21/2014 23:00	0.9347	4/22/2014 23:00	0.9305	-1	840	200000	$331.14	-$5,640.00	$2.54	-$0.15
4/22/2014 23:00	0.9305	4/28/2014 4:00	0.9295	1	-200	200000	$331.14	-$5,640.00	-$0.60	$0.04
4/28/2014 4:00	0.9295	4/28/2014 22:00	0.9239	-1	1120	200000	$331.14	-$5,640.00	$3.38	-$0.20
4/28/2014 22:00	0.9239	4/29/2014 22:00	0.9283	1	880	200000	$331.14	-$5,640.00	$2.66	-$0.16
4/29/2014 22:00	0.9283	5/2/2014 10:00	0.9219	-1	1280	200000	$331.14	-$5,640.00	$3.87	-$0.23
5/2/2014 10:00	0.9219	5/6/2014 5:00	0.9307	1	1760	200000	$331.14	-$5,640.00	$5.32	-$0.31
5/6/2014 5:00	0.9307	5/13/2014 4:00	0.9334	-1	-540	200000	$331.14	-$5,640.00	-$1.63	$0.10
5/13/2014 4:00	0.9334	5/13/2014 10:00	0.938	1	920	200000	$331.14	-$5,640.00	$2.78	-$0.16
5/13/2014 10:00	0.938	5/15/2014 10:00	0.9341	-1	780	200000	$331.14	-$5,640.00	$2.36	-$0.14
5/15/2014 10:00	0.9341	5/22/2014 0:00	0.9265	1	-1520	200000	$331.14	-$5,640.00	-$4.59	$0.27
5/22/2014 0:00	0.9265	5/28/2014 9:00	0.9222	-1	860	200000	$331.14	-$5,640.00	$2.60	-$0.15
5/28/2014 9:00	0.9222	5/29/2014 1:00	0.9275	1	1060	200000	$331.14	-$5,640.00	$3.20	-$0.19
5/29/2014 1:00	0.9275	6/2/2014 0:00	0.9263	-1	240	200000	$331.14	-$5,640.00	$0.72	-$0.04
6/2/2014 0:00	0.9263	6/3/2014 23:00	0.9283	1	400	200000	$331.14	-$5,640.00	$1.21	-$0.07
6/5/2014 10:00	0.9314	6/13/2014 7:00	0.9388	-1	-1480	200000	$331.14	-$5,640.00	-$4.47	$0.26
6/13/2014 7:00	0.9388	6/18/2014 16:00	0.9362	1	-520	200000	$331.14	-$5,640.00	-$1.57	$0.09
6/18/2014 16:00	0.9362	6/20/2014 12:00	0.9381	-1	-380	200000	$331.14	-$5,640.00	-$1.15	$0.07
6/20/2014 12:00	0.9381	6/22/2014 23:00	0.9424	1	860	200000	$331.14	-$5,640.00	$2.60	-$0.15
6/22/2014 23:00	0.9424	6/24/2014 4:00	0.9407	-1	340	200000	$331.14	-$5,640.00	$1.03	-$0.06
6/24/2014 4:00	0.9407	6/25/2014 13:00	0.9397	1	-200	200000	$331.14	-$5,640.00	-$0.60	$0.04
6/25/2014 13:00	0.9397	6/30/2014 8:00	0.9394	-1	60	200000	$331.14	-$5,640.00	$0.18	-$0.01
6/30/2014 8:00	0.9394	7/1/2014 2:00	0.9448	1	1080	200000	$331.14	-$5,640.00	$3.26	-$0.19
7/1/2014 2:00	0.9448	7/2/2014 10:00	0.9442	-1	120	200000	$331.14	-$5,640.00	$0.36	-$0.02
7/2/2014 10:00	0.9442	7/7/2014 23:00	0.9387	1	-1100	200000	$331.14	-$5,640.00	-$3.32	$0.20
7/7/2014 23:00	0.9387	7/10/2014 4:00	0.9369	-1	360	200000	$331.14	-$5,640.00	$1.09	-$0.06
7/10/2014 4:00	0.9369	7/17/2014 10:00	0.9387	1	360	200000	$331.14	-$5,640.00	$1.09	-$0.06
7/17/2014 10:00	0.9387	7/17/2014 19:00	0.9346	-1	820	200000	$331.14	-$5,640.00	$2.48	-$0.15
7/17/2014 19:00	0.9346	7/18/2014 16:00	0.9398	1	1040	200000	$331.14	-$5,640.00	$3.14	-$0.18
7/18/2014 16:00	0.9398	7/21/2014 20:00	0.9366	-1	640	200000	$331.14	-$5,640.00	$1.93	-$0.11
7/21/2014 20:00	0.9366	7/22/2014 10:00	0.9418	1	1040	200000	$331.14	-$5,640.00	$3.14	-$0.18
7/24/2014 11:00	0.9411	8/6/2014 14:00	0.9342	1	-1380	200000	$331.14	-$5,640.00	-$4.17	$0.24
8/6/2014 14:00	0.9342	8/6/2014 23:00	0.9297	-1	900	200000	$331.14	-$5,640.00	$2.72	-$0.16
8/6/2014 23:00	0.9297	8/13/2014 3:00	0.9295	1	-40	200000	$331.14	-$5,640.00	-$0.12	$0.01
8/13/2014 3:00	0.9295	8/15/2014 12:00	0.93	-1	-100	200000	$331.14	-$5,640.00	-$0.30	$0.02

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8/15/2014 12:00	0.93	8/22/2014 0:00	0.9314	1	280	200000	$331.14	-$5,640.00	$0.85	-$0.05
8/22/2014 0:00	0.9314	8/24/2014 19:00	0.9291	-1	460	200000	$331.14	-$5,640.00	$1.39	-$0.08
8/24/2014 19:00	0.9291	8/26/2014 10:00	0.9325	1	680	200000	$331.14	-$5,640.00	$2.05	-$0.12
8/26/2014 10:00	0.9325	9/1/2014 23:00	0.9313	-1	240	200000	$331.14	-$5,640.00	$0.72	-$0.04
9/1/2014 23:00	0.9313	9/3/2014 6:00	0.9324	1	220	200000	$331.14	-$5,640.00	$0.66	-$0.04
9/3/2014 6:00	0.9324	9/8/2014 7:00	0.9347	-1	-460	200000	$331.14	-$5,640.00	-$1.39	$0.08
9/9/2014 21:00	0.9205	9/16/2014 13:00	0.9087	1	-2360	200000	$331.14	-$5,640.00	-$7.13	$0.42
9/16/2014 13:00	0.9087	9/17/2014 13:00	0.9026	-1	1220	200000	$331.14	-$5,640.00	$3.68	-$0.22
9/17/2014 13:00	0.9026	10/1/2014 23:00	0.8783	1	-4860	200000	$331.14	-$5,640.00	-$14.68	$0.86
10/1/2014 23:00	0.8783	10/3/2014 7:00	0.8763	-1	400	200000	$331.14	-$5,640.00	$1.21	-$0.07
10/3/2014 7:00	0.8763	10/6/2014 16:00	0.875	1	-260	200000	$331.14	-$5,640.00	-$0.79	$0.05
10/6/2014 16:00	0.875	10/8/2014 12:00	0.8748	-1	40	200000	$331.14	-$5,640.00	$0.12	-$0.01
10/8/2014 12:00	0.8748	10/8/2014 16:59	0.8846	1	1960	200000	$331.14	-$5,640.00	$5.92	-$0.35
10/8/2014 16:59	0.8846	10/9/2014 13:00	0.8776	-1	1400	200000	$331.14	-$5,640.00	$4.23	-$0.25
10/9/2014 13:00	0.8776	10/13/2014 11:00	0.8777	1	20	200000	$331.14	-$5,640.00	$0.06	$0.00
10/13/2014 11:00	0.8777	10/14/2014 11:00	0.8724	-1	1060	200000	$331.14	-$5,640.00	$3.20	-$0.19
10/14/2014 11:00	0.8724	10/15/2014 11:00	0.8799	1	1500	200000	$331.14	-$5,640.00	$4.53	-$0.27
10/15/2014 11:00	0.8799	10/16/2014 7:00	0.8695	-1	2080	200000	$331.14	-$5,640.00	$6.28	-$0.37
10/16/2014 7:00	0.8695	10/21/2014 1:00	0.881	1	2300	200000	$331.14	-$5,640.00	$6.95	-$0.41
10/21/2014 1:00	0.881	10/21/2014 20:00	0.8763	-1	940	200000	$331.14	-$5,640.00	$2.84	-$0.17
10/21/2014 20:00	0.8763	10/24/2014 10:00	0.8807	1	880	200000	$331.14	-$5,640.00	$2.66	-$0.16
10/28/2014 8:00	0.8835	10/29/2014 16:00	0.8803	-1	640	200000	$331.14	-$5,640.00	$1.93	-$0.11
10/29/2014 16:00	0.8803	10/30/2014 14:00	0.8832	1	580	200000	$331.14	-$5,640.00	$1.75	-$0.10
10/30/2014 14:00	0.8832	11/2/2014 20:00	0.875	-1	1640	200000	$331.14	-$5,640.00	$4.95	-$0.29
11/2/2014 20:00	0.875	11/7/2014 7:00	0.8603	1	-2940	200000	$331.14	-$5,640.00	-$8.88	$0.52
11/7/2014 7:00	0.8603	11/10/2014 13:00	0.8623	-1	-400	200000	$331.14	-$5,640.00	-$1.21	$0.07
11/10/2014 13:00	0.8623	11/11/2014 13:00	0.8674	1	1020	200000	$331.14	-$5,640.00	$3.08	-$0.18
11/11/2014 13:00	0.8674	11/13/2014 21:00	0.8694	-1	-400	200000	$331.14	-$5,640.00	-$1.21	$0.07
11/13/2014 21:00	0.8694	11/14/2014 15:00	0.8749	1	1100	200000	$331.14	-$5,640.00	$3.32	-$0.20
11/14/2014 15:00	0.8749	11/17/2014 6:00	0.8727	-1	440	200000	$331.14	-$5,640.00	$1.33	-$0.08
11/17/2014 6:00	0.8727	11/18/2014 5:00	0.8745	1	360	200000	$331.14	-$5,640.00	$1.09	-$0.06
11/18/2014 5:00	0.8745	11/18/2014 22:00	0.8686	-1	1180	200000	$331.14	-$5,640.00	$3.56	-$0.21
11/18/2014 22:00	0.8686	11/21/2014 7:00	0.8682	1	-80	200000	$331.14	-$5,640.00	-$0.24	$0.01
11/21/2014 7:00	0.8682	11/24/2014 5:00	0.8646	-1	720	200000	$331.14	-$5,640.00	$2.17	-$0.13
11/24/2014 5:00	0.8646	11/27/2014 0:00	0.8584	1	-1240	200000	$331.14	-$5,640.00	-$3.74	$0.22
11/27/2014 0:00	0.8584	11/27/2014 19:00	0.8521	-1	1260	200000	$331.14	-$5,640.00	$3.81	-$0.22
11/27/2014 19:00	0.8521	12/1/2014 11:00	0.852	1	-20	200000	$331.14	-$5,640.00	-$0.06	$0.00
12/1/2014 11:00	0.852	12/2/2014 8:00	0.8447	-1	1460	200000	$331.14	-$5,640.00	$4.41	-$0.26
12/2/2014 8:00	0.8447	12/9/2014 12:00	0.8352	1	-1900	200000	$331.14	-$5,640.00	-$5.74	$0.34
12/9/2014 12:00	0.8352	12/11/2014 6:00	0.8253	-1	1980	200000	$331.14	-$5,640.00	$5.98	-$0.35
12/14/2014 21:00	0.821	12/29/2014 6:00	0.8158	1	-1040	200000	$331.14	-$5,640.00	-$3.14	$0.18
12/29/2014 6:00	0.8158	1/1/2015 22:00	0.8134	-1	480	200000	$331.14	-$5,640.00	$1.45	-$0.09
1/1/2015 22:00	0.8134	1/6/2015 3:00	0.8147	1	260	200000	$331.14	-$5,640.00	$0.79	-$0.05
1/6/2015 3:00	0.8147	1/6/2015 19:00	0.8072	-1	1500	200000	$331.14	-$5,640.00	$4.53	-$0.27
1/6/2015 19:00	0.8072	1/9/2015 11:00	0.817	1	1960	200000	$331.14	-$5,640.00	$5.92	-$0.35
1/9/2015 11:00	0.817	1/12/2015 9:00	0.8133	-1	740	200000	$331.14	-$5,640.00	$2.23	-$0.13
1/12/2015 9:00	0.8133	1/15/2015 4:00	0.8229	1	1920	200000	$331.14	-$5,640.00	$5.80	-$0.34
1/15/2015 4:00	0.8229	1/19/2015 23:00	0.8169	-1	1200	200000	$331.14	-$5,640.00	$3.62	-$0.21
1/19/2015 23:00	0.8169	1/27/2015 21:00	0.7993	1	-3520	200000	$331.14	-$5,640.00	-$10.63	$0.62
1/27/2015 21:00	0.7993	1/28/2015 16:59	0.7903	-1	1800	200000	$331.14	-$5,640.00	$5.44	-$0.32
1/29/2015 21:00	0.7785	2/13/2015 1:00	0.7781	1	-80	200000	$331.14	-$5,640.00	-$0.24	$0.01
2/13/2015 1:00	0.7781	2/19/2015 6:00	0.7758	-1	460	200000	$331.14	-$5,640.00	$1.39	-$0.08
2/19/2015 6:00	0.7758	2/24/2015 21:00	0.7857	1	1980	200000	$331.14	-$5,640.00	$5.98	-$0.35
2/24/2015 21:00	0.7857	2/26/2015 11:00	0.7826	-1	620	200000	$331.14	-$5,640.00	$1.87	-$0.11
2/26/2015 11:00	0.7826	3/3/2015 1:00	0.7826	1	0	200000	$331.14	-$5,640.00	$0.00	$0.00
3/3/2015 1:00	0.7826	3/5/2015 12:00	0.7776	-1	1000	200000	$331.14	-$5,640.00	$3.02	-$0.18
3/5/2015 12:00	0.7776	3/6/2015 9:00	0.7836	1	1200	200000	$331.14	-$5,640.00	$3.62	-$0.21
3/6/2015 9:00	0.7836	3/6/2015 11:00	0.7716	-1	2400	200000	$331.14	-$5,640.00	$7.25	-$0.43

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3/6/2015 11:00	0.7716	3/12/2015 5:00	0.7682	1	-680	200000	$331.14	-$5,640.00	-$2.05	$0.12
3/12/2015 5:00	0.7682	3/13/2015 15:00	0.7625	-1	1140	200000	$331.14	-$5,640.00	$3.44	-$0.20
3/13/2015 15:00	0.7625	3/18/2015 16:00	0.7719	1	1880	200000	$331.14	-$5,640.00	$5.68	-$0.33

			Expectancy (Profit or Loss Per Dollar Risked Per Trade)	1.00	-0.06			
Days Per Year 365	1st Trade	3/21/2013 0:00						
	Last Trade	3/13/2015 0:00						
	Strategy Days	722	Opportunities (Trades/Year)	88.98		Std Dev R Multiples	5.04723421	
	Number of Trades (Trades)	176	Annualized Expectancy (Expectunity) (Profit or Loss Per Dollar Risked Per Year)	88.98	-5.22	System Quality	2.6284691	Total profit/loss per dollar risked relative to the total variability of the profit/loss per dollar risked => Dimensionless

APPENDIX

EASYLANGUAGE CODE

```
{ Helpful instructions on the use of EasyLanguage, such as this, appear below and are
  contained within French curly braces {}.  There is no need to erase these
  instructions when using EasyLanguage in order for it to function properly, because
  this text will be ignored. }

Inputs:
        length(30),
        asset_multiplier(2),
        upper_multiplier(2.0),
        lower_multiplier(2.0);

Variables:
        avg(0),
        shift(0);

avg = AverageFC(close, length);
shift = AvgTrueRange(length);

{ STEP 1 OF 2: Replace <CRITERIA> with the criteria that will trigger a Buy at the open
  of the next bar using a market order. }

condition1 = close > avg + upper_multiplier*shift;
condition2 = close < avg - lower_multiplier*shift;

{ STEP 2 OF 2: Replace "Entry Name" (leaving the quotes) with a short name for the
  entry.  The entry name will appear on the chart above/below the trade arrows and in
  the trade by trade performance report. }

if condition1 then
        sellshort asset_multiplier*100000 shares next bar market;

if condition2 then
        buy asset_multiplier*100000 shares next bar market;

Value99 = WriteTrades32( 0 , 0 , 0 , length , 0.0001 , "C:\MyFile-WriteTrades3.csv");
```

APPENDIX

TRADING JOURNAL

09/15/14:

10,000 US dollars were sold and 61407.2 Chinese Yuan were bought. The rationale behind the trade was that the value of the Chinese Yuan compared to the US Dollars has been steadily increasing for past couple months, therefore profit could be made if this trend persisted. Also, this trend coincided with the Chinese economic expansion and growth, therefore the trend was expected to persist.

The Chinese Yuan greatly depreciated compared to the US Dollars. It is speculated that the Chinese government influenced the exchange rate in order to strengthen Chinese export to the United States.

09/18/14:

61407.2 Chinese Yuan were sold and 9977.65 US Dollars were bought back, resulting in the loss of 22.35 US Dollars. The rationale behind the trade was that the instruction was given to close the trade before the next class. Had such instruction was not given, the trade would not have been closed until the Chinese Yuan regained its strength.

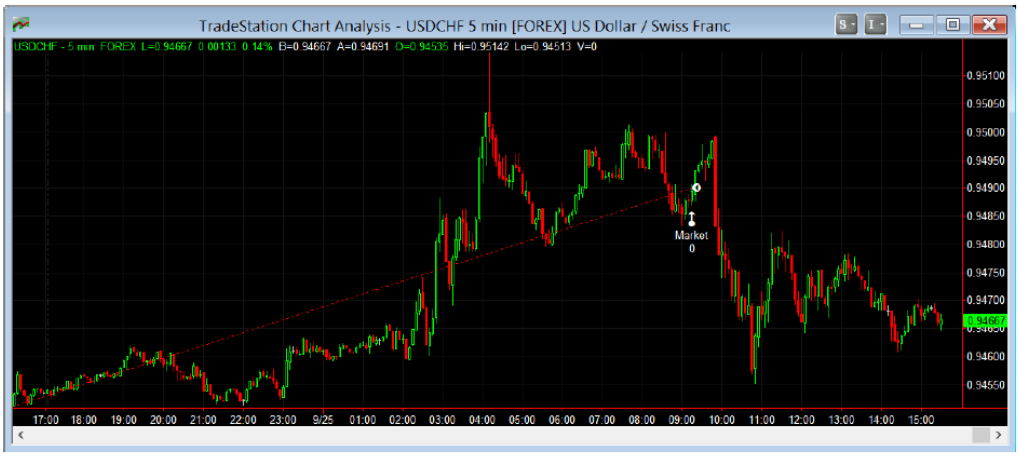
09/24/14, 1:30 PM:

For each currency pair indicated, 15,000 units of US Dollar is sold and equivalent currency is bought, resulting in 105,000 units of US Dollar sold and 1,632,645 units of Japanese Yen, 16,605 units of Canadian Dollar, 14,167 units of Swiss Franc, 9,177 units of British Pound, 18,565 units of New Zealand Dollar, 11,729 units of Euro, and 16,886 units of Australian Dollar bought.

The rationale behind the trade is that given the volatility of the market, breadth of the trade would provide security to the trade as one bad trade would have lesser impact compared to making one single large trade.

09/25/14, 9:00 AM:

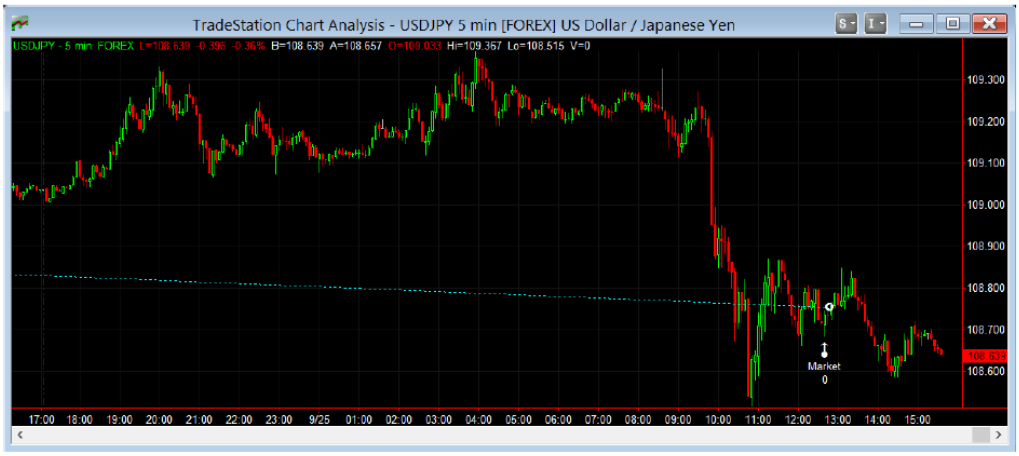
14,167 units of Swiss Franc is sold and 14,929 units of US Dollar is bought back, resulting in 71 units of US Dollar loss.



This trade is closed by mistake. There is no rationale behind the trade.

09/25/14, 12:30 PM:

1,632,645 units of Japanese Yen is sold and 15,012 units of US Dollar is bought back, resulting in 12 units of US Dollar profit.



The rationale behind this trade is that, given the trends of the currency pairs, it is evident that US Dollar is growing stronger, thus any trade is more likely to result in loss rather than gain. The trade is closed to ensure some profit is made.

09/25/14, 3:30 PM:

APPENDIX

16,886 units of Australian Dollar is sold and 14,838 units of US Dollar is bought back, resulting in 162 units of US Dollar loss.

The rationale behind the trade is that the loss exceeded the 1% loss threshold, and it is required to close the trade if such is the case.

One particular reason to hold onto the Euro is that Credit Suisse, Switzerland-based multinational financial services holding company, are looking to buy the Euro, which indicates the firm has particular confidence in the strength of the Euro.

However, it becomes less desirable to hold onto the New Zealand Dollar because UBS, Swiss global financial services company, said to bet on a five-cent gain in the New Zealand Dollar compared to the Australian Dollar, which means that the New Zealand Dollar is weak compared to the Australian Dollar. This would not be a problem if the Australian Dollar is strong. However, the trade involving the Australian Dollar has already resulted in more than 1% loss, which make it likely for the trade involving the New Zealand Dollar to result in worse loss if the prediction is correct.

10/02/14, 02:15:34 PM:

15,000 units of New Zealand Dollar is sold and 11,837 units of US Dollar is bought back, resulting in 283 units of US Dollar loss. The rationale behind the trade is that more than 1% of loss is accumulated, requiring the trade to be closed.

10/02/14, 02:16:21 PM:

15,000 units of British Pound is sold and 24,217 units of US Dollar is bought back, resulting in 300 units of US Dollar loss. The rationale behind the trade is that more than 1% of loss is accumulated, requiring the trade to be closed.

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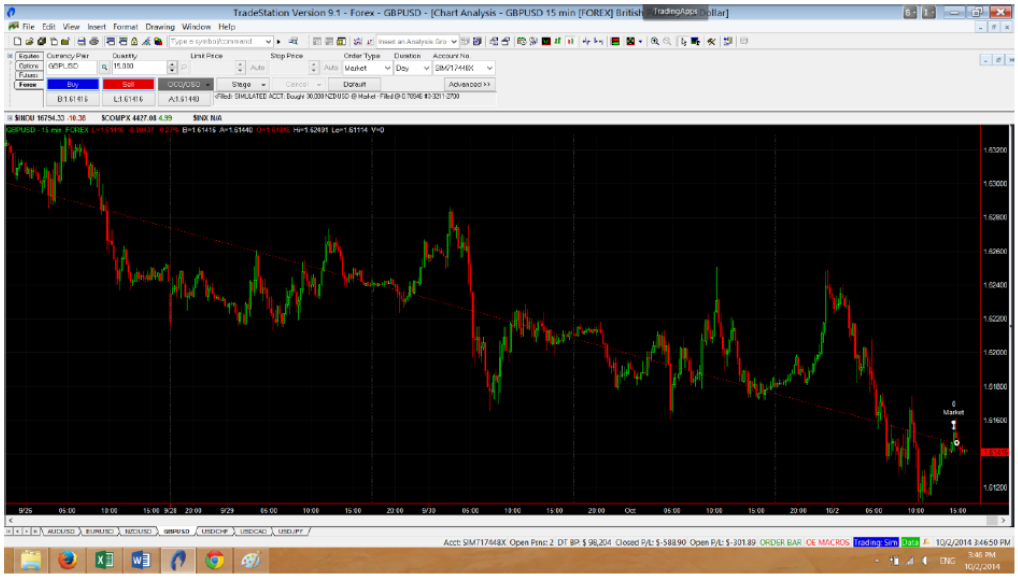

Vast majority of the news on the forexlive.com is about the strength of the US Dollar compared to other currencies. For example, in "ForexLive European morning wrap: USD dominates again as the week warms up," the editor talks about how dominant US dollar is compared to other currencies given the exchange rates, and how it is unlikely to stop anytime soon. Also, there are various news about the Eurozone, and how volatile economies of some of the Eurozone countries are. In "ECB's Nowotny says low interest rates are not enough for economic recovery," Ewald Nowotny, member of the European Central Bank (ECB)'s governing council, comments on how lowering the interest rates has been futile for the recovery of the Eurozone countries.

10/08/14 ~ Present:

A system is created and implemented to conduct trading and manual trading is halted. Below are the orders filled by the system regarding the AUDUSD pair, latest on top.

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10/16/14 10:09:00 PM	10/16/14 10:09:00 PM	AUDUSD	Buy			
100,000	100,000	0	Market	0.87844		
10/16/14 09:46:00 PM	10/16/14 09:46:00 PM	AUDUSD	Sell			
100,000	100,000	0	Market	0.87873		
10/16/14 01:52:00 PM	10/16/14 01:52:00 PM	AUDUSD	Buy			
100,000	100,000	0	Market	0.87689		
10/16/14 01:08:00 PM	10/16/14 01:08:00 PM	AUDUSD	Sell			
100,000	100,000	0	Market	0.87832		
10/09/14 01:37:00 PM	10/09/14 01:37:24 PM	AUDUSD	Buy			
100,000	100,000	0	Market	0.87821		
10/09/14 01:19:00 PM	10/09/14 01:19:22 PM	AUDUSD	Sell			
100,000	100,000	0	Market	0.87912		
10/09/14 08:00:00 AM	10/09/14 08:00:00 AM	AUDUSD	Buy			
100,000	100,000	0	Market	0.88661		
10/09/14 06:38:00 AM	10/09/14 06:38:00 AM	AUDUSD	Sell			
100,000	100,000	0	Market	0.88794		
10/09/14 04:34:00 AM	10/09/14 04:34:00 AM	AUDUSD	Buy			
100,000	100,000	0	Market	0.88797		

In the end, the system incurred 557 units of USD loss. On October 8th, there were several reports indicating that the outlook of the Australian economy is quite grim. For example, the unemployment rate was very high without any sign of alleviation, and its national bank reported that it is expecting fall in earnings. These manifested in the series of drops in AUDUSD pair. It is concerning how the system was not able to detect nor take advantage of such phenomena. On the other hand, on October 15th, there was a report

APPENDIX

indicating foreign demand for Australian housing was increasing, manifested by series of sharp rises in AUDUSD pair. The system was not able to take advantage of it again, not because it was not able to detect it, but because it is not allowed to have multiple trades open at any given time. In conclusion, it seems vital to revise the system in order to have it able to short and open multiple trades.

Below are the orders filled by the system regarding the NZDUSD pair, latest on top.

10/16/14 01:52:00 PM	10/16/14 01:52:00 PM	NZDUSD	Buy	100,000	100,000	0	Market	0.79550
10/16/14 01:08:00 PM	10/16/14 01:08:00 PM	NZDUSD	Sell	100,000	100,000	0	Market	0.79735
10/14/14 11:45:00 PM	10/14/14 11:45:00 PM	NZDUSD	Buy	100,000	100,000	0	Market	0.78395
10/14/14 11:08:00 PM	10/14/14 11:08:00 PM	NZDUSD	Sell	100,000	100,000	0	Market	0.78385
10/14/14 09:15:00 PM	10/14/14 09:15:00 PM	NZDUSD	Buy	100,000	100,000	0	Market	0.78199
10/14/14 08:49:05 PM	10/14/14 08:49:05 PM	NZDUSD	Sell	100,000	100,000	0	Market	0.78147
10/14/14 08:49:00 PM	10/14/14 08:49:00 PM	NZDUSD	Buy	100,000	100,000	0	Market	0.78171
10/14/14 08:48:00 PM	10/14/14 08:48:00 PM	NZDUSD	Sell	100,000	100,000	0	Market	0.78179
10/09/14 01:59:00 PM	10/09/14 01:59:00 PM	NZDUSD	Buy	100,000	100,000	0	Market	0.78613

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10/09/14 01:19:00 PM	10/09/14 01:19:22 PM	NZDUSD	Sell		
100,000	100,000	0	Market	0.78743	
10/09/14 08:11:00 AM	10/09/14 08:11:00 AM	NZDUSD	Buy		
100,000	100,000	0	Market	0.79443	
10/09/14 08:08:00 AM	10/09/14 08:08:00 AM	NZDUSD	Sell		
100,000	100,000	0	Market	0.79449	
10/09/14 07:59:00 AM	10/09/14 07:59:00 AM	NZDUSD	Buy		
100,000	100,000	0	Market	0.79448	
10/09/14 07:41:00 AM	10/09/14 07:41:00 AM	NZDUSD	Sell		
100,000	100,000	0	Market	0.79536	
10/09/14 07:29:00 AM	10/09/14 07:29:00 AM	NZDUSD	Buy		
100,000	100,000	0	Market	0.79524	
10/09/14 06:53:00 AM	10/09/14 06:53:00 AM	NZDUSD	Sell		
100,000	100,000	0	Market	0.79520	
10/09/14 04:41:00 AM	10/09/14 04:41:00 AM	NZDUSD	Buy		
100,000	100,000	0	Market	0.79540	
10/09/14 04:30:00 AM	10/09/14 04:30:00 AM	NZDUSD	Sell		
100,000	100,000	0	Market	0.79626	
10/09/14 04:24:00 AM	10/09/14 04:24:00 AM	NZDUSD	Buy		
100,000	100,000	0	Market	0.79585	

In conclusion, the system generated 402 units of USD profit. There is drastic difference of the nature of the trades between AUDUSD and NZDUSD. When the system is implemented to the AUDUSD pair, the system gradually lost money, which it is assumed that it would also gradually win money if the situation permits. However, when the system

is implemented to the NZDUSD pair, either hugely winning or hugely losing trades dictated the earnings of the system. This phenomena is surprising given the geopolitical closeness between the two countries.

Below are the orders filled by the system regarding the GBPUSD pair.

10/16/14 07:51:00 PM	10/16/14 07:51:00 PM	GBPUSD	Buy	100,000	100,000	0	Market	1.60972
10/16/14 07:16:00 PM	10/16/14 07:16:00 PM	GBPUSD	Sell	100,000	100,000	0	Market	1.61079
10/16/14 01:56:00 PM	10/16/14 01:56:00 PM	GBPUSD	Buy	100,000	100,000	0	Market	1.60728
10/10/14 12:19:00 PM	10/10/14 12:19:00 PM	GBPUSD	Sell	100,000	100,000	0	Market	1.60561
10/09/14 08:00:00 AM	10/09/14 08:00:00 AM	GBPUSD	Buy	100,000	100,000	0	Market	1.62100
10/09/14 06:14:00 AM	10/09/14 06:14:00 AM	GBPUSD	Sell	100,000	100,000	0	Market	1.62016
10/09/14 06:01:00 AM	10/09/14 06:01:00 AM	GBPUSD	Buy	100,000	100,000	0	Market	1.62034
10/09/14 05:13:00 AM	10/09/14 05:13:00 AM	GBPUSD	Sell	100,000	100,000	0	Market	1.62053
10/09/14 04:35:00 AM	10/09/14 04:35:00 AM	GBPUSD	Buy	100,000	100,000	0	Market	1.62031

In conclusion, the system incurred 1184 units of USD loss. After careful observation, it becomes obvious that overall trends of AUDUSD, NZDUSD, and GBPUSD are near identical with miniscule difference. This means that the strengths of these currencies are mostly determined by the relative strengths of the USD, not by the economic prospective of the countries.

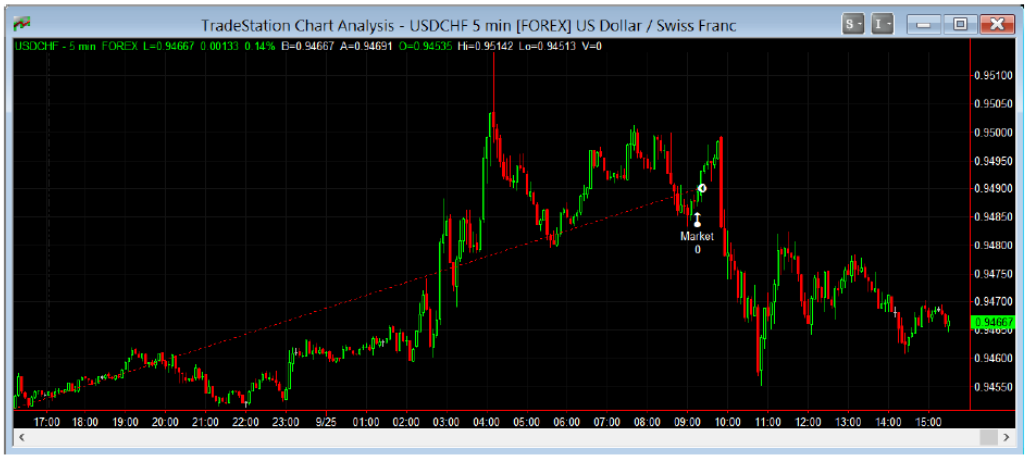
09/24/14, 1:30 PM:

For each currency pair indicated, 15,000 units of US Dollar is sold and equivalent currency is bought, resulting in 105,000 units of US Dollar sold and 1,632,645 units of Japanese Yen, 16,605 units of Canadian Dollar, 14,167 units of Swiss Franc, 9,177 units of British Pound, 18,565 units of New Zealand Dollar, 11,729 units of Euro, and 16,886 units of Australian Dollar bought.

The rationale behind the trade is that given the volatility of the market, breadth of the trade would provide security to the trade as one bad trade would have lesser impact compared to making one single large trade.

09/25/14, 9:00 AM:

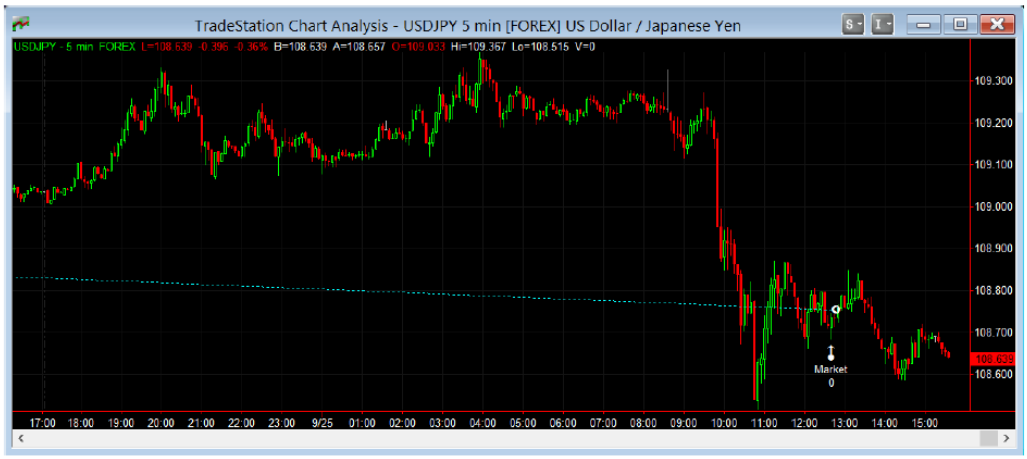
14,167 units of Swiss Franc is sold and 14,929 units of US Dollar is bought back, resulting in 71 units of US Dollar loss.



This trade is closed by mistake. There is no rationale behind the trade.

09/25/14, 12:30 PM:

1,632,645 units of Japanese Yen is sold and 15,012 units of US Dollar is bought back, resulting in 12 units of US Dollar profit.



APPENDIX

The rationale behind this trade is that, given the trends of the currency pairs, it is evident that US Dollar is growing stronger, thus any trade is more likely to result in loss rather than gain. The trade is closed to ensure some profit is made.

09/25/14, 3:30 PM:

16,886 units of Australian Dollar is sold and 14,838 units of US Dollar is bought back, resulting in 162 units of US Dollar loss.

The rationale behind the trade is that the loss exceeded the 1% loss threshold, and it is required to close the trade if such is the case.

Summary:

Currently, 16,605 units of Canadian Dollar, 9,177 units of British Pound, 18,565 units of New Zealand Dollar, and 11,729 units of Euro remain, as closing the trades respective to each currency is not profitable, nor they will result in more than 1% loss.

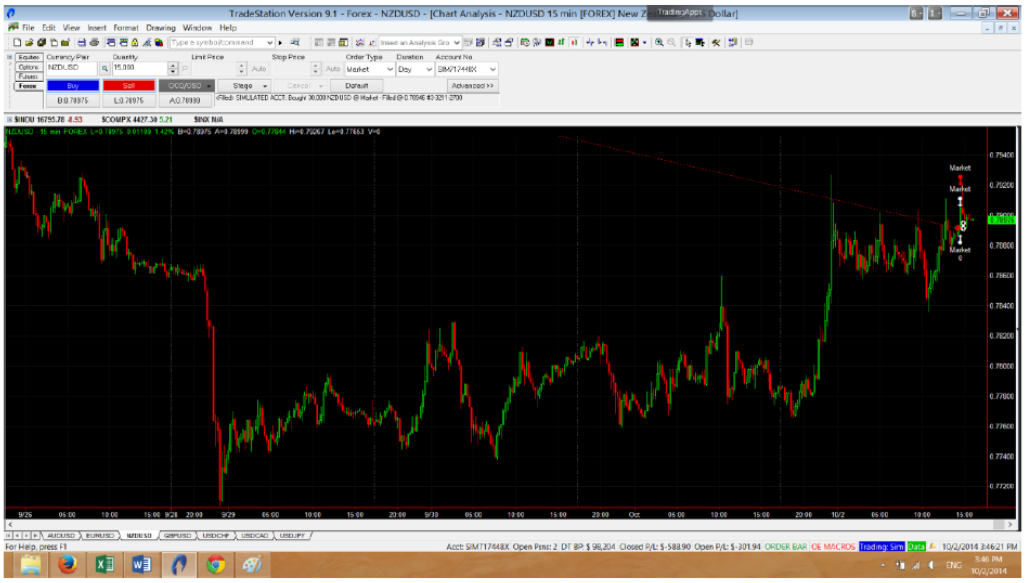
APPENDIX

One particular reason to hold onto the Euro is that Credit Suisse, Switzerland-based multinational financial services holding company, are looking to buy the Euro, which indicates the firm has particular confidence in the strength of the Euro.

However, it becomes less desirable to hold onto the New Zealand Dollar because UBS, Swiss global financial services company, said to bet on a five-cent gain in the New Zealand Dollar compared to the Australian Dollar, which means that the New Zealand Dollar is weak compared to the Australian Dollar. This would not be a problem if the Australian Dollar is strong. However, the trade involving the Australian Dollar has already resulted in more than 1% loss, which make it likely for the trade involving the New Zealand Dollar to result in worse loss if the prediction is correct.

10/02/14, 02:15:34 PM:

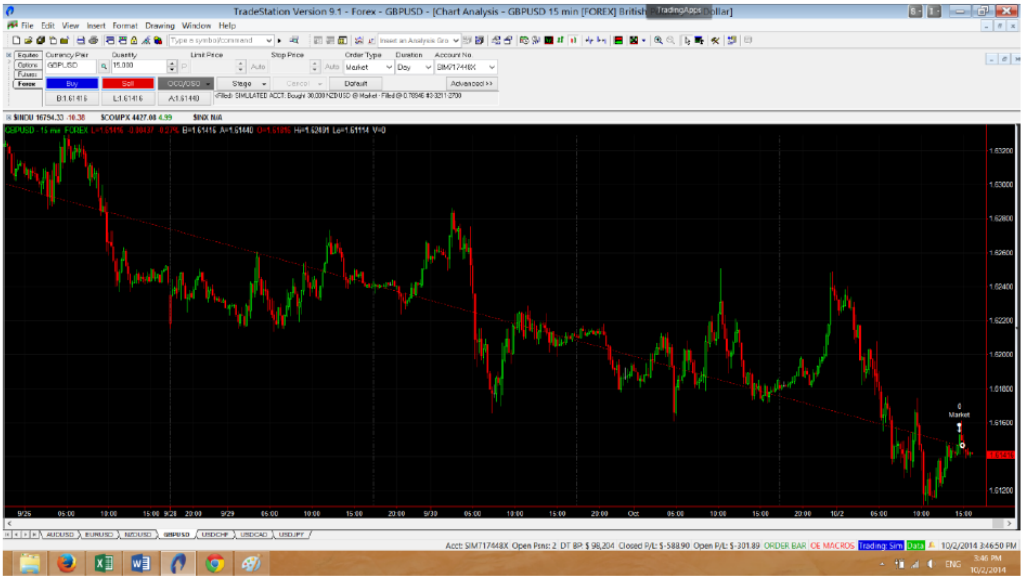
15,000 units of New Zealand Dollar is sold and 11,837 units of US Dollar is bought back, resulting in 283 units of US Dollar loss. The rationale behind the trade is that more than 1% of loss is accumulated, requiring the trade to be closed.



APPENDIX

10/02/14, 02:16:21 PM:

15,000 units of British Pound is sold and 24,217 units of US Dollar is bought back, resulting in 300 units of US Dollar loss. The rationale behind the trade is that more than 1% of loss is accumulated, requiring the trade to be closed.



Summary:

16,605 units of Canadian Dollar and 15,000 units of Euro remain. The trades are not closed because they are yet to generate profit, nor the trades incurs more than 1% loss. No foreign currency is bought this week due to the strength of the US Dollar and uncertainty of profit.

Vast majority of the news on the forexlive.com is about the strength of the US Dollar compared to other currencies. For example, in "ForexLive European morning wrap: USD dominates again as the week warms up," the editor talks about how dominant US dollar is

compared to other currencies given the exchange rates, and how it is unlikely to stop anytime soon. Also, there are various news about the Eurozone, and how volatile economies of some of the Eurozone countries are. In "ECB's Nowotny says low interest rates are not enough for economic recovery," Ewald Nowotny, member of the European Central Bank (ECB)'s governing council, comments on how lowering the interest rates has been futile for the recovery of the Eurozone countries.

10/30/14 – 11/6/14

Because this week follows the meeting where my colleagues made some inspiring presentations, no trading was conducted on my part. Instead, the week was spent studying and contemplating models my colleagues presented.

One particular trading tactics that got me thinking is increasing the trade volume after a losing trade. Also, I was told it is generally not a good idea to do so. However, as far as my reasoning is concerned, it would be possible to profit from said tactic. For example, my primary choice of trade is foreign currencies, which tends to be volatile, but has limiting extremes. If the exchange rates do not to deviate and stay far away from what is generally considered normal, wouldn't every consecutive losing trade increase the chance of winning the next one? And if every consecutive losing trade increase the chance of winning the next one, wouldn't increasing the trade volume exactly be the logical solution for recuperating the loss and eventually profit?

The strategy that will utilize the idea above is still in r&d stage. Prototype will be produced in a following week. Meanwhile, the strategy I presented last meeting is vastly improved.

One notable news is that the relative strength of Russian Ruble is constantly dropping. Although not specified in the article, I personally speculate that the drop began as Russia made aggressive moves in Eastern Europe and sanctions by many nations followed. Currently continuing dropped fueled by the currency holders, as they sell speculating even more drop—self-fulfilling prophecy.

APPENDIX

```
{ Helpful instructions on the use of EasyLanguage, such as this, appear below and are
  contained within French curly braces {}.  There is no need to erase these
  instructions when using EasyLanguage in order for it to function properly, because
  this text will be ignored. }

Inputs:
        len ( 50 ) ,
        mult ( 2 ) ,
        bound ( 2 ) ,
        choke ( 2 ) ;

Variables:
        av ( 0 ) ,
        sd ( 0 ) ;

av = Average ( close , len ) ;
sd = StdDev ( close , len ) ;

{ STEP 1 OF 2: Replace <CRITERIA> with the criteria that will trigger a Buy at the open
  of the next bar using a market order. }

Condition1 = close < av - bound * sd ;
Condition2 = close > av + choke * sd ;
```

```
{ STEP 2 OF 2: Replace "Entry Name" (leaving the quotes) with a short name for the
  entry.  The entry name will appear on the chart above/below the trade arrows and in
  the trade by trade performance report. }

if condition1 then begin
        buy 100000 * mult shares next bar market ;
end ;

if condition2 then begin
        sellshort 100000 * mult shares next bar market ;
end ;
```

11/7/14 – 11/14/14

On 11/9/14 all remaining open trades are closed in order to implement a new strategy. The new strategy uses standard deviations over certain number of bars in order to detect any anomalies. If the price spikes, determined by the close price crossing over the average added some multiple of standard deviations, the strategy will short, expecting the price to go down. If the price tanks, determined by the close price crossing below the average subtracted some multiple of standard deviations, the strategy will buy, expecting the price to go up. The strategy is implemented to EURUSD and AUDUSD because it performed poorly on NZDUSD and GBPUSD. The code is below.

```
{ Helpful instructions on the use of EasyLanguage, such as this, appear below and are
  contained within French curly braces {}.  There is no need to erase these
  instructions when using EasyLanguage in order for it to function properly, because
  this text will be ignored. }
```

APPENDIX

```
Inputs:
        len ( 30 ) ,
        mult ( 2 ) ,
        bound ( 2.0 ) ,
        choke ( 2.0 ) ;

Variables:
        av ( 0 ) ,
        sd ( 0 ) ;

av = Average ( close , len ) ;
sd = StdDev ( close , len ) ;

{ STEP 1 OF 2: Replace <CRITERIA> with the criteria that will trigger a Buy at the open
  of the next bar using a market order. }

Condition1 = close < av - bound * sd ;
Condition2 = close > av + choke * sd ;

{ STEP 2 OF 2: Replace "Entry Name" (leaving the quotes) with a short name for the
  entry.  The entry name will appear on the chart above/below the trade arrows and in
  the trade by trade performance report. }

if condition1 then begin
```

```
        buy 100000 * mult shares next bar market ;
end ;

if condition2 then begin
        sellshort 100000 * mult shares next bar market ;
end ;
```

On 11/14/14, the strategy shorted 8 standard lots of EURUSD.

11/15/14 – 11/22/14

On 11/21/14 the strategy bought 16 standard lots of EURUSD, covering the short on 11/14/14 while expecting further price increase. It also shorted 32 standard lots of AUDUSD, expecting price decrease.

There was one moment where manually closing a trade would have resulted in a profit. However, the strategy decided against it and eventually resulted in a loss. One way to improve the strategy is to have it recognize a stagnant but profitable price, and close the trade accordingly.

11/22/14 – 11/26/14

On 11/25/14 the strategy shorted 16 standard lots of EURUSD, closing the purchase on 11/21/14.

It is important to note that given the nature of automated strategies, long term trading is unfavorable because such relies on events and news, which automated strategies cannot account for. Automated strategies thrive in randomness and short term trading. For example, any currency pair involving JPY was deliberately avoided because breaking the system in order to chase after immediate gain is perceived unfavorable behavior for a trader.

APPENDIX

11/27/14 – 12/03/14

On 12/02/14 the strategy bought 8 standard lots of EURUSD (1.24043), covering the short on 11/25/14 (1.24845) and bought additional 8 standard lots (1.24040), expecting rate increase. The trade resulted in $6,414 profit.

12/04/14 – 12/10/14

On 12/04/14 the strategy sold 8 standard lots of EURUSD (1.24355), closing the purchase on 12/02/14 (1.24040) and shorted additional 8 standard lots (1.24357), expecting rate decrease. The trade resulted in $2,520 profit.

APPENDIX

On 12/05/14 the strategy bought 16 standard lots of AUDUSD (0.83305), covering the purchase on 11/24/14 (0.86820) and bought additional 16 standard lots (0.83304), expecting rate increase. The trade resulted in $60,320 profit.

On 12/09/14 the strategy sold 16 standard lots of AUDUSD (0.83515), closing the purchase on 12/05/14 (0.83304) and shorted additional 16 standard lots (0.83515), expecting rate decrease. The trade resulted in $3,376 profit.

APPENDIX


SA AUDUSD - 60 min FOREX L=0.81720 0.00077 0.09% B=0.81720 A=0.81743 O=0.81588 Hi=0.81911 Lo=0.81479 V=0
-1600000
Short
Market
1600000
Market
1600000
12/4
12/5
12/7
12/9
12/10
12/11

Nicolas

EXPECTANCY, EXPECTUNITY, SYSTEM QUALITY SPREADSHEET

Entry Date	Entry Price	Exit Date	Exit Price	Long/Short	Profit/Loss	No. of Shares	Average Loss	Largest Loss	R Mult 1	R Mult 2
2/2/2015 13:22	17105	2/2/2015 13:47	17059	-1	230	1	$290.57	$480.00	$0.79	$0.48
2/10/2015 10:47	2044.75	2/10/2015 11:48	2051.5	1	333.7	1	$290.57	$480.00	$1.15	$0.70
2/23/2015 15:09	2101.25	2/23/2015 16:11	2107	1	287.5	1	$290.57	$480.00	$0.99	$0.60
2/24/2015 12:40	2107.75	2/24/2015 12:57	2110.5	-1	-137.5	1	$290.57	$480.00	-$0.47	-$0.29
2/25/2015 9:34	4439.25	2/25/2015 10:10	4446.5	1	145	1	$290.57	$480.00	$0.50	$0.30
2/25/2015 10:10	4447	2/25/2015 10:12	4447.75	1	15	1	$290.57	$480.00	$0.05	$0.03
2/25/2015 11:53	2113.75	2/25/2015 14:34	2113.5	-1	12.5	1	$290.57	$480.00	$0.04	$0.03
3/18/2015 14:11	2077.75	3/18/2015 14:49	2085.75	-1	-400	1	$290.57	$480.00	-$1.38	-$0.83
3/20/2015 16:00	2100	3/23/2015 12:45	2104.5	1	225	1	$290.57	$480.00	$0.77	$0.47
3/25/2015 14:53	2064.25	3/25/2015 15:22	2058	1	-321.5	1	$290.57	$480.00	-$1.11	-$0.67
3/30/2015 9:32	2068	3/30/2015 9:43	2072.5	-1	-225	1	$290.57	$480.00	-$0.77	-$0.47
3/30/2015 11:41	48.43	3/30/2015 13:41	47.97	1	-460	1	$290.57	$480.00	-$1.58	-$0.96
3/31/2015 10:24	48.47	3/31/2015 10:39	48.54	1	70	1	$290.57	$480.00	$0.24	$0.15
3/31/2015 10:30	48.26	3/31/2015 10:39	48.54	1	280	1	$290.57	$480.00	$0.96	$0.58
3/31/2015 13:45	48.43	3/31/2015 14:25	48.12	-1	310	1	$290.57	$480.00	$1.07	$0.65
4/1/2015 11:29	1202.3	4/1/2015 11:30	1202.4	-1	-10	1	$290.57	$480.00	-$0.03	-$0.02
4/1/2015 1:19	2050	4/1/2015 4:02	2054	1	200	1	$290.57	$480.00	$0.69	$0.42
4/2/2015 12:55	48.97	4/2/2015 13:14	48.73	-1	240	1	$290.57	$480.00	$0.83	$0.50
4/8/2015 13:39	2073	4/8/2015 14:11	2067	-1	300	1	$290.57	$480.00	$1.03	$0.63
4/8/2015 14:11	2067	4/8/2015 14:17	2077	1	500	1	$290.57	$480.00	$1.72	$1.04
4/8/2015 14:11	2067	4/8/2015 14:24	2077.5	1	525	1	$290.57	$480.00	$1.81	$1.09
4/8/2015 14:11	2067	4/8/2015 14:25	2076.5	1	475	1	$290.57	$480.00	$1.63	$0.99
4/9/2015 18:13	50.76	4/13/2015 23:06	52	1	1240	1	$290.57	$480.00	$4.27	$2.58
4/1/2015 11:30	1202.2	4/14/2015 10:02	1194.5	-1	770	1	$290.57	$480.00	$1.03	$1.60
4/14/2015 10:14	2079.75	4/14/2015 10:35	2078	-1	87.5	1	$290.57	$480.00	$0.30	$0.18
4/15/2015 2:22	54.6	4/15/2015 8:11	54.08	-1	-480	1	$290.57	$480.00	-$1.65	-$1.00

			Expectancy (Profit or Loss Per Dollar Risked Per Trade)	0.11	0.06				
Days Per Year	1st Trade	2/22/2015							
365	Last Trade	4/15/2015							
Strategy Days	52		Opportunities (Trades/Year)	182.50		Std Dev R Multiples	0.877591316		
No. of Trades	26		Annualized Expectancy (Expectunity) (Profit or Loss Per Dollar Risked Per Year)	19.20	11.62	System Quality	0.611183067	Total profit/loss per dollar risked relative to the total variability of the profit/loss per dollar risked => Dimensionless	

APPENDIX

TRADING JOURNAL

Nicolas Silva

Trading Journal

Journal Entry #1 (10/27/14 →11/27/14)

For the first month of trading, I didn't make too many trades. I was also still new to trading the platform as well as trading E-Mini S&P 500, which were 4 of the 5 trades I made. My reasoning for making the trades was highly flawed, and for unfortunately I was making them throughout a school day, so I ended up making losing trades on most of them because of the conflict with classes. The last trade I made was an accident, as I was just exploring the forex markets and accidently made a buy on GBPCAD.

TradeStation Performance Summary Collapse

	All Trades	Long Trades	Short Trades
Total Net Profit	($1,279.07)	$682.43	($1,961.50)
Gross Profit	$988.00	$988.00	$0.00
Gross Loss	($2,267.07)	($305.57)	($1,961.50)
Profit Factor	0.44	3.23	0.00
Roll Over Credit	$0.00	$0.00	$0.00
Open Position P/L	$0.00	$0.00	$0.00
Select Total Net Profit	($1,279.07)	$682.43	($1,961.50)
Select Gross Profit	$988.00	$988.00	$0.00
Select Gross Loss	($2,267.07)	($305.57)	($1,961.50)
Select Profit Factor	0.44	3.23	0.00
Adjusted Total Net Profit	($3,400.60)	($521.64)	($3,348.49)
Adjusted Gross Profit	$0.00	$0.00	$0.00
Adjusted Gross Loss	($3,400.60)	($521.64)	($3,348.49)
Adjusted Profit Factor	0.00	0.00	0.00
Total Number of Trades	5	3	2
Percent Profitable	20.00%	33.33%	0.00%
Winning Trades	1	1	0
Losing Trades	4	2	2
Even Trades	0	0	0

As you know from our group meeting the other day, I haven't done much active trading, but I decided to back test my current strategy over the past month on the E-mini S&P 500 and see how it would've performed actively trading throughout the day, if I had been able to leave it running on a desktop as some people in the class have been able to do.

APPENDIX

TradeStation Performance Summary Collapse

	All Trades	Long Trades	Short Trades
Total Net Profit	$5,875.00	$1,250.00	$4,625.00
Gross Profit	$8,125.00	$1,500.00	$6,625.00
Gross Loss	($2,250.00)	($250.00)	($2,000.00)
Profit Factor	3.61	6.00	3.31
Roll Over Credit	$0.00	$0.00	$0.00
Open Position P/L	$0.00	$0.00	$0.00
Select Total Net Profit	$3,562.50	$1,250.00	$2,312.50
Select Gross Profit	$5,812.50	$1,500.00	$4,312.50
Select Gross Loss	($2,250.00)	($250.00)	($2,000.00)
Select Profit Factor	2.58	6.00	2.16
Adjusted Total Net Profit	$4,063.69	$594.67	$2,919.12
Adjusted Gross Profit	$6,688.69	$969.67	$5,272.68
Adjusted Gross Loss	($2,625.00)	($375.00)	($2,353.55)
Adjusted Profit Factor	2.55	2.59	2.24
Total Number of Trades	80	16	64
Percent Profitable	40.00%	50.00%	37.50%
Winning Trades	32	8	24
Losing Trades	36	4	32
Even Trades	12	4	8
Avg. Trade Net Profit	$73.44	$78.13	$72.27
Avg. Winning Trade	$253.91	$187.50	$276.04
Avg. Losing Trade	($62.50)	($62.50)	($62.50)
Ratio Avg. Win:Avg. Loss	4.06	3.00	4.42
Largest Winning Trade	$1,187.50	$312.50	$1,187.50
Largest Losing Trade	($62.50)	($62.50)	($62.50)
Largest Winner as % of Gross Profit	14.62%	20.83%	17.92%
Largest Loser as % of Gross Loss	2.78%	25.00%	3.13%
Net Profit as % of Largest Loss	9400.00%	2000.00%	7400.00%
Select Net Profit as % of Largest Loss	5700.00%	2000.00%	3700.00%
Adjusted Net Profit as % of Largest Loss	6501.90%	951.47%	4670.60%
Max. Consecutive Winning Trades	6	3	4
Max. Consecutive Losing Trades	5	1	5
Avg. Bars in Total Trades	1.02	1.00	1.03
Avg. Bars in Winning Trades	1.06	1.00	1.08

I applied the strategy to the 60 min interval, so that it was able to backtrack all the way to November 6, 2014. The strategy, despite being fairly simple and crude, would've yielded some excellent results. The main problem that I see with the strategy is that there are more losing trades than winning trades. This is something that will happen with my strategy no matter how what interval graph I use. I think the main problem lies within the stop-loss. I think I need to implement a set of instructions that will prevent my strategy from cashing out too early.

Something that I tried to do just for the purpose of analysis involved changing the number set inside the SetDollarTrailing function. The original value is 62.5 because each pip for 1 share of ESZ14 meant either a gain or loss of $12.50. Since I was doing 5 share trades, each pip meant either a profit or loss of $62.50. So that means my strategy would stop my loss if my position lost one pip in the next bar. Not every position I get into is going to have drastic movement from 1 bar, but it would definitely not be out of the question for a movement of 1 pip in the negative direction, so naturally, all of my trades were a loss of $62.50. Many of those could've been greater loses and some might not have been loses at all if I held on to them longer.

APPENDIX

```
Value1 = Average(Close-Open,7);
If Value1 crosses over 0.75 then
Buy next bar 5 Shares at market;
If Value1 crosses under 0 then
Sell short next bar 5 Shares at market;
SetDollarTrailing(62.5) ;
```

I increased the stop loss value by increments of $62.50 dollars, which meant increased the stop to 2 pips, then 3, and etc.

- At SetDollarTrailing(125) ;
  - Total Net Profit = $7,375.00
  - 3.03 Profit Factor
  - 32 Winning Trades, 35 Losing Trades
- SetDollarTrailing(187.5) ;
  - Total Net Profit - $5,750.00
  - 2.12 Profit Factor
  - 34 Winning Trades, 40 Losing Trades
- SetDollarTrailing(250) ;
  - Total Net Profit - $6,687.50
  - 2.06 Profit Factor
  - 34 Winning Trades, 39 Losing Trades

At the next pip is when the strategy starts to go sour, which makes sense because allowing a 5 pip stop loss is a considerable amount to let slip by, considering the stakes. Unfortunately I was not really able to lessen the amount of losing trades. Over break I'll be trying to tinker more with this strategy, but I also want to start to research a new approach with different markets. I will probably have a permanent idea by the end of winter break.

APPENDIX

Journal Entry #2 (11/27/14 → 12/11/14)

For the month of November, I wasn't trading much, did a few trades here and there when I was able to actually sit down and monitor the market throughout the work day. I made some pretty smart trades, except for one that ended tragically. The trade where I lost 7k happened because I made a trade in the E-mini late at night. And I bet you can guess what happened next. I fell asleep and woke up to a very unfortunate loss slope. I had meant to finish the order later in the night but I fell asleep on the job. I wouldn't really like to consider that a normal trade that I would normally do. I consider that trade to be an outlier, unusual behavior for me (2nd picture down)

APPENDIX

Typical trading behavior usually involves holding trades between 30 minutes to 5 hours. Regardless, this was a bad time for me with respect to making smart decisions. I think the cause or factors that contributed to my poor decisions was the increase in stress with my other classes as it got deeper into the term. Which is pretty unfortunate. Luckily, since I'm going to have 4 weeks of winter vacation, I'll be able to have more time and more relief from stress to be able to focus on trading the market throughout the work day and develop my strategy as well as build a small but respectable portfolio for myself.

#	Type	Date/Time	Account	Symbol	Price	Roll Over Shares/Ctrts/Units			Net Profit	%Profit	Run-up
1	Buy	12/01/14 11:33:32	SIM663891F	ESZ14	$2,054.00	0.00	5	$738.00	0.15%	$750.00	34.29%		$6.00
	Sell	12/01/14 15:20:17	SIM663891F	ESZ14	$2,057.00		$750.00	$738.00		($1,437.50)	100.00%	34.29%	$6.00
2	Buy	12/01/14 15:49:25	SIM663891F	ESZ14	$2,053.50	0.00	5	$2,175.50	0.43%	$2,187.50	62.50%		$6.00
	Sell	12/02/14 12:09:28	SIM663891F	ESZ14	$2,062.25		$2,187.50	$2,913.50		($1,312.50)	100.00%	62.50%	$6.00
3	Sell	12/04/14 09:43:27	SIM663892X	USDCHF	Fr.0.97	0.00	1000000	$792.63	0.08%	$792.63	100.00%		$0.00
	Buy	12/04/14 09:47:11	SIM663892X	USDCHF	Fr.0.97		$792.63	$3,706.13		$0.00	100.00%	100.00%	$0.00
4	Buy	12/02/14 12:51:23	SIM663891F	ESZ14	$2,061.00	0.00	5	($7,262.00)	(1.41%)	$4,500.00	32.29%		$6.00
	Sell	12/11/14 03:23:55	SIM663891F	ESZ14	$2,032.00		($7,250.00)	($3,555.87)		($9,437.50)	15.70%	(52.02%)	$6.00
5	Sell	12/11/14 09:30:51	SIM663891F	ESZ14	$2,034.50	0.00	5	($824.50)	(0.16%)	$0.00	0.00%		$6.00
	Buy	12/11/14 09:34:23	SIM663891F	ESZ14	$2,037.75		($812.50)	($4,380.37)		($812.50)	0.00%	(100.00%)	$6.00
6	Sell	12/12/14 11:26:31	SIM663891F	ESZ14	$2,016.00	0.00	5	$613.00	0.12%	$625.00	100.00%		$6.00
	Buy	12/12/14 12:00:10	SIM663891F	ESZ14	$2,013.50		$625.00	($3,767.37)		$0.00	100.00%	100.00%	$6.00
7	Buy	12/12/14 12:01:29	SIM663891F	ESZ14	$2,014.00	0.00	5	$363.00	0.07%	$375.00	7.89%		$6.00
	Sell	12/12/14 12:18:02	SIM663891F	ESZ14	$2,015.50		$375.00	($3,404.37)		($4,375.00)	100.00%	7.89%	$6.00
8	Buy	12/12/14 12:41:38	SIM663891F	ESZ14	$2,019.25	0.00	5	($137.00)	(0.02%)	$0.00	0.00%		$6.00
	Sell	12/12/14 12:42:21	SIM663891F	ESZ14	$2,018.75		($125.00)	($3,541.37)		($125.00)	0.00%	(100.00%)	$6.00
9	Buy	12/12/14 12:47:42	SIM663892X	USDCHF	Fr.0.96	0.00	100000	$32.15	0.03%	$32.15	13.96%		$0.00
	Sell	12/12/14 13:01:04	SIM663892X	USDCHF	Fr.0.96		$32.15	($3,509.22)		($198.13)	100.00%	13.96%	$0.00

For this B term, I focused more on learning trading terminology and familiarizing myself with the "trading world". Also, the majority of2 my trading is intraday as well as manual. Throughout the term, I've found that manually holding a position over long periods of time is very unsettling for me. I always keep thinking things like "What if the market crashes? I have to go check!" It's not very healthy to keep thinking about things like that all the time.

So what I think I've decided to do for the bulk of my project is to develop an automatic trading system. I'm really interested in how trading futures, especially E-Minis, have an affordable leverage requirement for any homeowner and has the potential for making larger profits fast at the risk of making just as larger.

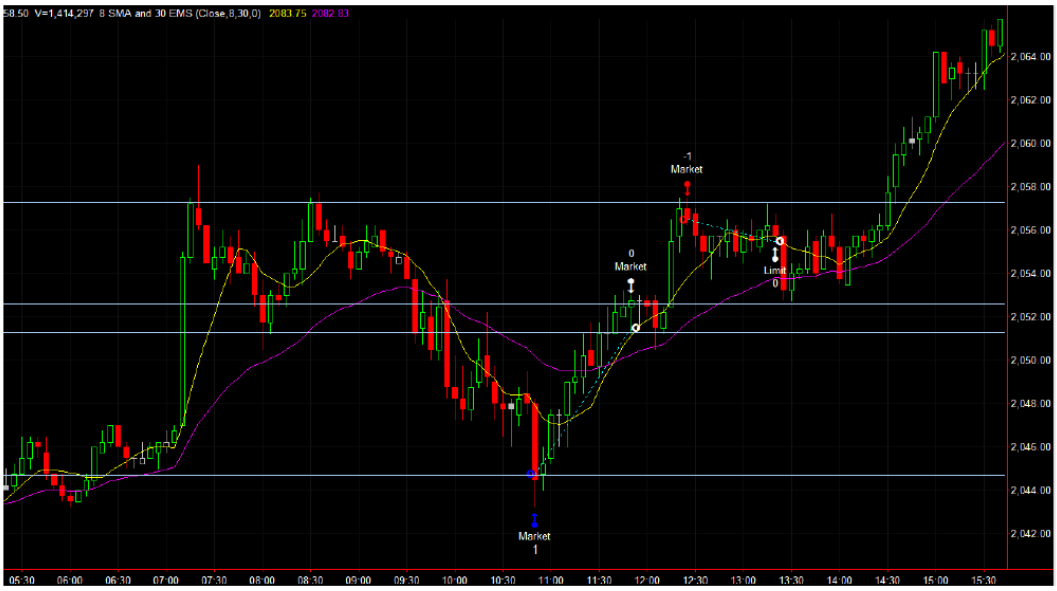
This term I have not made many trades at the cost of learning more about the system and the trading world as well. Also, I didn't want to waste my time trading too much in a market that I would not end up doing my project on due to the fear of getting accustomed to trading only that market. This winter break, I have big plans for making huge amounts of progress on my trading system. Hopefully by the end of winter break, I'll have an overarching trading system that can work successful over a variety of futures markets. If that proves to be too difficult, I will probably have 2 or 3 different systems trading in my top preferred futures markets. Doing all of this seemed impossible to do this term while having to focus on two other classes and extracurricular clubs.

APPENDIX

Journal Entry #3 (01/15/15 → 03/06/15)

For this journal entry, I'll be reviewing a few of the more successful trades that I have had throughout C term and emphasizing the reasons why they were successful. These trades have helped me mold the small details of my final working strategy. By this point in the school year, I had already decided that I would be exclusively trading futures contracts for my final trading strategy. I spent my time analyzing different futures symbols and taking note of all of the markets that seemed to have repetitive and predictable behavior some of the time. Big and active markets such as the S&P 500.

Trade #1



The trade above was made on the E-Mini S&P 500 March 2015 market, on 02/23/15. The support and resistance lines of interest are the top and bottom ones. The two closer lines in the middle are relevant to other time frames of that market. Anyways, for about 6 hours prior to the sharp increase around 7:10, the market was fluctuating between 2046.00 and 2044.00. Before that, the market had dropped from a higher values. I established 2045.00 as my support line as I noticed the market returning back down. When it hit, I assumed that the markets next move sooner or just a little later would be to go back up. I prematurely sold and closed the trade, and would have driven the profits up a substantial amount, since the contract price ended up past my resistance line later on in the day. I foolishly assume that the market would not be able to break through a past resistance line at 2051.00, but I later realized that I should have taken a higher risk and assumed the market would drive up to the more recently established resistance line.

APPENDIX

Trade #2

The trade displayed below was also made on the E-Mini S&P 500 March 2015 market, on 02/23/15. Prior to opening a position in the market, I noticed that the market was bouncing back and forth between a certain relative values range. The upper limit was around 2106.00 while the lower limit seemed to be 2101.00. The consumers for this market seemed to be against allowing the market too surpass and fall too far below those values, creating an inconsistent but obvious oscillating effect on the market. Although it is not visible in the given snapshot of the market activity, the support/resistance lines were still relevant in other time frames of short periods as well, so I waited for the contract price to return to the support line that I had established as the temporary lower limit. As the value broke past the line and was fluctuating up and down, I decided that the market would be likely to behave the same as before and rebound from the line.

My final trading strategy was partially modeled after the reasoning I used to make two previous trades. I tried to retain the parts of my reasoning that were successful and aimed to focus on improving the faulty reasoning that caused the trades to come up short. I also made noticed later on portions of the behavior that I could have capitalized on but didn't due to lack of awareness, and made sure to note that.