



**Building a Successful Trading Portfolio That Diversifies Between
Stock and Currency Trading Systems**

An Interactive Qualifying Project Report

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Abstract

The purpose of this project is to apply the scientific method to trading the market and trading systems. This is relevant to the widespread and growing trading community worldwide because, many people hold the common misconception that it is simple to be profitable trading and investing. Mass media and the internet have led the public to believe that the lack of skill can be replaced with a set of arbitrary or predefined rules to be successful in the market. In this project, a system of systems was used to evaluate how a defined set of parameters and rules helps to effectively trade stocks and forex. A set of statistical analysis was applied to each individual system and the whole to deduce whether it has value and efficiency to the project goal and future of trading community.

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1.0 Introduction and Statement of Problem

Even the hardest working man or woman has a limit on the amount of money they can earn in their lifetime if the sole source of income is based on how hard they work. Spending money wisely can increase the potential power of the dollar when it comes to saving money, but investing money wisely can have a much greater impact. Investing is a way of putting money to work with the goal of getting a return with profit on that investment. Some people open restaurants, some people buy land, and some people trade assets like stocks and currencies.

People often lose money on their investments because of poor planning. Restaurants go out of business, real estate prices plummet, and asset prices often change direction without apparent reason. A good investment should never be compared to a bet at a casino; careful planning and research are required before committing hard earned money to any endeavors. A bad investment can easily be compared to a bet at a casino; one can become very successful with one spin at the roulette wheel, but the odds of winning consistently are very low.

The economic crisis in 2008 alerted the general population to the importance of investing, and the abundance of personal computers has made access to online trading very easy for the average person. The internet has made trading possible more frequently than ever before, from almost any location, by almost every person. The growth of the trading industry has made it easy for the run-of-the-mill investor to get into the market. The increase in competition has made it more difficult to become successful. Computers allow trades and transactions to happen more rapidly than ever before, and are getting faster still. Commercial trading companies will, for a fee, handle the investor's trading decisions. The problem is, in order to be an intelligent investor; one must take responsibility for their own investments. Without careful planning and

research, the average trader can quickly fall victim to the ever changing markets. Movies and television ads have fostered the notion that buying low and selling high are the only things the average investor need to know to be successful in the market. A study done by Thomas A. Hieronymous¹ an agricultural economist at the University of Illinois told a rather different story. Hieronymous analyzed 462 speculative trading accounts of a major brokerage firm over the period of a year in 1969. The accounts traded the full range of commodity contracts available at that time. In the course of the year, 164 accounts showed profits and 298 (65%) accounts showed losses². In order to increase the chances of success, investors need to do research into what they are putting their money into. There is an emotional toll that needs to be removed in order meet financial goals in spite of temporary loss.

In order to be a successful trader a system needs to be implemented. A trading system is a carefully planned set of guidelines that are rigidly followed. By using a system, an investor removes the emotional component of trading and is able to examine and adapt to changes in the market using past data. This project focuses on asset trading by creating a diverse system that trades stocks, as well as currencies in attempt to maximize return by careful planning and adhering to a strict set of rules. Our system will show that even in the global world of high speed trading, a judiciously constructed trading system allows investors to stay competitive.

2.0 Background Research

2.1 Charlie Wright and Trading as a Business

¹ T. Hieronymous, Economics of Futures Trading

² T. Hieronymous, Economics of Futures Trading

Charlie Wright, author of “Trading as a Business,” is an experienced trader who highlighted the importance of having rules or code govern a system rather than to succumb to pure emotion or intuition. His work and participation in the financial sector helped him accumulate many different theories and ideas about the benefits of using systems with technical foundations as an approach to determine potential market movement. Most of his work, including his book, “Trading as a Business, (1998)” deals with the trading platform known as TradeStation. In this book, he demonstrates the values of objective trading, using trading strategies and indicators, rather than the use of subjective strategies, strategies that do not follow a logic-based form of trading³. Traders with predetermined and back tested strategies use entry and exit criteria that are certified by analysis of past results, in other words, reproducible and quantifiable data⁴. A trader should attribute his success in managing a stable financial future to the ability to analyze historical data paired with solid strategies/indicators and knowledge of modern business concepts. Wright outlined the importance of systems following user-appropriate rules, so that the system trades as the owner sees fit and that meets his own personal needs. This is so the system continues to operate correctly; executing trades without any uncertainty but also decreases any anxiety or emotions a trader might feel that will lead them to deem the system inadequate to their desires.

2.2 Van Tharp

Van Tharp is an experienced trader with a Ph.D. in psychology who studied investment systems and concise entry and exit schemes. Following anti-Martingale strategies for position sizing, he developed the ideas of system expectancy and expectunity. The famous trader’s axiom,

³ C. Wright, Trading as a Business

⁴ C. Wright, Trading as a Business

“Cut your losses short and let your profits run serves as both motivation and a solid mindset for traders when they consider rules for getting in and out of the market at the best time, and also when analyzing fundamental system analysis data to optimize and better adjust system rules and indicators.⁵

Tharp created a standard for knowing whether a system would perform well enough to make profit over an adequately long period of time, in other words, how to use expectancy in a trading system. This set of rules allowed one to know the expected reward for each dollar risked and the amount of opportunities one would have to attain that desired value of expectancy in the time span the system is running. Van Tharp mentioned that, “If a system had an expectancy of over 50%, that system was a good system.”⁶The description of how expectancy and probability are different was also outlined in Tharp’s research. If a system is based upon a high probability of winning, the tendency to have a less restricted entry could cause losing trades to be large thus decreasing expectancy. Tharp recommends that risk always be taken in the direction of the system’s expectancy to secure winnings and minimize losses. To tie his ideas together, he created expectancy, a combination of the system’s expectancy on each dollar risked and the number of opportunities there will be.

2.3 The Turtles

Two well-known traders, Richard Dennis and William Eckhardt, debated over whether or not traders were born or made. Eckhardt believed that traders were born while Dennis believed that traders could be taught. To settle the disagreement, they designed an experiment to find out

⁵J. Jankovsky, Trading Rules That Work

⁶V. Tharp, Trade Your Way to Financial Freedom

who was right. Out of more than one thousand people who applied, eighty were interviewed, and a total of thirteen people were chosen to take part in the experiment.⁷

In 1983, Eckhardt and Dennis gave these participants, later dubbed the Turtles, \$1,000,000 each and a set of trading rules to follow⁸. The results were astonishing. At the end, the participants had cumulatively made more than \$175,000,000 after only 5 years⁹. This led Dennis and Eckhardt to conclude that all people can be taught to trade successfully.

2.3.1 Fundamental Analysis

Fundamental analysis is the study of anything that may affect the price of a traded asset¹⁰. Fundamental analysis helps investors determine a price, at which an asset should be traded, then compare that value to the actual price to plan market positions. Fundamental analysis is also used growth investing and watching for companies that show unusual growth. For this project several sources of fundamental analysis were used.

The Wall Street Journal

The WSJ is an internationally circulating newspaper from America that focuses on daily news regarding economic activity and business. The online version of the WSJ has many different sections, the one of major importance to this IQP being the market section; this includes news on every different asset class. This source of information is both trustworthy (accurate) and updated frequently so that traders remain well informed about trending and volatile markets.

TradeStation

⁷ C. Faith, The Way of the Turtle

⁸ C. Faith, The Way of the Turtle

^{9,9} www.investopedia.com

¹⁰ www.investopedia.com

TradeStation has a built in news app, as well as company profile data for every traded stock.

2.4 Trading Systems

The purpose of a trading system is to generate alpha. Generating alpha is the achievement of outperforming a benchmark such as the S&P 500. A system can be profitable, but if it does not generate alpha, it would be more worthwhile to place the money in an index fund that mimics the benchmark.

For any strategy-based trading system, it is necessary for the trader to specify a set of rules to determine how the price's movement will affect the system. There are many factors to consider including: Trading Market, Order Types, Entries, Exits, Stop Losses, Position Sizing, and Bar Structure.

2.4.1 Order Types

There are numerous types of orders that can be sent to the market to buy or sell a financial asset. Three of the most common ones are:

1. **Market Orders** – A command to the market to buy or sell at the first available (and most advantageous) price. This order is almost always filled unless there is a very low or extremely high volume of trades.
2. **Limit Orders** – A command to the market to buy or sell at a set price. This order might never be filled if the asking price and the limit order price are never the same. For long positions, a limit order is usually placed below the current price; the limit order is placed above the current price for a short position.

3. Stop Orders – A command to the market to place a market order once the price has met or surpassed a certain value. This type of order is a mix between Limit and Market orders. For a long position, a stop order is placed above the current price; the stop order is placed below the current price for short positions.

2.4.2 Entries

A system's entry is the point at which the strategy dictates that it should enter the market. Each entry has a specific order, and one of two types of trades. The entry can either be a long position or a short position. Long positions are when the trader buys the asset. On the other hand, a short position is when the trader borrows (with interest), then sells the asset, and attempts to make a profit by buying it at a lower price and returning the asset.

2.4.3 Exits

The exit is the point at which a strategy determines that the profit or loss on any given trade is at an acceptable value for the system. If the entry was long, the exit sells; if the entry was short, the exit buys to cover the short. Market orders are usually used because an exit dictates that the position should be closed. An effective exit strategy can turn a good system into a great system by reducing unnecessary losses and maximizing profits¹¹.

2.4.4 Stop Losses

A stop loss is an exit that is set at some predetermined value to make sure that no single trade loses too much. Stop losses are generally placed with a stop order. This form of money management is important to reducing the risk taken by entering a market.

¹¹ P. King Complete Guide To Building A Successful Trading Business

2.5 Trading Markets

Selecting the correct trading market is central to planning any investment system. The most popularly traded markets are stocks, and currencies. A stock is at its most simple terms, a piece of ownership of a company.¹² Stocks represent a claim on the company's assets and earnings. Stocks entitle the owner to a percentage of the company's earnings. The greater the portion of the company one owns, the greater the percentage of the earnings the owner receives. A company sells these pieces of the company to raise money, and then it is in their best interest to raise the overall value of the corporation. A stock's price is a representation of how desirable portions of the company are. Because stocks are traded at central exchanges, there are normal business hours: Monday through Friday, opening at 0930 EST and closing at 1730 EST. There is an inherent risk when trading stocks. If a company's value goes down, so does the price of its stock. If the company goes bankrupt, the value of its stock goes to zero.

Stocks are categorized into multiple indices that are representations of how the stock market prices move. Arguably, the three most followed indices are The Dow Jones Industrial Average, the Standard and Poor's 500 index, and the NASDAQ composite index. The Dow Jones Industrial Average is a price weighted average of the stock price of thirty of the largest and most influential companies in the United States. The S&P 500 index is made up of 500 of the most popularly traded companies in the United States. Each stock in the index is represented in proportion to its market cap and is considered the best indicator for the movement of the U.S. stock market as a whole. The NASDAQ index is made-up of technology based companies and is also market cap weighted, like the S&P 500. Unlike the other indices, the NASDAQ contains

¹² www.investopedia.com

some companies based outside the United States and is the best indicator of the performance of technology stocks.

Currency, also known as forex, trading takes place on the Foreign Exchange market. Currency trading forms the basis for all foreign trading. If Wal-Mart, one of the biggest companies in the world, buys raw materials from Japan, the U.S. Dollar must be converted to Japanese Yen to complete the transaction. The forex market is by far the most heavily traded, often trading in excess of 4.9 trillion dollars per day¹³. Currency trading is all electronic as there is no central exchange. For this reason currencies can be traded twenty four hours a day, stopping only on weekends; Friday 1700 EST until 1700 Sunday EST.

2.5.1 Trading Stocks

There are two different positions an investor can take when trading stocks. A long position means that investor buys a certain amount of a stock, with the expectation that the price will rise, which makes the original investment more valuable. A short position is when an investor borrows a stock from a broker and sells it on the market with expectation that the price will fall. The investor later buys back the stock (covers the short) at a lower price to return the amount borrowed back to the broker.

2.5.2 Trading Currencies

The values of currencies are based upon the values of other currencies. Therefore, currencies are traded in pairs. Similar to the long and short positions taken in a stock market, forex traders can take a long or a short position. When taking a long position, the investor expects the value of the first currency in the pair to rise in respect to the second currency. The

¹³ www.investopedia.com

difference between shorting a stock and a currency is that the investor does not borrow anything in the currency market. Rather than borrow money and hope the price drops, the investor just buys the inverse pair and expects the value of the first currency to decrease with respect to the value of the second currency.

2.6 Position Sizing

Position sizing is a tool to help maximize the profits of any trading system. With an optimized position size, the profit of a system can be maximized which can be the difference between generating alpha or wasting time. There are many different ways to choose a position sizing. However, good position sizing techniques are anti-Martingale systems. Anti-Martingale systems increase position sizing after wins and decrease position sizing after losses. Two simple anti-Martingale techniques are fixed fractional position sizing (FF), and fixed ratio position sizing (FR).

2.6.1 Fixed Fractional

The position size for the Fixed Fractional method is determined by the use of the following formula:

$$N = FF * (\text{Equity}) / |\text{Trade Risk}|$$

N: the position size;

FF: predetermined fraction of equity to risk;

Equity: Total account value;

Trade Risk: Maximum loss to be taken on the trade.

2.6.2 Fixed Ratio

The position size for the Fixed Ratio method is determined by the use of the following formula:

$$N = 1/2 * [1 + (1 + 8*(Profit/Delta) 1/2)]$$

Profit: Total closed trade profit.

Delta: profit per share necessary to increase position size by 1 share.

2.7 TradeStation

TradeStation is an electronic trading platform that is widely known for its trade analysis software that acts as an online broker to traders for certain trading markets. It allows clients to place orders and manage them along with market positions and current position-sizing. The platform allows the creation of unique strategies which in turn can be tested and analyzed. One major function of TradeStation is the automation of these strategies using its own computer language, Easy Language.

TradeStation is valued for its ability to receive real-time data and to display this extensive data on customizable charts which include historical data for back testing and comparison. These attributes are available for accounts using simulation accounts and real money alike. There is also a built in database of predefined strategies, indicators and show-me studies for those who have little experience with coding Easy Language.¹⁴

¹⁴ www.TradeStation.com

2.7.1 Bar Structure

Trading can be done in many different ways, and the bars which show the price can be displayed in many formats. Bars can be based on time which can range from a minute scale to a much longer time scale such as weekly bars. Also, each bar can be made up of a specified number of trades. There are many other styles, but they can get complicated and most traders choose to use a comfortable time scale.

The display of a bar is can be manipulated as well. Three of the most prevalent bar displays are:

- Open-High-Low-Close (OHLC) bars



Figure 1: OHLC Bars

- Candlestick bars



Figure 2: Candlestick Bars

- Line on Close

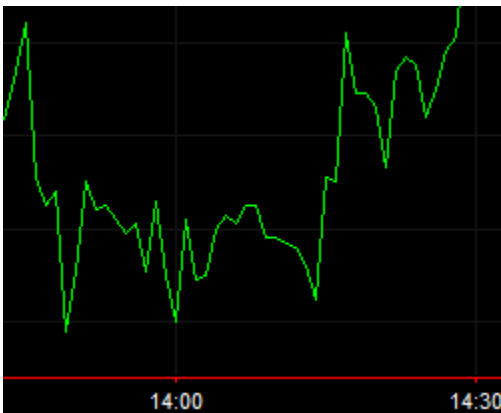


Figure 3: Line on Close

The OHLC and Candlestick bars are similar in that they both display the open, high, low, and close price of the equity. The Line on Close connects the close of each bar with a line. The example pictures all depict approximately the same set of data on 1-minute bars, the only difference being the bar style.

2.7.2 Indicators

2.7.2.1 Moving Average

A moving average indicator is used to smooth out the noise seen in the movement of the plotted prices of an asset. A moving average is a lagging indicator because it is based on past prices. In a TradeStation chart, a moving average takes a price value (open, close, high, low, or combination) from a user indicated number of historical bars and creates an average or smoothed price.



Figure 4: Moving Average Indicator

Figure 4 shows how a moving average indicator represents the motion of the close price of the stock, in this case Google, but without the noise of the relatively extreme values. The three most commonly used moving average indicators are the simple moving average, the exponential moving average, and the weighted moving average. The simple moving average weights each of its values equally. The exponential moving average weights recent prices more heavily using an exponential scale. The weighted moving average weights recent prices more heavily using a linear scale. The most common applications of moving averages are to identify the trend direction and to determine support and resistance levels. While moving averages are useful enough on their own, they also form the basis for other indicators such as the Moving

Average Convergence Divergence and strategies based on moving averages crossing one another.

Moving averages also impart important trading signals on their own, or when used in concert. A rising moving average indicates that the asset price is in an uptrend, while a declining moving average indicates that it is in a downtrend. Similarly, upward momentum is confirmed with a bullish crossover, which occurs when a short-term moving average crosses above a longer-term moving average.



Figure 5: 2 Line Moving Average

Figure 5 shows a two-line moving average with a fast average that is a calculation over nine bars (cyan), and a slow average, which is a calculation over eighteen bars (magenta). Downward momentum is confirmed with a bearish crossover, which occurs when the short-term moving average crosses below a longer-term moving average. When the fast average crosses below the slow average TradeStation can create a signal to enter a short position, and conversely, when the fast average crosses over the slow average, a long position can be triggered.

2.7.2.2 Bollinger Bands

As one of the most popular indicators found in investment and system trading, Bollinger Bands (BBs) use two standard deviations from a simple moving average as an attempt to show the volatility of the market. By watching the movement of the bands, one can deduce whether the market is either more or less volatile; to indicate a more volatile market the bands extend further from the average and the bands move closer to the average during a period of less volatility. John Bollinger, a renowned technical trader, developed this indicator to serve as a warning to possible spikes or drops in volatility, for example, traders might expect a sharp increase in trades when the bands around the average tighten.

Another popular indication given by the Bollinger bands are the inferences that, when a price moves closer to either the upper or lower bands, the market is being overbought or oversold respectively.

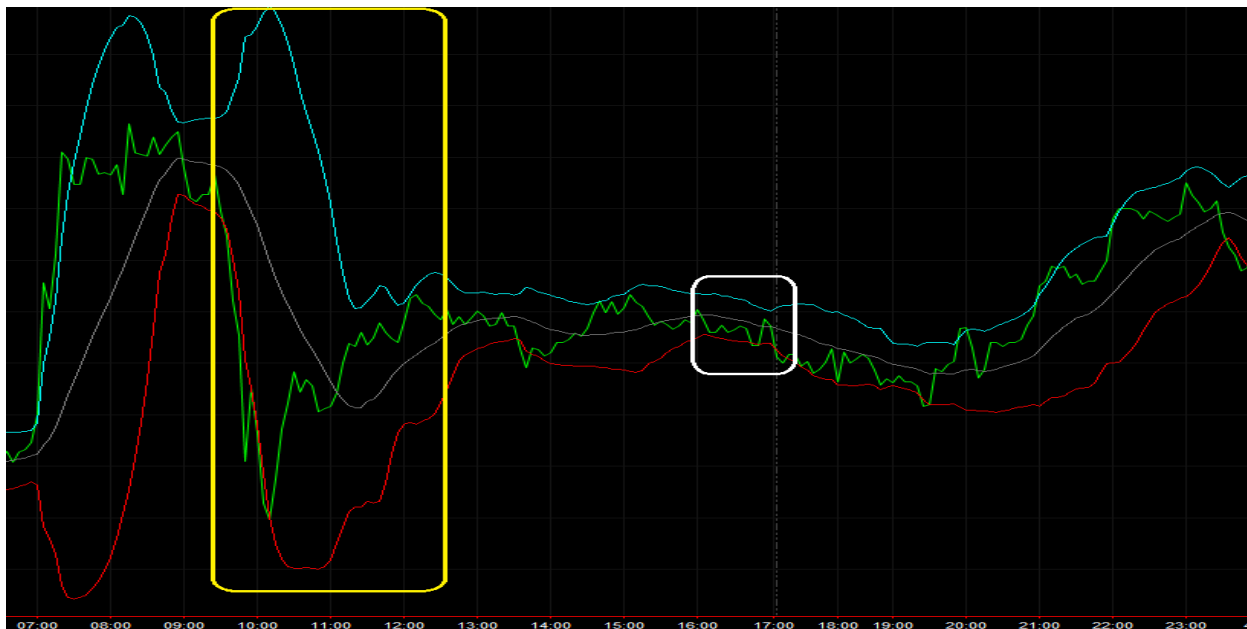


Figure 6: Bollinger Bands Indicator

In Figure 6, the cyan and red lines are the Bollinger bands which deviate from the grey moving average line between them; the green line indicates the price of the market at a given time. In the section encompassed by the yellow rectangle, the bands indicate a period of high volatility, since the bands are widening. Regarding the same section, the market can be labeled as being oversold, because the price overlaps then falls below the red band. In the white square, the volatility of the market is very low, since the bands are very close to the grey moving average line and seem to be keeping the market from trending up or down.

2.7.2.3 Volume Indicator

Volume is a measure of the amount of shares traded in a given amount of time. Since TradeStation divides time into bars, the program measures volume as the number of trades per bar. A volume indicator shows the amount of shares traded per bar of a chart. The default setting is a sub-graph below the bars of the symbol's chart. Many users of TradeStation call these "skyscrapers". When a bar closes at a price different than the previous bar, TradeStation shows the user with bar in the sub-graph. Default is red for a down price, cyan for an up price, and green if the close price is identical to the previous bar. The indicator also provides a moving average of the previous bars so that an investor can see which way the volume is tending. The default setting for the color of the line is yellow, and the average is calculated over fifty bars.



Figure 7: Volume Indicator

Volume is an indication of interest in a stock. The higher the average volume, the higher the overall interest in a particular stock becomes. Volume spikes accompany price moves in a stock. The end of a trend is often signaled by a spike in volume. A “skyscraper” can signal that traders believe that a price has reached its limit in a certain direction and many wish to get in (or out) before they miss it. This means that a spike in volume can often show where a new support or resistance level has formed.

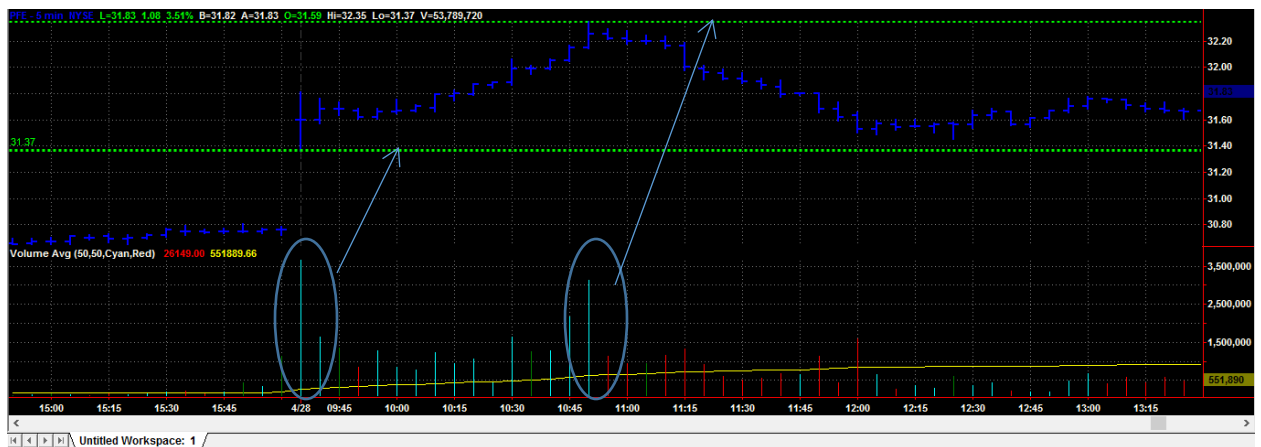


Figure 8: Volume Showing Support and Resistance

Volume can also signal a breakout on a stock that is trading flat. Many traders will use an increase in volume as a setup alert that a stock will experience a breakout. Volume on its own

does not provide enough information to signal entry into a position. Most stocks experience a spike in volume at session open and session close. Most times this is a false indication of actual interest and this indicator should be combined with others for confirmation of trends.

2.7.2.4 Momentum

The momentum is known to traders as “the rate of acceleration of a security's price or volume¹⁵.” Technically, the momentum can be measured by an oscillator, which helps to indicate which direction a market is likely to go. In other words this is an indicator of the trend of a market and the rate at which the price is going in that given direction. When there is acceleration in the market's current price, the momentum of the market indicates how likely the trades are to continue favoring that direction, giving traders an idea of when to follow a trend either short or long. Although this may seem like an answer to the question of when to get in or out of a market position, momentum is not a perfect indicator and is meant to be utilized carefully for it only indicates short-term price rather than true value. The momentum accounts for the volume of trades in a certain price's direction, and not the weight of each trade in their respective direction

¹⁵ www.investopedia.com

deceiving traders that are new to the trading game.

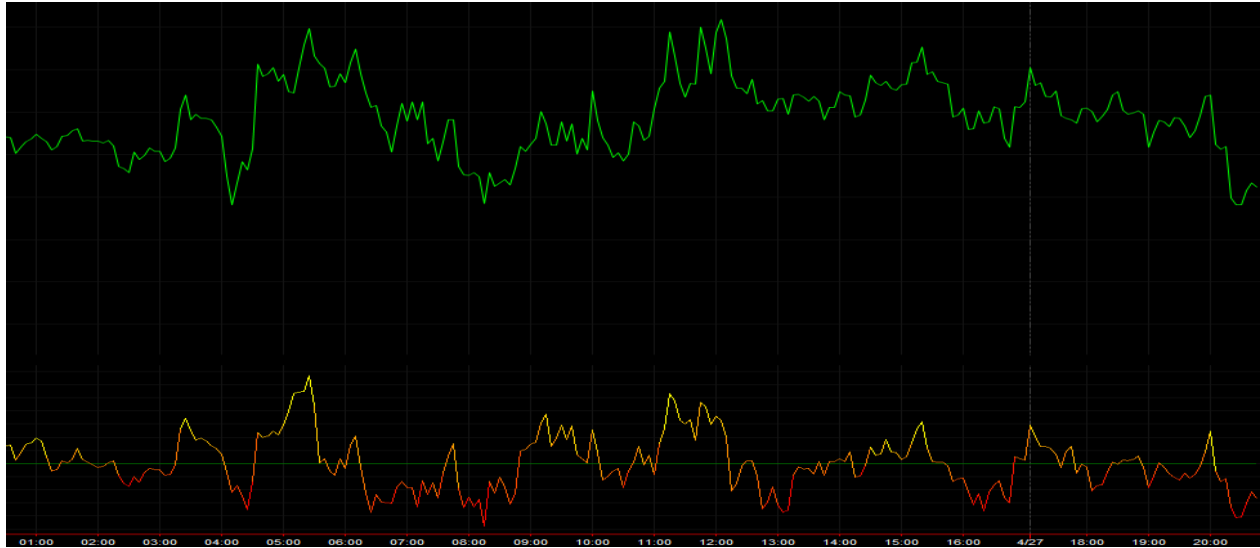


Figure 9: Momentum Indicator

In Figure 9, the plotted line on the bottom of the chart that fluctuates similarly to the price line above is the measure of momentum.

2.7.2.5 Precision Trading

The idea to trade based on floors and ceilings is common practice with all experienced traders. An innovative way to combine this strategy with the principles of statistics is implemented through the Precision Trading System (PTS). The indicators that make up this strategy involve linear regressions and regression channels based around the standard deviations of the linear regression¹⁶.

¹⁶ M. Raiman PTS Materials

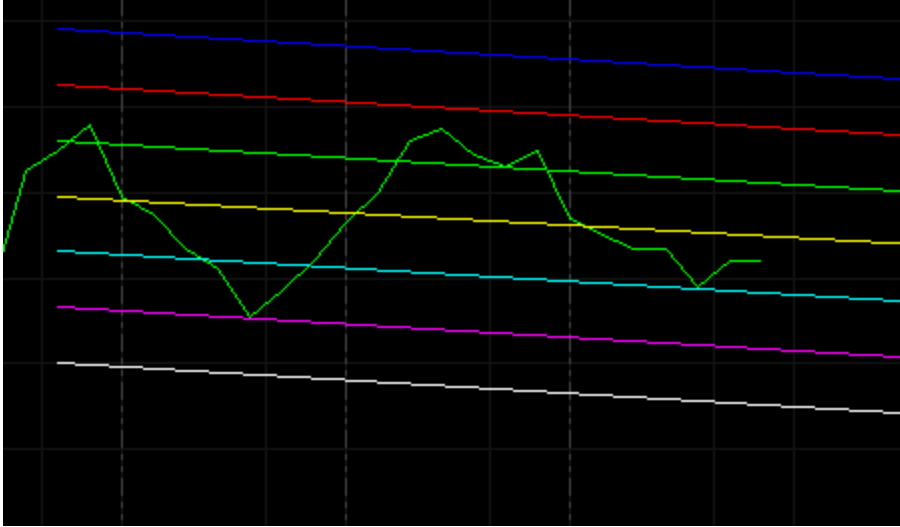


Figure 10: Linear Regression Channels

In Figure 10, the yellow line (middle) is the linear regression of the last 23 bars. The multicolored parallel lines are the standard deviation channels around the linear regression. It is easy to see how the price bounces off of the sloped lines and how a strategy can be based around this. One thing to be careful of is the fact that the indicator lines move with each new bar. This means that the lines may shift significantly and rapidly on lower time scales.

Statistics state that in a normal distribution, 68.2% of all activity will fall within ± 1 standard deviation of the average, 95% of all activity will fall within ± 2 standard deviations of the average, and 99.7% of all activity will fall within ± 3 standard deviations of the average. While trading markets do not follow a normal distribution (no one knows what kind of distribution it is), the fact that there are so many data points allow traders to model markets as if they are close to a normal distribution.¹⁷

¹⁷ J. Katz, Encyclopedia of Trading Strategies

Given all of this information from a few lines (sometimes traders choose only to have the linear regression and one of the pairs of standard deviation lines), it is possible to base many profitable and well thought out trading systems based on this indicator group.

2.7.2.6 Fibonacci Price Retracement Lines

A controversial indicator, the Fibonacci sequence (Fibs) generates floors and ceilings to help the trader set up entries and exits. Many traders think that the Fibs are a terrible indicator while others believe that since the Fibonacci sequence occurs naturally in many things that it should naturally occur in the markets as well. This paper will not take sides in the argument, but will discuss the outcomes of attempted experiments with the Fibs.

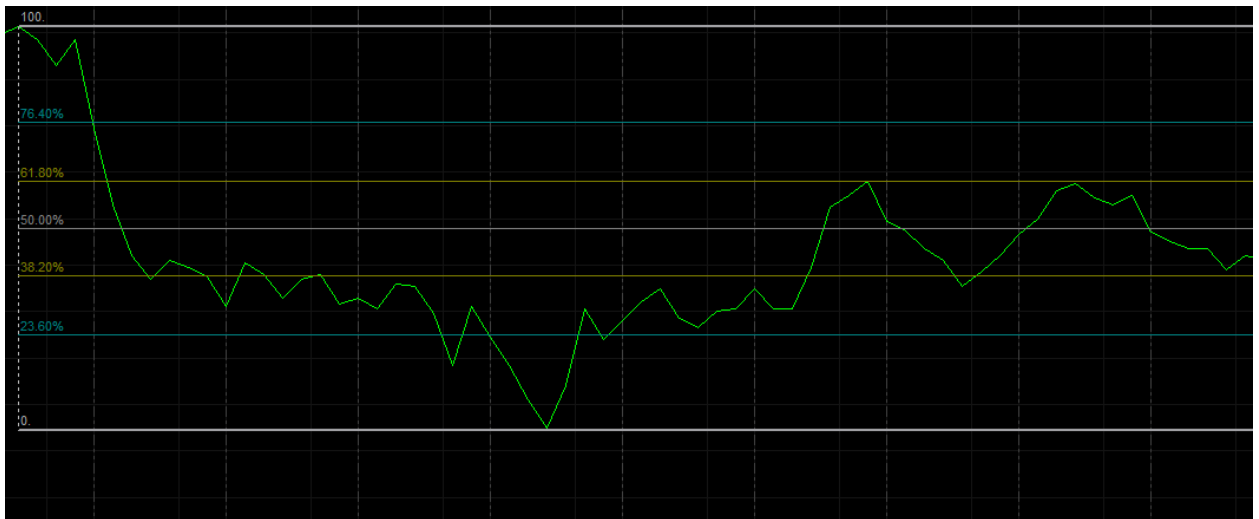


Figure 11: Fibonacci with Line on Close

As shown in Figure 11, the Fibs are drawn with the 100% marker at a recent maximum and the 0% marker at a recent minimum. The horizontal lines drawn at 76.4%, 61.6%, 50%, 38.2%, and 23.6% act as support and resistance for the equity being traded. Interestingly, the price of the equity on which the Fibs are superimposed use the horizontal lines as support and resistance.

This indicator is useful for determining entries and exits in the market. When the Fibs act as a support, it indicates that a trader should get out of a short position and take a long one, and vice versa for when the Fibs act as resistance

3.0 Strategy Development

Our system is comprised of multiple investment strategies with the purpose of maximizing returns by splitting capital between three different strategies that will respond differently under identical economic pressures. There is no guarantee of substantial gains or cataclysmic losses in diversified systems, but is agreed by many professional investment strategists that diversification is the best way to reduce risk¹⁸. The strategy of our system of systems is to trade multiple asset classes. Each system is designed to react differently to different market conditions. Stocks might trade flat for days while the currencies market turns volatile due to world politics. Matthew and Tiago's systems will both be comprised of Forex trading, while Chris' system will be trading stocks in the NASDAQ index

3.1 Matthew's Trading System

After experimenting with numerous indicators, it became apparent that my psychology required a mathematical approach to trading. Also, due to a busy schedule, I decided to trade currencies because of the longer hours. The indicators had to use something that would allow me to statistically guess which direction the price would move within a certain time frame. The three indicators I decided fit those criteria were Bollinger Bands, Fibonacci Price Retracement Lines, and regression channels. Next, I set some objectives to make sure that the system did well and fit with my psychology so that I would be able to trade it manually.

¹⁸ www.investopedia.com

3.1.1 System Objectives

- Profit factor over 1.25
- Traded manually
- High winning trade percentage (more than 50%)
- Viable on any time scale
- Hold less than five currency pairs at all times
- System indicates when to get out of a losing trade

3.1.2 Failed attempt 1 (Bollinger + Fibonacci)

The first system attempted was a combination of indicators of Bollinger Bands (BBs) and Fibonacci Price Retracement Lines. The system consisted of entries and exits based upon the distance between the Fibs' lines and the BBs. At the points where the two indicators approach or intersect each other, there should be a strong support or resistance, and the currency's price would bounce off of those points.



Figure 12: Bollinger Bands and Fibs

The red arrows on Figure 12 indicate where the bands and lines were close enough to create a strong support points. However, the blue arrow shows the problem with this system. The BBs and the Fibs line intersect at the exact point that the price is at, but there is a breakout. These breakouts reduced profits and even led to a loss. The results for this system were abysmal and this system was scrapped after 20 trades. The results were as follows:

| | All Trades | Long Trades | Short Trades |
|---------------------------|-------------------|--------------------|---------------------|
| Total Net Profit | (\$676.37) | (\$676.37) | \$0.00 |
| Gross Profit | \$556.27 | \$556.27 | \$0.00 |
| Gross Loss | (\$1,232.64) | (\$1,232.64) | \$0.00 |
| Profit Factor | 0.45 | 0.45 | n/a |
| Roll Over Credit | \$26.85 | \$26.85 | \$0.00 |
| Open Position P/L | \$0.00 | \$0.00 | \$0.00 |
| Select Total Net Profit | (\$676.37) | (\$676.37) | \$0.00 |
| Select Gross Profit | \$556.27 | \$556.27 | \$0.00 |
| Select Gross Loss | (\$1,232.64) | (\$1,232.64) | \$0.00 |
| Select Profit Factor | 0.45 | 0.45 | n/a |
| Adjusted Total Net Profit | (\$1,272.76) | (\$1,272.76) | \$0.00 |
| Adjusted Gross Profit | \$395.69 | \$395.69 | \$0.00 |
| Adjusted Gross Loss | (\$1,668.45) | (\$1,668.45) | \$0.00 |
| Adjusted Profit Factor | 0.24 | 0.24 | n/a |
| Total Number of Trades | 20 | 20 | 0 |
| Percent Profitable | 60.00% | 60.00% | 0.00% |
| Winning Trades | 12 | 12 | 0 |
| Losing Trades | 8 | 8 | 0 |
| Even Trades | 0 | 0 | 0 |

Table 1: Matthew's Failed System 1

Despite the fact that this system was profitable 60% of the time, the losses were too large and caused the overall system to lose money. Even though this system was scrapped, it was a good starting point because it successfully fit all of the system objectives except for the profit factor and indicating when to get out of a losing trade.

3.1.3 Failed Attempt 2 (PTS + Fibonacci)

The thought process behind making this system was that the BBs were a little too volatile. Therefore, another, more stable, channel based indicator would make the system better. Also, the system needed a way to know when to get out of a losing trade. That is where the PTS came in. The theory behind the two trading systems is identical; when the two indicator's lines approach each other or intersect, there should be a change in the price's

direction. However, an additional rule added was that if the slope of the PTS channel changed signs, the trade would be stopped.

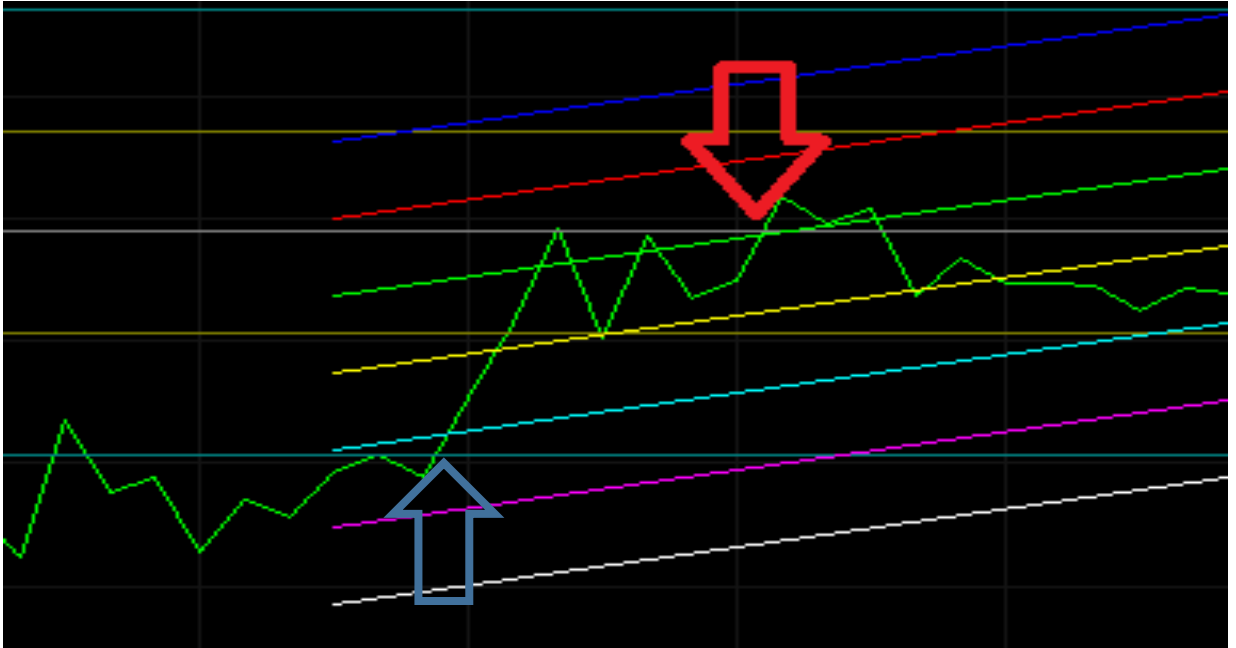


Figure 13: PTS and Fibs

While this system should act almost the same as the BBs + Fibs system, there are far too many false signals (blue arrows), and not nearly enough true signals (red arrows). The numerous false signals led to a high percentage of losing trades. Due to these troubles, the system was scrapped after 116 trades. The results were as follows:

| | All Trades | Long Trades | Short Trades |
|---------------------------|-------------------|--------------------|---------------------|
| Total Net Profit | (\$10,239.51) | (\$13,898.74) | \$3,659.22 |
| Gross Profit | \$28,698.28 | \$13,285.75 | \$15,412.53 |
| Gross Loss | (\$38,937.79) | (\$27,184.49) | (\$11,753.30) |
| Profit Factor | 0.74 | 0.49 | 1.31 |
| Roll Over Credit | (\$1,073.38) | \$783.05 | (\$1,856.43) |
| Open Position P/L | \$0.00 | \$0.00 | \$0.00 |
| Select Total Net Profit | (\$7,804.78) | (\$693.26) | (\$7,111.52) |
| Select Gross Profit | \$17,927.54 | \$13,285.75 | \$4,641.79 |
| Select Gross Loss | (\$25,732.32) | (\$13,979.01) | (\$11,753.30) |
| Select Profit Factor | 0.70 | 0.95 | 0.39 |
| Adjusted Total Net Profit | (\$19,094.66) | (\$22,053.30) | (\$1,135.04) |
| Adjusted Gross Profit | \$24,828.60 | \$10,680.20 | \$12,550.49 |
| Adjusted Gross Loss | (\$43,923.27) | (\$32,733.50) | (\$13,685.53) |
| Adjusted Profit Factor | 0.57 | 0.33 | 0.92 |
| Total Number of Trades | 116 | 50 | 66 |
| Percent Profitable | 47.41% | 52.00% | 43.94% |
| Winning Trades | 55 | 26 | 29 |
| Losing Trades | 61 | 24 | 37 |
| Even Trades | 0 | 0 | 0 |

Table 2: Matthew's Failed System 2

After a decent start with the BBs + Fibs trading system, this system improved in a few areas to meet the system objectives, but its positive qualities were diminished by the failures. The only saving grace of the system was that it indicated when to get out of a losing trade without losing too much money. However, the overall profit factor was still too low, and the winning trade percentage dropped to a point below the system objectives. While this system was frustrating, it gave rise to the final system which met all of the system criteria.

3.1.4 Final System (PTS)

After failing with the Fibs twice, a system using only PTS seemed to make sense. The PTS indicator gives a trader all the information needed to make trades. The other systems gave too many false signals, and the statistical background of the PTS indicator seems to be able to eliminate many of the issues with breakouts because the price of the currency very rarely travels

outside of the channels. Afterwards, even if traveling far away from the linear regression line, the price and linear regression slowly approach each other again.

Basic Structure Rules:

1. Format the bar type to be “Line on Close”
2. Market orders for Entries, Exits, and Stops.
3. Trade bars on the 5min, 1hr, Daily, and Weekly time intervals

Entry Rules:

1. If the slope of the linear regression is negative and the price crosses under the first upper standard deviation line, short one standard lot. If it then crosses the second upper standard deviation line, short another standard lot. Repeat if it crosses the third upper standard deviation line.
2. If the slope of the linear regression is positive and the price crosses over the first lower standard deviation line, buy one standard lot. If it then crosses the second lower standard deviation line, buy another standard lot. Repeat if it crosses the third upper standard deviation line.

Exit Rules:

1. for the first entry rule: If the price crosses the first lower standard deviation line, close the position unless it is breaking out. If it is breaking out, let the price run until the close of the bar, then close the position.

2. for the second entry rule: If the price crosses the first upper standard deviation line, close the position unless it is breaking out. If it is breaking out, let the price run until the close of the bar, then close the position.

Stop Rules:

1. for the first entry rule: If the slope of the linear regression changes from negative to positive, close the position.

2. for the second entry rule: If the slope of the linear regression changes from positive to negative, close the position.

3. there are no stop losses set, because with this type of strategy stop losses exit trades prematurely.

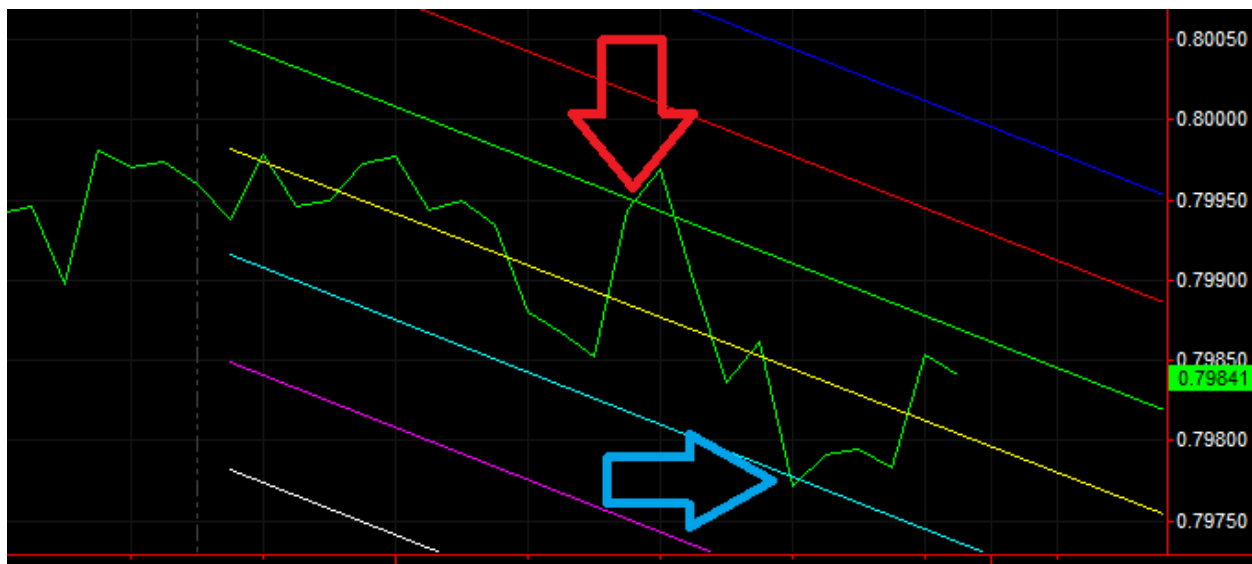


Figure 14: 1st Entry and Exit Rules

Figure 14 shows an example of the first entry and exit rules. The red arrow shows the entry, and the blue arrow shows the exit.

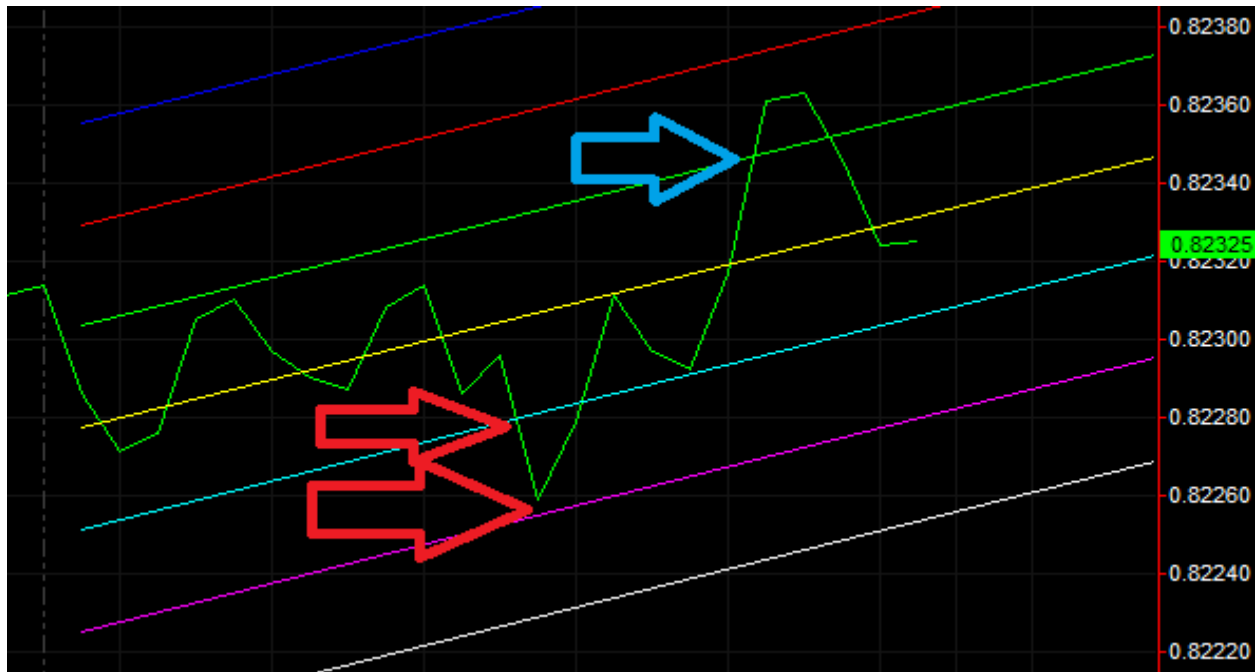


Figure 15: 2nd Entry and Exit Rules

Figure 15 is an example of how the second entry and exit rules work. The red arrows show the entries, and the blue arrow shows the exits.

3.1.4.1 Final System Results

The implementation of this system began on February 10, 2014, and the last data point included in this report is from March 26, 2014. The system traded for a period of 44 trading days and generated 105 trades (51 long trades and 54 short trades). Of all the trades, 76 were profitable (34 short and 42 long). Some more statistics on the system:

| | Net Profit | Gross Profit | Gross Loss | Profit Factor |
|----------------|------------|--------------|------------|---------------|
| Long | 14435.17 | 14820.36 | -385.19 | 38.475 |
| Short | 8331.47 | 10576.54 | -3118.93 | 3.391 |
| Overall | 21892.78 | 25396.90 | -3504.12 | 7.248 |

Table 3 Matthew's System Statistics

3.1.4.2 Final System Analysis

The equity curve below shows the account growth vs the trade number. It is exactly what a trader likes to see in a system (a relatively constant upwards slope).

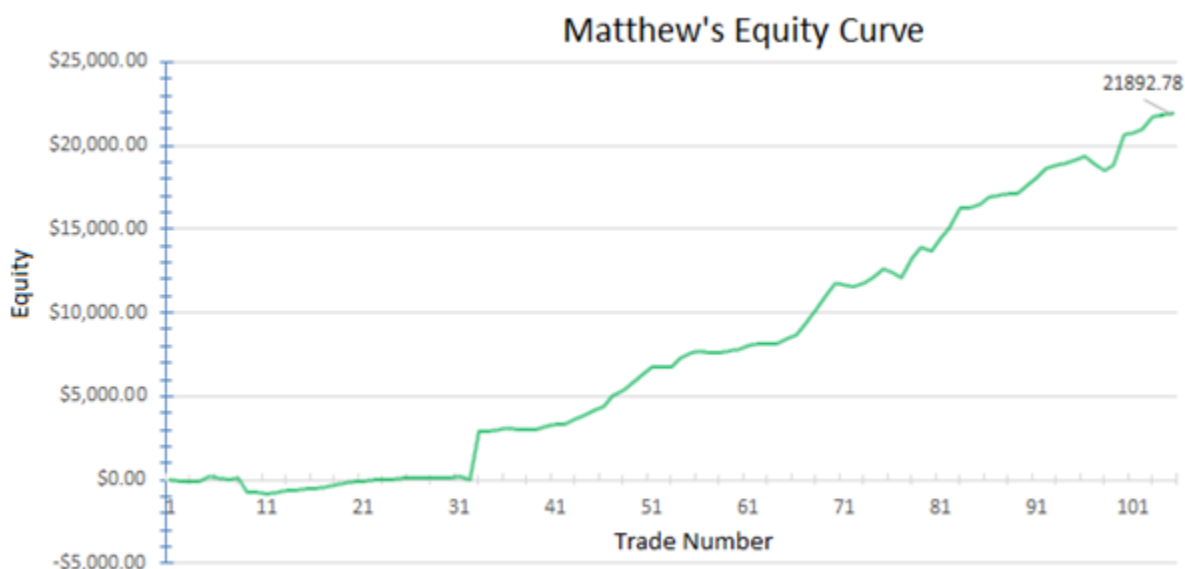


Figure 16 Matthew's Equity Curve

The average winning trade of this system was \$334.17 with a standard deviation of \$439.44. The expectancy, calculated by summing the ratios between each trade's profit/loss and the average loss, came out to be 1.73. This means that for every dollar risked in the market, over a long period of time, the return would be 1.73 dollars. The expectancy, calculated by multiplying the expectancy by the number of opportunities per year, came out to be 1503.00. Due to the fact that this system was only traded for 44 days, it is very possible that these numbers will change if the system is traded for a longer period of time. However, given the data accrued, if the trades continued at this rate, this system would make: $(1 + .2189)^{\left(\frac{365}{44}\right)} - 1$ or 416.59% in addition to the original account size each year.

3.2 Chris' System

3.2.1 Objectives

This strategy's objectives are to have a positive expectancy, to have the ability to get out of a losing position quickly, and to be adaptable to similar stock types. The ability of a system to average positive gains on equity in the long term is based on the Expectancy of the system. Expectancy is the average amount of money a system will generate over many, many trades per dollar risked.¹⁹ This strategy also has to have the ability to get out of a bad position quickly. Chuck Lebeau has shown that while it is very important to capitalize on good trades, it is much more important to limit losses to make money²⁰. This system also needs to be easily optimized and adaptable to fit the ever changing markets. As part of a system of systems, each component must be easily understood in order to be adjusted in the future.

3.2.2 Method

- Day-trading strategy
- 5 minute bars
- Stop and Reverse strategy
- Focus on high volume Stocks
- Price between \$10 and \$100

Swing-trading and other types of long term investment styles would be unfeasible due to the amount of time allotted and the number of trades needed for analysis. The need to thoroughly evaluate the strategy has led to the use of a shorter term day-trading strategy. Day-

¹⁹ Van Tharp, Trade Your Way to Financial Freedom

²⁰ C. LeBeau *What If-What If*

trading position sizes have to be carefully planned. If an investor will make small amounts per share, larger positions must be taken. This means there is less risk per dollar invested per trade. Closing positions by end of day means that trading capital is not tied up for large amounts of time. The action of day-trading means that the investor must utilize technical analysis to recognize trends quickly, to adapt to price movement.

A stop and reverse strategy was chosen because the trigger to exit a trade would always be the same signal that enters the opposite position. Carefully controlled, this allows for multiple trades per market session. A stop and reverse strategy does not do well with flat trading prices. For this reason, stocks were chosen that had high volume. That is, stocks that many investors were trading often, so that there was a lot amount of relative price movement for the system. Intra-day bars set at five minute intervals were chosen, any shorter and there would be too much noise for the strategy to be useful and longer intervals would not generate trades. Figures 17, 18, and 19 illustrate the difference in signal generation with three different bar intervals: one minute bars, sixty minute bars, and five minute bars.

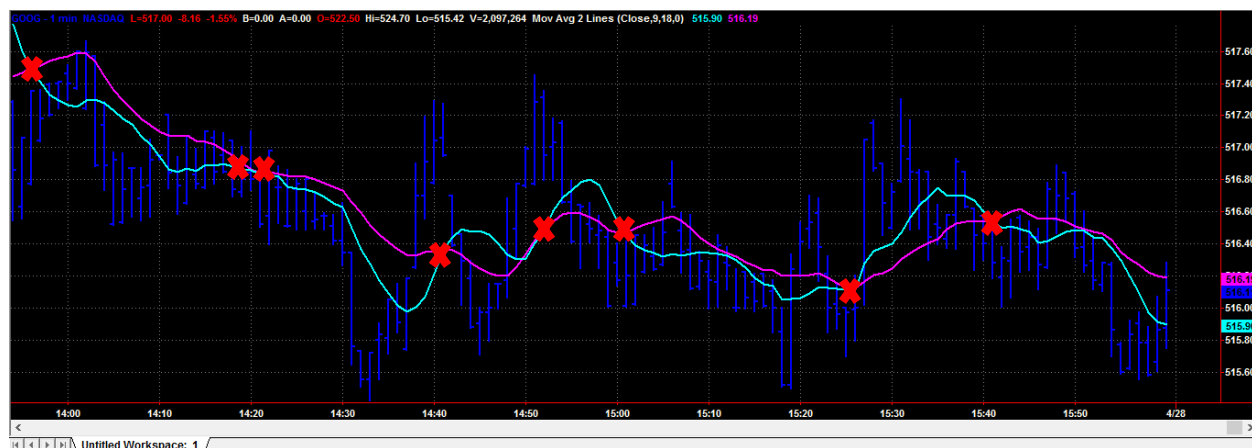


Figure 17: 2 hours of 1-minute bars



Figure 18: 7 Days of 60 minute bars



Figure 19: 1.5 Days of 5 minute bars

Each red “X” in figures 17, 18, and 19 represent a possible signal to enter a position, long or short, in each of the charts shown. Each chart represents the same stock, in this case Google. In the one minute bar interval the moving average crosses eight times in two hours. The noise created in this short interval generates far too many trades to be profitable, due to commission costs and slippage, the change in price between when the order is placed, and when the order is filled²¹. Conversely, sixty minute bars would only generate two signals in seven days. Overall, five minute bars are the clear candidate due to the acceptable amount of trades in a trading session; in this case, three trades on April 25.

²¹www.investopedia.com

Stock prices can range from pennies per share to thousands of dollars per share. The highest volume stocks tend to be priced between ten and one hundred dollars per share. These prices are in the range that everyday investors can afford, and are traded enough for large investors to buy and sell large lots of stocks.

3.2.3 System Components

The first component of this strategy was to find a moving average strategy that allowed the user to define the best times to get into a position. A three line moving strategy because it includes a set-up and a trigger. A two line moving average strategy has a tendency to prematurely enter or exit a position (see Figure 6).

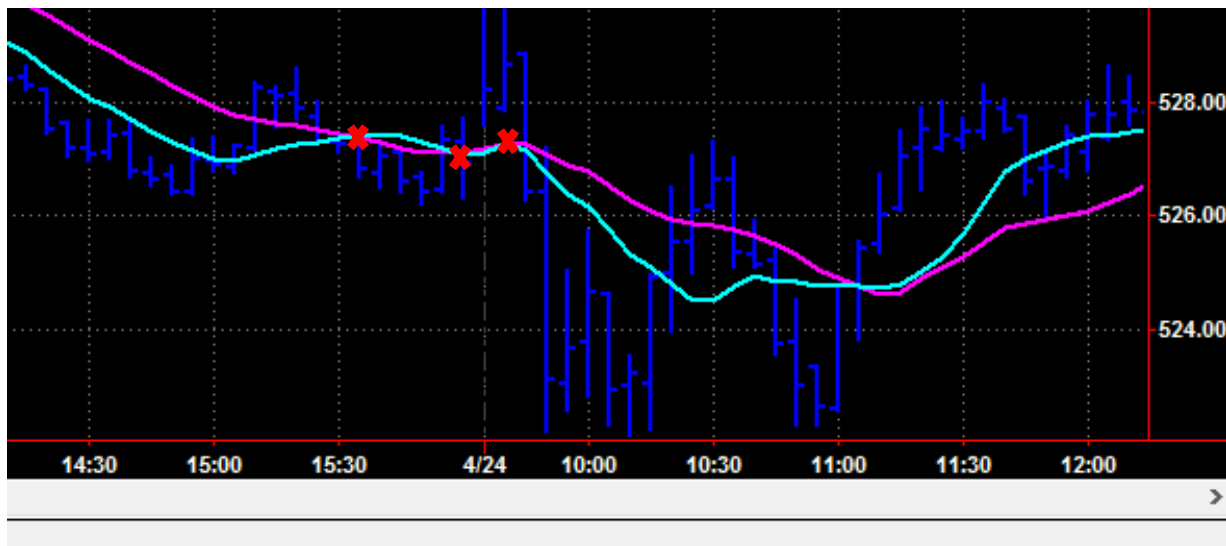


Figure 20: 2 line moving average, 5 min bars

At times when stocks trade flat, 2 line moving averages tend to cross multiple times in rapid succession. A three line moving average strategy requires two lines to cross before generating an entry signal. The fast moving average crossing the slow generates an alert that trade conditions are favorable soon and should be monitored. The trigger is when the medium moving average also crosses the slow. This provides a confirmation over a certain number of

bars that can be optimized.



Figure 21: 3 lines moving average indicator. 4, 9, 18

Figure 21 shows how a three line moving average strategy provides confirmation before entering a position. The yellow “X” indicates where the fast moving average (yellow) crosses the slow moving average (magenta). The red “X” shows where the medium moving average (cyan), crosses the slow moving average (magenta), and provides the trigger to enter a position.

TradeStation Hot Lists provided a list of the top 25 highest traded stocks by volume. Two stocks were selected based on highest volume, exchange, and similar trend behavior. The two stocks were Facebook (FB) and Cisco Systems (CSCO). FB and CSCO are both part of the NASDAQ index and should follow the behavior of that index. This strategy should also perform well with other stocks from this index. One year of historical data, starting on January 31, 2013, was chosen to see how the default system would behave.

TradeStation has a built-in default position of one hundred shares when using one of the preprogrammed strategy components. To keep results of the strategy standardized, this position size was kept throughout back testing and optimization.

The stop and reverse part of the strategy is introduced by taking the 3-line moving average long entry, and the 3-line moving average short entry strategy components from the TradeStation menu. To get out of every long position, a short position will be taken, and vice versa. The default inputs for these components are the fast average length, the medium average length, and the slow average length. TradeStation sets the calculations to four bars, nine bars, and eighteen bars, respectively. The benchmark of success of this strategy was the profit factor. TradeStation calculates the profit factor as a ratio of gross profit to gross loss. These defaults performed very poorly giving profit factors of less than one, which means the gross loss exceeded the gross profit.

3.2.4 Optimization and Final System

The first step to improving the system would be to adjust the moving average signals. The system would either take too long to get into a position, or take too long to get out. By optimizing the length of the moving average calculation, a trader can find the best average calculation for the stock being traded. The optimization process was carried out by an exhaustive test of changing values of the moving averages in increments of one. The fast average was tested with values ranging from one to five bars. The medium average was tested with values between five and ten bars. Finally, the slow average was tested with values ranging from 10 to fifteen bars. This optimization was done with both FB and CSCO symbols.

Strategy exits are executed by the stop and reverse mechanics of the system. There has to be a way to minimize losses in case of a bad trade. Also the strategy needs to be out of any positions by the end of each session. A one percent stop loss was inserted into the strategy to prevent a bad trade to cut into trading capital. Also an exit for then end each trading session was

inserted onto the strategy. This does change the behavior of the strategy, it is no longer a stop and reverse system. Minimizing losses though, is the best way to keep a strategy profitable. After the stop code was inserted the strategy was again optimized using the above method.

TradeStation has the ability to calculate moving averages in different ways. There are simple, exponential, and weighted moving average calculations, and each style may or may not perform better in this strategy. To find out which performs best, the strategy was optimized with each calculation, using the above method.

The final strategy, after optimization and averaging over the two symbols FB and CSCO resulted in a three line moving average stop and reverse strategy based on high volume stocks. The moving averages are calculated exponentially with final values of four, nine, and ten bars for the fast, medium, and slow averages, respectively. There is an exit at end of day and also a one percent stop loss to minimize the effects of bad trades. The optimized inputs for the strategy are

shown in Figure 22.

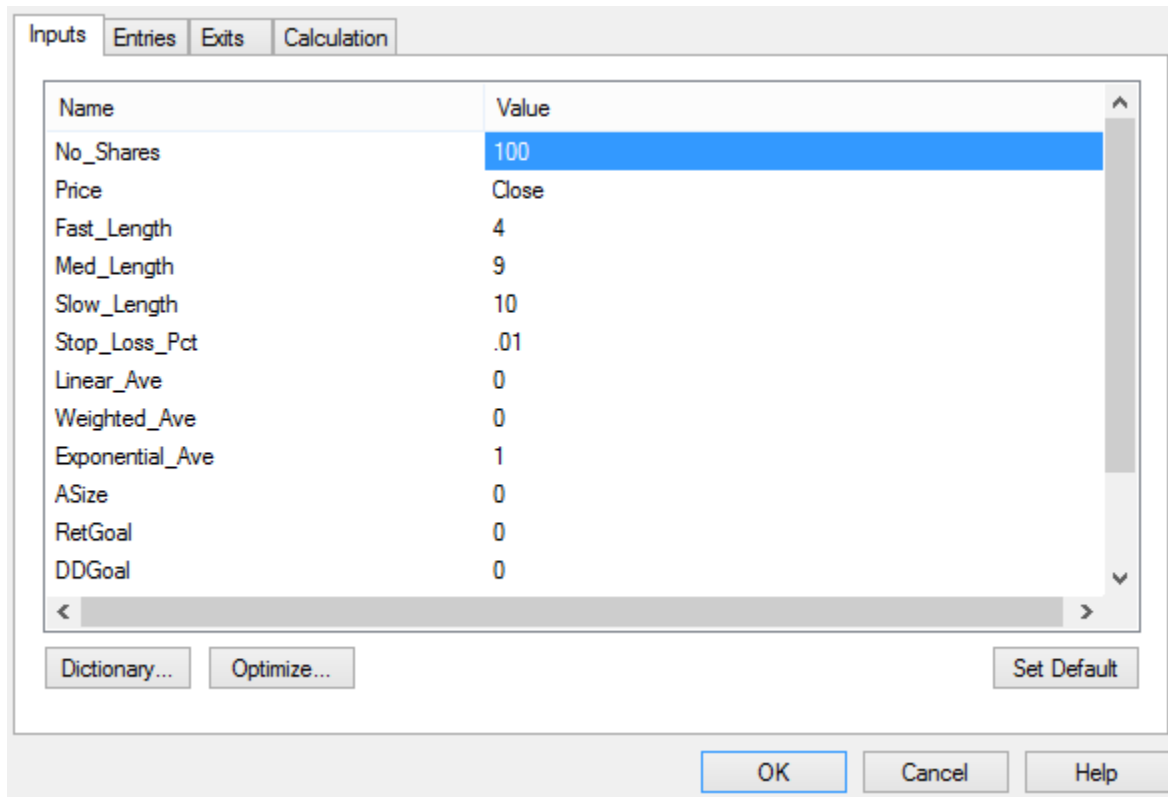


Figure 22: Chris' final strategy inputs

3.2.5 Results

This system had a starting balance of \$100,000, and traded from February 2, 2014 until April 8, 2014. The system generated a total of 352 trades between Facebook (FB) and Cisco Systems (CSCO), making a net profit of \$1571. The entire system ended with a profit factor of 1.48. The system breakdown is as follows.

| | Net Profit | Gross Profit | Gross Loss | Profit Factor |
|---------|------------|--------------|------------|---------------|
| CSCO | 113 | 577 | -464 | 1.24 |
| FB | 1458 | 4256 | -2798 | 1.52 |
| Overall | 1571 | 4833 | -3262 | 1.48 |

Table 4: Results of Chris' system

3.2.6 Analysis

The best way to evaluate a system over a period of trades is to examine the equity curve created by the profits and losses of the system. The net profit only shows the end result, while

the equity curve is an illustration of all the ups and downs along the way.

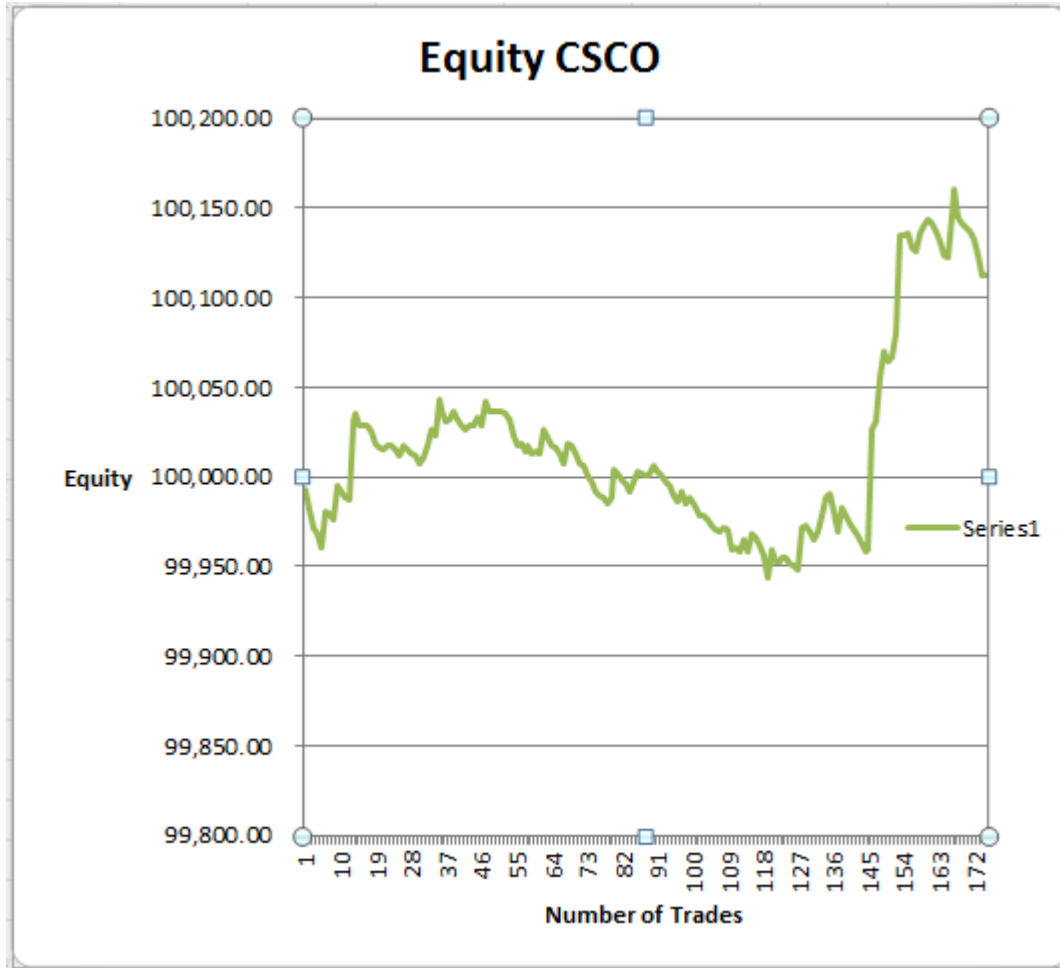


Figure 23: Equity Curve of CSCO

Figure 23 shows the equity curve of the system traded with the CSCO symbol. There were a number of trades that brought the equity below its starting value. Over time though, the profitable trades overtook the un-profitable trades.

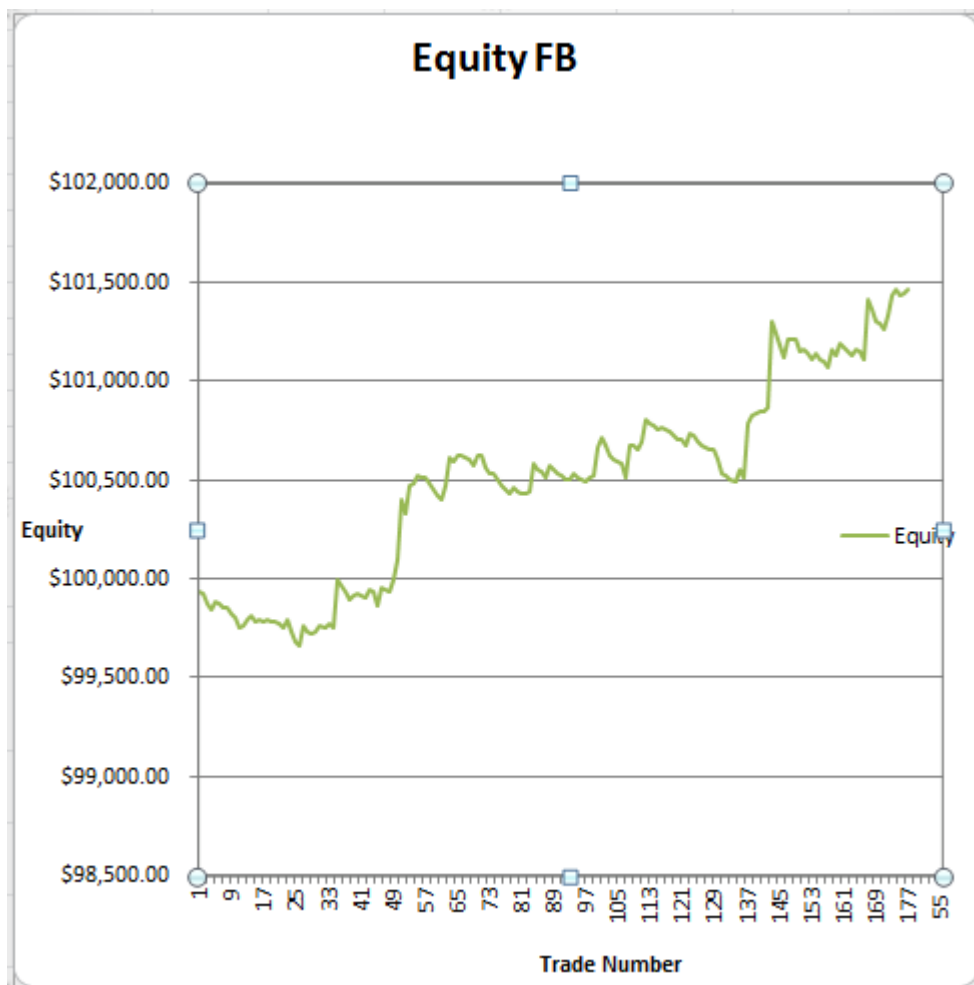


Figure 24: Equity Curve of FB

Figure 24 shows the equity curve of the system with the symbol FB. The trend for these trades is much closer to optimum. There were some losses at the beginning, but the system recovered and became profitable.

The Expectancy using Van K. Tharp’s method of the system, as traded on CSCO had a value of 0.15, and the Expectancy of FB was 0.33. The objective of this strategy was to finish with a positive expectancy. In order to be profitable though, more trials need to be performed to increase expectancy, perhaps even changing to a longer time frame. The expectancy is found by multiplying the number of trading opportunities per year by the expectancy. Expectancy allows

the investor to plan on gains on an annual basis, if in the market at every trading opportunity.

The expectancy of the system when trading FB was 319.87, and for CSCO, 154.17 The system quality is found by the following equation.

$$\sqrt{\#Trades} \times (Average\ Win\ Trade \div Std\ Deviation\ of\ Win\ Trade).$$

Using the System Quality rating of each as a rating of value, it was determined that an investor should divide the trading capital as follows. The quality rating for each system is based on how many trades are made using the system; if the average winning trade is large the system quality improves. Also if the standard deviation of the winning trades is small, it increases the quality rating. System quality improves for systems that trade well over long periods of time.

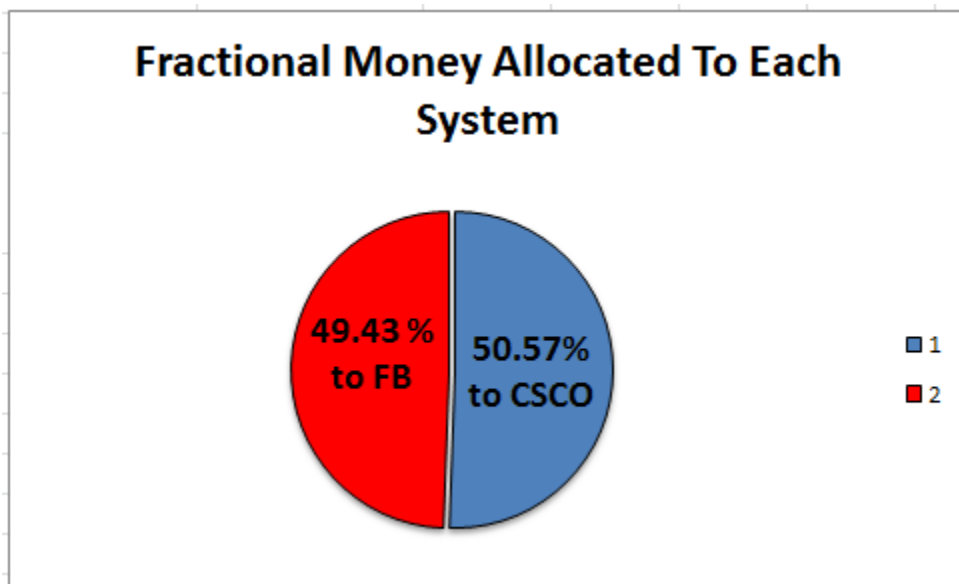


Figure 25: Fraction to Each Asset

3.3 Tiago's System

When first introduced to the idea of using the TradeStation platform, I became interested in the idea of manually trading currencies with indicators that would accurately suggest when to be in and out of the market. As a result, Fibonacci retracement lines or Bollinger bands paired

with the Linear Regression Channels (PTS) would be the best fit, or allow for reasonable amounts of testing. As I acquired more experience and came to better understand my trading profile, a system that automatically traded based on predefined rules was best. The Linear Regression Channel is still considered, acting as a manual influence on the system to lessen anxiety meeting my needs as a trader.

The systems being tested were always traded using 5 minute bars to place orders, while looking at 15 min, 30 min, 60 min, 1day, 1 week and 1 month Linear Regression charts as indicators.

3.3.1 System goals

1. More wins than losses (preferably higher than 50%)
2. Positive expectancy (low risk – high opportunity)
3. Stop losses not included
4. No more than three currency pairs traded at one time (“PTS smoothie” preferably)
5. 5 minute bar trading (Other time frames considered)

3.3.2 Failed attempt 1: Bollinger band and PTS system

The first system tested consisted of a two indicator method, which paired Linear Regression Channels with Bollinger bands. The PTS would indicate the trend of the system also revealing possible floors and ceilings (resistance) while the Bollinger bands reveal volatility of the price as well as the direction the market.

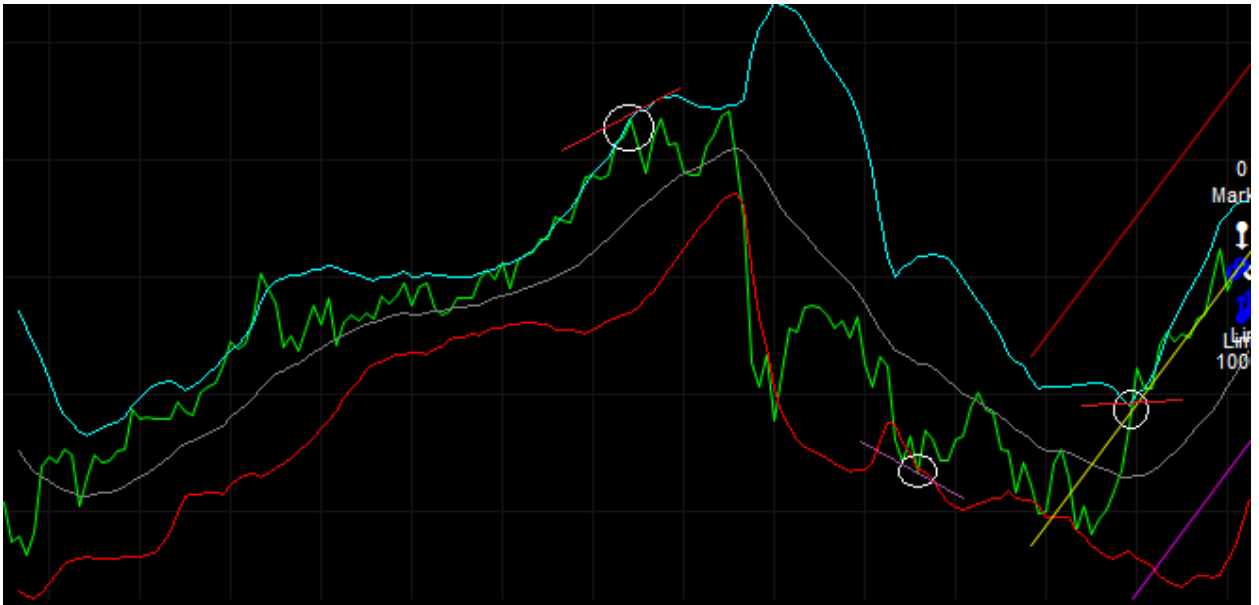


Figure 26: Bollinger Bands Failed Attempt

In Figure 26 above there are two sections where the combination of both indicators urged the system to buy or sell when in reality the market was going to break out in the opposite direction. When the bands widened and the price crossed the upper band signaling a possible short entry, the PTS still had a sharp increasing slope which did not favor the trade. This repeated itself when the stock became oversold and bounced back upwards. In this case the suggestion from the PTS lost an opportunity for an outbreak trade.

3.3.2.1 Reason for abandoning Bollinger Band + PTS System:

As the PTS acts as a passive indicator of how the market is trending and where it is likely to stay, the Bollinger takes on the role of being entry (warning when to get into the market and when to get out). The Bollinger bands do not follow the resistance shown by the PTS, but indicates the relative strength in the direction based on the volume of trades and the probability to keep trending. The Bollinger's overbuy/oversell idea diminishes the PTS's ability to gauge the channel in which the market will be traveling in. Since both indicators are fairly strong and often

accurate; one can become indecisive when the indicators disagree. This approach was dropped when the realization that, most of the time, the Bollinger bands disagreed with the PTS, and made it so little to no order were made within the research period.

3.3.3 Failed attempt 2 Fibonacci and PTS system

This second system excluded the notion of relying on market volatility, and solely managed the system based on the security's resistances. Orders were placed when there was a high degree of certainty that a resistance was broken and countered when another resistance was met. The Fibonacci retracement lines were interesting to consider because a lot of traders believe that the Fibs are a “tell all” to some degree. If that is true, then market action should slightly mimic the trends they indicate. Using the knowledge about the habits of other traders and the possible state of mind of a Fib trader, while applying their techniques, one can pre-emptively trade accordingly. In this case, the PTS serves to define which currency pair is trending and not flat, also reinforcing barriers set up by the Fibs.



Figure 27: Fibonacci Retracement

Observing the Fib lines and previous market action with respect to them, the price was approaching a solid ceiling after hovering around the next band down; the PTS had been flat for a short time. As the PTS swiveled down from a previously flat position and the Fib resistance was met and rejected the upwards trend, a short order opportunity was presented. The same opportunity had presented itself twice prior to the one being analyzed.


| TradeStation Performance Summary | | | | Collapse  |
|---|-------------------|--------------------|---------------------|--|
| | All Trades | Long Trades | Short Trades | |
| Total Net Profit | \$35,424.30 | (\$68,293.20) | \$103,717.50 | |
| Gross Profit | \$205,270.50 | \$50,749.00 | \$154,521.50 | |
| Gross Loss | (\$169,846.20) | (\$119,042.20) | (\$50,804.00) | |
| Profit Factor | 1.21 | 0.43 | 3.04 | |
| Roll Over Credit | \$851.30 | \$1,610.80 | (\$759.50) | |
| Open Position P/L | \$0.00 | \$0.00 | \$0.00 | |
| Select Total Net Profit | \$35,424.30 | (\$68,293.20) | \$103,717.50 | |
| Select Gross Profit | \$205,270.50 | \$50,749.00 | \$154,521.50 | |
| Select Gross Loss | (\$169,846.20) | (\$119,042.20) | (\$50,804.00) | |
| Select Profit Factor | 1.21 | 0.43 | 3.04 | |
| Adjusted Total Net Profit | (\$75,217.58) | (\$140,711.81) | \$17,914.12 | |
| Adjusted Gross Profit | \$148,338.71 | \$31,567.68 | \$91,438.36 | |
| Adjusted Gross Loss | (\$223,556.28) | (\$172,279.49) | (\$73,524.24) | |
| Adjusted Profit Factor | 0.66 | 0.18 | 1.24 | |
| Total Number of Trades | 23 | 12 | 11 | |
| Percent Profitable | 56.52% | 58.33% | 54.55% | |
| Winning Trades | 13 | 7 | 6 | |
| Losing Trades | 10 | 5 | 5 | |
| Even Trades | 0 | 0 | 0 | |

Table 5: Failed Fibs and PTS (Tiago)

System Equity Curve:

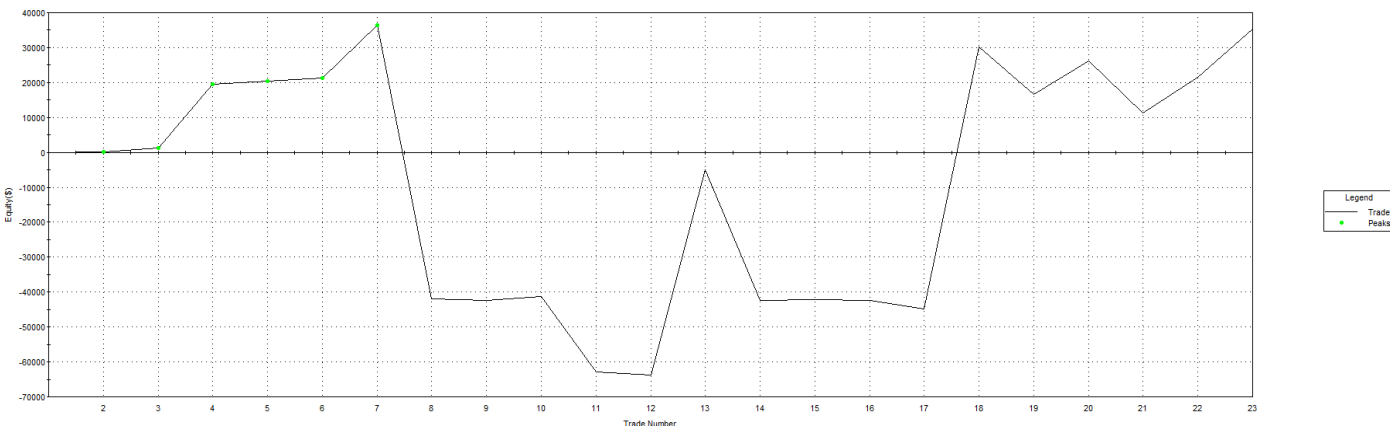


Figure 28: Failed Fibs and PTS (Tiago)

Reason for abandoning Fibonacci and PTS+ PTS System:

The PTS is extremely accurate when following a trend and the Fibs warn when there might be alterations in the trend or an end altogether. This system performed well on shorter trades but required close attention and fast action causing more anxiety and reluctance to place orders with a high sense of security. Further examination of the system rules and objectives in regards to the time frame it is traded in, the requirements for running the system did not meet my needs or match my schedule; it was concluded that coding this system was required to make true profit. Due to my lack of coding (Easy Language) experience I could not tie together with my entry and exit strategies, both the PTS and Fib indicators as strategies, into an automated system on TradeStation.

3.3.4 Final System: Volatility Expansion Strategy/Volatility Breakout System

In a volatility expansion strategy, one is looking for a breakout trend when there is a peak in market action, in other words, a system that predicts whether the market being traded is going to trend in a desired direction for an advantageous amount of time. An effective way of looking

at this system is to consider the term and indicator of momentum; the relative acceleration in a certain direction has to meet a strength favoring a winning trade. The system should not trade on any given breakout, but the ones that are paired with a high market volatility in the same direction so that the trend is continuous and allows for profit to be made and doesn't fail to sharp swings in the momentum.

Rules to consider:

1. When making a "breakout trade," an order should be placed in the direction the market is headed presently, once the desired price value is met. The volatility in the direction of the market should be considered first (momentum precedes price), which indicates the relative strength the market is pushing to reach a price range.
2. This system depends on the volatility and momentum of a system more than the price of the market, therefore this system should work on a Long/Short and stop system. The system is only in the market if the factors favor a win.
3. Alteration to rule #2: Since the addition of the PTS indicator, finding trending markets that produce breakouts more often becomes part of the system. The Volatility Expansion system will work on a stop and reverse basis.. The idea is that the code precisely trades breakouts when they

occur.



Figure 29: Market Favorable to Volatility Expansion

Figure 29 depicts a market favorable to the Volatility Expansion System, where the market is (almost) constantly trending, which gives way to future breakouts. Most of the losing trades tend to be small, and the winning trades run long and make up for the “cost of business” with profit.

3.3.5 System Performance and Equity

The implementation of this system began on January 27, 2014, and the last data point included in this report is from April 23, 2014. The system traded for a period of 86 trading days and generated 51 trades (26 long trades and 25 short trades). Of all the trades, 21 were profitable (10 short and 11 long). Some statistics on the system:

| | Net Profit | Gross Profit | Gross Loss | Profit Factor |
|-------|------------|--------------|------------|---------------|
| Long | 334840 | 916260 | -581420 | 1.576 |
| Short | 454720 | 856260 | -402540 | 2.130 |

| | | | | |
|----------------|---------------|----------------|----------------|--------------|
| Overall | 789560 | 1773520 | -983960 | 1.802 |
|----------------|---------------|----------------|----------------|--------------|

Table 6: Tiago's Final System

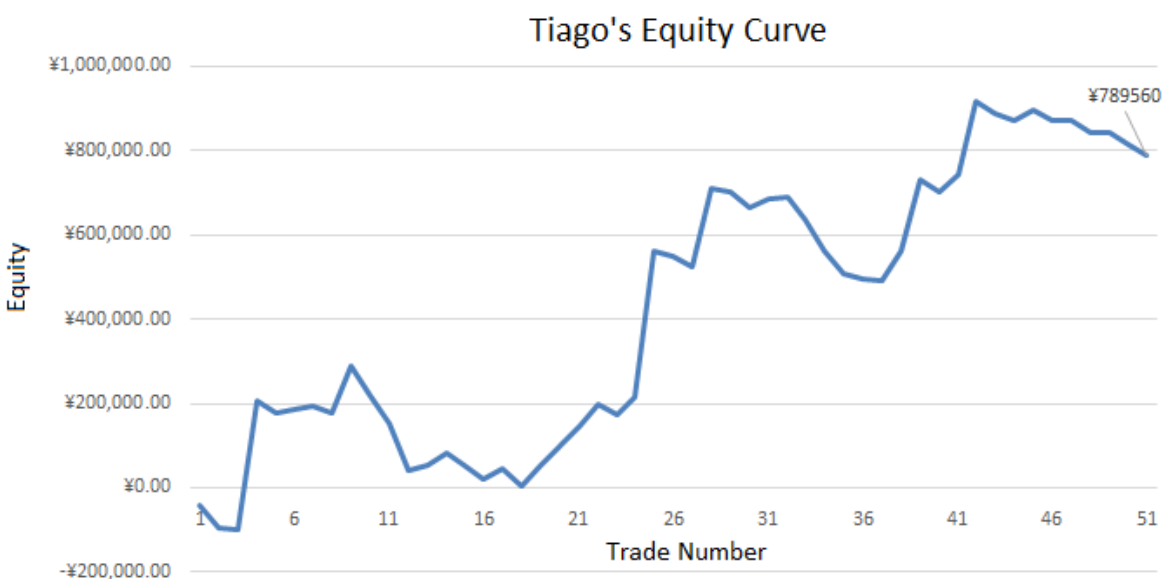


Table 7: Tiago's Equity Curve of Final System

Although the overall trend (best fitting line) is positive, there are moments when large losses brought down the overall system profit. This equity curve would have been better without the big drops, and smoothly increased through time.

4.0 System of Systems

While there were three different systems and strategies used to gather data for this report, the final results are not yet explained. In the market it is important to spread-out money over a diversity of places to protect investments from a shock that negatively affects a single or small number, of systems or assets. For example, a system using any strategy could perform well 45

weeks of the year, but on the other 7 weeks it could perform extremely poorly. If all of a person's investments were traded using that system, those 7 weeks could be catastrophic. However, if investments are split up over a number of versatile systems, it is possible to protect an investor from losing money. The system that is not performing well can have its losses cancelled out by other, better performing, systems during certain time stretches. Intelligent investors will have a number of systems and will swap out systems with others during specific market conditions. This analysis is of paramount importance to all people who have investments in the market because it is one of the ways to eliminate risk.

In order to efficiently allocate money to a system of systems, it is necessary to define a term by which to rate systems. In this case, a system quality term, calculated to determine a system's consistency, was defined.

$$\text{System Quality} = \sqrt{\# \text{ of trades}} * \frac{\text{average winning trade}}{\text{Standard deviation of winning trades}}$$

While this term is arbitrary, the term maximizes for systems with a large number of consistent trades.²²

4.1 Results

Using the formula for system quality, each system was assigned a certain percentage of capital based on its system quality in comparison to the total system quality.

| | Chris' FB | Chris' CSCO | Tiago's System | Matthew's System |
|----------------|-----------|-------------|----------------|------------------|
| System Quality | 10.44 | 10.68 | 6.16 | 7.79 |

Table 8: Overall System Quality

²² Tharp, V. "Definitive Guide to Position Sizing"

Because Chris' two systems use the same strategy, the FB and CSCO system's allocations were determined by calculating the system quality for all the trades. Then each individual system quality was taken into consideration and that was how the total allocation was divided; effectively splitting the system into two systems. Given the data, a pie chart with the allocation of capital for all systems was devised.

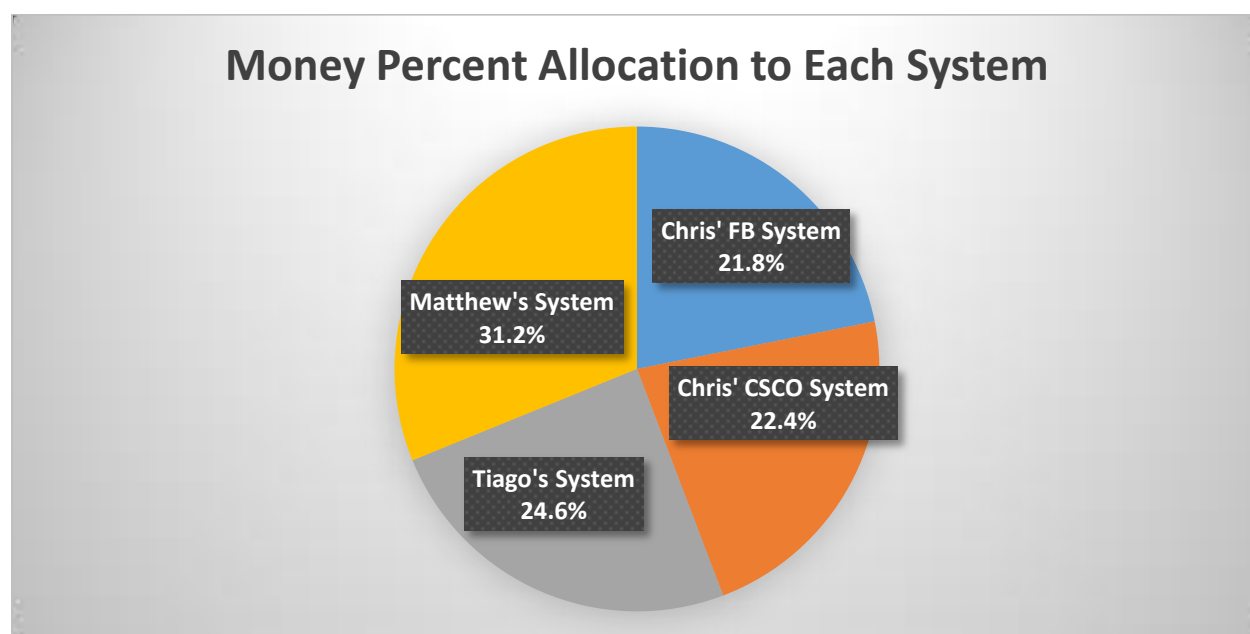


Figure 30: Capital Allocation

5.0 Conclusions

All three systems met the objectives that each trader set out to meet. Before trading these systems with real money however, it would be useful to trade the systems for a longer period of time. This would gather more data and allow any incorrect values from having too small a data set to stabilize at their appropriate values. Then, in order to optimize the strategies, using Position Sizing and Monte Carlo analysis techniques would make them market ready.

5.1 Future Work

There are many things that can be done with each system to further this project. As mentioned above, certain analysis techniques could be used, but also there are many tweaks that could be made to the individual systems that could boost performance.

5.1.1 Chris' System

This system shows promise, but some changes should be implemented for future iterations. Moving average cross-over systems hate noise and tend to do better with trending systems. The best trades with this system were always on the long uptrends and downtrends. Position sizing techniques would allow an investor to capitalize on short trades, but a longer bar interval would improve this system greatly. This system ended with a five percent increase in equity after two months of trading. The next step of this system should be a switch to one hour bars and a swing trading system. The longer time periods would allow some larger positions to be taken and the noise in the system would be appreciably smoother.

After this system was optimized, the slow and medium averages were so close that it seemed like a moving average two line crossover systems would be worth optimizing. Also since this system uses multiple assets, it should be changed so that the assets have opposing price patterns, such as stocks and bonds, to diversify better.

5.1.2 Matthew's System

A huge problem with this system is that it can only be traded manually. If this system were to be automated, computerized optimization could be used to find values that would generate larger profits or a larger percentage of winning trades. After optimizing the variables in the system, the next step would be to optimize the position sizing and possibly generate more

alpha. Another idea is to create a regression channel within the already used regression channel to improve the entry and exit strategies. If the new channel were to have a length half of the first channel, it could indicate a change in trend before the first channel would. With more time, there could be many new additions to the system (and some of them would surely end up in the failed attempts folder).

5.1.3 Tiago's System

This system should probably never be traded with real money. While it made a profit and even generated alpha, (this system made 7.90% while the S & P 500 grew by only 4.75%²³ the huge swings in the equity curve could be disastrous if the downward trend continued in any long term case. In order to improve this system to a quality in which it could trade real money, some major overhauls would need to be made. Perhaps it would be necessary to change the code to the point in which it would end up creating a new strategy all together. For that situation, it may be more worthwhile to just scrap this system and start over with different indicators and a new strategy. Sometimes this is necessary in the trading world.

Glossary of Terms

1. **Alpha**-A measure of performance on a risk-adjusted basis. Alpha takes the volatility (price risk) of a mutual fund and compares its risk-adjusted performance to a benchmark index. The excess return of the fund relative to the return of the benchmark index is a fund's alpha.
2. **Asset/Equity/Security**-A financial instrument that represents: an ownership position in a publicly-traded corporation (stock), a creditor relationship with governmental body or a corporation (bond), or rights to ownership as represented by an option. A security is a fungible,

²³ Google finance

negotiable financial instrument that represents some type of financial value. The company or entity that issues the security is known as the issuer.

3. **Back testing**- The process of testing a trading strategy on prior time periods. Instead of applying a strategy for the time period forward, which could take years, a trader can do a simulation of his or her trading strategy on relevant past data in order to gauge the its effectiveness.

Most technical-analysis strategies are tested with this approach. **Bankruptcy**-

4. **Broker** (Brokerage) - A licensed real estate professional who typically represents the seller of a property. A broker's duties may include: determining market values, advertising properties for sale, showing properties to prospective buyers, and advising clients with regard to offers and related matters.

5. **Business**- An organization or enterprising entity engaged in commercial, industrial or professional activities. A business can be a for-profit entity, such as a publicly-traded corporation, or a non-profit organization engaged in business activities, such as an agricultural cooperative.

6. **Capital**- Financial assets or the financial value of assets, such as cash.

7. **Commercial**- Relating to commerce. In the investment field, the term "commercial" is generally used to refer to a trading entity engaged in business activities that are hedged by positions in the futures or options markets. A commercial plays an active role in the futures and forward markets, ranging from the initial production to the final sales. While the term is also

widely used in other areas of finance and everyday life, it generally denotes an activity that pertains to business or one that has a profit motive.

8. **Company**- An entity formed to engage in a business. A company may be organized in various ways for tax and financial liability purposes. The line of business the company is in will generally determine which business structure it chooses. There are several types of companies, including sole proprietorships, limited partnerships, limited liability partnerships, limited liability corporations, S corporations and C corporations.

9. (To) **Cover**- The act of completing an offsetting transaction so as to eliminate a liability or obligation. It is generally used in the context of risk exposure, as when an investor decides to cover a short position in a stock to eliminate the risk of a "short squeeze." Covers normally reduce both risk and return of a particular position.

10. **Currency (Pair)** - The quotation and pricing structure of the currencies traded in the forex market: the value of a currency is determined by its comparison to another currency. The first currency of a currency pair is called the "base currency", and the second currency is called the "quote currency". The currency pair shows how much of the quote currency is needed to purchase one unit of the base currency.

11. **Delta**- The profit per share necessary to increase the position size by 1 share.

12. **Dow Jones Industrial Average**- The Dow Jones Industrial Average is a price-weighted average of 30 significant stocks traded on the New York Stock Exchange and the Nasdaq. The DJIA was invented by Charles Dow back in 1896.

13. (Market) **Economy**- An economic system in which economic decisions and the pricing of goods and services are guided solely by the aggregate interactions of a country's citizens and

businesses and there is little government intervention or central planning. This is the opposite of a centrally planned economy, in which government decisions drive most aspects of a country's economic activity.

14. (Political) **Economy**- The study and use of how economic theory and methods influences political ideology. Political economy is the interplay between economics, law and politics, and how institutions develop in different social and economic systems, such as capitalism, socialism and communism. Political economy analyzes how public policy is created and implemented.

15. **Entry (Point)** - The price at which an investor buys an investment. The entry point is usually a component of a predetermined trading strategy for minimizing investment risk and removing the emotion from trading decisions. Recognizing a good entry point is the first step in achieving a successful trade.

16. **Equity (Curve)** - A graphical representation of the change in value of a trading account over a time period. An equity curve with a consistently positive slope would generally indicate that the trading strategies of the account are profitable, while a negative slope would indicate that the account is in the red.

17. **Exit (Point)** - The price at which an investor sells an investment. The exit point is usually decided as part of a premeditated trading strategy meant to mitigate investment risk and take the emotion out of trade decisions. Exit strategies are used by virtually all finance professionals and are a key component to successful trades.

18. **Exit (Strategy)** - The method by which a venture capitalist or business owner intends to get out of an investment that he or she has made in the past. In other words, the exit strategy is a way of "cashing out" an investment. Examples include an initial public offering (IPO) or being

bought out by a larger player in the industry. Also referred to as a "harvest strategy" or "liquidity event".

19. **Expectancy**-A measure of the quantity of money expected to win per dollar risked over a series of trades.

20. **Expectunity**- The expectunity is found by multiplying the number of trading opportunities per year by the expectancy. Expectunity allows the investor to plan on gains on an annual basis, if in the market at every trading opportunity

21. **Fibonacci**- Leonardo Fibonacci was an Italian mathematician born in the 12th century. He is known to have discovered the "Fibonacci numbers," which are a sequence of numbers where each successive number is the sum of the two previous numbers.

e.g. 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, etc.

These numbers possess a number of interrelationships, such as the fact that any given number is approximately 1.618 times the preceding number.

Interpretation of the Fibonacci numbers in technical analysis anticipates changes in trends as prices tend to be near lines created by the Fibonacci studies. The four popular Fibonacci studies are arcs, fans, retracements, and time zones.

22. **Forex**- Forex refers to the foreign exchange markets and the buying and selling of currencies.

23. **Indicator**- Statistics used to measure current conditions as well as to forecast financial or economic trends. Indicators are used extensively in technical analysis to predict changes in stock

trends or price patterns. In fundamental analysis, economic indicators that quantify current economic and industry conditions are used to provide insight into the future profitability potential of public companies.

24. **Industry**- A classification that refers to a group of companies that are related in terms of their primary business activities. In modern economies, there are dozens of different industry classifications, which are typically grouped into larger categories called sectors.

Individual companies are generally classified into industries based on their largest sources of revenue. For example, an automobile manufacturer might have a small financing division that contributes 10% to overall revenues, but the company will still be universally classified as an auto maker for attribution purposes.

25. **Investment**- An asset or item that is purchased with the hope that it will generate income or appreciate in the future. In an economic sense, an investment is the purchase of goods that are not consumed today but are used in the future to create wealth. In finance, an investment is a monetary asset purchased with the idea that the asset will provide income in the future or appreciate and be sold at a higher price.

26. **Long Position**- The buying of a security such as a stock, commodity or currency, with the expectation that the asset will rise in value.

27. **Market**- A medium that allows buyers and sellers of a specific good or service to interact in order to facilitate an exchange. The price that individuals pay during the transaction may be determined by a number of factors, but price is often determined by the forces of supply and demand.

28. **NASDAQ**- A global electronic marketplace for buying and selling securities, as well as the benchmark index for U.S. technology stocks. Nasdaq was created by the National Association of Securities Dealers (NASD) to enable investors to trade securities on a computerized, speedy and transparent system, and commenced operations on February 8, 1971. The term “Nasdaq” is also used to refer to the Nasdaq Composite, an index of more than 3,000 stocks listed on the Nasdaq exchange that includes the world’s foremost technology and biotech giants such as Apple, Google, Microsoft, Oracle, Amazon, Intel and Amgen.

29. **Online Trading**- The act of placing buy/sell orders for financial securities and/or currencies with the use of a brokerage's internet-based proprietary trading platforms. The use of online trading increased dramatically in the mid- to late-'90s with the introduction of affordable high-speed computers and internet connections.

Stocks, bonds, options, futures and currencies can all be traded online.

30. **Optimization**- In the context of technical analysis, it is the process of adjusting one's trading system in an attempt to make it more effective. These adjustments include changing the number of periods used in moving averages, changing the number of indicators used, or simply taking away what doesn't work.

31. **Order**- An investor's instructions to a broker or brokerage firm to purchase or sell a security. Orders are typically placed over the phone or online. Orders fall into different available types which allow investors to place restrictions on their orders affecting the price and time at which the order can be executed. These order instructions will affect the investor's profit or loss on the transaction and, in some cases, whether the order is executed at all.

32. **Position Sizing**- The dollar value being invested into a particular security by an investor. An investor's account size and risk tolerance should be taken into account when determining appropriate position sizing.

33. **Profit**- A financial benefit that is realized when the amount of revenue gained from a business activity exceeds the expenses, costs and taxes needed to sustain the activity. Any profit that is gained goes to the business's owners, who may or may not decide to spend it on the business.

34. **Real-Time Data**- When a system relays information to a user at a speed that is near instantaneous or has a short delay from when the event actually occurred. Online brokerages often provide a real-time data feed that displays stock quotes and their respective real-time changes, with a very insignificant lag time, so that clients can base their investing decisions on the most up-to-date information.

35. **Risk**- The chance that an investment's actual return will be different than expected. Risk includes the possibility of losing some or all of the original investment. Different versions of risk are usually measured by calculating the standard deviation of the historical returns or average returns of a specific investment. A high standard deviation indicates a high degree of risk.

Many companies now allocate large amounts of money and time in developing risk management strategies to help manage risks associated with their business and investment dealings. A key component of the risk management process is risk assessment, which involves the determination of the risks surrounding a business or investment.

36. **S&P 500**- Companies in the S&P 500 who have increased their dividends for at least 25 consecutive years. The S&P 500 Dividend Aristocrats index tracks their performance, and is

mainly comprised of large, well-known blue-chip companies. Standard & Poor's will remove companies from the index if they fail to increase their dividends from the previous year. The index is updated annually in January.

37. **Short Position**- The sale of a borrowed security, commodity or currency with the expectation that the asset will fall in value.

38. **Standard deviation**- A measure of the dispersion of a set of data from its mean. The more spread apart the data, the higher the deviation. Standard deviation is calculated as the square root of variance.

In finance, standard deviation is applied to the annual rate of return of an investment to measure the investment's volatility. Standard deviation is also known as historical volatility and is used by investors as a gauge for the amount of expected volatility.

39. **Stock**- A type of security that signifies ownership in a corporation and represents a claim on part of the corporation's assets and earnings.

There are two main types of stock: common and preferred. Common stock usually entitles the owner to vote at shareholders' meetings and to receive dividends. Preferred stock generally does not have voting rights, but has a higher claim on assets and earnings than the common shares. For example, owners of preferred stock receive dividends before common shareholders and have priority in the event that a company goes bankrupt and is liquidated.

40. **Stop Loss**- An order placed with a broker to sell a security when it reaches a certain price. A stop-loss order is designed to limit an investor's loss on a position in a security. Although most investors associate a stop-loss order only with a long position, it can also be used for a short

position, in which case the security would be bought if it trades above a defined price. A stop-loss order takes the emotion out of trading decisions and can be especially handy when one is on vacation or cannot watch his/her position. However, execution is not guaranteed, particularly in situations where trading in the stock is halted or gaps down (or up) in price. Also known as a “stop order” or “stop-market order.”

41. **Strategy**- A set of objective rules designating the conditions that must be met for trade entries and exits to occur. A trading strategy includes specifications for trade entries, including trade filters and triggers, as well as rules for trade exits, money management, timeframes, order types, etc. A trading strategy, if based on quantifiable specifications, can be analyzed on historical data to project the future performance of the strategy.

42. **Symbol**- A graphical symbol used as a substitute for the actual name of a form of money which is usually unique to a specific country or region. A currency symbol is the short-hand, familiar version of a currency. Short-hand currency identifiers created by the International Organization for Standardization (ISO) are often used instead of formal currency names in international and domestic markets.

43. **Trade**- A basic economic concept that involves multiple parties participating in the voluntary negotiation and then the exchange of one's goods and services for desired goods and services that someone else possesses. The advent of money as a medium of exchange has allowed trade to be conducted in a manner that is much simpler and effective compared to earlier forms of trade, such as bartering.

In financial markets, trading also can mean performing a transaction that involves the selling and purchasing of a security.

44. **Trading Platform**- Software through which investors and traders can open, close and manage market positions. Trading platforms are frequently offered by brokers either for free or at a discount rate in exchange for maintaining a funded account and/or making a specified number of trades per month.

45. **Volatility**- A statistical measure of the dispersion of returns for a given security or market index. Volatility can either be measured by using the standard deviation or variance between returns from that same security or market index. Commonly, the higher the volatility, the riskier the security.

A variable in option pricing formulas showing the extent to which the return of the underlying asset will fluctuate between now and the option's expiration. Volatility, as expressed as a percentage coefficient within option-pricing formulas, arises from daily trading activities. How volatility is measured will affect the value of the coefficient used.

Appendix A: Trade Data

Chris' FB trades and analysis

| <u>Entry Date</u> | <u>Entry Price</u> | <u>Exit Date</u> | <u>Exit Price</u> | <u>Long/ Short</u> | <u>Profit/ Loss</u> | <u>No. of Shares</u> | <u>Average Loss</u> | <u>Largest Loss</u> | <u>Symbol</u> |
|-------------------|--------------------|-------------------|-------------------|--------------------|---------------------|----------------------|---------------------|---------------------|---------------|
| 2/3/2014 13:55 | 60.84 | 2/3/2014 14:10 | 61.45 | -1 | -61.00 | 100 | 25.21 | 72.00 | FB |
| 2/3/2014 14:20 | 61.55 | 2/3/2014 15:20 | 61.38 | 1 | -17.00 | 100 | 25.21 | 72.00 | FB |
| 2/3/2014 15:20 | 61.38 | 2/3/2014 15:35 | 61.82 | -1 | -44.00 | 100 | 25.21 | 72.00 | FB |
| 2/3/2014 15:35 | 61.82 | 2/3/2014 16:00 | 61.48 | 1 | -34.00 | 100 | 25.21 | 72.00 | FB |
| 2/4/2014 9:40 | 62.43 | 2/4/2014 13:25 | 62.82 | 1 | 39.00 | 100 | 25.21 | 72.00 | FB |
| 2/4/2014 13:25 | 62.82 | 2/4/2014 13:35 | 62.96 | -1 | -14.00 | 100 | 25.21 | 72.00 | FB |

| | | | | | | | | | |
|--------------------|-------|--------------------|-------|----|--------|-----|-------|-------|----|
| 2/4/2014 13:35 | 62.96 | 2/4/2014 13:50 | 62.8 | 1 | -16.00 | 100 | 25.21 | 72.00 | FB |
| 2/4/2014 13:50 | 62.8 | 2/4/2014 15:25 | 62.79 | -1 | 1.00 | 100 | 25.21 | 72.00 | FB |
| 2/4/2014 15:25 | 62.79 | 2/4/2014 15:35 | 62.53 | 1 | -26.00 | 100 | 25.21 | 72.00 | FB |
| 2/4/2014 15:35 | 62.53 | 2/4/2014 16:00 | 62.76 | -1 | -23.00 | 100 | 25.21 | 72.00 | FB |
| 2/5/2014 9:35 | 62.74 | 2/5/2014 9:55 | 62.26 | 1 | -48.00 | 100 | 25.21 | 72.00 | FB |
| 2/5/2014 9:55 | 62.26 | 2/5/2014 11:45 | 62.18 | -1 | 8.00 | 100 | 25.21 | 72.00 | FB |
| 2/5/2014 11:45 | 62.18 | 2/5/2014 14:15 | 62.45 | 1 | 27.00 | 100 | 25.21 | 72.00 | FB |
| 2/5/2014 14:15 | 62.45 | 2/5/2014 16:00 | 62.19 | -1 | 26.00 | 100 | 25.21 | 72.00 | FB |
| 2/6/2014 10:00 | 62.7 | 2/6/2014 11:10 | 62.32 | 1 | -38.00 | 100 | 25.21 | 72.00 | FB |
| 2/6/2014 11:10 | 62.32 | 2/6/2014 13:15 | 62.22 | -1 | 10.00 | 100 | 25.21 | 72.00 | FB |
| 2/6/2014 13:15 | 62.22 | 2/6/2014 15:00 | 62.17 | 1 | -5.00 | 100 | 25.21 | 72.00 | FB |
| 2/6/2014 15:00 | 62.17 | 2/6/2014 16:00 | 62.14 | -1 | 3.00 | 100 | 25.21 | 72.00 | FB |
| 2/10/2014 10:00 | 63.99 | 2/10/2014 11:35 | 64 | -1 | -1.00 | 100 | 25.21 | 72.00 | FB |
| 2/10/2014 11:35 | 64 | 2/10/2014 11:40 | 63.94 | 1 | -6.00 | 100 | 25.21 | 72.00 | FB |
| 2/10/2014 11:40 | 63.94 | 2/10/2014 11:50 | 64.07 | -1 | -13.00 | 100 | 25.21 | 72.00 | FB |
| 2/10/2014 11:50 | 64.07 | 2/10/2014 12:45 | 63.96 | 1 | -11.00 | 100 | 25.21 | 72.00 | FB |
| 2/10/2014 12:45 | 63.96 | 2/10/2014 16:00 | 63.56 | -1 | 40.00 | 100 | 25.21 | 72.00 | FB |
| 2/11/2014 9:40 | 63.49 | 2/11/2014 9:45 | 64.13 | -1 | -64.00 | 100 | 25.21 | 72.00 | FB |
| 2/11/2014 9:50 | 64.07 | 2/11/2014 10:55 | 63.58 | 1 | -49.00 | 100 | 25.21 | 72.00 | FB |
| 2/11/2014 10:55 | 63.58 | 2/11/2014 11:55 | 63.81 | -1 | -23.00 | 100 | 25.21 | 72.00 | FB |
| 2/11/2014 11:55 | 63.81 | 2/11/2014 16:00 | 64.85 | 1 | 104.00 | 100 | 25.21 | 72.00 | FB |
| 2/12/2014 9:35 | 64.92 | 2/12/2014 10:05 | 64.58 | 1 | -34.00 | 100 | 25.21 | 72.00 | FB |
| 2/12/2014 10:05 | 64.58 | 2/12/2014 12:25 | 64.68 | -1 | -10.00 | 100 | 25.21 | 72.00 | FB |
| 2/12/2014 | 64.68 | 2/12/2014 | 64.79 | 1 | 11.00 | 100 | 25.21 | 72.00 | FB |

| | | | | | | | | | |
|--------------------|-------|--------------------|-------|----|--------|-----|-------|-------|----|
| 12:25 | | 13:55 | | | | | | | |
| 2/12/2014 13:55 | 64.79 | 2/12/2014 15:55 | 64.51 | -1 | 28.00 | 100 | 25.21 | 72.00 | FB |
| 2/12/2014 15:55 | 64.51 | 2/12/2014 16:00 | 64.45 | 1 | -6.00 | 100 | 25.21 | 72.00 | FB |
| 2/13/2014 9:35 | 64.14 | 2/13/2014 9:40 | 64.32 | 1 | 18.00 | 100 | 25.21 | 72.00 | FB |
| 2/13/2014 9:40 | 64.32 | 2/13/2014 9:45 | 64.48 | -1 | -16.00 | 100 | 25.21 | 72.00 | FB |
| 2/13/2014 9:45 | 64.48 | 2/13/2014 14:30 | 66.85 | 1 | 237.00 | 100 | 25.21 | 72.00 | FB |
| 2/13/2014 14:30 | 66.85 | 2/13/2014 14:55 | 67.1 | -1 | -25.00 | 100 | 25.21 | 72.00 | FB |
| 2/13/2014 14:55 | 67.1 | 2/13/2014 15:30 | 66.78 | 1 | -32.00 | 100 | 25.21 | 72.00 | FB |
| 2/13/2014 15:30 | 66.78 | 2/13/2014 15:45 | 67.16 | -1 | -38.00 | 100 | 25.21 | 72.00 | FB |
| 2/13/2014 15:45 | 67.16 | 2/13/2014 16:00 | 67.32 | 1 | 16.00 | 100 | 25.21 | 72.00 | FB |
| 2/18/2014 9:35 | 66.97 | 2/18/2014 10:45 | 66.86 | -1 | 11.00 | 100 | 25.21 | 72.00 | FB |
| 2/18/2014 10:45 | 66.86 | 2/18/2014 11:35 | 66.73 | 1 | -13.00 | 100 | 25.21 | 72.00 | FB |
| 2/18/2014 11:35 | 66.73 | 2/18/2014 12:55 | 66.77 | -1 | -4.00 | 100 | 25.21 | 72.00 | FB |
| 2/18/2014 12:55 | 66.77 | 2/18/2014 15:50 | 67.14 | 1 | 37.00 | 100 | 25.21 | 72.00 | FB |
| 2/18/2014 15:50 | 67.14 | 2/18/2014 16:00 | 67.29 | -1 | -15.00 | 100 | 25.21 | 72.00 | FB |
| 2/19/2014 9:35 | 67.05 | 2/19/2014 9:40 | 67.7 | -1 | -65.00 | 100 | 25.21 | 72.00 | FB |
| 2/19/2014 9:40 | 67.7 | 2/19/2014 12:30 | 68.61 | 1 | 91.00 | 100 | 25.21 | 72.00 | FB |
| 2/19/2014 12:30 | 68.61 | 2/19/2014 12:40 | 68.77 | -1 | -16.00 | 100 | 25.21 | 72.00 | FB |
| 2/19/2014 12:40 | 68.77 | 2/19/2014 13:45 | 68.67 | 1 | -10.00 | 100 | 25.21 | 72.00 | FB |
| 2/19/2014 13:45 | 68.67 | 2/19/2014 16:00 | 68.05 | -1 | 62.00 | 100 | 25.21 | 72.00 | FB |
| 2/20/2014 9:40 | 67.72 | 2/20/2014 11:35 | 66.66 | -1 | 106.00 | 100 | 25.21 | 72.00 | FB |
| 2/20/2014 11:35 | 66.66 | 2/20/2014 16:00 | 69.64 | 1 | 298.00 | 100 | 25.21 | 72.00 | FB |
| 2/24/2014 9:35 | 68.74 | 2/24/2014 9:40 | 69.43 | -1 | -69.00 | 100 | 25.21 | 72.00 | FB |
| 2/24/2014 9:45 | 69.54 | 2/24/2014 14:55 | 70.94 | 1 | 140.00 | 100 | 25.21 | 72.00 | FB |

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|--------------------|-------|--------------------|-------|----|--------|-----|-------|-------|----|
| 2/24/2014 14:55 | 70.94 | 2/24/2014 16:00 | 70.78 | -1 | 16.00 | 100 | 25.21 | 72.00 | FB |
| 2/25/2014 9:40 | 70.53 | 2/25/2014 11:35 | 70.14 | -1 | 39.00 | 100 | 25.21 | 72.00 | FB |
| 2/25/2014 11:35 | 70.14 | 2/25/2014 11:40 | 69.99 | 1 | -15.00 | 100 | 25.21 | 72.00 | FB |
| 2/25/2014 11:40 | 69.99 | 2/25/2014 13:10 | 69.95 | -1 | 4.00 | 100 | 25.21 | 72.00 | FB |
| 2/25/2014 13:10 | 69.95 | 2/25/2014 13:55 | 69.66 | 1 | -29.00 | 100 | 25.21 | 72.00 | FB |
| 2/25/2014 13:55 | 69.66 | 2/25/2014 14:50 | 69.95 | -1 | -29.00 | 100 | 25.21 | 72.00 | FB |
| 2/25/2014 14:50 | 69.95 | 2/25/2014 15:20 | 69.63 | 1 | -32.00 | 100 | 25.21 | 72.00 | FB |
| 2/25/2014 15:20 | 69.63 | 2/25/2014 16:00 | 69.84 | -1 | -21.00 | 100 | 25.21 | 72.00 | FB |
| 2/26/2014 9:40 | 70.06 | 2/26/2014 12:25 | 70.73 | 1 | 67.00 | 100 | 25.21 | 72.00 | FB |
| 2/26/2014 12:25 | 70.73 | 2/26/2014 16:00 | 69.26 | -1 | 147.00 | 100 | 25.21 | 72.00 | FB |
| 2/27/2014 9:50 | 69.13 | 2/27/2014 10:05 | 69.31 | -1 | -18.00 | 100 | 25.21 | 72.00 | FB |
| 2/27/2014 10:05 | 69.31 | 2/27/2014 11:45 | 69.6 | 1 | 29.00 | 100 | 25.21 | 72.00 | FB |
| 2/27/2014 11:45 | 69.6 | 2/27/2014 12:35 | 69.63 | -1 | -3.00 | 100 | 25.21 | 72.00 | FB |
| 2/27/2014 12:35 | 69.63 | 2/27/2014 13:25 | 69.55 | 1 | -8.00 | 100 | 25.21 | 72.00 | FB |
| 2/27/2014 13:25 | 69.55 | 2/27/2014 13:40 | 69.7 | -1 | -15.00 | 100 | 25.21 | 72.00 | FB |
| 2/27/2014 13:40 | 69.7 | 2/27/2014 14:15 | 69.42 | 1 | -28.00 | 100 | 25.21 | 72.00 | FB |
| 2/27/2014 14:15 | 69.42 | 2/27/2014 16:00 | 68.94 | -1 | 48.00 | 100 | 25.21 | 72.00 | FB |
| 3/3/2014 9:35 | 66.95 | 3/3/2014 9:35 | 66.95 | 1 | 0.00 | 100 | 25.21 | 72.00 | FB |
| 3/3/2014 9:40 | 67.04 | 3/3/2014 10:50 | 67.65 | -1 | -61.00 | 100 | 25.21 | 72.00 | FB |
| 3/3/2014 10:50 | 67.65 | 3/3/2014 11:25 | 67.38 | 1 | -27.00 | 100 | 25.21 | 72.00 | FB |
| 3/3/2014 11:25 | 67.38 | 3/3/2014 13:15 | 67.4 | -1 | -2.00 | 100 | 25.21 | 72.00 | FB |
| 3/3/2014 13:15 | 67.4 | 3/3/2014 14:00 | 67.13 | 1 | -27.00 | 100 | 25.21 | 72.00 | FB |
| 3/3/2014 14:00 | 67.13 | 3/3/2014 14:10 | 67.39 | -1 | -26.00 | 100 | 25.21 | 72.00 | FB |
| 3/3/2014 | 67.39 | 3/3/2014 | 67.15 | 1 | -24.00 | 100 | 25.21 | 72.00 | FB |

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|--------------------|-------|--------------------|-------|----|--------|-----|-------|-------|----|--|
| 14:10 | | 15:20 | | | | | | | | |
| 3/3/2014 15:20 | 67.15 | 3/3/2014 16:00 | 67.41 | -1 | -26.00 | 100 | 25.21 | 72.00 | FB | |
| 3/4/2014 9:40 | 68.28 | 3/4/2014 13:00 | 68.62 | 1 | 34.00 | 100 | 25.21 | 72.00 | FB | |
| 3/4/2014 13:00 | 68.62 | 3/4/2014 13:05 | 68.77 | -1 | -15.00 | 100 | 25.21 | 72.00 | FB | |
| 3/4/2014 13:05 | 68.77 | 3/4/2014 13:55 | 68.63 | 1 | -14.00 | 100 | 25.21 | 72.00 | FB | |
| 3/4/2014 13:55 | 68.63 | 3/4/2014 15:35 | 68.67 | -1 | -4.00 | 100 | 25.21 | 72.00 | FB | |
| 3/4/2014 15:35 | 68.67 | 3/4/2014 16:00 | 68.77 | 1 | 10.00 | 100 | 25.21 | 72.00 | FB | |
| 3/5/2014 10:15 | 70.07 | 3/5/2014 15:00 | 71.48 | 1 | 141.00 | 100 | 25.21 | 72.00 | FB | |
| 3/5/2014 15:00 | 71.48 | 3/5/2014 16:00 | 71.72 | -1 | -24.00 | 100 | 25.21 | 72.00 | FB | |
| 3/5/2014 16:00 | 71.72 | 3/5/2014 16:00 | 71.57 | 1 | -15.00 | 100 | 25.21 | 72.00 | FB | |
| 3/6/2014 9:45 | 71.62 | 3/6/2014 9:55 | 71.38 | 1 | -24.00 | 100 | 25.21 | 72.00 | FB | |
| 3/6/2014 9:55 | 71.38 | 3/6/2014 15:05 | 70.8 | -1 | 58.00 | 100 | 25.21 | 72.00 | FB | |
| 3/6/2014 15:05 | 70.8 | 3/6/2014 15:15 | 70.62 | 1 | -18.00 | 100 | 25.21 | 72.00 | FB | |
| 3/6/2014 15:15 | 70.62 | 3/6/2014 15:35 | 70.81 | -1 | -19.00 | 100 | 25.21 | 72.00 | FB | |
| 3/6/2014 15:35 | 70.81 | 3/6/2014 15:55 | 70.62 | 1 | -19.00 | 100 | 25.21 | 72.00 | FB | |
| 3/6/2014 15:55 | 70.62 | 3/6/2014 16:00 | 70.79 | -1 | -17.00 | 100 | 25.21 | 72.00 | FB | |
| 3/6/2014 16:00 | 70.79 | 3/6/2014 16:00 | 70.85 | 1 | 6.00 | 100 | 25.21 | 72.00 | FB | |
| 3/10/2014 9:40 | 71.51 | 3/10/2014 13:45 | 71.75 | 1 | 24.00 | 100 | 25.21 | 72.00 | FB | |
| 3/10/2014 13:45 | 71.75 | 3/10/2014 14:40 | 71.91 | -1 | -16.00 | 100 | 25.21 | 72.00 | FB | |
| 3/10/2014 14:40 | 71.91 | 3/10/2014 15:15 | 71.76 | 1 | -15.00 | 100 | 25.21 | 72.00 | FB | |
| 3/10/2014 15:15 | 71.76 | 3/10/2014 15:45 | 71.84 | -1 | -8.00 | 100 | 25.21 | 72.00 | FB | |
| 3/10/2014 15:45 | 71.84 | 3/10/2014 16:00 | 72.05 | 1 | 21.00 | 100 | 25.21 | 72.00 | FB | |
| 3/11/2014 10:05 | 72.12 | 3/11/2014 11:25 | 72.24 | 1 | 12.00 | 100 | 25.21 | 72.00 | FB | |
| 3/11/2014 13:55 | 71.45 | 3/11/2014 16:00 | 70.09 | -1 | 136.00 | 100 | 25.21 | 72.00 | FB | |

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|--------------------|-------|--------------------|-------|----|--------|-----|-------|-------|----|
| 3/12/2014 10:25 | 70.32 | 3/12/2014 12:15 | 70.85 | 1 | 53.00 | 100 | 25.21 | 72.00 | FB |
| 3/12/2014 12:15 | 70.85 | 3/12/2014 12:30 | 71.26 | -1 | -41.00 | 100 | 25.21 | 72.00 | FB |
| 3/12/2014 12:30 | 71.26 | 3/12/2014 12:45 | 70.77 | 1 | -49.00 | 100 | 25.21 | 72.00 | FB |
| 3/12/2014 12:45 | 70.77 | 3/12/2014 13:55 | 71 | -1 | -23.00 | 100 | 25.21 | 72.00 | FB |
| 3/12/2014 13:55 | 71 | 3/12/2014 14:45 | 70.88 | 1 | -12.00 | 100 | 25.21 | 72.00 | FB |
| 3/12/2014 14:45 | 70.88 | 3/12/2014 16:00 | 70.9 | -1 | -2.00 | 100 | 25.21 | 72.00 | FB |
| 3/13/2014 9:35 | 71.32 | 3/13/2014 9:45 | 70.6 | 1 | -72.00 | 100 | 25.21 | 72.00 | FB |
| 3/13/2014 9:50 | 70.54 | 3/13/2014 15:40 | 68.9 | -1 | 164.00 | 100 | 25.21 | 72.00 | FB |
| 3/13/2014 15:40 | 68.9 | 3/13/2014 16:00 | 68.85 | 1 | -5.00 | 100 | 25.21 | 72.00 | FB |
| 3/17/2014 9:40 | 67.87 | 3/17/2014 10:25 | 67.72 | 1 | -15.00 | 100 | 25.21 | 72.00 | FB |
| 3/17/2014 10:25 | 67.72 | 3/17/2014 12:05 | 67.39 | -1 | 33.00 | 100 | 25.21 | 72.00 | FB |
| 3/17/2014 12:05 | 67.39 | 3/17/2014 15:55 | 68.55 | 1 | 116.00 | 100 | 25.21 | 72.00 | FB |
| 3/17/2014 15:55 | 68.55 | 3/17/2014 16:00 | 68.73 | -1 | -18.00 | 100 | 25.21 | 72.00 | FB |
| 3/18/2014 9:40 | 68.92 | 3/18/2014 10:30 | 68.77 | 1 | -15.00 | 100 | 25.21 | 72.00 | FB |
| 3/18/2014 10:30 | 68.77 | 3/18/2014 11:20 | 68.99 | -1 | -22.00 | 100 | 25.21 | 72.00 | FB |
| 3/18/2014 11:20 | 68.99 | 3/18/2014 14:00 | 69.16 | 1 | 17.00 | 100 | 25.21 | 72.00 | FB |
| 3/18/2014 14:00 | 69.16 | 3/18/2014 14:15 | 69.29 | -1 | -13.00 | 100 | 25.21 | 72.00 | FB |
| 3/18/2014 14:15 | 69.29 | 3/18/2014 14:20 | 69.16 | 1 | -13.00 | 100 | 25.21 | 72.00 | FB |
| 3/18/2014 14:20 | 69.16 | 3/18/2014 14:35 | 69.39 | -1 | -23.00 | 100 | 25.21 | 72.00 | FB |
| 3/18/2014 14:35 | 69.39 | 3/18/2014 15:05 | 69.22 | 1 | -17.00 | 100 | 25.21 | 72.00 | FB |
| 3/18/2014 15:05 | 69.22 | 3/18/2014 16:00 | 69.19 | -1 | 3.00 | 100 | 25.21 | 72.00 | FB |
| 3/19/2014 9:40 | 69.24 | 3/19/2014 9:45 | 68.93 | 1 | -31.00 | 100 | 25.21 | 72.00 | FB |
| 3/19/2014 9:45 | 68.93 | 3/19/2014 12:25 | 68.32 | -1 | 61.00 | 100 | 25.21 | 72.00 | FB |
| 3/19/2014 | 68.32 | 3/19/2014 | 68.17 | 1 | -15.00 | 100 | 25.21 | 72.00 | FB |

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|--------------------|-------|--------------------|-------|----|--------|-----|-------|-------|----|
| 12:25 | | 12:45 | | | | | | | |
| 3/19/2014 12:45 | 68.17 | 3/19/2014 13:10 | 68.44 | -1 | -27.00 | 100 | 25.21 | 72.00 | FB |
| 3/19/2014 13:10 | 68.44 | 3/19/2014 14:25 | 68.26 | 1 | -18.00 | 100 | 25.21 | 72.00 | FB |
| 3/19/2014 14:25 | 68.26 | 3/19/2014 14:45 | 68.4 | -1 | -14.00 | 100 | 25.21 | 72.00 | FB |
| 3/19/2014 14:45 | 68.4 | 3/19/2014 14:55 | 68.27 | 1 | -13.00 | 100 | 25.21 | 72.00 | FB |
| 3/19/2014 14:55 | 68.27 | 3/19/2014 16:00 | 68.24 | -1 | 3.00 | 100 | 25.21 | 72.00 | FB |
| 3/20/2014 9:40 | 67.7 | 3/20/2014 10:40 | 68.23 | -1 | -53.00 | 100 | 25.21 | 72.00 | FB |
| 3/20/2014 10:40 | 68.23 | 3/20/2014 11:00 | 67.54 | 1 | -69.00 | 100 | 25.21 | 72.00 | FB |
| 3/20/2014 11:10 | 67.73 | 3/20/2014 11:30 | 67.61 | 1 | -12.00 | 100 | 25.21 | 72.00 | FB |
| 3/20/2014 11:30 | 67.61 | 3/20/2014 11:45 | 67.74 | -1 | -13.00 | 100 | 25.21 | 72.00 | FB |
| 3/20/2014 11:45 | 67.74 | 3/20/2014 13:00 | 67.61 | 1 | -13.00 | 100 | 25.21 | 72.00 | FB |
| 3/20/2014 13:00 | 67.61 | 3/20/2014 16:00 | 66.96 | -1 | 65.00 | 100 | 25.21 | 72.00 | FB |
| 3/24/2014 9:35 | 67.19 | 3/24/2014 9:40 | 66.69 | 1 | -50.00 | 100 | 25.21 | 72.00 | FB |
| 3/24/2014 9:40 | 66.69 | 3/24/2014 13:55 | 63.87 | -1 | 282.00 | 100 | 25.21 | 72.00 | FB |
| 3/24/2014 13:55 | 63.87 | 3/24/2014 16:00 | 64.24 | 1 | 37.00 | 100 | 25.21 | 72.00 | FB |
| 3/24/2014 16:00 | 64.24 | 3/24/2014 16:00 | 64.1 | -1 | 14.00 | 100 | 25.21 | 72.00 | FB |
| 3/25/2014 9:40 | 64.73 | 3/25/2014 11:00 | 64.81 | 1 | 8.00 | 100 | 25.21 | 72.00 | FB |
| 3/25/2014 11:00 | 64.81 | 3/25/2014 12:45 | 64.82 | -1 | -1.00 | 100 | 25.21 | 72.00 | FB |
| 3/25/2014 12:45 | 64.82 | 3/25/2014 14:35 | 65.02 | 1 | 20.00 | 100 | 25.21 | 72.00 | FB |
| 3/26/2014 9:35 | 64.73 | 3/26/2014 16:00 | 60.38 | -1 | 435.00 | 100 | 25.21 | 72.00 | FB |
| 3/27/2014 10:20 | 59.26 | 3/27/2014 10:25 | 59.86 | -1 | -60.00 | 100 | 25.21 | 72.00 | FB |
| 3/27/2014 10:45 | 59.89 | 3/27/2014 11:35 | 59.29 | 1 | -60.00 | 100 | 25.21 | 72.00 | FB |
| 3/27/2014 11:40 | 59.34 | 3/27/2014 12:00 | 59.94 | -1 | -60.00 | 100 | 25.21 | 72.00 | FB |
| 3/27/2014 12:05 | 60.09 | 3/27/2014 14:05 | 60.97 | 1 | 88.00 | 100 | 25.21 | 72.00 | FB |

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|--------------------|-------|--------------------|-------|----|--------|-----|-------|-------|----|
| 3/27/2014 14:05 | 60.97 | 3/27/2014 15:50 | 60.97 | -1 | 0.00 | 100 | 25.21 | 72.00 | FB |
| 3/27/2014 15:50 | 60.97 | 3/27/2014 16:00 | 60.95 | 1 | -2.00 | 100 | 25.21 | 72.00 | FB |
| 3/31/2014 9:40 | 60.83 | 3/31/2014 9:50 | 60.22 | 1 | -61.00 | 100 | 25.21 | 72.00 | FB |
| 3/31/2014 10:00 | 60.82 | 3/31/2014 11:40 | 60.96 | 1 | 14.00 | 100 | 25.21 | 72.00 | FB |
| 3/31/2014 11:40 | 60.96 | 3/31/2014 12:15 | 61.18 | -1 | -22.00 | 100 | 25.21 | 72.00 | FB |
| 3/31/2014 12:15 | 61.18 | 3/31/2014 12:25 | 60.85 | 1 | -33.00 | 100 | 25.21 | 72.00 | FB |
| 3/31/2014 12:25 | 60.85 | 3/31/2014 15:00 | 60.52 | -1 | 33.00 | 100 | 25.21 | 72.00 | FB |
| 3/31/2014 15:00 | 60.52 | 3/31/2014 15:55 | 60.17 | 1 | -35.00 | 100 | 25.21 | 72.00 | FB |
| 3/31/2014 15:55 | 60.17 | 3/31/2014 16:00 | 60.21 | -1 | -4.00 | 100 | 25.21 | 72.00 | FB |
| 4/1/2014 9:35 | 60.46 | 4/1/2014 9:40 | 60.8 | -1 | -34.00 | 100 | 25.21 | 72.00 | FB |
| 4/1/2014 9:40 | 60.8 | 4/1/2014 13:05 | 61.77 | 1 | 97.00 | 100 | 25.21 | 72.00 | FB |
| 4/1/2014 13:05 | 61.77 | 4/1/2014 13:55 | 62.07 | -1 | -30.00 | 100 | 25.21 | 72.00 | FB |
| 4/1/2014 13:55 | 62.07 | 4/1/2014 16:00 | 62.63 | 1 | 56.00 | 100 | 25.21 | 72.00 | FB |
| 4/2/2014 10:35 | 63.29 | 4/2/2014 12:15 | 63.06 | 1 | -23.00 | 100 | 25.21 | 72.00 | FB |
| 4/2/2014 12:15 | 63.06 | 4/2/2014 12:25 | 63.27 | -1 | -21.00 | 100 | 25.21 | 72.00 | FB |
| 4/2/2014 12:25 | 63.27 | 4/2/2014 13:15 | 63.12 | 1 | -15.00 | 100 | 25.21 | 72.00 | FB |
| 4/2/2014 13:15 | 63.12 | 4/2/2014 15:35 | 62.83 | -1 | 29.00 | 100 | 25.21 | 72.00 | FB |
| 4/2/2014 15:35 | 62.83 | 4/2/2014 16:00 | 62.73 | 1 | -10.00 | 100 | 25.21 | 72.00 | FB |
| 4/3/2014 9:45 | 62.9 | 4/3/2014 10:15 | 62.51 | 1 | -39.00 | 100 | 25.21 | 72.00 | FB |
| 4/3/2014 10:15 | 62.51 | 4/3/2014 16:00 | 59.48 | -1 | 303.00 | 100 | 25.21 | 72.00 | FB |
| 4/7/2014 9:35 | 55.88 | 4/7/2014 9:45 | 56.44 | -1 | -56.00 | 100 | 25.21 | 72.00 | FB |
| 4/7/2014 10:05 | 57.96 | 4/7/2014 10:10 | 57.38 | 1 | -58.00 | 100 | 25.21 | 72.00 | FB |
| 4/7/2014 10:50 | 56.91 | 4/7/2014 11:35 | 56.98 | -1 | -7.00 | 100 | 25.21 | 72.00 | FB |
| 4/7/2014 | 56.98 | 4/7/2014 | 56.69 | 1 | -29.00 | 100 | 25.21 | 72.00 | FB |

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|-------------------|-------|-------------------|-------|----|--------|-----|-------|-------|----|--|
| 11:35 | | 12:00 | | | | | | | | |
| 4/7/2014 12:00 | 56.69 | 4/7/2014 14:45 | 55.96 | -1 | 73.00 | 100 | 25.21 | 72.00 | FB | |
| 4/7/2014 14:45 | 55.96 | 4/7/2014 16:00 | 56.96 | 1 | 100.00 | 100 | 25.21 | 72.00 | FB | |
| 4/8/2014 9:35 | 57.73 | 4/8/2014 12:00 | 57.95 | 1 | 22.00 | 100 | 25.21 | 72.00 | FB | |
| 4/8/2014 12:00 | 57.95 | 4/8/2014 12:10 | 58.2 | -1 | -25.00 | 100 | 25.21 | 72.00 | FB | |
| 4/8/2014 12:10 | 58.2 | 4/8/2014 13:45 | 58.31 | 1 | 11.00 | 100 | 25.21 | 72.00 | FB | |
| 4/8/2014 13:45 | 58.31 | 4/8/2014 15:25 | 58.17 | -1 | 14.00 | 100 | 25.21 | 72.00 | FB | |

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|-------------------------------|----------|-------------------------------|----------|----------------------|----------|--------|
| Average Winning Trade | 66.5 | 1st Trade | 2/3/2014 | Expectancy | 0.33 | 0.11 |
| Std Dev Winning Trades | 84.72795 | Last Trade | 4/8/2014 | Opportunities | 1,009.45 | |
| System Quality | 10.44 | Strategy Calendar Days | 64 | Expectunity | 329.87 | 115.49 |
| | | Number of Trades | 177 | | | |

Chris' CSCO trades and analysis

| <u>Entry Date</u> | <u>Entry Price</u> | <u>Exit Date</u> | <u>Exit Price</u> | <u>Long/Short</u> | <u>Profit/Loss</u> | <u>Number of Shares</u> | <u>Average Loss</u> | <u>Largest Loss</u> | <u>Symbol</u> |
|-------------------|--------------------|-------------------|-------------------|-------------------|--------------------|-------------------------|---------------------|---------------------|---------------|
| 2/3/2014 14:00 | 21.53 | 2/3/2014 16:00 | 21.6 | -1 | -7 | 100 | 4.18 | 16.00 | CSCO |
| 2/4/2014 9:35 | 21.58 | 2/4/2014 9:40 | 21.47 | 1 | -11 | 100 | 4.18 | 16.00 | CSCO |
| 2/4/2014 9:40 | 21.47 | 2/4/2014 10:15 | 21.57 | -1 | -10 | 100 | 4.18 | 16.00 | CSCO |
| 2/4/2014 10:15 | 21.57 | 2/4/2014 11:10 | 21.53 | 1 | -4 | 100 | 4.18 | 16.00 | CSCO |
| 2/4/2014 11:10 | 21.53 | 2/4/2014 11:40 | 21.6 | -1 | -7 | 100 | 4.18 | 16.00 | CSCO |
| 2/4/2014 11:40 | 21.6 | 2/4/2014 16:00 | 21.8 | 1 | 20 | 100 | 4.18 | 16.00 | CSCO |
| 2/5/2014 9:50 | 21.77 | 2/5/2014 11:15 | 21.76 | 1 | -1 | 100 | 4.18 | 16.00 | CSCO |

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|--------------------|-------|--------------------|-------|----|----|-----|------|-------|------|
| 2/5/2014 11:15 | 21.76 | 2/5/2014 11:20 | 21.8 | -1 | -4 | 100 | 4.18 | 16.00 | CSCO |
| 2/5/2014 11:20 | 21.8 | 2/5/2014 14:25 | 21.99 | 1 | 19 | 100 | 4.18 | 16.00 | CSCO |
| 2/5/2014 14:25 | 21.99 | 2/5/2014 14:40 | 22.02 | -1 | -3 | 100 | 4.18 | 16.00 | CSCO |
| 2/5/2014 14:40 | 22.02 | 2/5/2014 15:10 | 21.98 | 1 | -4 | 100 | 4.18 | 16.00 | CSCO |
| 2/5/2014 15:10 | 21.98 | 2/5/2014 16:00 | 21.99 | -1 | -1 | 100 | 4.18 | 16.00 | CSCO |
| 2/6/2014 9:40 | 22.05 | 2/6/2014 16:00 | 22.49 | 1 | 44 | 100 | 4.18 | 16.00 | CSCO |
| 2/10/2014 9:40 | 22.73 | 2/10/2014 12:35 | 22.77 | 1 | 4 | 100 | 4.18 | 16.00 | CSCO |
| 2/10/2014 12:35 | 22.77 | 2/10/2014 13:25 | 22.83 | -1 | -6 | 100 | 4.18 | 16.00 | CSCO |
| 2/10/2014 13:25 | 22.83 | 2/10/2014 14:45 | 22.83 | 1 | 0 | 100 | 4.18 | 16.00 | CSCO |
| 2/10/2014 14:45 | 22.83 | 2/10/2014 16:00 | 22.83 | -1 | 0 | 100 | 4.18 | 16.00 | CSCO |
| 2/11/2014 9:40 | 22.82 | 2/11/2014 9:55 | 22.86 | -1 | -4 | 100 | 4.18 | 16.00 | CSCO |
| 2/11/2014 9:55 | 22.86 | 2/11/2014 10:00 | 22.8 | 1 | -6 | 100 | 4.18 | 16.00 | CSCO |
| 2/11/2014 10:00 | 22.8 | 2/11/2014 10:15 | 22.83 | -1 | -3 | 100 | 4.18 | 16.00 | CSCO |
| 2/11/2014 10:15 | 22.83 | 2/11/2014 10:30 | 22.82 | 1 | -1 | 100 | 4.18 | 16.00 | CSCO |
| 2/11/2014 10:30 | 22.82 | 2/11/2014 12:05 | 22.79 | -1 | 3 | 100 | 4.18 | 16.00 | CSCO |
| 2/11/2014 12:05 | 22.79 | 2/11/2014 14:40 | 22.78 | 1 | -1 | 100 | 4.18 | 16.00 | CSCO |
| 2/11/2014 14:40 | 22.78 | 2/11/2014 15:10 | 22.8 | -1 | -2 | 100 | 4.18 | 16.00 | CSCO |
| 2/11/2014 15:10 | 22.8 | 2/11/2014 15:35 | 22.77 | 1 | -3 | 100 | 4.18 | 16.00 | CSCO |
| 2/11/2014 15:35 | 22.77 | 2/11/2014 16:00 | 22.72 | -1 | 5 | 100 | 4.18 | 16.00 | CSCO |
| 2/12/2014 10:15 | 22.79 | 2/12/2014 11:45 | 22.77 | 1 | -2 | 100 | 4.18 | 16.00 | CSCO |
| 2/12/2014 11:45 | 22.77 | 2/12/2014 12:00 | 22.79 | -1 | -2 | 100 | 4.18 | 16.00 | CSCO |
| 2/12/2014 12:00 | 22.79 | 2/12/2014 14:05 | 22.78 | 1 | -1 | 100 | 4.18 | 16.00 | CSCO |
| 2/12/2014 14:05 | 22.78 | 2/12/2014 15:30 | 22.82 | -1 | -4 | 100 | 4.18 | 16.00 | CSCO |
| 2/12/2014 | 22.82 | 2/12/2014 | 22.85 | 1 | 3 | 100 | 4.18 | | CSCO |

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|--------------------|-------|--------------------|-------|----|----|-----|------|-------|------|
| 15:30 | | 16:00 | | | | | | 16.00 | |
| 2/13/2014 9:40 | 21.97 | 2/13/2014 11:45 | 21.91 | -1 | 6 | 100 | 4.18 | 16.00 | CSCO |
| 2/13/2014 11:45 | 21.91 | 2/13/2014 14:40 | 22.01 | 1 | 10 | 100 | 4.18 | 16.00 | CSCO |
| 2/13/2014 14:40 | 22.01 | 2/13/2014 15:00 | 22.05 | -1 | -4 | 100 | 4.18 | 16.00 | CSCO |
| 2/13/2014 15:00 | 22.05 | 2/13/2014 16:00 | 22.25 | 1 | 20 | 100 | 4.18 | 16.00 | CSCO |
| 2/14/2014 11:15 | 22.65 | 2/14/2014 12:20 | 22.6 | 1 | -5 | 100 | 4.18 | 16.00 | CSCO |
| 2/18/2014 10:00 | 22.41 | 2/18/2014 11:00 | 22.48 | -1 | -7 | 100 | 4.18 | 16.00 | CSCO |
| 2/18/2014 11:00 | 22.48 | 2/18/2014 12:20 | 22.49 | 1 | 1 | 100 | 4.18 | 16.00 | CSCO |
| 2/18/2014 12:20 | 22.49 | 2/18/2014 14:55 | 22.45 | -1 | 4 | 100 | 4.18 | 16.00 | CSCO |
| 2/18/2014 14:55 | 22.45 | 2/18/2014 15:15 | 22.41 | 1 | -4 | 100 | 4.18 | 16.00 | CSCO |
| 2/18/2014 15:15 | 22.41 | 2/18/2014 15:20 | 22.44 | -1 | -3 | 100 | 4.18 | 16.00 | CSCO |
| 2/18/2014 15:20 | 22.44 | 2/18/2014 16:00 | 22.42 | 1 | -2 | 100 | 4.18 | 16.00 | CSCO |
| 2/18/2014 16:00 | 22.42 | 2/18/2014 16:00 | 22.4 | -1 | 2 | 100 | 4.18 | 16.00 | CSCO |
| 2/19/2014 9:50 | 22.48 | 2/19/2014 11:35 | 22.48 | 1 | 0 | 100 | 4.18 | 16.00 | CSCO |
| 2/19/2014 11:35 | 22.48 | 2/19/2014 13:20 | 22.44 | -1 | 4 | 100 | 4.18 | 16.00 | CSCO |
| 2/19/2014 13:20 | 22.44 | 2/19/2014 14:30 | 22.4 | 1 | -4 | 100 | 4.18 | 16.00 | CSCO |
| 2/19/2014 14:30 | 22.4 | 2/19/2014 16:00 | 22.27 | -1 | 13 | 100 | 4.18 | 16.00 | CSCO |
| 2/20/2014 9:45 | 22.26 | 2/20/2014 10:45 | 22.32 | -1 | -6 | 100 | 4.18 | 16.00 | CSCO |
| 2/20/2014 10:45 | 22.32 | 2/20/2014 12:55 | 22.33 | 1 | 1 | 100 | 4.18 | 16.00 | CSCO |
| 2/20/2014 12:55 | 22.33 | 2/20/2014 14:30 | 22.33 | -1 | 0 | 100 | 4.18 | 16.00 | CSCO |
| 2/20/2014 14:30 | 22.33 | 2/20/2014 14:50 | 22.32 | 1 | -1 | 100 | 4.18 | 16.00 | CSCO |
| 2/20/2014 14:50 | 22.32 | 2/20/2014 14:55 | 22.33 | -1 | -1 | 100 | 4.18 | 16.00 | CSCO |
| 2/20/2014 14:55 | 22.33 | 2/20/2014 16:00 | 22.3 | 1 | -3 | 100 | 4.18 | 16.00 | CSCO |
| 2/24/2014 10:05 | 22.17 | 2/24/2014 10:50 | 22.26 | -1 | -9 | 100 | 4.18 | 16.00 | CSCO |

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|--------------------|-------|--------------------|-------|----|----|-----|------|-------|------|
| 2/24/2014 10:50 | 22.26 | 2/24/2014 12:05 | 22.2 | 1 | -6 | 100 | 4.18 | 16.00 | CSCO |
| 2/24/2014 12:05 | 22.2 | 2/24/2014 15:45 | 22.18 | -1 | 2 | 100 | 4.18 | 16.00 | CSCO |
| 2/24/2014 15:45 | 22.18 | 2/24/2014 16:00 | 22.13 | 1 | -5 | 100 | 4.18 | 16.00 | CSCO |
| 2/25/2014 9:50 | 22.07 | 2/25/2014 11:25 | 22.04 | -1 | 3 | 100 | 4.18 | 16.00 | CSCO |
| 2/25/2014 11:25 | 22.04 | 2/25/2014 12:10 | 22 | 1 | -4 | 100 | 4.18 | 16.00 | CSCO |
| 2/25/2014 12:10 | 22 | 2/25/2014 13:20 | 21.99 | -1 | 1 | 100 | 4.18 | 16.00 | CSCO |
| 2/25/2014 13:20 | 21.99 | 2/25/2014 13:30 | 21.98 | 1 | -1 | 100 | 4.18 | 16.00 | CSCO |
| 2/25/2014 13:30 | 21.98 | 2/25/2014 16:00 | 21.84 | -1 | 14 | 100 | 4.18 | 16.00 | CSCO |
| 2/26/2014 9:40 | 21.74 | 2/26/2014 10:40 | 21.79 | -1 | -5 | 100 | 4.18 | 16.00 | CSCO |
| 2/26/2014 10:40 | 21.79 | 2/26/2014 11:50 | 21.75 | 1 | -4 | 100 | 4.18 | 16.00 | CSCO |
| 2/26/2014 11:50 | 21.75 | 2/26/2014 12:40 | 21.77 | -1 | -2 | 100 | 4.18 | 16.00 | CSCO |
| 2/26/2014 12:40 | 21.77 | 2/26/2014 12:50 | 21.74 | 1 | -3 | 100 | 4.18 | 16.00 | CSCO |
| 2/26/2014 12:50 | 21.74 | 2/26/2014 13:20 | 21.8 | -1 | -6 | 100 | 4.18 | 16.00 | CSCO |
| 2/26/2014 13:20 | 21.8 | 2/26/2014 16:00 | 21.92 | 1 | 12 | 100 | 4.18 | 16.00 | CSCO |
| 2/26/2014 16:00 | 21.92 | 2/26/2014 16:00 | 21.94 | -1 | -2 | 100 | 4.18 | 16.00 | CSCO |
| 2/27/2014 9:35 | 21.94 | 2/27/2014 10:05 | 21.9 | 1 | -4 | 100 | 4.18 | 16.00 | CSCO |
| 2/27/2014 10:05 | 21.9 | 2/27/2014 10:45 | 21.95 | -1 | -5 | 100 | 4.18 | 16.00 | CSCO |
| 2/27/2014 10:45 | 21.95 | 2/27/2014 12:15 | 21.93 | 1 | -2 | 100 | 4.18 | 16.00 | CSCO |
| 2/27/2014 12:15 | 21.93 | 2/27/2014 12:40 | 21.98 | -1 | -5 | 100 | 4.18 | 16.00 | CSCO |
| 2/27/2014 12:40 | 21.98 | 2/27/2014 13:00 | 21.94 | 1 | -4 | 100 | 4.18 | 16.00 | CSCO |
| 2/27/2014 13:00 | 21.94 | 2/27/2014 13:35 | 21.99 | -1 | -5 | 100 | 4.18 | 16.00 | CSCO |
| 2/27/2014 13:35 | 21.99 | 2/27/2014 14:30 | 21.97 | 1 | -2 | 100 | 4.18 | 16.00 | CSCO |
| 2/27/2014 14:30 | 21.97 | 2/27/2014 15:15 | 21.98 | -1 | -1 | 100 | 4.18 | 16.00 | CSCO |
| 2/27/2014 | 21.98 | 2/27/2014 | 21.94 | 1 | -4 | 100 | 4.18 | | CSCO |

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|--------------------|-------|--------------------|-------|----|----|-----|------|-------|------|
| 15:15 | | 15:30 | | | | | | 16.00 | |
| 2/27/2014 15:30 | 21.94 | 2/27/2014 16:00 | 21.9 | -1 | 4 | 100 | 4.18 | 16.00 | CSCO |
| 3/3/2014 9:40 | 21.64 | 3/3/2014 13:35 | 21.49 | -1 | 15 | 100 | 4.18 | 16.00 | CSCO |
| 3/3/2014 13:35 | 21.49 | 3/3/2014 13:40 | 21.47 | 1 | -2 | 100 | 4.18 | 16.00 | CSCO |
| 3/3/2014 13:40 | 21.47 | 3/3/2014 14:10 | 21.5 | -1 | -3 | 100 | 4.18 | 16.00 | CSCO |
| 3/3/2014 14:10 | 21.5 | 3/3/2014 15:20 | 21.47 | 1 | -3 | 100 | 4.18 | 16.00 | CSCO |
| 3/3/2014 15:20 | 21.47 | 3/3/2014 15:55 | 21.51 | -1 | -4 | 100 | 4.18 | 16.00 | CSCO |
| 3/3/2014 15:55 | 21.51 | 3/3/2014 16:00 | 21.57 | 1 | 6 | 100 | 4.18 | 16.00 | CSCO |
| 3/4/2014 10:20 | 21.77 | 3/4/2014 13:05 | 21.82 | 1 | 5 | 100 | 4.18 | 16.00 | CSCO |
| 3/4/2014 13:05 | 21.82 | 3/4/2014 14:40 | 21.83 | -1 | -1 | 100 | 4.18 | 16.00 | CSCO |
| 3/4/2014 14:40 | 21.83 | 3/4/2014 15:55 | 21.82 | 1 | -1 | 100 | 4.18 | 16.00 | CSCO |
| 3/4/2014 15:55 | 21.82 | 3/4/2014 16:00 | 21.81 | -1 | 1 | 100 | 4.18 | 16.00 | CSCO |
| 3/5/2014 9:40 | 21.87 | 3/5/2014 11:35 | 21.91 | 1 | 4 | 100 | 4.18 | 16.00 | CSCO |
| 3/5/2014 11:35 | 21.91 | 3/5/2014 12:05 | 21.94 | -1 | -3 | 100 | 4.18 | 16.00 | CSCO |
| 3/5/2014 12:05 | 21.94 | 3/5/2014 13:05 | 21.92 | 1 | -2 | 100 | 4.18 | 16.00 | CSCO |
| 3/5/2014 13:05 | 21.92 | 3/5/2014 13:25 | 21.95 | -1 | -3 | 100 | 4.18 | 16.00 | CSCO |
| 3/5/2014 13:25 | 21.95 | 3/5/2014 13:45 | 21.92 | 1 | -3 | 100 | 4.18 | 16.00 | CSCO |
| 3/5/2014 13:45 | 21.92 | 3/5/2014 14:10 | 21.97 | -1 | -5 | 100 | 4.18 | 16.00 | CSCO |
| 3/5/2014 14:10 | 21.97 | 3/5/2014 14:50 | 21.93 | 1 | -4 | 100 | 4.18 | 16.00 | CSCO |
| 3/5/2014 14:50 | 21.93 | 3/5/2014 16:00 | 21.87 | -1 | 6 | 100 | 4.18 | 16.00 | CSCO |
| 3/6/2014 9:45 | 21.92 | 3/6/2014 10:10 | 21.85 | 1 | -7 | 100 | 4.18 | 16.00 | CSCO |
| 3/6/2014 10:10 | 21.85 | 3/6/2014 12:30 | 21.82 | -1 | 3 | 100 | 4.18 | 16.00 | CSCO |
| 3/6/2014 12:30 | 21.82 | 3/6/2014 12:55 | 21.79 | 1 | -3 | 100 | 4.18 | 16.00 | CSCO |
| 3/6/2014 12:55 | 21.79 | 3/6/2014 13:10 | 21.83 | -1 | -4 | 100 | 4.18 | 16.00 | CSCO |

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|--------------------|-------|--------------------|-------|----|-----|-----|------|-------|------|
| 3/6/2014 13:10 | 21.83 | 3/6/2014 14:55 | 21.81 | 1 | -2 | 100 | 4.18 | 16.00 | CSCO |
| 3/6/2014 14:55 | 21.81 | 3/6/2014 15:40 | 21.82 | -1 | -1 | 100 | 4.18 | 16.00 | CSCO |
| 3/6/2014 15:40 | 21.82 | 3/6/2014 15:45 | 21.8 | 1 | -2 | 100 | 4.18 | 16.00 | CSCO |
| 3/6/2014 15:45 | 21.8 | 3/6/2014 16:00 | 21.83 | -1 | -3 | 100 | 4.18 | 16.00 | CSCO |
| 3/10/2014 9:40 | 21.71 | 3/10/2014 11:30 | 21.73 | -1 | -2 | 100 | 4.18 | 16.00 | CSCO |
| 3/10/2014 11:30 | 21.73 | 3/10/2014 13:40 | 21.72 | 1 | -1 | 100 | 4.18 | 16.00 | CSCO |
| 3/10/2014 13:40 | 21.72 | 3/10/2014 16:00 | 21.7 | -1 | 2 | 100 | 4.18 | 16.00 | CSCO |
| 3/10/2014 16:00 | 21.7 | 3/10/2014 16:00 | 21.69 | 1 | -1 | 100 | 4.18 | 16.00 | CSCO |
| 3/11/2014 10:05 | 21.83 | 3/11/2014 11:25 | 21.72 | 1 | -11 | 100 | 4.18 | 16.00 | CSCO |
| 3/11/2014 11:25 | 21.72 | 3/11/2014 14:00 | 21.71 | -1 | 1 | 100 | 4.18 | 16.00 | CSCO |
| 3/11/2014 14:00 | 21.71 | 3/11/2014 14:15 | 21.68 | 1 | -3 | 100 | 4.18 | 16.00 | CSCO |
| 3/11/2014 14:15 | 21.68 | 3/11/2014 16:00 | 21.61 | -1 | 7 | 100 | 4.18 | 16.00 | CSCO |
| 3/12/2014 9:50 | 21.6 | 3/12/2014 10:15 | 21.67 | -1 | -7 | 100 | 4.18 | 16.00 | CSCO |
| 3/12/2014 10:15 | 21.67 | 3/12/2014 12:35 | 21.77 | 1 | 10 | 100 | 4.18 | 16.00 | CSCO |
| 3/12/2014 12:35 | 21.77 | 3/12/2014 14:20 | 21.79 | -1 | -2 | 100 | 4.18 | 16.00 | CSCO |
| 3/12/2014 14:20 | 21.79 | 3/12/2014 15:25 | 21.75 | 1 | -4 | 100 | 4.18 | 16.00 | CSCO |
| 3/12/2014 15:25 | 21.75 | 3/12/2014 16:00 | 21.81 | -1 | -6 | 100 | 4.18 | 16.00 | CSCO |
| 3/13/2014 9:40 | 21.88 | 3/13/2014 10:30 | 21.76 | 1 | -12 | 100 | 4.18 | 16.00 | CSCO |
| 3/13/2014 10:30 | 21.76 | 3/13/2014 15:10 | 21.6 | -1 | 16 | 100 | 4.18 | 16.00 | CSCO |
| 3/13/2014 15:10 | 21.6 | 3/13/2014 15:20 | 21.53 | 1 | -7 | 100 | 4.18 | 16.00 | CSCO |
| 3/13/2014 15:20 | 21.53 | 3/13/2014 16:00 | 21.53 | -1 | 0 | 100 | 4.18 | 16.00 | CSCO |
| 3/17/2014 9:45 | 21.5 | 3/17/2014 13:05 | 21.52 | 1 | 2 | 100 | 4.18 | 16.00 | CSCO |
| 3/17/2014 13:05 | 21.52 | 3/17/2014 15:05 | 21.52 | -1 | 0 | 100 | 4.18 | 16.00 | CSCO |
| 3/17/2014 | 21.52 | 3/17/2014 | 21.49 | 1 | -3 | 100 | 4.18 | | CSCO |

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|--------------------|-------|--------------------|-------|----|-----|-----|------|-------|------|
| 15:05 | | 15:50 | | | | | | 16.00 | |
| 3/17/2014 15:50 | 21.49 | 3/17/2014 16:00 | 21.5 | -1 | -1 | 100 | 4.18 | 16.00 | CSCO |
| 3/18/2014 9:40 | 21.37 | 3/18/2014 11:45 | 21.4 | -1 | -3 | 100 | 4.18 | 16.00 | CSCO |
| 3/18/2014 11:45 | 21.4 | 3/18/2014 16:00 | 21.64 | 1 | 24 | 100 | 4.18 | 16.00 | CSCO |
| 3/18/2014 16:00 | 21.64 | 3/18/2014 16:00 | 21.63 | -1 | 1 | 100 | 4.18 | 16.00 | CSCO |
| 3/19/2014 10:10 | 21.66 | 3/19/2014 10:50 | 21.63 | 1 | -3 | 100 | 4.18 | 16.00 | CSCO |
| 3/19/2014 10:50 | 21.63 | 3/19/2014 12:00 | 21.68 | -1 | -5 | 100 | 4.18 | 16.00 | CSCO |
| 3/19/2014 12:00 | 21.68 | 3/19/2014 14:20 | 21.72 | 1 | 4 | 100 | 4.18 | 16.00 | CSCO |
| 3/19/2014 14:20 | 21.72 | 3/19/2014 16:00 | 21.63 | -1 | 9 | 100 | 4.18 | 16.00 | CSCO |
| 3/20/2014 10:00 | 21.76 | 3/20/2014 13:35 | 21.86 | 1 | 10 | 100 | 4.18 | 16.00 | CSCO |
| 3/20/2014 13:35 | 21.86 | 3/20/2014 16:00 | 21.83 | -1 | 3 | 100 | 4.18 | 16.00 | CSCO |
| 3/24/2014 9:35 | 21.66 | 3/24/2014 9:45 | 21.76 | -1 | -10 | 100 | 4.18 | 16.00 | CSCO |
| 3/24/2014 9:45 | 21.76 | 3/24/2014 10:00 | 21.65 | 1 | -11 | 100 | 4.18 | 16.00 | CSCO |
| 3/24/2014 10:00 | 21.65 | 3/24/2014 13:15 | 21.52 | -1 | 13 | 100 | 4.18 | 16.00 | CSCO |
| 3/24/2014 13:15 | 21.52 | 3/24/2014 13:30 | 21.48 | 1 | -4 | 100 | 4.18 | 16.00 | CSCO |
| 3/24/2014 13:30 | 21.48 | 3/24/2014 14:00 | 21.53 | -1 | -5 | 100 | 4.18 | 16.00 | CSCO |
| 3/24/2014 14:00 | 21.53 | 3/24/2014 14:30 | 21.5 | 1 | -3 | 100 | 4.18 | 16.00 | CSCO |
| 3/24/2014 14:30 | 21.5 | 3/24/2014 14:35 | 21.54 | -1 | -4 | 100 | 4.18 | 16.00 | CSCO |
| 3/24/2014 14:35 | 21.54 | 3/24/2014 15:25 | 21.5 | 1 | -4 | 100 | 4.18 | 16.00 | CSCO |
| 3/24/2014 15:25 | 21.5 | 3/24/2014 15:30 | 21.55 | -1 | -5 | 100 | 4.18 | 16.00 | CSCO |
| 3/24/2014 15:30 | 21.55 | 3/24/2014 16:00 | 21.57 | 1 | 2 | 100 | 4.18 | 16.00 | CSCO |
| 3/25/2014 9:40 | 21.69 | 3/25/2014 16:00 | 22.35 | 1 | 66 | 100 | 4.18 | 16.00 | CSCO |
| 3/26/2014 10:15 | 22.51 | 3/26/2014 13:25 | 22.56 | 1 | 5 | 100 | 4.18 | 16.00 | CSCO |
| 3/26/2014 13:25 | 22.56 | 3/26/2014 16:00 | 22.32 | -1 | 24 | 100 | 4.18 | 16.00 | CSCO |

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|--------------------|-------|--------------------|-------|----|-----|-----|------|-------|------|
| 3/27/2014 9:45 | 22.22 | 3/27/2014 15:45 | 22.07 | -1 | 15 | 100 | 4.18 | 16.00 | CSCO |
| 3/27/2014 15:45 | 22.07 | 3/27/2014 16:00 | 22.02 | 1 | -5 | 100 | 4.18 | 16.00 | CSCO |
| 3/31/2014 9:40 | 22.52 | 3/31/2014 13:30 | 22.54 | 1 | 2 | 100 | 4.18 | 16.00 | CSCO |
| 3/31/2014 13:30 | 22.54 | 3/31/2014 16:00 | 22.41 | -1 | 13 | 100 | 4.18 | 16.00 | CSCO |
| 4/1/2014 9:50 | 22.54 | 4/1/2014 16:00 | 23.09 | 1 | 55 | 100 | 4.18 | 16.00 | CSCO |
| 4/1/2014 16:00 | 23.09 | 4/1/2014 16:00 | 23.09 | -1 | 0 | 100 | 4.18 | 16.00 | CSCO |
| 4/2/2014 10:00 | 22.96 | 4/2/2014 12:25 | 22.95 | -1 | 1 | 100 | 4.18 | 16.00 | CSCO |
| 4/2/2014 12:25 | 22.95 | 4/2/2014 12:50 | 22.87 | 1 | -8 | 100 | 4.18 | 16.00 | CSCO |
| 4/2/2014 12:50 | 22.87 | 4/2/2014 14:25 | 22.89 | -1 | -2 | 100 | 4.18 | 16.00 | CSCO |
| 4/2/2014 14:25 | 22.89 | 4/2/2014 16:00 | 22.99 | 1 | 10 | 100 | 4.18 | 16.00 | CSCO |
| 4/3/2014 9:40 | 23.09 | 4/3/2014 11:50 | 23.13 | 1 | 4 | 100 | 4.18 | 16.00 | CSCO |
| 4/3/2014 11:50 | 23.13 | 4/3/2014 14:00 | 23.09 | -1 | 4 | 100 | 4.18 | 16.00 | CSCO |
| 4/3/2014 14:00 | 23.09 | 4/3/2014 14:10 | 23.06 | 1 | -3 | 100 | 4.18 | 16.00 | CSCO |
| 4/3/2014 14:10 | 23.06 | 4/3/2014 14:15 | 23.1 | -1 | -4 | 100 | 4.18 | 16.00 | CSCO |
| 4/3/2014 14:15 | 23.1 | 4/3/2014 14:55 | 23.04 | 1 | -6 | 100 | 4.18 | 16.00 | CSCO |
| 4/3/2014 14:55 | 23.04 | 4/3/2014 15:35 | 23.11 | -1 | -7 | 100 | 4.18 | 16.00 | CSCO |
| 4/3/2014 15:35 | 23.11 | 4/3/2014 16:00 | 23.09 | 1 | -2 | 100 | 4.18 | 16.00 | CSCO |
| 4/7/2014 9:40 | 22.76 | 4/7/2014 15:40 | 23 | 1 | 24 | 100 | 4.18 | 16.00 | CSCO |
| 4/7/2014 15:40 | 23 | 4/7/2014 16:00 | 22.85 | -1 | 15 | 100 | 4.18 | 16.00 | CSCO |
| 4/8/2014 10:35 | 22.72 | 4/8/2014 10:50 | 22.88 | -1 | -16 | 100 | 4.18 | 16.00 | CSCO |
| 4/8/2014 10:50 | 22.88 | 4/8/2014 12:10 | 22.85 | 1 | -3 | 100 | 4.18 | 16.00 | CSCO |
| 4/8/2014 12:10 | 22.85 | 4/8/2014 12:20 | 22.88 | -1 | -3 | 100 | 4.18 | 16.00 | CSCO |
| 4/8/2014 12:20 | 22.88 | 4/8/2014 13:05 | 22.86 | 1 | -2 | 100 | 4.18 | 16.00 | CSCO |
| 4/8/2014 | 22.86 | 4/8/2014 | 22.91 | -1 | -5 | 100 | 4.18 | | CSCO |

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|-------------------|-------|-------------------|-------|----|-----|-----|------|-------|------|
| 13:05 | | 13:35 | | | | | | 16.00 | |
| 4/8/2014 13:35 | 22.91 | 4/8/2014 14:15 | 22.83 | 1 | -8 | 100 | 4.18 | 16.00 | CSCO |
| 4/8/2014 14:15 | 22.83 | 4/8/2014 14:35 | 22.94 | -1 | -11 | 100 | 4.18 | 16.00 | CSCO |
| 4/8/2014 14:35 | 22.94 | 4/8/2014 16:00 | 22.94 | 1 | 0 | 100 | 4.18 | 16.00 | CSCO |

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|-------------------------------|----------|-------------------------------|----------|----------------------|--------|-------|
| Average Winning Trade | 10.30357 | 1st Trade | 2/3/2014 | Expectancy | 0.15 | 0.04 |
| Std Dev Winning Trades | 12.76062 | Last Trade | 4/8/2014 | Opportunities | 998.05 | |
| System Quality | 10.68 | Strategy Calendar Days | 64 | Expectunity | 154.17 | 40.28 |
| | | Number of Trades | 175 | | | |

Matthew's trades and analysis

| Entry Date | Entry Price | Exit Date | Exit Price | Long/Short | Profit/Loss | Number of Shares | Average Loss | Largest Loss | Currency Pair |
|--------------------|-------------|--------------------|------------|------------|-------------|------------------|--------------|--------------|---------------|
| 2/10/2014 11:18 | \$1.37 | 2/10/2014 11:35 | \$1.37 | -1 | -22.49 | 100000 | \$120.83 | \$873.86 | EURJPY |
| 2/10/2014 11:36 | \$1.36 | 2/10/2014 12:40 | \$1.36 | 1 | -52 | 100000 | \$120.83 | \$873.86 | EURUSD |
| 2/11/2014 12:03 | \$1.36 | 2/10/2014 12:40 | \$1.36 | 1 | -17 | 100000 | \$120.83 | \$873.86 | EURUSD |
| 2/11/2014 0:26 | \$1.37 | 2/11/2014 7:22 | \$1.37 | -1 | -29 | 100000 | \$120.83 | \$873.86 | EURUSD |
| 2/11/2014 1:17 | \$1.65 | 2/11/2014 7:22 | \$1.66 | 1 | 352.69 | 100000 | \$120.83 | \$873.86 | GBPJPY |
| 2/11/2014 10:12 | \$1.37 | 2/11/2014 10:56 | \$1.37 | -1 | -106 | 100000 | \$120.83 | \$873.86 | EURUSD |
| 2/11/2014 10:13 | \$1.11 | 2/11/2014 10:56 | \$1.10 | 1 | -153.54 | 100000 | \$120.83 | \$873.86 | USDCAD |
| 2/10/2014 10:56 | \$1.10 | 2/11/2014 12:00 | \$1.10 | -1 | 138.07 | 100000 | \$120.83 | \$873.86 | USDCAD |
| 2/11/2014 12:11 | \$1.37 | 2/11/2014 12:23 | \$1.38 | -1 | -873.86 | 100000 | \$120.83 | \$873.86 | EURJPY |
| 2/11/2014 12:13 | \$1.37 | 2/11/2014 12:15 | \$1.37 | 1 | -14.62 | 100000 | \$120.83 | \$873.86 | EURJPY |
| 2/11/2014 12:02 | \$1.37 | 2/11/2014 12:23 | \$1.37 | 1 | -31 | 100000 | \$120.83 | \$873.86 | EURUSD |
| 2/11/2014 | \$1.38 | 2/11/2014 | \$1.38 | 1 | 83.79 | 100000 | \$120.83 | \$873.86 | EURJPY |

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|--------------------|--------|--------------------|--------|----|---------|--------|----------|----------|--------|
| 12:13 | | 12:25 | | | | | | | |
| 2/11/2014 12:27 | \$1.66 | 2/11/2014 13:14 | \$1.66 | 1 | 41.89 | 100000 | \$120.83 | \$873.86 | GBPJPY |
| 2/11/2014 12:38 | \$1.66 | 2/11/2014 13:14 | \$1.66 | 1 | 51.64 | 100000 | \$120.83 | \$873.86 | GBPJPY |
| 2/11/2014 12:55 | \$1.66 | 2/11/2014 13:14 | \$1.66 | 1 | 74.04 | 100000 | \$120.83 | \$873.86 | GBPJPY |
| 2/11/2014 12:26 | \$1.37 | 2/11/2014 13:16 | \$1.36 | -1 | 67 | 100000 | \$120.83 | \$873.86 | EURUSD |
| 2/11/2014 12:33 | \$1.37 | 2/11/2014 13:16 | \$1.36 | -1 | 96 | 100000 | \$120.83 | \$873.86 | EURUSD |
| 2/11/2014 12:36 | \$1.37 | 2/11/2014 13:16 | \$1.36 | -1 | 115 | 100000 | \$120.83 | \$873.86 | EURUSD |
| 2/11/2014 13:18 | \$1.66 | 2/11/2014 13:35 | \$1.66 | -1 | 65.28 | 100000 | \$120.83 | \$873.86 | GBPJPY |
| 2/11/2014 13:46 | \$1.10 | 2/11/2014 14:58 | \$1.10 | -1 | 79.94 | 100000 | \$120.83 | \$873.86 | USDCAD |
| 2/11/2014 13:46 | \$1.10 | 2/11/2014 14:58 | \$1.10 | -1 | 79.94 | 100000 | \$120.83 | \$873.86 | USDCAD |
| 2/11/2014 14:02 | \$1.10 | 2/11/2014 14:58 | \$1.10 | -1 | 68.13 | 100000 | \$120.83 | \$873.86 | USDCAD |
| 2/12/2014 2:36 | \$1.10 | 2/12/2014 3:02 | \$1.10 | 1 | 23.63 | 100000 | \$120.83 | \$873.86 | USDCAD |
| 2/12/2014 2:37 | \$1.10 | 2/12/2014 3:02 | \$1.10 | 1 | 17.27 | 100000 | \$120.83 | \$873.86 | USDCAD |
| 2/12/2014 2:37 | \$1.10 | 2/12/2014 3:02 | \$1.10 | 1 | 20.9 | 100000 | \$120.83 | \$873.86 | USDCAD |
| 2/12/2014 2:39 | \$1.10 | 2/12/2014 3:02 | \$1.10 | 1 | 35.44 | 100000 | \$120.83 | \$873.86 | USDCAD |
| 2/12/2014 13:31 | \$1.10 | 2/12/2014 13:41 | \$1.10 | -1 | 19.99 | 100000 | \$120.83 | \$873.86 | USDCAD |
| 2/12/2014 13:33 | \$1.67 | 2/12/2014 13:57 | \$1.67 | -1 | -13.66 | 100000 | \$120.83 | \$873.86 | GBPJPY |
| 2/12/2014 13:42 | \$1.67 | 2/12/2014 13:57 | \$1.67 | -1 | 43.88 | 100000 | \$120.83 | \$873.86 | GBPJPY |
| 2/12/2014 14:19 | \$1.67 | 2/12/2014 15:00 | \$1.67 | 1 | -7.8 | 100000 | \$120.83 | \$873.86 | GBPJPY |
| 2/12/2014 14:31 | \$1.67 | 2/12/2014 15:01 | \$1.67 | 1 | 49.74 | 100000 | \$120.83 | \$873.86 | GBPJPY |
| 2/12/2014 15:05 | \$1.66 | 2/12/2014 17:21 | \$1.67 | -1 | -205.67 | 100000 | \$120.83 | \$873.86 | GBPJPY |
| 2/10/2014 12:07 | \$1.84 | 2/14/2014 0:08 | \$1.85 | 1 | 2931.9 | 200000 | \$120.83 | \$873.86 | GBPAUD |
| 2/14/2014 12:09 | \$0.99 | 2/14/2014 12:26 | \$0.99 | -1 | -4.55 | 100000 | \$120.83 | \$873.86 | AUDCAD |
| 2/14/2014 0:10 | \$1.00 | 2/14/2014 13:18 | \$1.00 | 1 | 85.43 | 100000 | \$120.83 | \$873.86 | USDJPY |

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|--------------------|--------|--------------------|--------|----|---------|--------|----------|----------|--------|
| 2/14/2014 0:10 | \$1.00 | 2/14/2014 13:18 | \$1.00 | 1 | 85.43 | 100000 | \$120.83 | \$873.86 | USDJPY |
| 2/14/2014 13:27 | \$1.00 | 2/14/2014 14:29 | \$1.00 | -1 | -41.25 | 100000 | \$120.83 | \$873.86 | USDJPY |
| 2/14/2014 14:10 | \$1.00 | 2/14/2014 14:56 | \$1.00 | -1 | -25.54 | 100000 | \$120.83 | \$873.86 | USDJPY |
| 2/14/2014 14:28 | \$1.00 | 2/16/2014 14:56 | \$1.00 | -1 | -7.86 | 100000 | \$120.83 | \$873.86 | USDJPY |
| 2/14/2014 12:17 | \$1.02 | 2/16/2014 20:04 | \$1.02 | -1 | 160.53 | 100000 | \$120.83 | \$873.86 | USDNOK |
| 2/17/2014 14:02 | \$1.13 | 2/18/2014 2:20 | \$1.13 | -1 | 139.12 | 100000 | \$120.83 | \$873.86 | EURGBP |
| 2/18/2014 1:44 | \$1.13 | 2/18/2014 2:31 | \$1.13 | -1 | -1.67 | 100000 | \$120.83 | \$873.86 | EURGBP |
| 2/14/2014 13:56 | \$1.02 | 2/18/2014 9:17 | \$1.01 | -1 | 338.02 | 100000 | \$120.83 | \$873.86 | USDNOK |
| 2/14/2014 15:38 | \$1.02 | 2/18/2014 9:17 | \$1.01 | -1 | 251.45 | 100000 | \$120.83 | \$873.86 | USDNOK |
| 2/14/2014 16:29 | \$1.02 | 2/18/2014 9:17 | \$1.01 | -1 | 277.43 | 100000 | \$120.83 | \$873.86 | USDNOK |
| 2/16/2014 22:15 | \$1.02 | 2/18/2014 9:18 | \$1.01 | -1 | 210.41 | 100000 | \$120.83 | \$873.86 | USDNOK |
| 2/18/2014 2:32 | \$1.13 | 2/18/2014 9:18 | \$1.13 | 1 | 632.2 | 100000 | \$120.83 | \$873.86 | EURGBP |
| 2/14/2014 14:56 | \$0.99 | 2/19/2014 1:22 | \$1.00 | 1 | 334.85 | 100000 | \$120.83 | \$873.86 | USDJPY |
| 2/17/2014 2:10 | \$0.99 | 2/19/2014 10:50 | \$1.00 | 1 | 465.91 | 100000 | \$120.83 | \$873.86 | AUDCAD |
| 2/17/2014 2:11 | \$0.99 | 2/19/2014 10:50 | \$1.00 | 1 | 458.69 | 100000 | \$120.83 | \$873.86 | AUDCAD |
| 2/17/2014 2:24 | \$0.99 | 2/19/2014 10:50 | \$1.00 | 1 | 516.46 | 100000 | \$120.83 | \$873.86 | AUDCAD |
| 2/19/2014 12:32 | \$1.38 | 2/19/2014 13:09 | \$1.37 | 1 | -76 | 100000 | \$120.83 | \$873.86 | EURUSD |
| 2/19/2014 12:38 | \$1.38 | 2/19/2014 13:09 | \$1.37 | 1 | -22 | 100000 | \$120.83 | \$873.86 | EURUSD |
| 2/12/2014 17:14 | \$0.91 | 2/19/2014 14:19 | \$0.90 | -1 | 596.8 | 200000 | \$120.83 | \$873.86 | AUDJPY |
| 2/14/2014 14:56 | \$1.00 | 2/19/2014 15:48 | \$1.01 | 1 | 350.49 | 100000 | \$120.83 | \$873.86 | USDJPY |
| 2/19/2014 0:34 | \$1.01 | 2/19/2014 16:26 | \$1.01 | 1 | 99.69 | 100000 | \$120.83 | \$873.86 | USDJPY |
| 2/11/2014 12:25 | \$1.37 | 2/20/2014 1:08 | \$1.37 | -1 | -108.74 | 100000 | \$120.83 | \$873.86 | EURJPY |
| 2/20/2014 0:24 | \$0.90 | 2/20/2014 1:08 | \$0.90 | -1 | -21.36 | 100000 | \$120.83 | \$873.86 | AUDCHF |
| 2/20/2014 | \$0.90 | 2/20/2014 | \$0.90 | 1 | 93.3 | 100000 | \$120.83 | \$873.86 | AUDCHF |

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|--------------------|--------|--------------------|--------|----|---------|--------|----------|----------|--------|
| 1:10 | | 2:17 | | | | | | | |
| 2/20/2014 2:17 | \$1.37 | 2/20/2014 2:35 | \$1.37 | -1 | 152.51 | 100000 | \$120.83 | \$873.86 | EURJPY |
| 2/20/2014 2:26 | \$1.37 | 2/20/2014 2:35 | \$1.37 | -1 | 158.38 | 100000 | \$120.83 | \$873.86 | EURJPY |
| 2/19/2014 12:56 | \$1.85 | 2/20/2014 13:02 | \$1.85 | 1 | 67.11 | 100000 | \$120.83 | \$873.86 | GBPCAD |
| 2/19/2014 13:20 | \$1.85 | 2/20/2014 13:02 | \$1.85 | 1 | 76.12 | 100000 | \$120.83 | \$873.86 | GBPCAD |
| 2/26/2014 13:22 | \$0.91 | 2/26/2014 13:51 | \$0.91 | 1 | -11.23 | 100000 | \$120.83 | \$873.86 | CADCHF |
| 2/25/2014 12:01 | \$1.67 | 2/28/2014 9:03 | \$1.67 | 1 | 271.2 | 100000 | \$120.83 | \$873.86 | GBPUSD |
| 2/25/2014 12:12 | \$1.67 | 2/28/2014 9:03 | \$1.67 | 1 | 219.2 | 100000 | \$120.83 | \$873.86 | GBPUSD |
| 2/27/2014 12:04 | \$1.13 | 2/28/2014 9:04 | \$1.14 | 1 | 692.09 | 100000 | \$120.83 | \$873.86 | CHFJPY |
| 2/27/2014 12:10 | \$1.13 | 2/28/2014 9:04 | \$1.14 | 1 | 780.48 | 100000 | \$120.83 | \$873.86 | CHFJPY |
| 2/27/2014 12:18 | \$1.13 | 2/28/2014 9:04 | \$1.14 | 1 | 824.67 | 100000 | \$120.83 | \$873.86 | CHFJPY |
| 2/27/2014 14:24 | \$1.13 | 2/28/2014 9:04 | \$1.14 | 1 | 818.78 | 100000 | \$120.83 | \$873.86 | CHFJPY |
| 2/28/2014 9:15 | \$1.14 | 2/28/2014 9:16 | \$1.14 | -1 | -141.46 | 400000 | \$120.83 | \$873.86 | CHFJPY |
| 2/28/2014 9:16 | \$1.67 | 2/28/2014 9:16 | \$1.67 | -1 | -56 | 200000 | \$120.83 | \$873.86 | GBPUSD |
| 2/28/2014 11:57 | \$1.14 | 3/2/2014 17:26 | \$1.13 | -1 | 245.43 | 100000 | \$120.83 | \$873.86 | CHFJPY |
| 2/28/2014 12:04 | \$1.14 | 3/2/2014 17:26 | \$1.13 | -1 | 257.26 | 100000 | \$120.83 | \$873.86 | CHFJPY |
| 2/20/2014 2:26 | \$1.38 | 3/2/2014 18:49 | \$1.37 | -1 | 548.43 | 100000 | \$120.83 | \$873.86 | EURJPY |
| 2/20/2014 3:27 | \$1.37 | 3/2/2014 18:49 | \$1.37 | -1 | -195.79 | 100000 | \$120.83 | \$873.86 | EURJPY |
| 2/20/2014 3:28 | \$1.37 | 3/2/2014 18:49 | \$1.37 | -1 | -304.23 | 100000 | \$120.83 | \$873.86 | EURJPY |
| 2/28/2014 12:04 | \$1.38 | 3/3/2014 12:04 | \$1.37 | -1 | 1193.84 | 100000 | \$120.83 | \$873.86 | EURJPY |
| 3/3/2014 2:10 | \$1.36 | 3/4/2014 7:35 | \$1.37 | 1 | 559.21 | 100000 | \$120.83 | \$873.86 | EURJPY |
| 3/4/2014 7:35 | \$1.37 | 3/4/2014 11:16 | \$1.37 | -1 | -120.36 | 100000 | \$120.83 | \$873.86 | EURJPY |
| 2/25/2014 12:00 | \$0.90 | 3/6/2014 15:46 | \$0.91 | 1 | 671.9 | 100000 | \$120.83 | \$873.86 | AUDUSD |
| 2/25/2014 12:00 | \$0.90 | 3/6/2014 15:46 | \$0.91 | 1 | 664.9 | 100000 | \$120.83 | \$873.86 | AUDUSD |

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|--------------------|--------|--------------------|--------|----|---------|--------|----------|----------|--------|
| 3/5/2014 3:15 | \$0.90 | 3/6/2014 15:46 | \$0.91 | 1 | 1192.2 | 100000 | \$120.83 | \$873.86 | AUDUSD |
| 3/6/2014 13:19 | \$1.52 | 3/6/2014 23:35 | \$1.52 | 1 | 5.86 | 100000 | \$120.83 | \$873.86 | EURCAD |
| 3/9/2014 18:09 | \$1.11 | 3/10/2014 0:46 | \$1.11 | 1 | 208.94 | 100000 | \$120.83 | \$873.86 | USDCAD |
| 3/10/2014 1:31 | \$1.07 | 3/10/2014 15:45 | \$1.07 | -1 | 457.37 | 200000 | \$120.83 | \$873.86 | AUDNZD |
| 3/10/2014 16:32 | \$1.85 | 3/10/2014 20:00 | \$1.84 | -1 | 109.95 | 100000 | \$120.83 | \$873.86 | GBPAUD |
| 3/10/2014 16:33 | \$1.85 | 3/10/2014 20:00 | \$1.84 | -1 | 113.47 | 100000 | \$120.83 | \$873.86 | GBPAUD |
| 3/11/2014 21:25 | \$1.15 | 3/11/2014 21:37 | \$1.15 | 1 | 3.32 | 100000 | \$120.83 | \$873.86 | EURGBP |
| 3/11/2014 0:28 | \$1.39 | 3/19/2014 15:04 | \$1.38 | -1 | 448.3 | 100000 | \$120.83 | \$873.86 | EURUSD |
| 3/11/2014 0:29 | \$1.39 | 3/19/2014 15:04 | \$1.38 | -1 | 450.3 | 100000 | \$120.83 | \$873.86 | EURUSD |
| 3/24/2014 3:02 | \$1.81 | 3/24/2014 14:28 | \$1.81 | -1 | 543.4 | 100000 | \$120.83 | \$873.86 | GBPAUD |
| 3/25/2014 1:34 | \$0.91 | 3/25/2014 5:06 | \$0.92 | 1 | 185 | 100000 | \$120.83 | \$873.86 | AUDUSD |
| 3/25/2014 1:35 | \$0.91 | 3/25/2014 5:06 | \$0.92 | 1 | 192 | 100000 | \$120.83 | \$873.86 | AUDUSD |
| 3/25/2014 23:00 | \$0.92 | 3/26/2014 0:27 | \$0.92 | 1 | 197 | 100000 | \$120.83 | \$873.86 | AUDUSD |
| 3/25/2014 23:00 | \$0.92 | 3/26/2014 0:27 | \$0.92 | 1 | 199 | 100000 | \$120.83 | \$873.86 | AUDUSD |
| 3/4/2014 11:36 | \$1.38 | 3/26/2014 15:29 | \$1.38 | -1 | -474.95 | 100000 | \$120.83 | \$873.86 | EURJPY |
| 3/5/2014 15:37 | \$1.38 | 3/26/2014 15:29 | \$1.38 | -1 | -364.49 | 100000 | \$120.83 | \$873.86 | EURJPY |
| 3/6/2014 2:31 | \$1.39 | 3/26/2014 15:29 | \$1.38 | -1 | 256.64 | 100000 | \$120.83 | \$873.86 | EURJPY |
| 3/6/2014 11:29 | \$1.40 | 3/26/2014 15:38 | \$1.38 | -1 | 1800 | 100000 | \$120.83 | \$873.86 | EURJPY |
| 3/12/2014 0:54 | \$1.15 | 3/26/2014 15:38 | \$1.15 | -1 | 207.91 | 100000 | \$120.83 | \$873.86 | EURGBP |
| 3/12/2014 0:54 | \$1.15 | 3/26/2014 15:38 | \$1.15 | -1 | 207.91 | 100000 | \$120.83 | \$873.86 | EURGBP |
| 3/19/2014 21:11 | \$1.16 | 3/26/2014 15:38 | \$1.15 | -1 | 678.45 | 100000 | \$120.83 | \$873.86 | EURGBP |
| 3/26/2014 13:09 | \$0.92 | 3/26/2014 15:39 | \$0.92 | 1 | 93 | 100000 | \$120.83 | \$873.86 | AUDUSD |
| 3/26/2014 13:09 | \$0.92 | 3/26/2014 15:39 | \$0.92 | 1 | 93 | 100000 | \$120.83 | \$873.86 | AUDUSD |

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|-------------------------------|-------------|-------------------------------|-----------|----------------------|----------------|---------------|
| Average Winning Trade | 334.169737 | 1st Trade | 2/10/2014 | Expectancy | 1.73 | 0.24 |
| Std Dev Winning Trades | 439.435973 | Last Trade | 3/26/2014 | Opportunities | 871.02 | |
| System Quality | 7.79 | Strategy Calendar Days | 44 | Expectunity | 1503.00 | 207.83 |
| | | Number of Trades | 105 | | | |

Tiago's trades and analysis

| Entry Date | Entry Price | Exit Date | Exit Price | Long/Short | Profit/Loss | Number of Shares | Average Loss | Largest Loss | Currency Pair |
|--------------------|-------------|--------------------|------------|------------|-------------|------------------|--------------|--------------|---------------|
| 1/27/2014 3:00 | 140.532 | 1/27/2014 4:00 | 140.126 | 1 | -40600 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 1/27/2014 4:00 | 140.126 | 1/28/2014 4:00 | 140.68 | -1 | -55400 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 1/28/2014 4:00 | 140.68 | 1/29/2014 5:00 | 140.63 | 1 | -5170 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 1/29/2014 5:00 | 140.63 | 2/4/2014 19:00 | 137.519 | -1 | 309460 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 2/4/2014 19:00 | 137.519 | 2/4/2014 20:00 | 137.207 | 1 | -31200 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 2/4/2014 20:00 | 137.207 | 2/5/2014 4:00 | 137.114 | -1 | 9300 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 2/5/2014 4:00 | 137.114 | 2/5/2014 21:00 | 137.191 | 1 | 7710 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 2/5/2014 21:00 | 137.191 | 2/6/2014 9:00 | 137.358 | -1 | -16700 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 2/6/2014 9:00 | 137.358 | 2/7/2014 4:00 | 138.457 | 1 | 109770 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 2/7/2014 4:00 | 138.457 | 2/7/2014 9:00 | 139.136 | -1 | -67900 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 2/7/2014 9:00 | 139.136 | 2/7/2014 9:00 | 138.46 | 1 | -67600 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 2/7/2014 9:00 | 138.46 | 2/10/2014 20:00 | 139.579 | -1 | 112450 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 2/10/2014 20:00 | 139.579 | 2/11/2014 9:00 | 139.72 | 1 | 14100 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |

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|--------------------|---------|--------------------|---------|----|--------|--------|------------|-------------|--------|
| 2/11/2014 9:00 | 139.72 | 2/13/2014 5:00 | 139.401 | -1 | 31130 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 2/13/2014 5:00 | 139.401 | 2/13/2014 23:00 | 139.089 | 1 | -31200 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 2/13/2014 23:00 | 139.089 | 2/16/2014 21:00 | 139.418 | -1 | -33260 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 2/16/2014 21:00 | 139.418 | 2/17/2014 21:00 | 139.667 | 1 | 24640 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 2/17/2014 21:00 | 139.667 | 2/17/2014 23:00 | 140.085 | -1 | -41800 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 2/17/2014 23:00 | 140.085 | 2/18/2014 21:00 | 140.602 | 1 | 51610 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 2/18/2014 21:00 | 140.602 | 2/20/2014 9:00 | 140.169 | -1 | 42890 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 2/20/2014 9:00 | 140.169 | 2/25/2014 3:00 | 140.651 | 1 | 47820 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 2/25/2014 3:00 | 140.651 | 2/28/2014 6:00 | 140.128 | -1 | 51110 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 2/28/2014 6:00 | 140.128 | 3/2/2014 18:00 | 139.904 | 1 | -22530 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 3/2/2014 18:00 | 139.904 | 3/3/2014 20:00 | 139.479 | -1 | 42230 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 3/3/2014 20:00 | 139.479 | 3/9/2014 18:00 | 142.957 | 1 | 347430 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 3/9/2014 18:00 | 142.957 | 3/13/2014 1:00 | 143.108 | -1 | -15940 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 3/13/2014 1:00 | 143.108 | 3/13/2014 11:00 | 142.898 | 1 | -21000 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 3/13/2014 11:00 | 142.898 | 3/14/2014 4:00 | 141.07 | -1 | 182540 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 3/14/2014 4:00 | 141.07 | 3/17/2014 4:00 | 141.005 | 1 | -6600 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 3/17/2014 4:00 | 141.005 | 3/17/2014 5:00 | 141.361 | -1 | -35600 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 3/17/2014 5:00 | 141.361 | 3/18/2014 3:00 | 141.556 | 1 | 19450 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 3/18/2014 3:00 | 141.556 | 3/18/2014 8:00 | 141.53 | -1 | 2600 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 3/18/2014 8:00 | 141.53 | 3/21/2014 4:00 | 140.996 | 1 | -53300 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 3/21/2014 4:00 | 140.996 | 3/24/2014 5:00 | 141.713 | -1 | -71960 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 3/24/2014 5:00 | 141.713 | 3/24/2014 6:00 | 141.144 | 1 | -56900 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 3/24/2014 6:00 | 141.144 | 3/24/2014 14:00 | 141.236 | -1 | -9200 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |

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|--------------------|---------|--------------------|---------|----|--------|--------|------------|-------------|--------|
| 3/24/2014 14:00 | 141.236 | 3/26/2014 5:00 | 141.158 | 1 | -7850 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 3/26/2014 5:00 | 141.158 | 3/28/2014 6:00 | 140.416 | -1 | 72190 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 3/28/2014 6:00 | 140.416 | 3/31/2014 11:00 | 142.109 | 1 | 169270 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 3/31/2014 11:00 | 142.109 | 4/1/2014 4:00 | 142.385 | -1 | -27860 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 4/1/2014 4:00 | 142.385 | 4/3/2014 8:00 | 142.801 | 1 | 41730 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 4/3/2014 8:00 | 142.801 | 4/10/2014 21:00 | 141.056 | -1 | 172810 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 4/10/2014 21:00 | 141.056 | 4/11/2014 8:00 | 140.743 | 1 | -31300 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 4/11/2014 8:00 | 140.743 | 4/14/2014 4:00 | 140.897 | -1 | -15620 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 4/14/2014 4:00 | 140.897 | 4/16/2014 22:00 | 141.131 | 1 | 23730 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 4/16/2014 22:00 | 141.131 | 4/17/2014 6:00 | 141.373 | -1 | -24200 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 4/17/2014 6:00 | 141.373 | 4/17/2014 23:00 | 141.374 | 1 | -90 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 4/17/2014 23:00 | 141.374 | 4/20/2014 20:00 | 141.624 | -1 | -25490 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 4/20/2014 20:00 | 141.624 | 4/21/2014 11:00 | 141.593 | 1 | -3100 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 4/21/2014 11:00 | 141.593 | 4/23/2014 3:00 | 141.868 | -1 | -28040 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |
| 4/23/2014 3:00 | 141.868 | 4/23/2014 4:00 | 141.627 | 1 | -24100 | 100000 | ¥32,798.67 | ¥112,450.00 | EURJPY |

| | | | | | | |
|---------------------------------------|-------------|---------------------------------------|-----------|--------------------|---------------|--------------|
| Average Winning Trade | 84453.33 | 1st Trade | 1/27/2014 | Expectancy | 0.47 | 0.14 |
| Std Dev Winning Trades | 97874.1 | Last Trade | 4/23/2014 | Opportunity | 216.45 | |
| System Quality | 6.16 | Strategy Calendar Days | 86 | Expectunity | 102.17 | 29.80 |
| | | Number of Trades | 51 | | | |

Appendix B: Indicators ELD

Bollinger Bands ELD

inputs:

double BollingerPrice(Close), { price to be used in calculation of the moving average that will be plotted; this is also the price of which the standard deviation will be taken for plotting of the upper and lower bands }

double TestPriceUBand(Close), { if this price crosses under the upper band, and alerts are enabled, then an alert will be triggered }

double TestPriceLBand(Close), { if this price crosses over the lower band, and alerts are enabled, then an alert will be triggered }

int Length(20), { number of bars to be used in the moving average and standard deviation calculations }

double NumDevsUp(2), { number of standard deviations to be added to the moving average to calculate the upper Bollinger band }

double NumDevsDn(-2), { number of standard deviations to be added to the moving average to calculate the lower Bollinger band; this input should be negative if it is desired for the lower band to be at a price that is lower than the moving average }

int Displace(0), { number of bars to displace plots; a value of 0 indicates that calculated values are plotted on the bar on which they are calculated (no offset) }

bool ColorPercentB(true), { set this input to true if it is desired for the %B values that are shown in RadarScreen to be colored according to their values }

int PercentBVeryHighColor(Yellow), { if ColorPercentB is true, use this color for %B values that are greater than 100; if ColorPercentB is false then this input has no effect }

int PercentBHighColor(Red), { if ColorPercentB is true, use this color for %B values that are greater than or equal to 50; if ColorPercentB is false then this input has no effect }

int PercentBLowColor(Magenta), { if ColorPercentB is true, use this color for %B values that are less than 50; if ColorPercentB is false then this input has no effect }

int PercentBVeryLowColor(Cyan); { if ColorPercentB is true, use this color for %B values that are less than 0; if ColorPercentB is false then this input has no effect }

variables:

intraBarPersist bool PlotPercentB(false),

double Avg(0),

double SDev(0),

double LowerBand(0),

double UpperBand(0),

double PercentB(0);

{ if the application is something other than Charting, like RadarScreen, then set PlotPercentB to true to indicate that the %B value is to be plotted; this value is not plotted in Charting since it is on a different scale than the bands and the moving average }

once

PlotPercentB = GetAppInfo(aiApplicationType) <> cChart ;

Avg = AverageFC(BollingerPrice, Length);

SDev = StandardDev(BollingerPrice, Length, 1);

UpperBand = Avg + NumDevsUp * SDev ;

LowerBand = Avg + NumDevsDn * SDev ;

if Displace >= 0 or CurrentBar > AbsValue(Displace) then

begin

Plot1[Displace](UpperBand, "UpperBand") ;

Plot2[Displace](LowerBand, "LowerBand") ;

Plot3[Displace](Avg, "MidLine") ;

if PlotPercentB then

begin

if UpperBand <> LowerBand then

PercentB = (BollingerPrice - LowerBand) / (UpperBand - LowerBand)

else

PercentB = 0 ;

Plot4[Displace](PercentB, "%B") ;

{ color Plot4 in grid applications, if ColorPercentB input is true }

if ColorPercentB then

switch(PercentB)

begin

case < 0:

SetPlotColor(4, PercentBVeryLowColor) ;

case < 0.5:

SetPlotColor(4, PercentBLowColor) ;

case <= 1:


```

        SetPlotColor( 4, PercentBHighColor ) ;
    case > 1:
        SetPlotColor( 4, PercentBVeryHighColor ) ;
    end ;

end ;

{ alert criteria }
if Displace <= 0 then
    begin
        if TestPriceLBand crosses over LowerBand then
            Alert( "Price crossing over lower price band" )
        else if TestPriceUBand crosses under UpperBand then
            Alert( "Price crossing under upper price band" ) ;
        end ;
    end ;
end ;

```

```

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```

Linear Regression Channel ELD

```
[LegacyColorValue = true];
```

```

{ // Note: Setting a begin date that is earlier than the amount of length for the regression
  will produce an extend to the left model that is date and time restricted
  The End Date must not be in the future // }

```

inputs:

```
Length ( 23), { // Length of Linear Regression // }
BeginDate ( 0), { // Choose Zero to use full length // }
BeginTime ( 0), { // Choose Zero to use full time // }
EndDate ( 0), { // Choose Zero for Current Day // }
EndTime ( 0), { // Choose Zero for Current Time // }
NumDevsUp ( 2), { // Standard deviations for upper // }
NumDevsDn ( -2), { // Standard deviations for lower // }
LRColor ( blue), { // Color for Linear Regression Line // }
UBColor ( Red), { // Color for Upper Boundary // }
LBColor ( Magenta), { // Color for Lower Boundary // }
ExtRight ( true), { // Set to true to extend to right // }
ExtLeft ( false); { // Set to true to extend to left // }
```

variables:

```
FirstDate ( 0),
FirstTime ( 0),
UpperBand ( 0),
LowerBand ( 0),
UpperBand_1 ( 0),
LowerBand_1 ( 0),
LRV ( 0),
LRV_1 ( 0),
TL_LRV ( 0),
TL_UB ( 0),
TL_LB ( 0),
Flag ( 0),
```

```
SDev ( 0 );
```

```
if BeginDate = 0 then
```

```
    FirstDate = date[ Length - 1 ]
```

```
else
```

```
    FirstDate = BeginDate;
```

```
if BeginTime = 0 then
```

```
    FirstTime = time[ Length - 1 ]
```

```
else
```

```
    FirstTime = BeginTime;
```

```
{ //////////////////////////////////////////////////////////////////// }
```

```
if Flag = 0 then
```

```
    begin
```

```
        if ( EndDate = CurrentDate or EndDate = 0 ) and LastBarOnChart then
```

```
            begin
```

```
                LRV = LinearRegValue( Close, Length, 0 );
```

```
                LRV_1 = LinearRegValue( Close, Length, Length - 1 );
```

```
                SDev = StandardDev( Close, Length, 1 );
```

```
                UpperBand = LRV + NumDevsUp * SDev;
```

```
                LowerBand = LRV + NumDevsDn * SDev;
```

```
                UpperBand_1 = LRV_1 + NumDevsUp * SDev;
```

```
                LowerBand_1 = LRV_1 + NumDevsDn * SDev;
```

```

LRV );
TL_LRV = TL_New( FirstDate, FirstTime, LRV_1, date, time,
time, UpperBand );
TL_UB = TL_New( FirstDate, FirstTime, UpperBand_1, date,
time, LowerBand );
TL_LB = TL_New( FirstDate, FirstTime, LowerBand_1, date,
time, LowerBand );

Flag = 1 ;
end
else if date = EndDate and ( time = EndTime or EndTime = 0 ) then
begin
LRV = LinearRegValue( Close, Length, 0 );
LRV_1 = LinearRegValue( Close, Length, Length - 1 );
SDev = StandardDev( Close, Length, 1 );

UpperBand = LRV + NumDevsUp * SDev;
LowerBand = LRV + NumDevsDn * SDev;
UpperBand_1 = LRV_1 + NumDevsUp * SDev;
LowerBand_1 = LRV_1 + NumDevsDn * SDev;

TL_LRV = TL_New( FirstDate, FirstTime, LRV_1, date, time,
LRV );
TL_UB = TL_New( FirstDate, FirstTime, UpperBand_1, date,
time, UpperBand );
TL_LB = TL_New( FirstDate, FirstTime, LowerBand_1, date,
time, LowerBand );

Flag = 2;
end;

```

```

if Flag = 1 or Flag = 2 then
    begin
        TL_SetColor( TL_LRV, LRColor );
        TL_SetColor( TL_UB, UBColor );
        TL_SetColor( TL_LB, LBColor );

        TL_SetExtLeft( TL_LRV, ExtLeft );
        TL_SetExtLeft( TL_UB, ExtLeft );
        TL_SetExtLeft( TL_LB, ExtLeft );

        TL_SetExtRight( TL_LRV, ExtRight );
        TL_SetExtRight( TL_UB, ExtRight );
        TL_SetExtRight( TL_LB, ExtRight );
    end;

end

else
    if Flag = 1 then
        begin
            LRV = LinearRegValue( Close, Length, 0 );
            LRV_1 = LinearRegValue( Close, Length, Length - 1 );
            SDev = StandardDev( Close, Length, 1 );

            UpperBand = LRV + NumDevsUp * SDev;
            LowerBand = LRV + NumDevsDn * SDev;
            UpperBand_1 = LRV_1 + NumDevsUp * SDev;
        end;
    end;
end

```

```

LowerBand_1 = LRV_1 + NumDevsDn * SDev;

TL_SetBegin( TL_LRV, FirstDate, FirstTime, LRV_1 );
TL_SetBegin( TL_UB, FirstDate, FirstTime, UpperBand_1 );
TL_SetBegin( TL_LB, FirstDate, FirstTime, LowerBand_1 );

TL_SetEnd( TL_LRV, date, time, LRV );
TL_SetEnd( TL_UB, date, time, UpperBand );
TL_SetEnd( TL_LB, date, time, LowerBand );

end;

{ // Code modified from TradeStation indicator of LinearRegLine
  by
    Greg Ballard, 04/09/2003 // }

```

Momentum ELD

inputs:

```

Price( Close ),
Length( 12 ),
ColorNormLength( 14 ), { Number of bars over which to normalize the indicator
  for gradient coloring. See also: comments in function NormGradientColor. }
UpColor( Yellow ), { Color to use for indicator values that are relatively high
  over ColorNormLength bars. }
DnColor( Red ), { Color to use for indicator values that are relatively low
  over ColorNormLength bars. }
GridForegroundColor( Black ); { Color to use for numbers in RadarScreen cells
  when gradient coloring is enabled, that is, when both UpColor and DnColor are

```

```
set to non-negative values. }
```

```
{ Set either UpColor and/or DnColor to -1 to disable gradient plot coloring.  
When disabled, Plot1 color is determined by settings in indicator properties  
dialog box. Plot2 (ZeroLine) color always comes from indicator properties  
dialog box. }
```

variables:

```
ApplicationType( 0 ),  
Mom( 0 ),  
Accel( 0 ),  
ColorLevel( 0 );
```

```
if CurrentBar = 1 then
```

```
ApplicationType = GetAppInfo( aiApplicationType );
```

```
Mom = Momentum( Price, Length );
```

```
Accel = Momentum( Mom, 1 ); { 1 bar acceleration }
```

```
Plot1( Mom, "Momentum" );
```

```
Plot2( 0, "ZeroLine" );
```

```
{ Gradient coloring }
```

```
if UpColor >= 0 and DnColor >= 0 then
```

```
begin
```

```
ColorLevel = NormGradientColor( Mom, true, ColorNormLength, UpColor, DnColor );
```

```
if ApplicationType = 1 then { study is applied to a chart }
```

```
SetPlotColor( 1, ColorLevel )
```

```

else if ApplicationType > 1 then { study is applied to grid app }
    begin
        SetPlotColor( 1, GridForegroundColor );
        SetPlotBGColor( 1, ColorLevel );
    end ;
end ;

{ Alert criteria }
if Mom > 0 and Accel > 0 then
    Alert( "Indicator positive and increasing" )
else if Mom < 0 and Accel < 0 then
    Alert( "Indicator negative and decreasing" ) ;

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```

Moving Avg 2-line ELD

inputs:

```

Price( Close ),
FastLength( 9 ),
SlowLength( 18 ),
Displace( 0 );

```

variables:

```

FastAvg( 0 ),

```



```
SlowAvg( 0 ) ;
```

```
FastAvg = AverageFC( Price, FastLength ) ;
```

```
SlowAvg = AverageFC( Price, SlowLength ) ;
```

```
if Displace >= 0 or CurrentBar > AbsValue( Displace ) then
```

```
begin
```

```
Plot1[Displace]( FastAvg, "FastAvg" ) ;
```

```
Plot2[Displace]( SlowAvg, "SlowAvg" ) ;
```

```
{ Alert criteria }
```

```
if Displace <= 0 then
```

```
begin
```

```
if FastAvg crosses over SlowAvg then
```

```
Alert( "Bullish alert" )
```

```
else if FastAvg crosses under SlowAvg then
```

```
Alert( "Bearish alert" ) ;
```

```
end ;
```

```
end ;
```

```
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```

```
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```

```
with each release. ** }
```

Volume ELD

inputs: HiAlert(100000000), LoAlert(-1) ;

variables: VolumeValue(0) ;

if BarType >= 2 and BarType < 5 then { not tick/minute data nor an advanced chart
type (Kagi, Renko, Kase etc.) }

 VolumeValue = Volume

else { if tick/minute data or an advanced chart type; in the case of minute data,
also set the "For volume, use:" field in the Format Symbol dialog to Trade Vol or
Tick Count, as desired; when using advanced chart types, Ticks returns volume if
the chart is built from 1-tick interval data }

 VolumeValue = Ticks ;

Plot1(VolumeValue, "Volume") ;

if VolumeValue >= HiAlert then

 Alert("Volume is at/above " + NumToStr(HiAlert, 0))

else if VolumeValue <= LoAlert then

 Alert("Volume is at/below " + NumToStr(LoAlert, 0)) ;

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Appendix C: Strategies ELD

Chris' Final Strategy ELD

inputs:

```

No_Shares ( 100 ),
Price ( Close ),
Fast_Length ( 4 ),
Med_Length ( 9 ),
Slow_Length ( 10 ),
Stop_Loss_Pct ( .01 ),
Linear_Ave ( 0 ),
Weighted_Ave ( 0 ),
Exponential_Ave ( 1 ),
//// MonteCarlo function inputs////
ASize ( 0 ), { account size, $ }
RetGoal ( 0 ), { rate of return goal, % }
DDGoal ( 0 ), { max closed out trade drawdown, % }
RiskPer ( 0 ), { percentage risk per trade }
TrRisk ( 0 ), { risk for current trade, $ }
NRand ( 0 ); { number of random sequences }

```

variables:

```

Fast_Avg ( 0 ),
Med_Avg ( 0 ),
Slow_Avg ( 0 );

```

If Linear_Ave = 1 then

```

    Begin
        Fast_Avg = AverageFC( Price, Fast_Length );
        Med_Avg = AverageFC( Price, Med_Length );
        Slow_Avg = AverageFC( Price, Slow_Length );
    End

```

```

        End

Else
Begin

If Exponential_Ave = 1 then
    Begin
        Fast_Avg = XAverage( Price, Fast_Length ) ;
        Med_Avg = XAverage( Price, Med_Length ) ;
        Slow_Avg = XAverage( Price, Slow_Length ) ;
    End

Else
Begin

If Weighted_Ave = 1 then
    Begin
        Fast_Avg = WAverage( Price, Fast_Length ) ;
        Med_Avg = WAverage( Price, Med_Length ) ;
        Slow_Avg = WAverage( Price, Slow_Length ) ;
    End ;
End ;
End ;

//conditional trigger to enter position
Condition1 = Price > Fast_Avg and Fast_Avg > Med_Avg and Med_Avg > Slow_Avg ;
Condition2 = Price < Fast_Avg and Fast_Avg < Med_Avg and Med_Avg < Slow_Avg ;

```

if CurrentBar > 1 and Condition1 and Condition1[1] = false

then

Buy No_Shares shares next bar at market ;

if CurrentBar > 1 and Condition2 and Condition2[1] = false

then

Sell Short No_Shares shares next bar at market ;

//stop loss

SetStopShare ;

if MarketPosition = 1 then

SetStopLoss(EntryPrice * Stop_Loss_Pct)

else

Sell ("PctStopLX-eb") next bar at Close * (1 - Stop_Loss_Pct) stop ;

if MarketPosition = -1 then

SetStopLoss(EntryPrice * Stop_Loss_Pct)

else

Buy To Cover ("PctStopSX-eb") next bar at Close * (1 + Stop_Loss_Pct) stop ;

//close at end of day

Setexitonclose ;

{ Value99 = mjr_WriteTradesSym(0, 0, 0, 10, 1, "c:\MSA_InputFile.csv") ;}

{ Value98 = MonteCarlo(10000,5,500,2,2,100) ;}

{ Value97 = NConFF2 (0,0,0,0);}

Tiago's Final Strategy ELD

[IntrabarOrderGeneration = false]

inputs: Length(4), NumATRSE(1.6), NumATR SX(7) ;

Buy ("VltClsLE") next bar at Close + AvgTrueRange(Length) * NumATRSE stop ;

Sell ("VltClsLX") next bar at Close - AvgTrueRange(Length) * NumATR SX stop ;

Sell Short ("VltClsSE") next bar at Close - AvgTrueRange(Length) * NumATRSE stop ;

Buy To Cover ("VltClsSX") next bar at Close + AvgTrueRange(Length) * NumATR SX
stop ;

Appendix D: Functions

Write Trades Function ELD

{User function: WriteTradesSym}

Use this function to write out the trades generated by a trading system to a text file.

This function is designed to provide the input files needed by Market System Analyzer 3.2. To use this function, call it as the last line in your trading system. Make sure the function call is outside of all loops and other control statements.

INPUTS:

TrRisk: risk for current trade in dollars; should be positive. This number can be different for each trade if desired. TrRisk should be for the same number of contracts or shares as the profit/loss.

StopL: initial stop price for a long trade.

StopS: initial stop price for a short trade.

NATR: Averaging period for average true range calculation.

CurrConv: Currency conversion factor. Use 1 if no currency conversion is needed.

FName: name of file for writing trade profit/loss and risk data to, including drive and path with no extension; e.g., "C:\Futures\Data\out1". The symbol name followed by ".csv" will

be appended to the file name; e.g., "out1" will become "out1@ES.D.csv" for the symbol @ES.D.

This file, if already present, will be deleted before being re-written.

Notes:

1. It is not necessary to use both TrRisk and stop prices (StopL, StopS). Use one or the other to define the trade risk.
2. The average true range (ATR) value output by this function is the value calculated on the bar immediately prior to the bar of entry for the trade.
3. The symbol name is retrieved from the built-in TradeStation function GetSymbolName.

OUTPUT:

The function writes the entry and exit dates/times, trade profit/loss, risk, entry price, exit price, stop price, size (contracts or shares), market position (long or short), symbol name, and the average true range for each trade to the text file specified by FName.

The function returns the number of trades.

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}

input: TrRisk (NumericSeries), { risk for current trade }
StopL (NumericSimple), { initial stop price for long trade }
StopS (NumericSimple), { initial stop price for short trade }
NATR (NumericSimple), { period for average true range }
CurrConv (NumericSimple), { currency conversion factor }
FName (StringSimple); { file name to write results to }

```

Var: TradePL (0),           { Trade profit/loss }
    NTrades (0),           { Number of trades }
    EnDate (0),           { Entry date }
    ExDate (0),           { Exit date }
    EnTime (0),           { Entry time }
    ExTime (0),           { Exit time }
    EntPr (0),            { Entry price }
    ExPr (0),            { Exit price }
    StopPr (0),          { Stop price }
    NSize (0),           { size of position }
    NTNew (0),           { Number of new trades on current bar }
    MarkPos (0),         { market position }
    ATR (0),             { average true range }
    EntBar (0),          { bar of entry, to use with ATR }
    ATREnt (0),          { ATR value prior to entry }
    ii (0),              { loop counter }
    EnDT (""),           { Entry date/time string }
    ExDT (""),           { Exit date/time string }
    FNameSym (""),       { File name with symbol appended }
    StrOut ("");         { output character string }

```

```
FNameSym = FName + GetSymbolName + ".csv";
```

```
if BarNumber = 1 then
```

```
    FileDelete(FNameSym);
```

```
ATR = Average(TrueRange, NATR);
```



```

{ Collect profit/loss and write out data to file }
NTNew = TotalTrades - NTrades;
If NTNew > 0 then Begin
  for ii = 0 to NTNew - 1 Begin
    EnDate = EntryDate(NTNew - ii);
    ExDate = ExitDate(NTNew - ii);
    EnTime = EntryTime(NTNew - ii);
    EntBar = FindBar(EnDate, EnTime);
    ATREnt = ATR[EntBar + 1];
    ExTime = ExitTime(NTNew - ii);
    TradePL = PositionProfit(NTNew - ii);
    EntPr = EntryPrice(NTNew - ii);
    ExPr = ExitPrice(NTNew - ii);
    NSize = MaxContracts(NTNew - ii);
    MarkPos = MarketPosition(NTNew - ii);
    if MarkPos > 0 then
      StopPr = StopL
    else if MarkPos < 0 then
      StopPr = StopS
    else
      StopPr = 0;
    EnDT = DateString3(EnDate, EnTime);
    ExDT = DateString3(ExDate, ExTime);
    StrOut = EnDT + "," + NumtoStr(EntPr, 4) + "," + ExDT + "," + NumtoStr(ExPr, 4) + "," +
      NumtoStr(StopPr, 4) + "," + NumtoStr(MarkPos, 0) + "," + NumtoStr(TradePL, 2) +
      "," + NumtoStr(TrRisk, 2) + "," + NumtoStr(NSize, 0) + "," + GetSymbolName +
      "," + NumtoStr(ATREnt, 4) + "," + NumtoStr(CurrConv, 4) + Newline;
  end
end

```

```
FileAppend(FNameSym, StrOut);
NTrades = NTrades + 1;
    End;
End;

mjr_WriteTradesSym = NTrades;
```

References

1. Faith, Curtis M. *Way of the Turtle*. New York: McGraw-Hill, 2007. *My.wpi.edu*. Web. 28 Apr. 2014. <https://my.wpi.edu/bbcswebdav/pid-98663-dt-content-rid-515814_1/xid-515814_1>.
2. Hieronymous, Thomas A. "Economics of Futures Trading for Commercial and Personal Profit." *Economics of Futures Trading for Commercial and Personal Profit*. Commodity Research Bureau, n.d. Web. 26 Apr. 2014. <http://www.farmdoc.illinois.edu/irwin/archive/books/hieronymus/Ec_of%20Futures_pre face.pdf>.
3. "Investopedia - Educating the World about Finance." *Investopedia*. N.p., n.d. Web. 28 Apr. 2014. <<http://www.investopedia.com/>>.
4. Jankovsky, Jason Alan. *Trading Rules That Work: The 28 Essential Lessons That Every Trader Must Master*. Hoboken, NJ: Wiley, 2006. *My.wpi.edu*. Web. 28 Apr. 2014. <https://my.wpi.edu/bbcswebdav/pid-98608-dt-content-rid-515678_1/xid-515678_1>.
5. Katz, Jeffrey Owen., and Donna L. McCormick. *The Encyclopedia of Trading Strategies*. New York: McGraw-Hill, 2000. *My.wpi.edu*. Web. 28 Apr. 2014. <https://my.wpi.edu/bbcswebdav/pid-91762-dt-content-rid-453429_1/xid-453429_1>.

6. King, Paul M. *The Complete Guide to Building a Successful Trading Business*. Middlebury, VT: PMKing Trading, 2007. Print.
7. LeBeau, Chuck. *What If-WhatIf*. Comp. Michael Radzicki, PhD. N.p.: n.p., n.d. *My.wpi.edu*. Web. 28 Apr. 2014. <https://my.wpi.edu/bbcswebdav/pid-216195-dt-content-rid-1054233_1/xid-1054233_1>.
8. "Online Trading | Trade Stocks, Options, Futures & Forex Online | Trading Software." *Online Trading | Trade Stocks, Options, Futures & Forex Online | Trading Software*. N.p., n.d. Web. 28 Apr. 2014. <<http://www.tradestation.com/>>.
9. Raiman, Mel. "Precision Trading System Materials." *My.wpi.edu*. Michael Radzicki PhD, n.d. Web. 28 Apr. 2014. <https://my.wpi.edu/bbcswebdav/pid-276448-dt-content-rid-1386142_1/xid-1386142_1>.
10. "S&P 500: INDEXSP:.INX quotes & news - Google Finance." *S&P 500: INDEXSP:.INX quotes & news - Google Finance*. N.p., n.d. Web. 30 Apr. 2014. <<https://www.google.com/finance?q=INDEXSP:.INX>>.
11. Tharp, Van K. *Trade Your Way to Financial Freedom*. New York: McGraw-Hill, 2007. Print.
12. Wright, Charlie F. *Trading as a Business*. Mequon, WI: Charlie F. Wright, 1998. Print.