Investment, Trading and Risk Management IQP

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Investment Trading And Risk Management:
Scientifically Developing and Analyzing Trading Systems

An Interactive Qualifying Project

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ABSTRACT

The purpose of this IQP project is to scientifically develop profitable systems and indicators for trading the markets. The project consists of nine individually developed strategies, which were quantitatively analyzed for profitability and then combined into a system of systems. Each individual system or indicator was given defined rules and then allocated simulated money to trade. Two types of systems were mainly developed, predictive and confirmative, leading to a system of systems that incorporated a predictive layer and a confirmative layer in the decision to take positions.

ACKNOWLEDGEMENTS

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CHAPTER 1: INTRODUCTION

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Problem Statement

Nowadays trading and investing are a vital component in the personal budget management and controlling one's financial future. One may trade or invest for a variety of reasons; it could be trading as a profession, attempting to supplement income from day job with gains from the market, investing funds while financially planning retirement or simply accumulating a budget for major life events such as going to college. Because of the many uses and the emergence of Internet trading as well as high speed computing, automated trading systems and manual trading strategies have seen a large emergence in the recent decades.[1]

However, most of the new strategies lack systematic approach to the trading. This can be observed especially often when examining the use of manual strategies, where traders usually lack the discipline to follow predefined rules, often bending them and losing profits. In regards to automated strategies, traders usually lack back testing and statistical analysis of profitability of their systems, hurting profits in the long run. The problem of insufficient strategy and market analysis generally leads to the loss of the invested funds or the loss of potential profits, and affects traders regardless of their goals or levels of profession.

In finding a solution to this problem we developed a set of automated strategies and manual indicators that incorporated those components of statistical analysis of strategies, and fundamental and technical analysis of the markets to ensure profitability of a system of trading systems.

Importance, Future Relevance and Points of Distinction

It is well known that the Interactive Qualifying Project is one of the many ways WPI envokes the practice portion of its motto, "theory and practice." This IQP's importance is not only that is an extension of practice within each members individual process of learning theory, but that this practice will become a life long endeavor.

Being able to manage one's own financial future is an invalubale skill that many don't ever learn. Instead people trust their money to banks, where they earn fractions of a percent in

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[1] Michael J. Radzicki. "Topic #1 - Course Overview & Big Picture". Worcester Polytechnic Institute. 2012

interest, or to money managers, where their returns are cut down simply because they lacked the ability to manage money on their own.

Not only this, but many who do attempt to manage their money do so based off of gut feelings or intuition, never incorporating any true analysis or scientific method. They turn managing money into little more than gambling, where as it should be a science.

Even those who use some technical and fudumental analysis in their money management decisions often only know how to invest, and go long. It's not uncommon to hear someone say that the markets are "bad" if they are down at the current. Yet, The markets are never bad, as different types of systems prosper on different types of markets; that persons system has simply fallen out of tune with the current type of market. As well, most people often evaluate systems on one simple measure of quality: profit. However, opportunity, risk and more all play vital roles in a system's overall quality. Regardless of how much money one may make it is hard to risk large sums of money only to make small amounts, and if one only makes one trade a year, it's hard to say they maximized their opportunities to profit.

This projects importance, and major point of distinction is that we scientifically created systems with predefined rules for either trading or investing, that were able function in multiple market types, and be quantitatively analyzed for system quality under multiple means of measure. Further more, these strategies were combined into a robust system of systems, that has proved underlying profitability and consistency through the proof of the individual systems. The smaller systems were created using many different methods, each strategy pertinent to each individuals studies of theory and interests. However this skill of scientifically based money management is something that each group member will be able to carry with them far beyond this one year IQP, to take control of their respective financial futures.

CHAPTER 2: LITERATURE REVIEW

Books

Book: Charlie F. Wright, Trading as a Business, ASIN: B0006ROD1O.
IMPORTANCE: The book is an excellent textbook on how to develop, test, optimize and deploy strategies.

Other Sources

Richard O'Brien
LINK: http://www.fxstreet.com/analysis/indices-insider/2014/11/10/02/
IMPORTANCE: Essentially the article discussed that the USDJPY was due for a major correction, after all the excitement that happened immediately after the announcement of the stimulus by the Japanese Central Bank. Thus I deployed my Triple Moving Average strategy on the USDJPY.

LINK:http://finance.yahoo.com/q;_ylc=X1MDMjE0MjQ3ODk0OARfcgMyBGZyA3VoM19m aW5hbmNlX3dlYgRmcjIDc2EtZ3AEZ3ByaWQDBG5fZ3BzAzkEb3JpZ2luA2ZpbmFuY2UUue WFob28uY29tBHBvcwMxBHBxc3RyAwRxdWVyeQNBQVBMLARzYWMDMQRzYW8DM Q?p=http%3A%2F%2Ffinance.yahoo.com%2Fq%3Fs%3DAAPL%26ql%3D0&type=2button&f r=uh3_finance_web&uhb=uh3_finance_vert&s=AAPL
IMPORTANCE: This basically just showed Apple's low stock price, around $110 per share and indicated a bullish sentiment among analysts.

LINK: http://www.thestreet.com/story/13037135/1/exxon-mobil-xom-stock-rallies-today-along-with-crude-prices.html?puc=yahoo&cm_ven=YAHOO
IMPORTANCE: Oil prices were very volatile at this time, with them dropping as much as 8% some days and then rallying back 5% the next. Thus petroleum companies were more volatile as well.

Jiacong (Sophie) Xu
LINK: http://www.theaustralian.com.au/business/opinion/reasons-behind-australian-dollars-dazzling-drop/story-fnp85nwc-1227114468419?nk=c61b474aad5fbdf1d816d0c181eda755
IMPORTANCE: AUDUSD signaled a bearish continuation due to the strengthening US stock market. The Aussie Dollar fell recently because the iron ore and coal prices were depressed and China shut down some of its steel mills to control the air pollution issue.

LINK: http://www.forexlive.com/blog/2014/11/11/forex-technical-trading-usdjpy-trades-at-new-highs-foryeargoing-back-to-2007/
IMPORTANCE: The USDJPY reached the newest high in multiple years. Bank of Japan policy board members were marking down price projection and at least one member predicts inflation to slip below a 1% annual rate for the fiscal year.

LINK: http://www.dailyfx.com/forex/technical/article/special_report/2011/12/12/When_is_the_Best_Time_of_Day_to_Trade_Forex.html
IMPORTANCE: The best trading time for Asian currency is between 2pm and 6am EST.

LINK: http://www.businessinsider.com/us-market-update-december-8-2014-12
IMPORTANCE: Stocks were falling in accordance with the oil price drop. Oil was also making new lows on Monday morning, falling more than 3% average. Stocks in Europe were also trading lower due to the previous two factors.

LINK: https://www.youtube.com/watch?v=iSlBE3CWg5Q
IMPORTANCE: This link was vital in helping me learn VBA and build my Excel indicator.

Dmytro Bogatov
LINK: http://money.cnn.com/2014/11/27/news/opec-oil-prices/index.html
IMPORTANCE: OPEC's decision to keep oil production level unchanged crashed oil prices, which, in turn, led to most major indexes' reaction.

LINK: http://www.reuters.com/article/2014/12/01/us-markets-stocks-idUSKCN0JF26620141201
IMPORTANCE: Article nicely explains the reasons of AAPL's large drop. Article contains strong market analysis.

LINK: http://www.cnbc.com/id/102263988
IMPORTANCE: Explanation of the effect of oil's drop on major stock exchange indexes.

LINK: http://www.apple.com/pr/library/2015/01/27Apple-Reports-Record-First-Quarter-Results.html
IMPORTANCE: Apple's first quarter financial results were very high which drove its price to the historical height.

LINK: http://www.bls.gov/news.release/empsit.nr0.htm
IMPORTANCE: Employment situation summary is an excellent indicator of US economy.

LINK: http://www.bbc.com/news/world-europe-31436513
IMPORTANCE: Ukraine – Russia ceasefire agreement played an important role in the military conflict. Russia's and the EU's economies depended on the resolution of the conflict. Nevertheless, ceasefire was not kept.

LINK: http://www.economist.com/news/europe/21644592-deal-struck-extend-bail-out-after-greece-caves-now-syriza-must-answer-its
IMPORTANCE: EU agreed to extend the financial aid program for Greece for the additional 4 months, which strengthen EUR against USD.

LINK: http://www.babypips.com/
IMPORTANCE: The web-resource is a good web-based "school" of trading. It contains useful educational materials.

LINK: http://www.r-bloggers.com/artificial-intelligence-in-trading-k-means-clustering/
IMPORTANCE: Lists a well described approached to the K-Means clustering for the stock trading. Additionally, provides code implementation of the K-Means clustering algorithm in R language.
LINK: http://www.breakyourhead.com/2013/03/stock-prediction-artificial-neural.html
IMPORTANCE: Provides a description of Neural Network algorithm implementation for the stock trading in MATLAB.

Lecture Notes

NOTES: "Expectancy - Expectunity - System Quality" spreadsheet file on myWPI (by professor Radzicki)
IMPORTANCE: This document gives an example of analyzing system quality and provides descriptive explanation of what each parameter means.

CHAPTER 3: BACKGROUND INFORMATION

Overview of Trading/ Investments

Assets

Overview

Trading assets are a collection of securities held by a firm that are held for the purpose of reselling for a profit. Trading assets are recorded as a separate account from the investment portfolio. Trading assets may include U.S. Treasury securities, mortgage-backed securities, foreign exchange rate contracts and interest rate contracts. Trading assets include those positions acquired by the firm with the purpose of reselling in the near term in order to profit from short-term price movements.

Trading assets are recorded at the fair value when they are purchased and sold. When banks hold trading assets for other banks, they are recorded as marked-to-market, thereby adjusting to the current market value. Certain banks are required to file reports with the government and the Federal Deposit Insurance Corporation (FDIC) to report this activity.[2] Some types of trading assets are equities (stocks), options and futures.

Equities

An equity is a stock or any other security representing an ownership of an interest. It's a very broad aray of financial assets. It is composed of the three principal asset classes that includes stocks, together with fixed-income (bonds), and cash/cash-equivalents.[3] Equities are one of the most comomonly known and traded items by the general public. Equities are used in asset allocation planning to structure a desired risk and return profile for an investor's portfolio. Equities include a variety of risk, with stocks generally being higher and bonds generally being lower risk. Investors[4] recover money that is invested but not returned in the normal course of the business when they sell their shareholdings to other investors, or when the assets of the firm are liquidated and proceeds distributed among them after satisfying the firm's obligations.

Exchange Traded Funds (ETF's)

An ETF, is a marketable security that tracks an index, a commodity, bonds, or a basket of assets like an index fund. Unlike mutual funds, an ETF trades like a common stock on a stock exchange, and is often traded more frequently. [5] The distinction can further be drawn that mutual funds are traditionally used by investors where an ETF is typically used by traders. An ETF is a

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[2] http://www.investopedia.com/articles/basics/03/103103.asp

[3] http://www.investopedia.com/terms/e/equity.asp

[4] http://www.businessdictionary.com/definition/equity-investment.html

[5] http://www.investopedia.com/terms/e/etf.asp

type of fund which owns the underlying assets (shares of stock, bonds, oil futures, gold bars, foreign currency, etc.) and divides ownership of those assets into shares. ETFs typically have higher daily liquidity and lower fees than mutual fund shares, making them an attractive alternative for individual investors. One very prominently traded ETF by our group was the SPY, and fund which is designed to mimic the S&P as a whole.
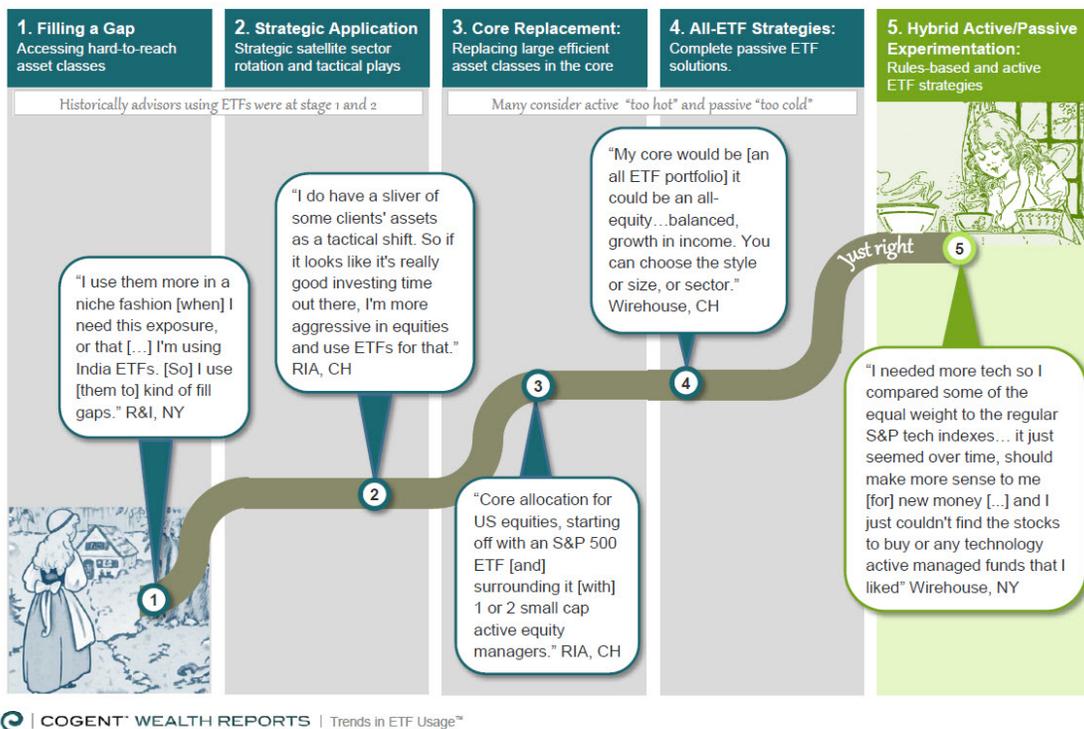
Figure 1: ETF Path[6]

Bonds[7]

A bond is a debt investment in which an investor loans money to an entity (typically corporate or governmental), which borrows the funds for a defined period of time at a variable or fixed interest rate. Bonds are used by companies, municipalities, states and sovereign governments to raise money and finance a variety of projects and activities. Bonds are commonly referred to as fixed-income securities and are one of the three main generic asset classes—along with stocks and cash equivalents.

When companies or other entities need to raise money to finance new projects, maintain ongoing operations, or refinance existing other debts, they may issue bonds directly to investors instead of

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[6] http://www.marketstrategies.com/blog/2014/08/the-future-of-etfs-a-goldilocks-tale/

[7] http://www.investopedia.com/terms/b/bond.asp

obtaining loans from a bank. The issuance price of a bond is usually $100 or $1,000 face value per individual bond. The actual market price of a bond depends on a number of factors including the credit quality of the issuer, the length of time until expiration, and the coupon rate compared to the general interest rate environment at the time. Bonds acrue interest and mature to a certain value over a given period of time.

Currencies[8]

Currency is any generally accepted form of money, including coins and paper notes, which are issued by a government and circulated within an economy. Currency is used as a medium of exchange for goods and services—the basis for trade. Each country has its own currency. Investors often trade currency on the foreign exchange market, which is one of the most heavily traded markets in the world, with volumes in trillions of trades a day.

The majority of trading in forex is concentrated in the world's major financial centers such as New York and London. Success in this market doesn't depend on how big you are—it depends on your dedication to learning the fundamentals, good judgment, hard work and some common sense. Each forex transaction involves two different trades: the purchase of one currency and the sale of another, which is known as a currency pair. Most commonly traded currencies are listed in the table below:

Currency	Market Share
USD	83.7%
EUR	60%
GBP	15.3%
JPY	13.4%
CHF	9.5%
SEK	2.2%
AUD	2.1%
CAD	1.6%

Figure 2: Market Share[9]

Trading currencies is unique in that one needs to consider the health and changes in an entire nations economy, which affected currency value, as opposed to simply one company.

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[8] http://www.investopedia.com/terms/c/currency.asp

[9] http://www.investopedia.com/walkthrough/forex/beginner/level1/currencies.aspx

Futures

Futures are a financial contract obligating the buyer to purchase an asset, such as a physical commodity or a financial instrument, at a predetermined future date and price. Futures contracts detail the quality and quantity of the underlying asset—standardized to facilitate trading on a futures exchange. Futures can be used either to hedge or to speculate on the price movement of the underlying asset. The holder of a losing contract is obligated to fulfil the terms of his or her contract regardless of the price of a commodity at the date the contract is exercised. [10] If one was long in a futures contract, one could go short in the same type of contract to offset his or her position. This serves to exit one's position, much like selling a stock in the equity markets would close a trade. Futures markets have existed in rudementary forms for thoughsands of years

Commodities[11]

The sale and purchase of commodities is usually carried out through futures contracts on exchanges that standardize the quantity and minimum quality of the commodity being traded. Most individual commodities are traded in the form of futures where what is being traded is not the commodity itself but rather a contract to buy or sell it for a certain price by a stated date in the future. Commodities are considered raw materials, and other non-manufactured product. An example of a commodity would be copper.

Like any investment, the goal in commodities [12] trading is to buy low and sell high. The difference with commodities is that they are highly leveraged and trade in contract sizes instead of shares. Investors can buy and sell positions whenever the markets are open.

Exchanges

Overview of Exchanges

An exchange is a highly organized market where (especially) tradable securities, commodities, foreign exchange, futures, and options contracts are sold and bought.[13] During the course of this IQP, the group concentrated mainly on stock (NYSE and NASDAQ) and foreign (FX or Forex) exchange markets.

The Dow Jones Industrial Average (DJIA), the New York Stock Exchange (NYSE) and the NASDAQ are the three biggest exchanges in the U.S. The DJIA is supposed to be an exchange that represents the U.S economy by having the 30 largest, most representative group of companies traded on it. To give an idea of what size they are looking for, Apple recently added to the DJIA. The NYSE and NASDAQ are the two major stock exchange market that we focused on, and so it is important to note that they differ in many characteristics.

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[10] http://www.investopedia.com/terms/f/futures.asp

[11] http://www.investopedia.com/terms/c/commodity.asp

[12] http://www.investopedia.com/university/commodities/

[13] https://en.wikipedia.org/wiki/Exchange_(organized_market)

Location: On the NYSE, all trades occur in a physical place, on the trading floor in New York City. The NASDAQ, on the other hand, is located not on a physical trading floor but on a telecommunications network. Though, as electronic trading becomes more prevalent, computers have begun handling all the trades at the NYSE as well.

Dealer Vs. Auction Market: The NASDAQ is a dealer's market, wherein market participants are not buying from and selling to one another directly but through a dealer, who, in the case of the NASDAQ, is a market maker. The NYSE is an auction market, wherein individuals are typically buying and selling between one another and there is an auction occurring; that is, the highest bidding price will be matched with the lowest asking price. In both cases the exchanges do collect fees though.

Traffic control: The traffic controllers of both exchanges deal with specific traffic problems and, in turn, make it possible for their markets to work. On the NASDAQ, the traffic controller is known as the market maker, who, as we already mentioned, transacts with buyers and sellers to keep the flow of trading going. On the NYSE, the exchange traffic controller is known as the specialist, who is in charge of matching up buyers and sellers. Both the market maker and specialist functions are mainly computer driven now.

Perception and cost: The NASDAQ is typically known as a high-tech market, attracting many of the firms dealing with the Internet or electronics. On the other hand, the companies on NYSE are perceived to be better-established companies and flock to the exchange for its historic reputation. Due to this reputation the entry fee a company can expect to pay on the NYSE is up to $250,000 while on the NASDAQ, it is only $50,000 to $75,000. Yearly listing fees are also a big factor: on the NYSE, they based on the number of shares of a listed security, and are capped at $500,000, while the NASDAQ fees come in at around $27,500.[14] Overall the NASDAQ is a far cheaper exchange to be listed on, though not as well renowned.

There is also the Foreign Exchange market. Foreign Exchange is the exchange of one currency for another, or the conversion of one currency into another currency. Foreign exchange also refers to the global market where currencies are traded virtually around-the-clock. The term foreign exchange is usually abbreviated as "Forex" and occasionally as "FX."

Foreign exchange transactions encompass everything from the conversion of currencies by a traveler at an airport kiosk to billion-dollar payments made by corporate giants and governments for goods and services purchased overseas. Increasing globalization has led to a massive increase in the number of foreign exchange transactions in recent decades. The global foreign exchange market is by far the largest financial market, with average daily volumes in the trillions of dollars.[15]

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[14] http://www.investopedia.com/articles/basics/03/103103.asp

[15] http://www.investopedia.com/terms/f/foreign-exchange.asp

Difference Between Foreign Exchanges and Exchanges

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Foreign exchange transactions encompass everything from the conversion of currencies by a traveler at an airport kiosk to billion-dollar payments made by corporate giants and governments for goods and services purchased overseas. Increasing globalization has led to a massive increase in the number of foreign exchange transactions in recent decades. The global foreign exchange market is by far the largest financial market, with average daily volumes in the trillions of dollars.[16]

Other Exchanges such as the NYSE, the NASDQ, and the DJIA have equities, commodities and other assets, aside from currencies traded on them. However there is also a distinction with hours and commissions. The FX market is open twenty-four hours a day from Sunday evening to Friday evening. There are many different centers or the Foreign Exchange markets such as the London market, the Japanese market, and the American market, all taking place at different times of day, sometimes overlapping. Other exchanges are only open 9:30 AM to 4:30 PM Monday through Friday.

For commissions, in the Foreign Exchange Market, there are none, since nothing is being bought; simply one currency is being exchanged for another. A network of banks, not centralized exchanges, operate the FX market, so there is also not necessarily a NYSE of the FX world that can charge a customer for a commission.

Trading Versus Investing

Overiew

Investing and trading are two very different methodologies of attempting to accomplish the same goal of profit in the financial markets. The goal of investing is to gradually build wealth over an extended period of time through the buying and holding of a portfolio of stocks, baskets of stocks, mutual funds, bonds and other investment instruments. Investors often enhance their profits through compounding, or reinvesting any profits and dividends into additional shares of stock. Investments are often held for a period of years, or even decades, taking advantage of perks like interest, dividends and stock splits along the way. While markets inevitably fluctuate, investors will "ride out" the downtrends with the expectation that prices will rebound and any losses will eventually be recovered. Investors are typically more concerned with market fundamentals, such as price/earnings ratios and management forecasts.

Trading, on the other hand, involves more frequent buying and selling of stock, commodities, currency pairs or other instruments, with the goal of generating returns that outperform buy-and-

[16] http://www.investopedia.com/terms/f/foreign-exchange.asp

hold investing. An easy way to look at the difference is that while investors may be content with a 10 to 15% annual return, traders might seek a 10% return each month. Trading profits are generated through buying at a lower price and selling at a higher price within a relatively short period of time. The reverse is also true: trading profits are made by selling at a higher price and buying to cover at a lower price (known as "selling short") to profit in falling markets. Where buy-and-hold investors wait out less profitable positions, traders must make profits (or take losses) within a specified period of time, and often use a protective stop loss order to automatically close out losing positions at a predetermined price level. Traders often employ technical analysis tools, such as moving averages and stochastic oscillators, to find high-probability trading setups.[17]

Cost

There is important distinction to be made between the costs of investing and trading. The only cost investors incur, is typically the commission at the first time of purchase, or when reinvesting other earnings by buying more of an asset. This an infrequent cost, as they don't buy often. Losses are also typically more infrequent; as investors are willing hold an asset for years, waiting on a gain, even if an assets price continuously depreciates.

Costs incurred with trading are both more frequent and generally higher in magnitude. Two main costs of trading are commission and margin costs. Commission is far more frequently a drawdown on profits with traders than investors, seeing as they make far more trades. The higher frequency the trading and the smaller the position size, the more of an issue commission becomes. Margin costs also reduce the profitability of trading, if a trader does decide to go on margin. Margin costs can range largely from platform to platform, though traders often see the potential reward as far outweighing the risk and costs of margin. As well, losses are more frequent with traders, due to the fact that they generally operate under a specific amount of rules on specific time frames. This means that if a position goes against them, it is more common to see a trader simply accept the loss and close the position. Traders often have more tax implications as well, but details of this are too great in magnitude for this report. It is important to note, that while traders have higher cost, they also typically have higher profits, as they have far more opportunity to make them.

Successful Trader vs. Successful investor

A very famous example of a successful investor in Warren Buffet, AKA "The Oracle." Warren Buffet is one of the wealthiest people in the world, and owns the holding company Berkshire Hathaway. Buffet is a value investor, meaning he searches for companies he feels are undervalued, then buys massive quantities of shares, and waits for the rest of the market to catch up to the idea that they were undervalued.

A famous trader would be the former hedge fund manager Steve Cohen. For perspective on how much profit the most successful trader in the world can personally make, he made $1.3 billion in

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[17] http://www.investopedia.com/ask/answers/12/difference-investing-trading.asp

2014. [18] Cohen ran SAC Capital Advisors, a very successful hedge fund, and though his trading secrets are proprietary, it is well known that he is a trader, not an investor.

Means of Trading

How the Internet has Changed Trading

The Internet has been one of the most revolutionary and disruptive technologies in history. It has had a profound impact on the way that consumers listen to music, watch movies, buy and sell products, and communicate. It has also had a hugely beneficial impact on investing, especially for retail investors. [19]

Wharton Business School conducted academic research back in 2000 defining three key factors of the Internet's benefits on investing.

- The first was transparency, or the ability for a much wider base of investors to analyze information and come to their own conclusions on how to properly price securities.

- It also defined differential pricing, which speaks to the demise of full-service brokers that charged high prices until the Internet significantly lowered the costs that the industry could charge to make financial transactions.

- Finally, it spoke of disintermediation, which again referred to the ability for investors to bypass old school full service brokers and advisors for both information and the trading of securities. [20]

Overview of TradeStation

TradeStation is a sophisticated brokerage platform that was used during the course of this interim qualifying project. The software product includes an expansive number of advanced features that our team used during the course of our yearlong research. Since the platform has so much functionality, only some of the most prominent features will be discussed.

The platform allows one to have a simulated account. That is, one can trade virtual money practicing trading skills and developing strategies with live data feeds from exchanges. One is able to trade equities, options, futures and currencies within the software. The interface is also unified, so by simply entering a symbol, TradeStation returns a currency, option, future or equity all on the same interface.

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[18] http://www.forbes.com/sites/nathanvardi/2015/02/25/the-25-highest-earning-hedge-fund-managers-and-traders/

[19] http://www.investopedia.com/financial-edge/0212/how-the-internet-has-changed-investing.aspx

[20] http://www.investopedia.com/financial-edge/0212/how-the-internet-has-changed-investing.aspx

TradeStation's programming environment is known as EasyLanguage. One of the best functionalities of the program is that a trader can write strategy or indicator code, and then immediately apply it to the strategy to an assets chart. This not only gives a small preview of historic trades, but also allows immediate implementation.

The software also includes some advanced features such as general and walk-forward optimization, historical testing, position management tools and profitability reporting.

Trading Systems

Classifications

Trend Following
A trend following trading system is a buy and hold strategy that typically typically stays in positions longer than others, such as support and resistance. Traders using this type of strategy wait for an indication of a trend beginning before they enter the market, whether it be through indications by moving averages, the ADX, or other means. Once the trend the trader has entered a position on shows signs of deterioration, they exit the market. These types of systems seek to capture the majority of a market trend, up or down, for profit even if that means experiencing uncomfortable market volatility. These strategies always involves a plan since it requires a strong self-discipline to follow the systems precise rules. Risk management measures are also involved in that trend following traders use an initial risk rule that determines the position size at the time of entry. This means they know exactly how much to buy or sell based on how much money they have. Historically, a trend trader's average profit per trade is significantly higher than the average loss per trade, though their number of winning trades is lower than their number or losing trades. They are trying to hit homeruns, not every ball that is thrown at them.

Support Vs. Resistance
Support and resistance are two of the most highly discussed aspects of any technical analysis and they are often regarded as complex concepts.

Support[21]
The support level is a price, or prices in the case it is a sloped line, at which a stock garners support from investors, meaning once hit, it tends to reverse its downtrend. If the price of a stock falls towards a support level, it is a test for the stock: the support will either be reconfirmed or wiped out. It will be reconfirmed if a lot of buyers move into the stock, causing it to rise and move away from the support level. It will be wiped out if buyers will not enter the stock and the stock falls below the support. Below is an image of a support trend line.

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[21] http://www.investopedia.com/terms/s/support.asp

Figure 3: Support[22]

Resistance[23]

Resistance, often known as the resistance level, is a chart point or range that caps an increase in the level of a stock or index over a period of time. An area of resistance (level) indicates that the stock or index is finding it difficult to break through it, and may head lower in the near future. The more times that the stock or index has tried unsuccessfully to break through the resistance level, the more formidable that area of resistance becomes. For example, if a stock is approaching a very strong resistance level, a trader may prefer to close the position rather than take the risk or a significant decline if the stock uptrend reverses. The image below shows both support and resistance, but pay particular attention to the resistance lines near the top or the chart.

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[22] http://wiki.timetotrade.eu/images/d/d6/Support_Trend_Line.png

[23] http://www.investopedia.com/terms/r/resistance.asp

Figure 4: Resistance[24]

Support and Resistance Strategies

Support and Resistance strategies attempt to profit off an asset that has a price whic oscillates between predicable support and resistance lines. These strategies typically buy at predicted support levels and sell at predicted resistance levels. They require strict sets or rules to avoid becoming greedy and not selling at predicted resistance levels, or waiting too long to try to buy below support levels. A common example of this are Bollinger Band strategies and how they try to buy when it hits the lowest band and sell at the highest band. Here it is assumed that a certain number or standard deviations away from an average price causes natural support and resistance.

Gap Trading[25]

Gap trading is a simple and disciplined approach to buying and selling stocks. Essentially one finds stocks that have a price gap in one direction or another different from the previous close and then watches the first hour of trading to identify the trading range. The trading range is simply the spread between the high and low prices of that time. Rising above that range signals a buy since it indicates the beginning of a run up, and falling below it signals a short for the exact opposite reason. These runs are likely because the time immediately following a gap is a period when the asset becomes more volatile than usual. Gaps are risky due to low liquidity and high

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[24] http://www.onlinetradingconcepts.com/TechAnalPics/SupportResistanceSMH.gif

[25] http://stockcharts.com/school/doku.php?id=chart_school:trading_strategies:gap_trading_strategies

volatility, but sometimes with proper trading techniques, they offer opportunities for quick profits. In order to secure these profits, traders often use trailing stops on these strategies, so the stop will move with the run and secure profits once it stops or reverses. A trailing stop is simply an exit threshold that follows the rising price or falling price in the case of short positions. It is defined to limit loss and protect profits.

- Gap:A gap is a change in price levels between the close and open of two consecutive days. Basic types of gaps:
  o Full Gap Up—when the opening price is greater than yesterday's high price.
  o Full Gap Down—when the opening price is less than yesterday's low price.
  o Partial Gap Up—when today's opening price is higher than yesterday's close, but not higher than yesterday's high.
  o Partial Gap Down—when today's opening price is higher than yesterday's close, but not below yesterday's low.
  o End-of-day—traders can review those stocks with the best potential. Increases in volume for stocks gapping up or down is a strong indication of continued movement in the same direction of the gap. A gapping stock that crosses above resistance levels provides reliable entry signals and a short position would be signalled by a sock whose gap down fails support levels.

Playing Volatility

Volatility[26]

Volatility is a statistical measure of the dispersion of returns for a given security or market index. It can either be measured by using the standard deviation or variance between returns from that same security or market index. The higher the volatility, the riskier the security. It refers to the amount of uncertainty or risk about the size of changes in a security's value.

Strategies

Support and Resistance strategies tend to do well in volatile markets as they benefit from constant swings in price. Gap trading strategies thrive in volatile markets because they need volatility in order for the runs that they profit off of to occur. However in trend following systems volatility is the enemy. These systems want to follow smooth and long term increases or decreases in price.

Entries

Entry Point[27]

An entry point is the price at which an investor buys an investment. It's usually a component of a predetermined trading strategy for minimizing investment risk and removing the emotion from trading decisions, which is the first step in achieving a successful trade. As mentioned, predetermined rules and conditions known as set ups and triggers determine the entry point of a

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[26] http://realmoney.thestreet.com/articles/10/13/2014/playing-volatility-xiv

[27] http://www.investopedia.com/terms/e/entry-point.asp

strategy. However, an investor or trader must first identify an attractive asset before determining conditions for entry points.

Setups[28]

A price level predetermined as the point of entry into a specific security, stock, or currency. Once the setup price is broken the trader will enter the position determined by the setup. This could include shorting a stock because they think the price will drop or going long because they expect an upward movement.

Triggers[29]

A trade trigger is usually a market condition, such as a rise or fall in the price of an index or security. Trade triggers are used to automate certain types of trades, such as selling shares of a stock when the price reaches a certain level. Day traders often use trade triggers in order to avoid having to constantly monitor market conditions. Trade triggers are automatic, thus freeing the trader to focus on other tasks. When the trigger occurs the strategy enters into the position that was predetermined.

Exits

Exit Point

An exit point is the price at which an investor sells an investment. Strategies have a predetermined set of conditions that dictate when the strategy should exit a position.[30] These conditions vary widely from system to system. An exit point is usually decided to mitigate investment risk and take the emotion out of the trade decisions, as it can be difficult to decide to stop taking profits or losses in the moment and close a position. Determing and exit point is a key component to a successful system. One final note is that exit points can simply serve the function of getting the trader out of a position, or can function as a signal to reverse position in stop and reverse strategies. Such is commmon in strategies involving moving averages. It is important to note that an investor or trader must first identify an attractive asset and enter into a position on said asset before determining any exit points.

Positions

Description

A position is the amount of an asset either owned or borrowed by an individual or a dealer. It's a trade that someone currently holds open and it can be either a long position or a short position. A long position is when a trader buys a certain amount of an asset. The amount he or she owns after the purchase would be the size of his or her position. The investor would win when price increases and lose when the price decreases. A short position is when a trader sells a borrowed asset with the expectation the asset will fall in value. When he or she is short, he oir she wins

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[28] http://www.investopedia.com/terms/s/setup_price.asp

[29] http://www.investopedia.com/terms/t/trade-trigger.asp

[30] http://www.investopedia.com/terms/e/exit-point.asp

when price decreases and loses when the price increases. There is also a net position which is the difference between total open long and open short positions in a given asset held by an individual or more likely a firm.

Position Sizing

Position sizing is very important to any trading system that is developed and is key in managing risk as well as managing expectations of returns. The old saying is true when dealing with position sizing, "Now risk, no reward." If a position size is too small, it will fail to garner a significant amount of either profits or losses even if the position moves significantly.

It's important to keep in mind that position sizing is relative. What may be a large position for and individual investor would be microscopic for a hedge fund manager. Thus it is important to understand not what dollar amount one wishes to invest when considering position size, but percent of portfolio.

Position sizes can be further extended by the use of margin. When someone goes "on margin," they borrow money to increase their position size in a respective asset. This generally incurs a fee, and though it is also more risky, due to the larger position size, it can garner more reward.

Cost Benefit Analysis[31]

Cost benefit analysis (CBA) is a process by which business decisions are analyzed. The benefits of a given situation or business-related action are summed and then the costs associated with taking that action are subtracted. Most analysts will factor opportunity cost into equations. Opportunity cost is the potential benefits of everything one could have been doing, instead of engaging in whatever endeavor they are preforming the analysis on. These supposed benefits are also subtracted from the overal benefit of the decision. Managers conduct a cost-benefit analysis as a means of evaluation all of the potential costs and revenues that may be generated if the project is completed. The outcome of the analysis will determine whether the project is financially feasible, or if another project should be pursued.

Cost-Benefit Analysis has two purposes[32]:
- To determine if it is a sound investment;
- To provide a basis for comparing projects, which involves comparing the total expected cost of each option against the total expected benefits, to see whether the benefits outweigh the costs, and by how much.

Traders need to look for total number of trades, system quality, total profit, total cost, and profitability in order to perform CBA.

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[31] http://www.investopedia.com/terms/c/cost-benefitanalysis.asp

[32] http://en.wikipedia.org/wiki/Cost%E2%80%93benefit_analysis

Evaluating System Quality

Expectancy[33]

Expectance helps a trader understand how winners, losers, gains and losses relate to each other over the long term. It basically tells you the profit or loss of a system per the dollar risked. These quotients and percentages helps people understand what trading system profits should be, helps compare certain system's profitability to other system's and helps validate back testing. Deeterming expectancy of a system has three steps:

1. Calculate win and loss ratio:

$$Win\ Ratio = \frac{Total\ Winners}{Total\ Trades};$$

$$Loss\ Ratio = 1 - \frac{Total\ Winners}{Total\ Trades};$$

2. Calculate reward and risk ratio:

$$Reward\ to\ Risk\ Ratio = \frac{Winner\ size}{Loser\ size};$$

3. Combine two ratios into an expectancy ratio:

$$Expectancy\ Ratio = Reward\ to\ Risk\ Ratio * Win\ Ratio - Loss\ Ratio.$$

Expectunity[34]

The expectancy coupled with the opportunity is what would make the equity curve rise and fall. expectunity attempts to explain how a well system not only profits off of every dollar risked, but also takes advantage of opportunities. In the expectunity, more trades correlate to more opportunity, because each trades yields yet another opportunity for profit, or loss. For instance, a trading system that has an expectancy of 0.6R and produces 100 trades per year will have an expectunity of 60R. Notice the word expectunity is a combination of both expetency and opportunity and is thus a term to express expectancy multiplied by opportunity (number of trades).

$$Expectunity = Expectancy\ Ratio * Opportunity$$

Monte-Carlo Evaluation[35]

The basic idea of this method of statistical testing is running the same simulation a number of times, each time with small random changes. The higher the number of repetitions, the bigger the statistical significance of the results. In an automated trading scenario, the trader is presented

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[33] http://www.learningmarkets.com/determining-expectancy-in-your-trading/

[34] http://www.fxstreet.com/education/glossary/expectunity

[35] http://www.evidencebasedta.com/montedoc12.15.06.pdf

with a large number of trading opportunities. Each time an opportunity presents itself, the trader may choose to take a long position, take a short position, or remain neutral. Each opportunity is associated with a raw return—market change, which may be positive or negative. The Monte-Carlo simulation tests the quality of the model that chooses to be long, short, or neutral when the trading opportunity arises. It is an excellent way to test the null hypothesis that a trading system's matching of positions to raw returns is random as opposed to intelligent.

- Opportunity:
  It is an arbitrary designation, and any decision about opening a position is based on information that is obtained when the trading opportunity presents itself.
- When we are unable to use Monte-Carlo:
  We may not have the requisite information, or the trading system may have been designed in a way that is incompatible with Monte-Carlo randomization tests. In order to perform a Monte-Carlo test, we need a lot of information, at a minimum, we need the raw market return and the position for each trade. In addition, if a person is never out of the market, ideally we should have the complete set of raw potential profits and losses for every trading opportunity that person had, whether that opportunity was taken or not. Automated strategies can often have Monte Carlo simulations run on them, however manually traded and selective strategies often do not have enough data.

Example:

Below are two graphs and a table. The first graph is on hundred different lines which all represent different increases in equity of one hundred different iterations of the same system. As previously discussed, each iteration has a minor change. The second graph is the average increase in equity from utilizing a monte carlo simulation of the one hundred iterations.

100 different simulations of the same system (change the order of trades):
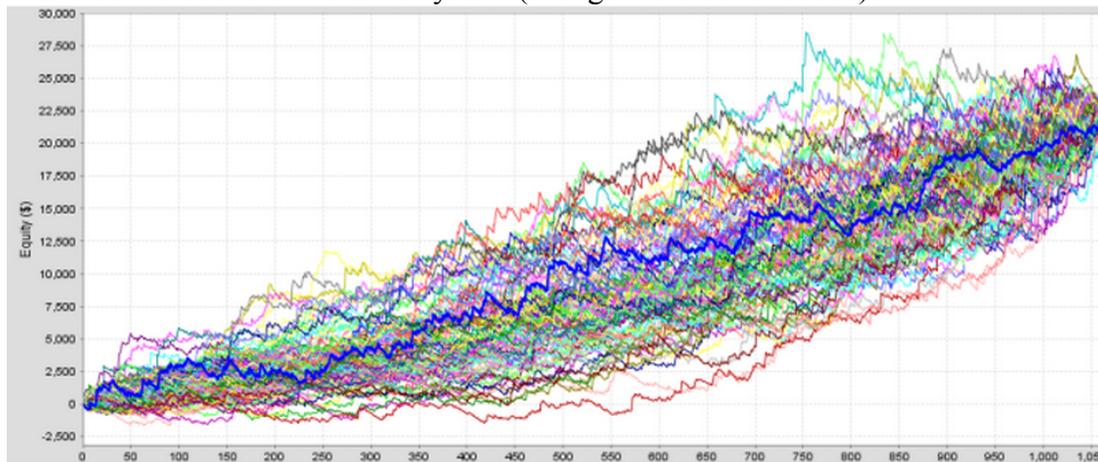
Figure 5:Monte Carlo[36]

Average equity curve

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[36] http://www.strategyquant.com/eaanalyzer/monte-carlo-analysis
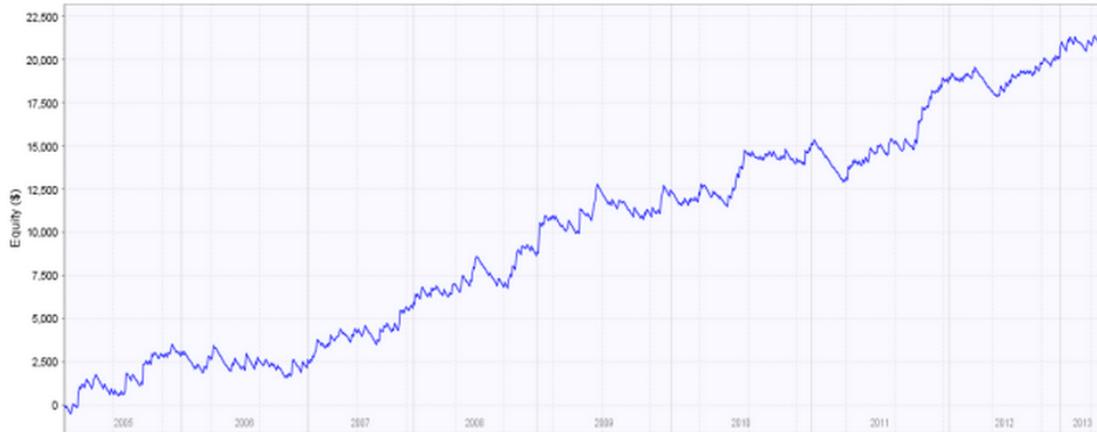
Figure 6: Average Equity[37]

Performance Statistics:

Conf	Net Profit	Max DD %	Ret/DD	R Exp	AR %
Original	$ 22018.71	16.49 %	original 0.23 R		14.88 %
50 %	$ 22018.7	14.4 %	5.91	0.22 R	14.88 %
60 %	$ 22018.7	15.75 %	5.49	0.21 R	14.88 %
70 %	$ 22018.69	16.52 %	4.98	0.21 R	14.88 %
80 %	$ 22018.69	18.36 %	4.4	0.2 R	14.88 %
90 %	$ 22018.68	21.22 %	3.87	0.18 R	14.88 %
91 %	$ 22018.68	22.76 %	3.53	0.18 R	14.88 %
92 %	$ 22018.68	23.07 %	3.41	0.18 R	14.88 %
93 %	$ 22018.68	23.12 %	3.26	0.18 R	14.88 %
94 %	$ 22018.68	23.24 %	3.24	0.18 R	14.88 %
95 %	$ 22018.68	23.59 %	3.16	0.18 R	14.88 %
96 %	$ 22018.68	23.6 %	2.94	0.17 R	14.88 %
97 %	$ 22018.67	23.99 %	2.68	0.17 R	14.88 %
98 %	$ 22018.66	24.28 %	2.64	0.17 R	14.88 %
99 %	$ 22018.66	25.01 %	2.42	0.17 R	14.88 %
100 %	$ 22018.65	25.75 %	worst case R		14.88 %

Figure 7: Results[38]

Monte Carlo results can be interpreted by worst case and best case scenarios. The system as it stands originally had drawdown around 16%. The best case scenario of the on hundred iterations is a draw down of roughly 14%. The worst case has drawdown 26%, almost double the original, though we are 100% certain, from the evidence of the one hundred iterations, that the draw down should not exceed this amount. This gives an idea of how robust the system behaves in the market. Though the iteration that played out for the trader had a max drawdown of 16%, they shouldn't be surprised to see drawdowns in the mid 20%'s. Monte-Carlo analysis can test

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[37] http://www.strategyquant.com/eaanalyzer/monte-carlo-analysis

[38] http://www.strategyquant.com/eaanalyzer/monte-carlo-analysis

properties such as changing trades orders, changing position size, skipping trades, as well and see how they affect the robustness of the system.

CHAPTER 4: RESULTS AND ANALYSIS

Diversification

Diversification is an important aspect to any well balanced portfolio. The main purpose of diversification is to reduce risk. If a trader is not diversified, moves in one sector of the market or even one company, can have a massive affect on the traders portfolio. Some trader choose not to diversify, and instead specialize in certain companies or market sectors. This can lead to lead to large returns, though at greater risk.

In regards to strategies, diversification is vastly important when creating a system of systems. If all the systems function off the same indicators, there are no checks and balances within integration of them. As well, a system of systems needs to be able to handle when the market changes, for example it goes from trending to volatile.

Our systems are very diverse and fit into two broad categories. The first category is a predictive layer of systems. This is composed of most of the indicators that will be discussed. These systems use different methods, such as comparison to the fifty-two week high and low, cluster sampling, and neural networks to attempt to predict where the stock will go, up or down, and even in some cases to what price. All of these systems use very different means for making their predictions, such as how the Neural Network uses the closing prices on a training set of data, but the Excel Analysis System uses the comparison of the fifty-two weeks high and low to the current price. This ensures that the systems prediction layer, will be getting indications from multiple sources not all the same one.

The second layer is the confirmation layer of systems. These are automated systems that would actually do the trading, if their buy or sell signals confirm that of the prediction layers systems. These strategies include a Bollinger Band strategy, to a Triple Moving Average strategy one utilizing the stochastic, one utilizing multiple time frames, and more. These systems also do not all gaine their indications from the same sources, and so there is assurance of diversity within them as well.

This diversity should ensure that our system of systems can constantly adapt to a changing market and that there is a strong level of depth within the analysis being preformed as it comes from many sources.

Time and Fiscal Limitations

Time Limitations

Importance of Availability
Time and fiscal limitations go a long way in shaping how one trades, or even if one trades and invests. For instance, if one only has time to look at the markets and preform analysis a few times a year, investing may be the best option for them due to its low maintenance nature.

Time limitations are the most drastic of the two limitations in shaping ones trading or investing strategy. This is partially, but not fully overcome with the use of automated strategies. As long as someone has the time to identify indicators they would like to act on every time they occur, and the ability to code a system, an automated trading strategy will be able to operate without human intervention and follow the strict guidelines that have been set. Though, automated strategies often neglect fundumental analysis, such as what's happening in the news, how the latest earnings report was, and so other important pieces of information of this nature. Thus they aren't truly as functional or profitable as if one was able to sit in front of a computer all day and trade by a defined set of rules, while still observing the softer details that affect trading.

Experience With Limitation
Time limitations as a student particularly affected this project. Though, it would have been ideal to be able to create systems numbering in the double digits, it simply wasn't feasible with everything else going on as a student. As well, most of the market day, students are generally in classes or in meetings, mimicing the situation of someone with a day job. This means that although automated trading systems still took and exited positions while people were in classes, large moves for non analytical factors were less likely to get caught, and analysis had to be limited to before and after the market day as opposed to constant analysis for changes throughout. Though the group still proved it is possible and profitable to scientifically trade on under this time restriction, there is no doubt of its affect on trading.

Fiscal Limitations

Position Sizing
Fiscal limitations also have a large effect on traders and investors alike. One of the two major ways fiscal limitations affect a trader is through position size. If one has less money to take positions with, they must take smaller positions, and thus any movement within the market results in less profits. Fiscal limitations can have a large affect on profits, which is why hedge funds and other money managers try to accrue so much funds, that way they maximize profits even if their percent return isn't very significant.

However, the issue of position sizing with fiscal limitations can be overcome at a risk by going on margin. Some markets, such as Forex, allow a margin of up to 50:1. This means one could take a position fifty times larger than the size of their account, however it probably isn't the wisest decision due to the level of risk one takes.

Level of risk

Fiscal limitations also have a large affect on the level or risk one is able to take, and that one is taking. For instance, a young professional in his or her mid-thirties with a steady income, lots of earning potential and a long life ahead of him or her is able to take more risk than an old retired man or woman living on a pension. As well, a $10,000 trade to a young professional in his or her mid-thirties is less risky than the seam for a debt ridden college student, with no job. Fiscal limitations can make what might be a normal trade for one person, a very risky one for another.

Richard O'Brien's Trading Systems

Triple Moving Average System

Description

My Triple Moving Average System evolved from a standard double moving average system that is very commonly taught. The idea of the double moving average system is that there are two moving averages and one is an average of fewer bars than the other, so it reacts to changes in current recent price quicker. The one that is an average of fewer bars is typically referred to as the "faster" average. The averages are typically taken of the closing price of each bar. When the faster average crosses over the slower average the strategy enter into a long position, since recent momentum is shifting upwards, and if the faster average crosses below the slower average, the strategy enters into a short position since recent momentum is shifting downwards. These are typically stop and reverse systems, meaning that their exits are when it is time to reverse the position.

By adding in another moving average, my system actually gains a vast amount of complexity. My strategy is composed of a Simple moving average (SMA), which simply takes the average of the past specified number of bars, an Exponential moving average (EMA), which takes the average of the past number of bars but puts more weight on the most recent 3, and a Hull moving average (HMA), which puts almost all the weight on the past three bars, but factors the other number of bars into the average calculation slightly. The HMA is given the least amount of bars to average making it the fastest, the EMA is given the second least amount of bars to average making it the second fastest, and the SMA is given the most making it the slowest.

The HMA essentially acts a way to filter out the noise of each bar in the strategy. When looking at a chart one would notice it is almost the average price of every bar, though it is smoother where there are sudden jumps in the price. The strategy uses the HMA as a basis for the other two moving averages to have to cross over or under. The HMA is the purple line on the 10 min USDJPY chart below.

Figure 8: HMA Line

The EMA is designed to catch trends more quickly than a traditional moving average system. The EMA also reacts to the stocks rather quickly, though not as fast as the HMA. An issue I noticed when I was using a double moving average strategy is that it caught trends after they had already run far enough to lose out on significant profits. Thus in my strategy, the when the EMA crosses over the HMA the strategy enters into 80% of whatever size position I am taking long, and if the EMA crosses under the HMA it enters 80% of whatever position size I am using short.

The EMA is the red line in the chart below.

Figure 9: EMA Line

The EMA's fast reactions to the price add risk. The SMA has the job of mitigating this risk by tranching into the position. The remaining 20% of positions is entered when the SMA crosses the HMA in the same manner the EMA did. This acts as a confirmation to the initial hunch of the EMA, and ensures if the EMA was wrong, it doesn't lose as much money. Though this 20% does take longer to enter into the position than the original 80%, some profits are sacrificed in the name of risk management.

The SMA is the blue line in the chart below.

Figure 10: SMA Line

The whole strategy has custom made calculations that keep track of each average and the overall position. Since this strategy doesn't do well when the asset it is traded on doesn't trend, it has a feature built in that if it loses on three trades in a row, it shuts off for three potential trades and then automatically resumes. This way it waits out the sideways motion. Additionally, this strategy is used only on forty-five minute bars or higher to eliminate getting caught in the noise of the market and actually catch trends.

EMA = Exponential Moving Average
Hull = Hull Moving Average
SMA = Simple Moving Average

Can_trade >= 3:
Strategy can make trades

Out Of The Market
First_Hull = 0
First_EMA = 0

If First_EMA = 0:
EMA > or < SMA

If First_Hull = 0:
Hull > or < SMA

> | < | > | <

Buy Tranche_Amount Shares Next Bar At Market

Sell Short Tranche_Amount Shares Next Bar At

Buy Order_Amount Shares Next Bar At Market

Sell Short Order_Amount Shares Next Bar At Market

EMA_position = Tranche_Amount

EMA_position = - Tranche_Amount

Hull_position = Order_Amount

Hull_position = - Order_Amount

First_EMA = 1 | First_EMA = 1 | First_Hull = 1 | First_Hull = 1

In The Market Hierarchy
First_Hull = 1
First_EMA = 1

Figure 11: Triple Moving Average Flowchart #1

EMA = Exponential Moving Average
Hull = Hull Moving Average
SMA = Simple Moving Average

Can_trade >= 3

Out Of Market Hierarchy

In The Market
First_Hull = 1
First_EMA = 1

If First_EMA = 1:
EMA Crosses SMA

If First_Hull = 1:
EMA Crosses SMA

Cross Over

Cross under

Cross Over

Cross under

Reverse To Long
Tranche_Amount Next
Bar At Market

Sell Short
Tranche_Amount
Shares Next Bar At

Reverse to Long
Order_Amount Next
Bar At Market

Sell Short
Order_Amount Shares
Next Bar At Market

EMA_position =
Tranche_Amount

EMA_position =
- Tranche_Amount

Hull_position =
Order_Amount

Hull_position =
- Order_Amount

3 Losing trades:
Can_trade = 0
Exit All Positions

Profit

Out Of the Market:
First_EMA = 0
First_Hull = 0

Any moving averages
cross: Can_trade + 1

Figure 12: Triple Moving Average Flowchart #2

Going long
- Setup is a change into an upward trend indicated by the EMA or SMA changing direction.
- Entry into 80% of position if out of the market is the value of the EMA > HMA
- Entry into the remaining 20% of position if out of the market is the value of the SMA > HMA
- Entry if in the market is the cross of the EMA over the HMA and then the cross of the SMA over the HMA.

Going short
- Setup is a change into a downward trend indicated by the EMA or SMA changing direction.
- Entry into 80% of position if out of the market is the value of the EMA < HMA
- Entry into the remaining 20% of position if out of the market is the value of the SMA < HMA
- Entry is the cross of the EMA under the HMA and then the cross of the SMA under the HMA

Exit
- Strategy signals a reversal. If long and EMA or SMA cross under HMA, their respective positions are reversed. If short and EMA or SMA cross over HMA, their respective positions are reversed.
- If three trades in a row lose money, all positions are cleared.

Applications
This strategy preforms well on any currency that lacks major spikes and has a strong history of trending either up or down. For the entirety of the year this strategy was deployed almost exclusively and works well on the U.S. Dollar, Japanese Yen (USDJPY) foreign exchange market. It has been briefly deployed on some equities such as Apple, though equities tend to have periods of stabilization that would cause sideways movement mid week and would hurt profits too greatly.

Optimization
The optimizer tended to return numbers that were under what I felt was appropriate to maintain the essence of the strategy. The optimizer would often attempt to get the HMA and EMA as close as possible, essentially turning the strategy into a double moving average. Thus I took the idea of having the EMA and SMA far closer than the SMA, but generally did not use the "optimized" parameters.

The HMA was generally kept around an average of five bars, though I would change to either six or four depending on if the optimization numbers were especially low one time I ran it or especially high.

The EMA was generally fixed at an average of nine bars. Though again, it was allowed to fluctuate to eight or ten depending on the most recent optimization report.

The SMA remained a seventeen bar average for the entirety of the strategy. Though the optimization report often called for a lower number, I wished to preserve it as a longer-term indicator of momentum since I already had two very short-term ones. An example of the optimized conditions is below.
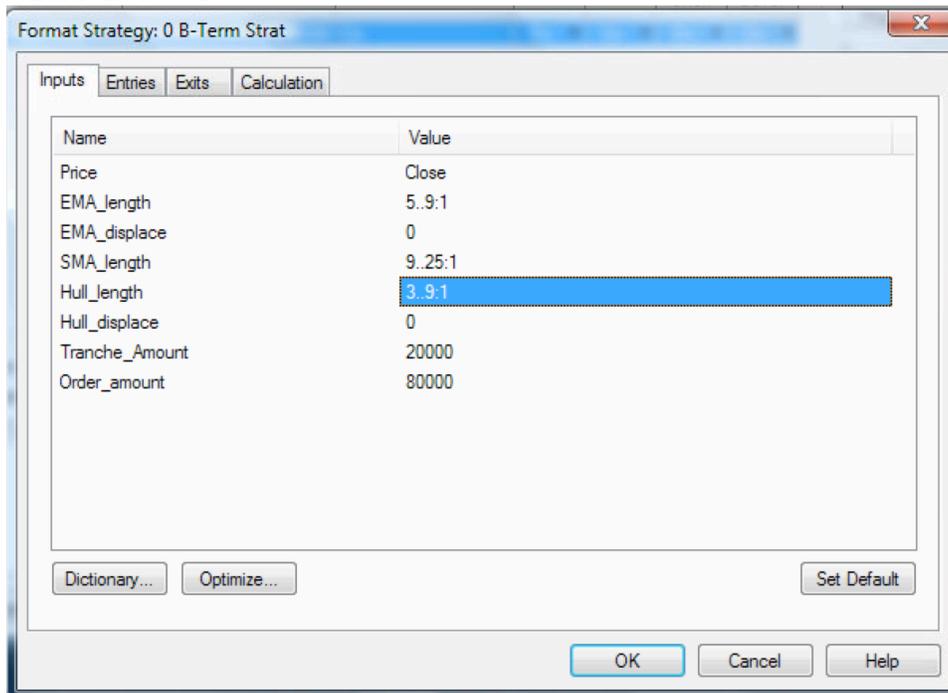
Figure 13: Richard's Optimization #1
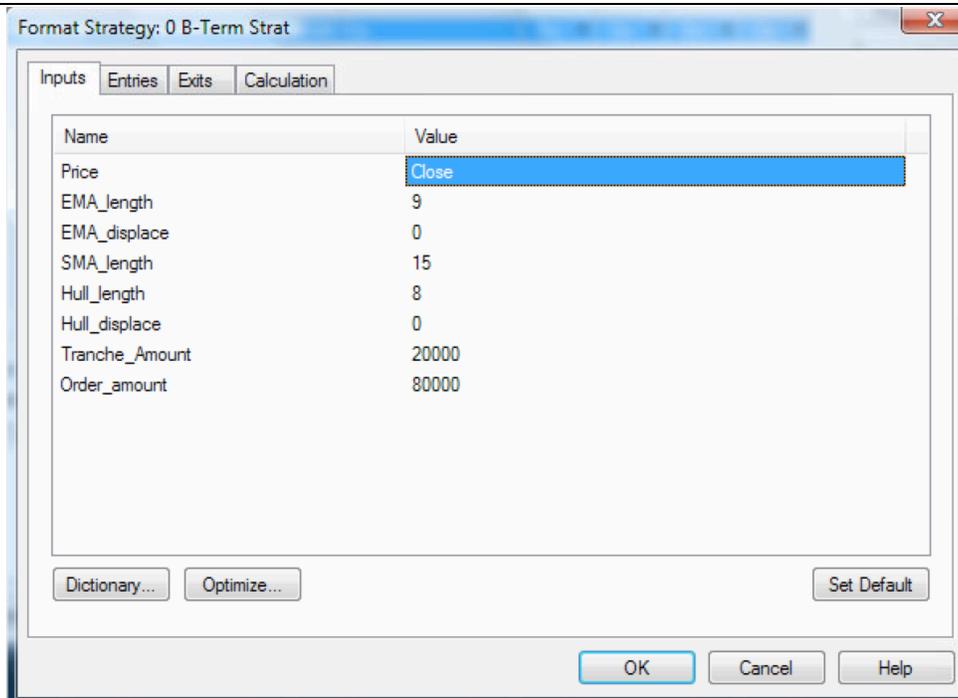
Figure 14: Richard's Optimization #2

Walk Forward

After preforming the Walk Forward optimization, the results were quite promising though there was one issue with the system that was brought to attention. The figure below shows an overview of the Walk Forward results

Figure 15: Richard's Walk Forward

The average net profit of $18,975.60 indicates that the system should be profitable under most optimization circumstances. As well, the largest net profit being greater in magnitude to the largest net loss is also an indication of profitability. The optimization efficiency or roughly 81% shows that the system doesn't need to be optimized too often as well. However a concern is the size of the largest drawdown. Here we can see that it was $90,000, which at the time of trading was 40%. Below is an equity curve, where one may notice the drawdown commencing around trade 60.
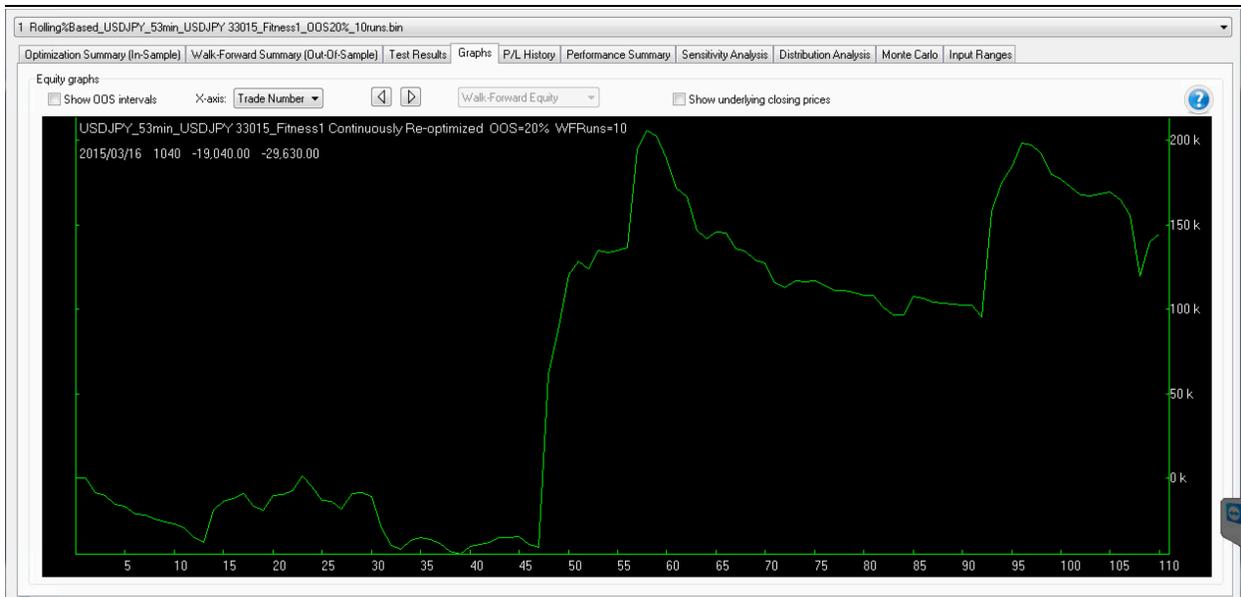
Figure 16: Richard's Walk Forward Equity

From the equity curve it is clear to see that through routine optimization this strategy could be very profitable, and would have been in the past. Though in the figure below the overall result of the Walk Forward optimization is a failure, I would personally disagree. The reason the strategy fails the optimization report is that most of its profits are made on a few trades, and the system has large drawdowns after big wins, though they are not nearly as big as the wins. By the nature of the system though, since it is a trend following system, it is going to hit homeruns, and but lose most of the trades it enters. Anyone using this strategy understands these facts going in, so failure in the two aforementioned categories isn't surprising or worrying.

Figure 17: Richard's Walk Forward Result

Figure 18: Richard's Walk Forwad Break Down

In the performance summary above, we can clearly see the nature of the system illustrated. It lost on sixty-seven trades and only profited on forty-three. Though it lost more times than won, the largest winning trade is over three times the size of the largest losing trade. In the figure below it is also interesting to not that with more bars per trade, there was far higher average profit. This is because once the market moves against the system, it generally takes the loss quickly and reverses the position.
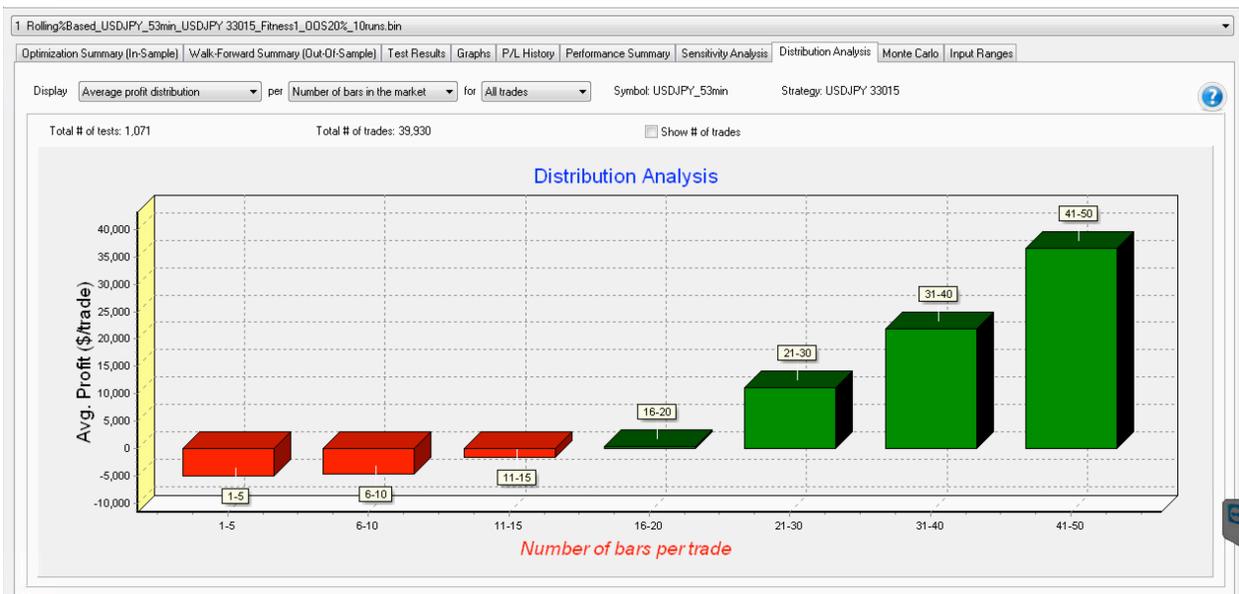
Figure 19: Richard's Profit by Number of Trades

Finally, the walk forwards analysis also showed the sensitivities of each moving average to the base line moving average, the HMA. In the figures below, it is apparent that changing the SMA

has a large impact on profits and its interactions with the HMA, however changing the EMA does virtually nothing to both.
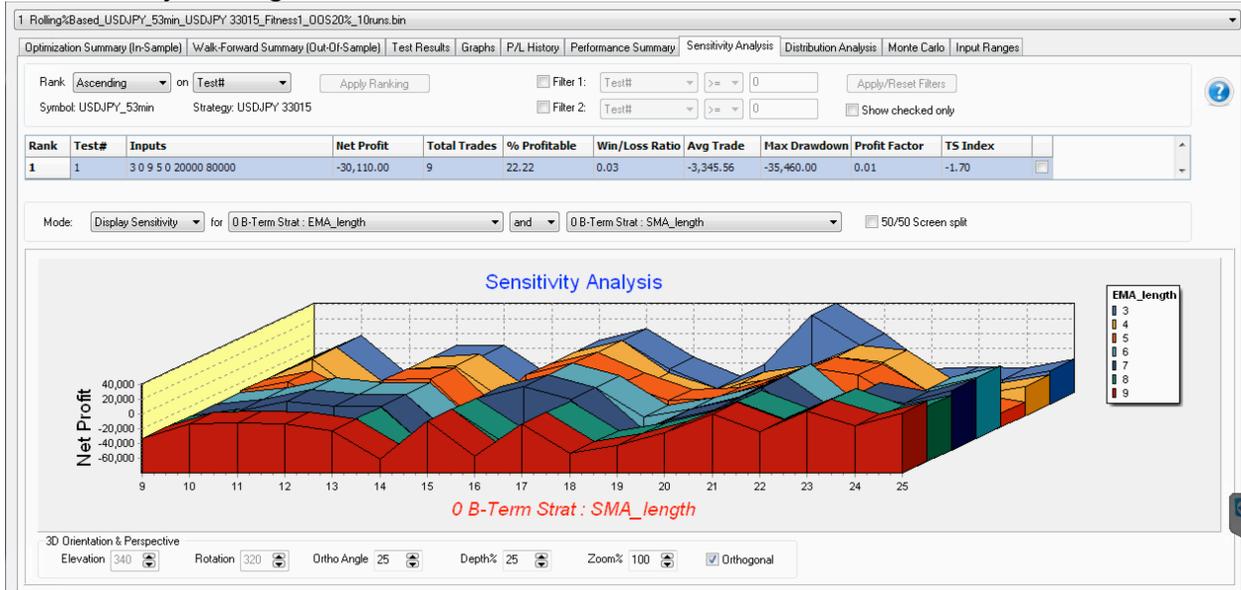
Figure 20: Sensitivity Analysis #1
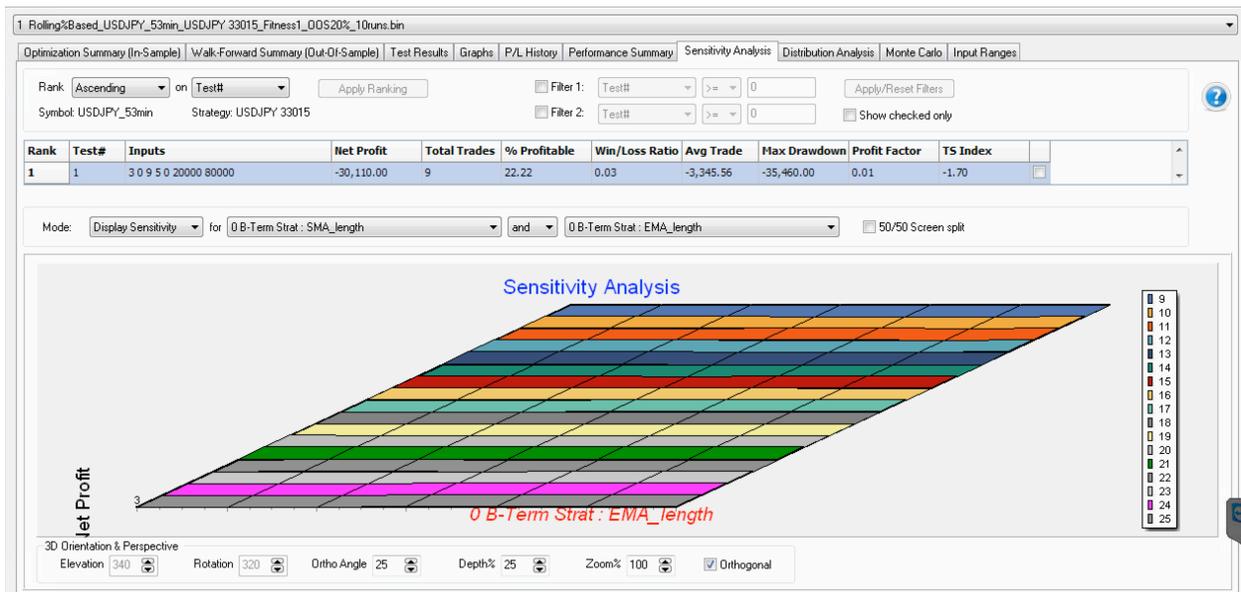
Figure 21: Sensitivity Analysis #2

Performance report and Analysis

The overall performance report in terms of profitability was very strong for the Triple Moving Average Strategy. As a distinction from the Walk Forward, these are actual results, where as Walk Forward gives an idea of future results if optimized. Below is a graph of the equity curve for the strategy and the average equity curve. One may notice that the initial equity is $1,000,000 that is different than the generic $100,000 and so the profits are to scale, however the percentages I will discuss are regardless of scale.
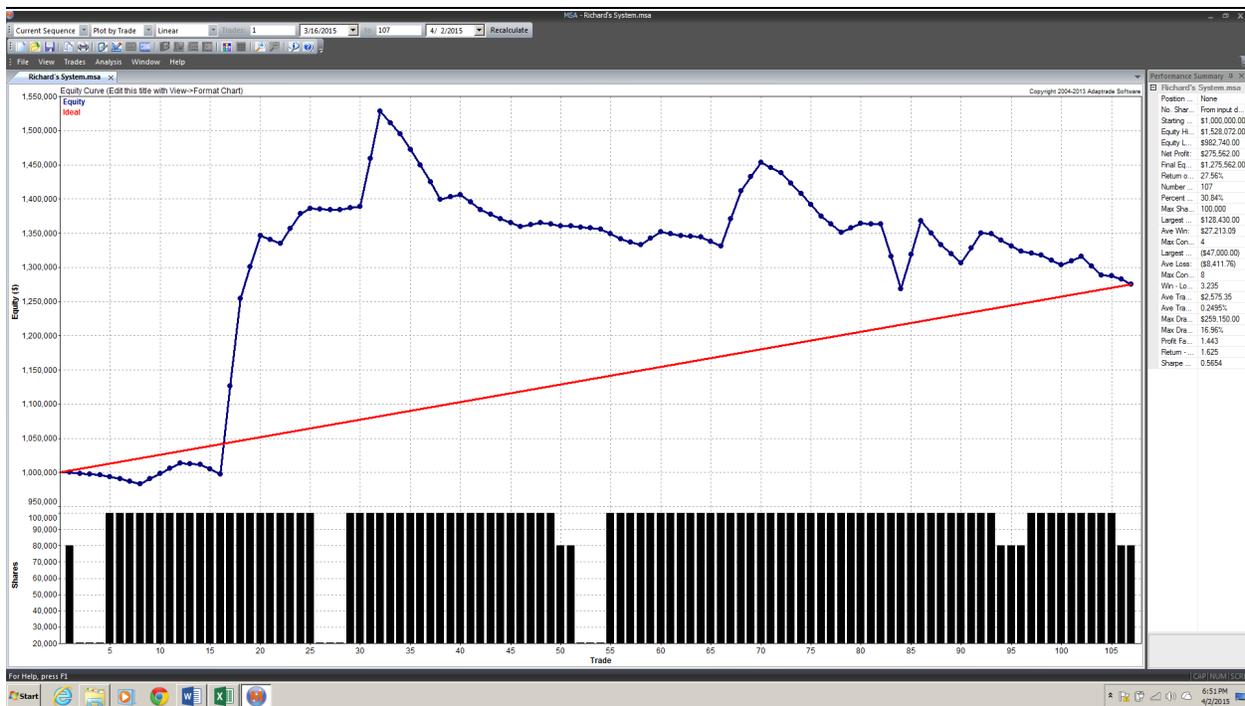
Figure 22: Triple Moving Average Equity Curve

The chart above shows a profit of roughly $275,000 translating to a 27.5% increase in equity. This is clearly a very profitable system, though most of its profits were made only on a few trades, this is to be expected with a trend following system. As well, a Monte Carlo analysis below indicates consistent profitability for future use.

```
Monte Carlo Results: Market System                                    _ □ ×
File  Edit  Help

Initial Account Equity: $1,000,000.00
Trading Vehicle: Stocks
Minimum Margin Requirement: 100.0%
Slippage per side: $0.00 per trade
Commissions and fees per side: $0.00 per trade

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

Key Results at Select Confidence Levels

Confidence (%)   Rate of Return (%)   Max Drawdown (%)   Return-DD Ratio   Mod. Sharpe Ratio
50               27.56                12.75              2.162             0.1082
60               27.56                13.68              2.014             0.1070
70               27.56                14.74              1.870             0.1057
80               27.56                16.16              1.705             0.1041
85               27.56                17.07              1.614             0.1031
90               27.56                18.35              1.502             0.1018
91               27.56                18.74              1.470             0.1015
92               27.56                19.05              1.446             0.1011
93               27.56                19.41              1.420             0.1008
94               27.56                19.82              1.391             0.1004
95               27.56                20.43              1.349             0.1000
96               27.56                21.12              1.304             0.09940
97               27.56                22.00              1.252             0.09878
98               27.56                23.06              1.195             0.09801
99               27.56                24.98              1.103             0.09682
100              27.56                34.76              0.7928            0.08966

Monte Carlo Results at 95.00% Confidence

Total Net Profit: $275,562.00            Max Number of Shares: 100,000
Final Account Equity: $1,275,562.00      Minimum Number of Shares: 20,000
Return on Starting Equity: 27.56%        Average Number of Shares: 91,775
Profit Factor: 1.443

Largest Winning Trade: $128,430.00       Largest Losing Trade: ($47,000.00)
Largest Winning Trade (%): 11.28%        Largest Losing Trade (%): -5.111%
Average Winning Trade: $27,213.09        Average Losing Trade: ($8,411.76)
Average Winning Trade (%): 2.288%        Average Losing Trade (%): -0.8460%

Average Trade: $2,575.35                 Win/Loss Ratio: 3.235
Average Trade (%): 0.2498%               Win/Loss Ratio (%/%): 3.237
Trade Standard Deviation: $25,515.28     Max Consecutive Wins: 2
Trade Standard Deviation (%): 2.595%     Max Consecutive Losses: 15

Worst Case Drawdown: ($242,162.00)       Return/Drawdown Ratio: 1.349
Worst Case Drawdown (%): 20.43%          Modified Sharpe Ratio: 0.1000
Average Drawdown: ($71,618.00)
Average Drawdown (%): 6.172%
```

Figure 23: Triple Moving Average Monte Carlo

Through 10,000 different iterations of systems trades it can be seen that with 99% confidence the return to drawdown ratio will be greater than 1 (1.103), which is a good sign since we wouldn't ever want to have drawdowns greater than the returns pushing the system into the negative. As well, with 99% confidence, the rate of return should be around 27.5% and the max drawdown will be less than 25% of total equity. If a stop loss were to be added to this system it would decrease the drawdown statistic significantly.

I also performed another measure of consistency on the system by drawing an oval two standard deviations away from the average line, and checking to see if the equity curve would venture outside of it.
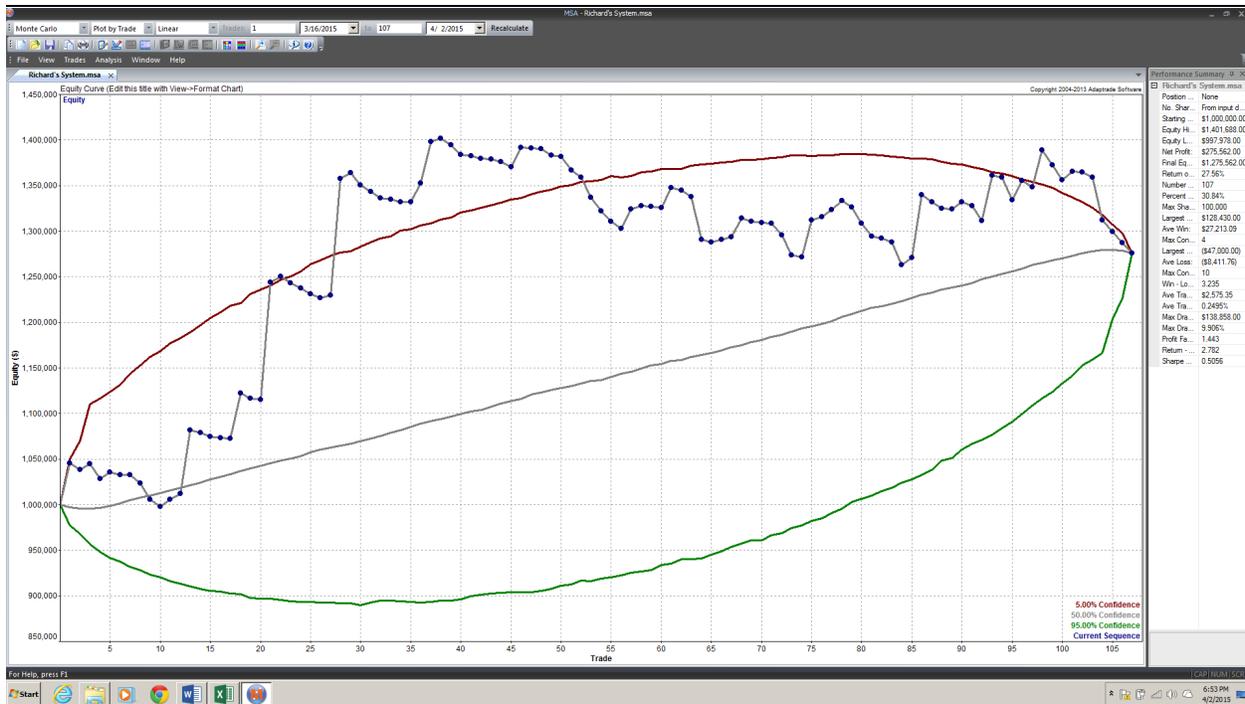
Figure 24: Triple Moving Average Statistical Test #1

Though the equity curve did briefly venture outside of the oval, indicating some lack of predictability, this is minimal and it exclusively ventured out of the oval on the high side. This indicates that profits at times might be higher than predicted, which although does show lack of perfect predictability, is not necessarily a bad thing.

As a final test of consistency the equity curve was stopped near the end, and then a cone was projected from the last point. This cone represented the expected area where the equity curve should reside for the remaining points given the rest of the data. It can be seen below that the line stays entirely within the cone, with the exception of one point, which is sitting just on the outer edge of the border. This indicates that future earnings can be accurately predicted.
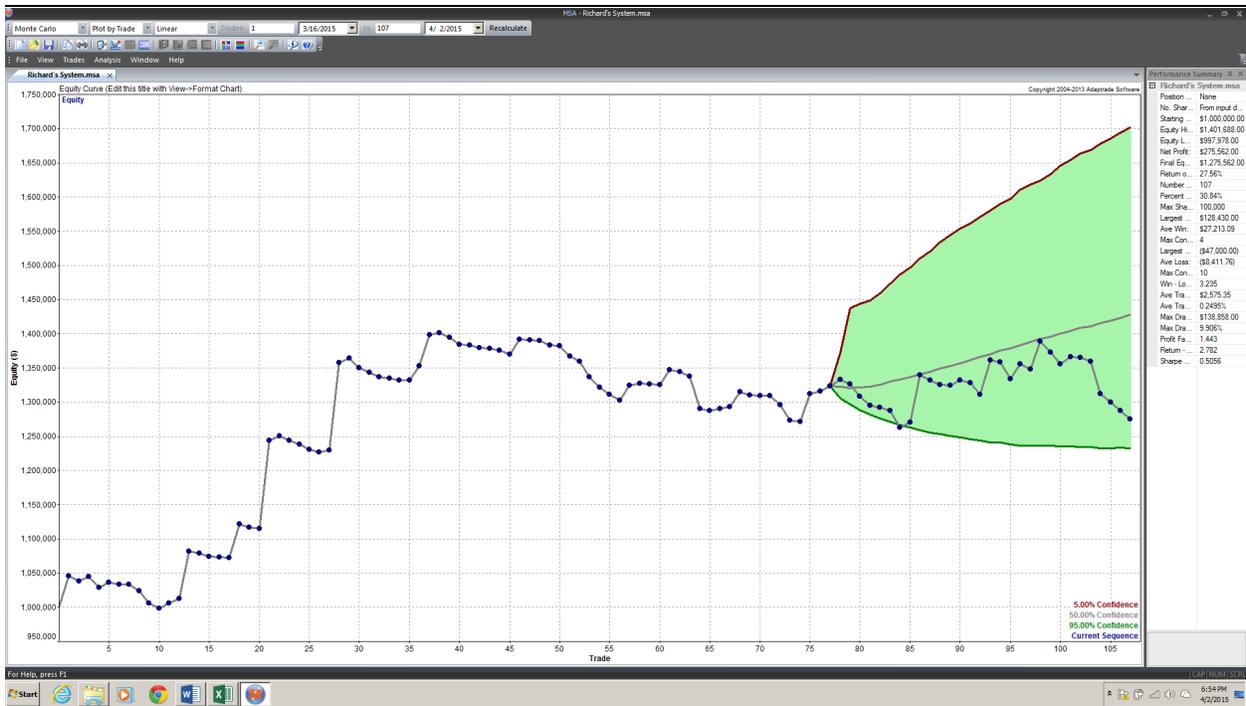
Figure 25: Triple Moving Average Statistical Test #2

Finally, to check for an optimal position sizing method, Monte Carlo simulations were run for different ways of position sizing: the current method, percent of equity, and others. Percent of equity turned out being the most profitable yielding a 35.7% return on equity. A graph of the equity curve, taking positions as a constant percent of overall equity is below. This is an idea that could be explored with future use.
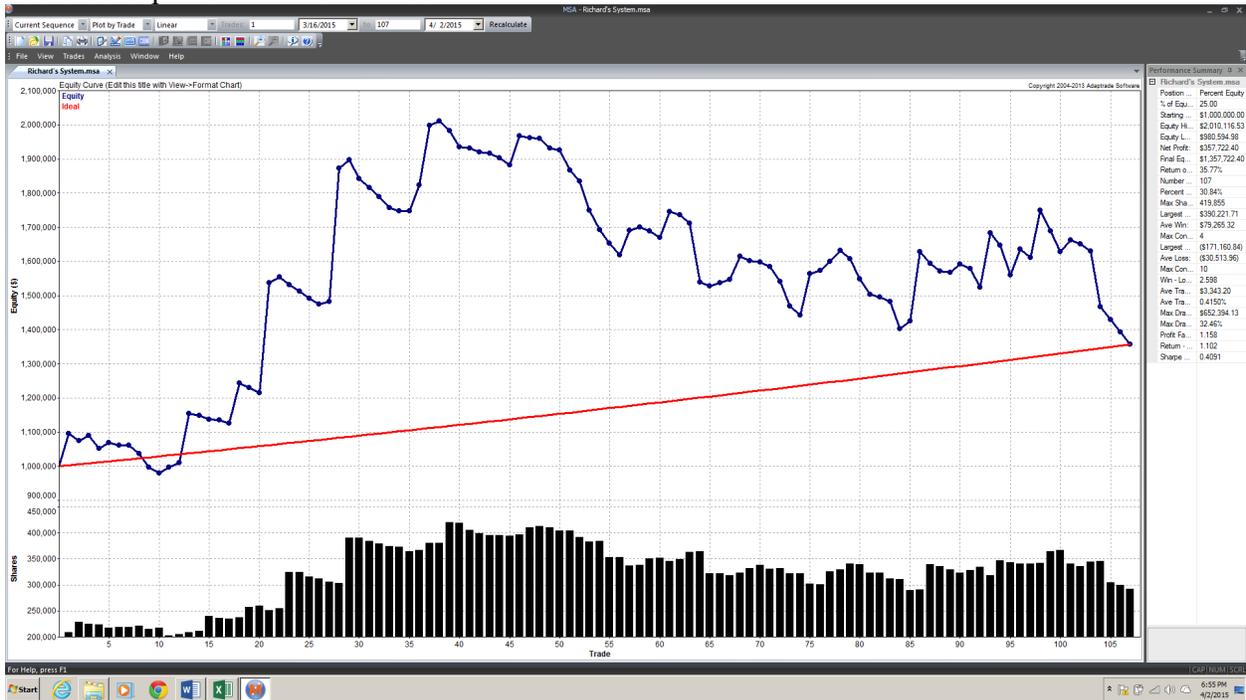
System Quality

In order to evaluate system quality, I calculated expectancy, Expectunity, annualized expectancy, overall system quality and more. A summary of the calculations can be seen in the figure below.

Expectancy (Profit or Loss Per Dollar Risked Per Trade)	0.30	0.05		
Opportunities (Trades/Year)	2,297.35		Std Dev R Multiples	2.9513067	
Annualized Expectancy (Expectunity) (Profit or Loss Per Dollar Risked Per Year)	684.35	125.88	System Quality	1.04406411	Total profit/loss per dollar risked relative to the total variability of the profit/loss per dollar risked => Dimensionless

Figure 27: Triple Moving Average System Quality

The tradeoff between opportunity and very high expectancy is apparent here. Though the system has had great profits for me, it trades so often, and provides so much opportunity (2,298 trades per year), that the profit per every dollar that is risked is only roughly thirty cents. One could look at this and say it is a low return for every dollar risked, but the system gives so much opportunity for profit, that it just happens to drag down the expectancy as a result. Additionally, the expectancy is well above zero, meaning on average, if you risk money with the system by taking a position, you should expect a net profit.

Due to the high opportunity, the Expectunity, the profit per dollar risked per year, is $685. Since the system provides so much opportunity, and this is a product of expectancy and opportunity, the system preforms extremely well under this measure. The expectancy gives an idea of how profitable this should be in the long run.

Another great sign for the Triple Moving Average strategy is that its system quality is over one. This means that the total profit/loss per dollar risked relative to the total variability profit/loss per dollar risked was roughly even. This shows that there isn't a massive amount of variability in profit or loss per dollar risked and so the system is consistent. The importance of this being a dimensionless measure means that it is not affected by time span, and thus it is a very strong indicator of consistency.

Overall, the system quality measures reassure logical scientific use of this system.

Code

See Appendix A.

Dead Ends

Two major dead ends arose during the course of developing this strategy. The first is simply that this strategy shouldn't be used on anything under forty-five minute bars. If it is, it get tangled in too much of the inexplicable motion of the markets on the way to their trends, and exits profitable positions prematurely or enters poor position too often.

The second is that the mathematical calculations within this strategy make it become very hard to make simply changes once it has progressed to the point it is currently at, take for instance adding something simply like a stop loss. Since all the averages positions are being individually tracked, something simply like adding a stop loss would have to update the calculations to each position that is tethered to each moving average. If the EMA had entered into 80% of the position, and then a stop loss was triggered, the strategy would have to no to subtract from the EMA's position, but not the SMA's position and then allow them to still calculate once the averages cross again as well as update the fact that the strategy has now netted a loss on one consecutive trade. Basically, if you wish to expand this strategy it becomes exponentially more work, the more complex you make it.

Excel Analysis System

Description

Extracting Data

The Excel Analysis System is a custom built, multifunctional indicator that I scripted using the coding language VBA to pull data from the Internet and then analyze it using custom built indicators. The script pulls the volume, price, day high, day low, day change, fifty-two week high, fifty two week low, one year target, and dividend info into an excel spread sheet for the full S&P 500. The figure below shows all the data being pulled in.

Analyzing Data

This data is then pulled into a series of indicators that currently function mainly off comparison of the price to the fifty-two week high and low prices. First the current price is calculated as a percent of the fifty-two week high and low, and has to meet a certain threshold in order to be considered for buying or shorting. For example, a stock would have to be at 90% of its fifty-two week high or low, more in order to be considered. From there, the price is compared to the one-year target according to analysts. Again if it beyond a certain threshold away from the one-year targets it continues to be considered. Next the daily change and a risk component are factored into the decision. Currently quantitative amount for either of these since this strategy has taken so long to create and was started to late in the year, though in future development they will be mathematically derived. As it stands, the risk amount raises the threshold to total threshold that the stock must be within the fifty-two week high or low of, and the proximity it must be away from the target, but is determined by assigning a number to how risky I feel the markets are. Finally there is dividend to consider, as all the stocks can be filtered by amount of dividends in they give out, allowing for a potential longer-term high dividend portfolio, or a dividend capture strategy. Below is an example of the indicator in general and it filtered on only buys showing its ability to focus in.

Figure 29: Excel Analysis Indicator

Figure 30: Excel Analysis Indicator Filtering

Future Development

For future development this indicator has potentially unlimited growth and versatility. I have identified three places of immediate improvement though: inserting mathematically calculated risk of the portfolio, inserting a mathematically calculated momentum indicator such as a change in moving average, and allowing for any stock to have more info pulled simply by the push of a button for more in depth analysis if needed. Below is an example of how I will build the momentum indicator.

Figure 31: Excel Analysis System Momentum Indicator

Flowchart
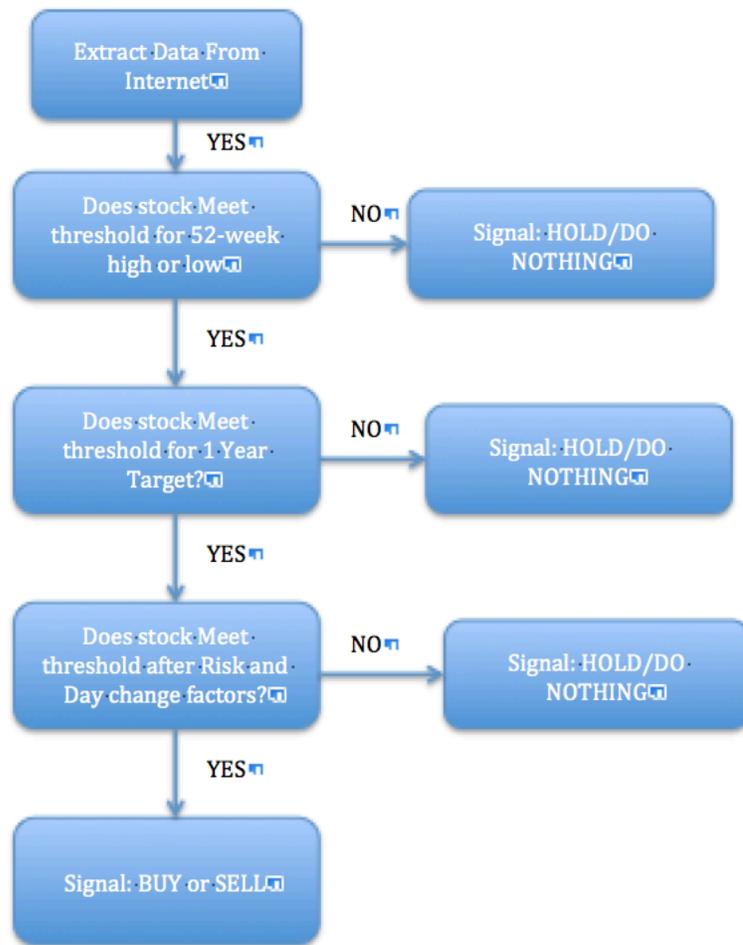
Figure 32: Excel Analysis System Flowchart

Setup / Entry

Since this is an indicator and not an automated strategy, the Excel Analysis System does not have any setup or entries. The system does however thresholds and conditions as previously described which then lead to an eventual buy or sell signal if met or a hold signal if not met.

Exit

Since this indicator has no entries, it naturally has no exits. Though, it indicated a time to exit when the original indicator that got a trader into the position reverses. For example, if the indicator gave a buy signal on Apple, then the exit signal would be when it indicated a sell on Apple.

Applications

This indicator applicable to all types of markets currently because it hinges on the idea of value investing, getting stocks when they are "cheap." This can function off a volatile market, catching a stock at a low, then flipping for a quick profit, or on a trending market, again catching the trend near the bottom, and then riding the trend the reverse direction.

Optimization

This is not an automated strategy and thus can't be optimized. I am looking into a way to optimize the least amount of risk mathematically, however this is not complete at the time of writing.

Walk Forward

This is not an automated strategy and thus can't be Walked Forward.

Performance report and Analysis

This system does not have enough trades to give any statistically meaningful performance report. As it was developed over most of C-term, and is functional, yet has a large room for growth, it would not representative of the full quality of the system, only quality as it is partially complete.

System Quality

This system does not have enough trades to preform any sort of robust system analysis.

Code

See Appendix A.

Dead Ends

There are a few ways to pull data from the Internet. The first way I attempted was to pull data from each yahoo finance page of every stock in the S&P 500. This simply takes too much time to be able to run often. The solution is to pull from the Yahoo Finance API, which is essentially a place where all the websites data is stored.

Jiacong (Sophie) Xu's Trading Systems

Multi-Timeframe System

Description

I developed a multi-timeframe strategy that mainly focuses on trading the Forex market. This strategy was primarily used on the USDJPY. The core ideology behind this system is based on three exponential moving averages and Bollinger Bands. It takes these rather commonly used indicators and manipulates them in a unique way by combining their signals to create reassurances of one another and by limiting the timeframes to those which are what I have determined as generally the most consistent and trusted times to trade the USDJPY. The two time frames that are considered are five-minute bar and sixty-minute bar charts. The entry and exit conditions are lengthy and specific, making the strategy rather picky about taking trades. Below is an example of exponential moving averages on a chart. Notice how they lag behind the price at different speeds; this is due to the fact that they are averaging a different number of bars. My strategy incorporates three of these.

Figure 33: Ebay Daily Chart EMA[39]

Once the system is entered into the market, it compares the aforementioned three exponential moving averages to the current price. The exponential moving average slope is easier to determine than a trend in price: the slope is always down when price closes below the moving average and always up when price is above.

After careful observation and research of the USDJPY, I found particular time periods that are best for trading Japanese Yen: between 12pm and 8pm EST. Though I am combining two timeframes, five-minute and sixty-minute charts, I set a condition to restrict the trading time between 12pm and 8pm EST.

Here are the USDJPY Observations:

Date	Time	Price
2015-01-21	13:54	117.895
	17:43	117.908
2015-01-22	9:40	117.284
	13:29	118.231
	17:04	118.501
	18:15	118.665
2015-01-23	8:17	118.009

---

[39] http://www.onlinetradingconcepts.com/TechnicalAnalysis/MAExponential.html

	10:51	117.609
	22:24	117.737
2015-01-24	10:27	117.756
	16:46	117.756
2015-01-26	15:11	118.461
	17:54	117.784
2015-01-28	12:43	117.768
	18:32	117.510
	20:44	117.605
2015-01-29	08:53	117.864
	12:05	118.437
	17:01	118.268
	18:41	118.387
2015-01-30	01:58	117.784
	08:01	117.809
	09:04	117.537
	10:05	117.533
	12:18	117.502

Figure 34: USDJPY Obervations

The strategy uses a Bullish indicator that compares the average value of the recent two hundred bars back, starting from the closing price of the sixty-minute chart with the closing price. I found it useful to combine this indicator with the Relative Strong Index (RSI). RSI states that the RSI total is the sum of RSI in consecutive three days. When the Bullish Flag returned true and the RSI value lay between 40 and 80, it's the best circumstances for my strategy to go long USDJPY. The strategy does not go short.

Conditions
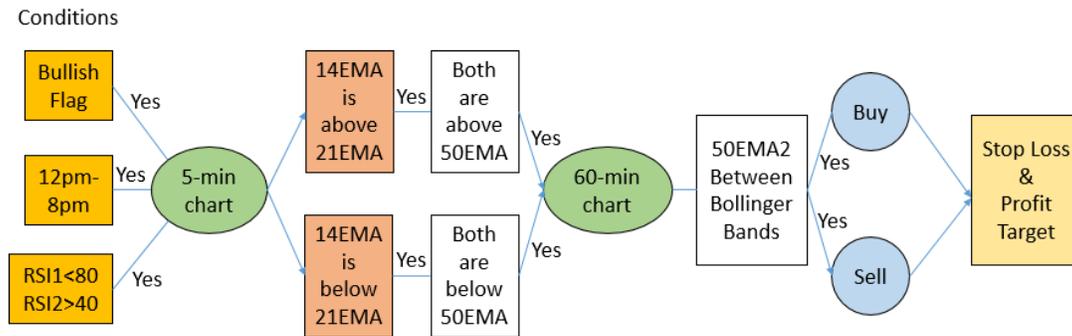
Figure 35: Multi-Timeframe System Methodology Flowchart

Setup / Entry
- The Bullish Indicator determines setup during 12pm-8pm EST.
- Relative Strong Indicator lies between 40 and 80.
- Entry into the market is when 14 EMA is above 21 EMA, and both are above 50 EMA in the five-minute chart, and when 50 EMA is between Bollinger Bands in the sixty-minute chart. Bollinger Bands were set as two moving averages 2 standard deviations above and below the price.

Exit
- A profit target is set to $3000, which is total price of limit price and exit market price. Limit price is the highest value of 10 historical high values while exit market price is the lowest of the 10 historical low values.
- A stop loss is set to $1000. If the stop loss is reached, then the system exits the market.
- The system also exits the market when 14 EMA is below 21 EMA, and both are below 50 EMA in the five-minute chart, and when 50 EMA is between Bollinger Bands in the sixty-minute chart.

Applications
This strategy works on Asian currency pairs especially USDJPY. It functions better with more obvious trends, either uptrend or downtrend.

Optimization
The optimization process allowed me to identify the best parameter for all of my systems input values. Along the optimization process, TradeStation suggested the increment differently for each input value.

Figure 36: Sophie's Optimization Setup

After the optimization, the most profitable result appears to be using Length=13, Length1=39, Length2=60, and Length3=139. Although I did not change the input value into what's been suggested, this process provides me an idea of what the relationship between each parameter should be. I didn't use the exact inputs to avoid over fitting. TradeStation's optimal value set can be seen below.
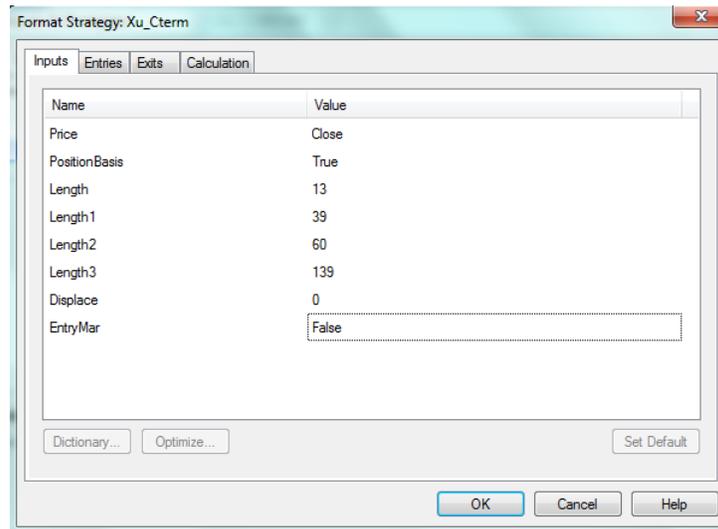
Figure 37: Sophie's Optimization Result

Walk Forward

The following is a summary of a walk-forward optimization of my strategy.

Period	Days	Bars	NetProfit	MaxDD	MaxDD%	#Trades	%Profitable	Avg W/L	AvgTrd	StdDev
2014/06/19 - 2014/08/21	63	925	4,509.25	-2,742.95	2.74%	8	62.50%	1.24	563.66	1,740.26
2014/08/22 - 2014/10/01	40	925	14,952.76	-1,493.05	1.49%	12	75.00%	3.63	1,246.06	1,779.12
2014/10/01 - 2014/12/04	64	925	15,014.09	-1,668.49	1.67%	14	85.71%	0.96	1,072.43	1,363.53
2014/12/07 - 2015/02/04	58	925	-12,098.95	-12,098.95	12.10%	15	26.67%	0.49	-806.60	1,029.87
2015/02/04 - 2015/03/31	56	925	205.92	-3,835.81	3.84%	17	64.71%	0.56	12.11	913.53
TOTAL	281	4,625	22,583.07			66				
Largest			15,014.09	-12,098.95	12.10%	17	85.71%	3.63	1,246.06	1,779.12
Average			4,516.61	-4,367.85	4.37%	13	62.92%	1.38	417.53	1,365.26
Smallest			-12,098.95	-1,493.05	1.49%	8	26.67%	0.49	-806.60	913.53
Annualized P/L			29,333.88							
Walk-Forward Efficiency			120.97%							

Figure 38: Walk-Forward Optimization Summary

The best Walk Forward runs with the highest average profit at the highest average Walk Forward Pass/Fail rate result are highlighted in green:
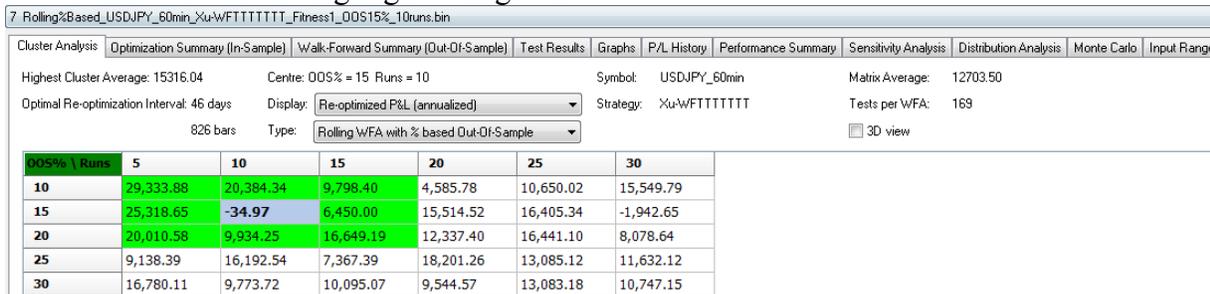
Figure 39: Cluster Analysis Part1

Overall the Walk Forward optimization confirmed the profitability of the strategy and diversity of it. I would not need to optimize every day in order for the strategy to remain profitable, which suggests it can handle changes in the market.

Performance report and Analysis
Below is an image of the equity curve that my strategy produced during trading.
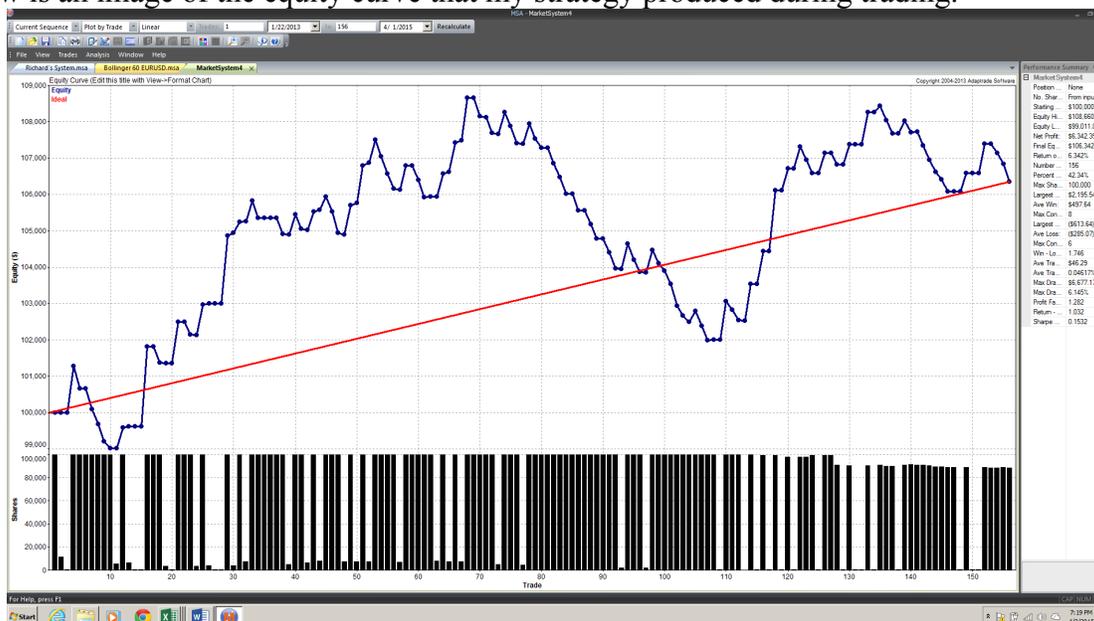
Figure 40: Market System Analyzer

The Market System Analyzer displayed above not only shows the equity curve, but also the number of shares for each trade indicated by the bars on the bottom, and the average increase in equity indicated by the red line.

Monte Carlo Results: Market System

File Edit Help

Trading Vehicle: Stocks
Minimum Margin Requirement: 100.0%
Slippage per side: $0.00 per trade
Commissions and fees per side: $0.00 per trade

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

Key Results at Select Confidence Levels

Confidence (%)	Rate of Return (%)	Max Drawdown (%)	Return-DD Ratio	Mod. Sharpe Ratio
50	12.69	3.010	4.153	0.1716
60	11.85	3.248	3.677	0.1621
70	10.97	3.549	3.201	0.1514
80	9.857	3.919	2.704	0.1380
85	9.221	4.164	2.438	0.1302
90	8.409	4.491	2.130	0.1205
91	8.206	4.572	2.063	0.1181
92	8.014	4.651	1.974	0.1156
93	7.747	4.758	1.887	0.1123
94	7.477	4.846	1.790	0.1083
95	7.139	4.995	1.687	0.1040
96	6.762	5.179	1.594	0.09988
97	6.289	5.406	1.459	0.09299
98	5.656	5.723	1.284	0.08558
99	4.836	6.227	1.056	0.07366
100	-2.295	9.377	0.000	-0.03725

Monte Carlo Results at 95.00% Confidence

Total Net Profit: $7,139.31   Max Number of Shares: 100,000
Final Account Equity: $107,139.31   Minimum Number of Shares: 1
Return on Starting Equity: 7.139%   Average Number of Shares: 79,101
Profit Factor: 1.324

Largest Winning Trade: $1,866.25   Largest Losing Trade: ($613.64)
Largest Winning Trade (%): 1.732%   Largest Losing Trade (%): -0.6155%
Average Winning Trade: $471.04   Average Losing Trade: ($306.97)
Average Winning Trade (%): 0.4512%   Average Losing Trade (%): -0.2970%

Average Trade: $52.95   Win/Loss Ratio: 1.598
Average Trade (%): 0.05241%   Win/Loss Ratio (%/%): 1.610
Trade Standard Deviation: $574.15   Max Consecutive Wins: 4
Trade Standard Deviation (%): 0.5444%   Max Consecutive Losses: 10

Worst Case Drawdown: ($5,378.76)   Return/Drawdown Ratio: 1.687
Worst Case Drawdown (%): 4.995%   Modified Sharpe Ratio: 0.1040
Average Drawdown: ($1,409.29)
Average Drawdown (%): 1.334%

Figure 41: Monte Carlo Analysis

My strategy has a total net profit of $7139.31 and so a Monte Carlo simulation was run on it to ensure consistency in profitability. After running 10,000 iterations of the trades, I can say with 99% confidence that my rate of return will be at least 4.836%. The rate of return gets larger as the confidence interval gets smaller, ranging from over 4% to over 12%. The largest winning trade was $1866.25 and the average winning trade was $471.04, showing that not only can the system win big, but also on average it makes strong profits. The win/loss ratio is 1.598, which shows that more winning trades occur than losing trades, with roughly three winning trades to every two losing.
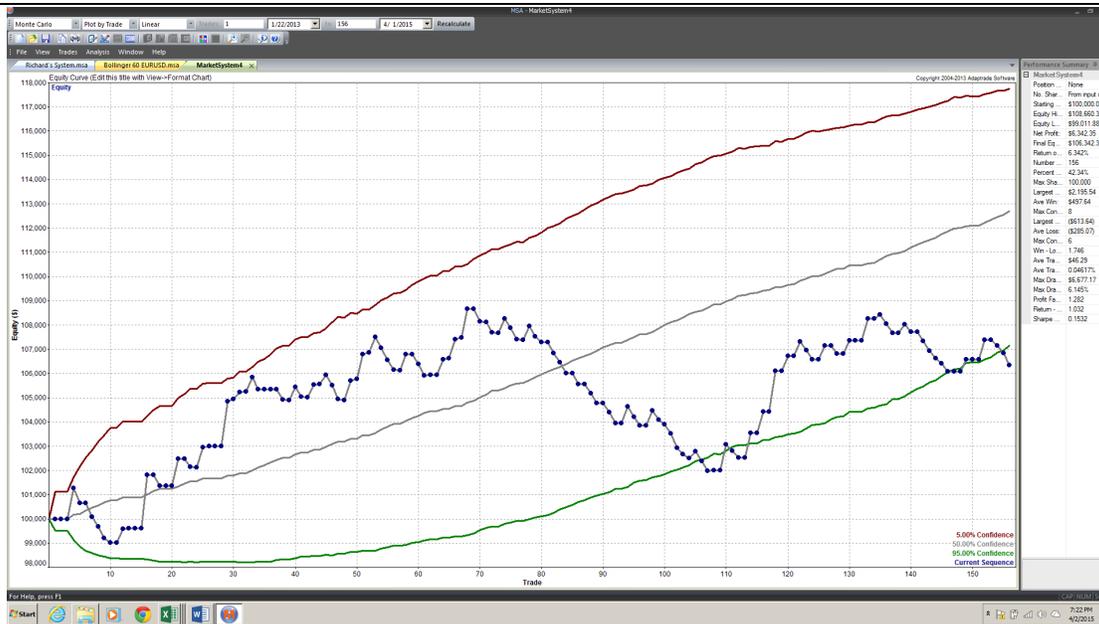
Figure 42: Statistical Oval

This graph shows the interval between 5% confidence level (CL) and 95% confidence level for what the Monte Carlos expected equity curves. The real life iteration of the strategy lies mostly between those two lines indicating that nothing very abnormal happened, and the system is consistent. The 95% CL rate of return is 7.139% as indicated by the red line and 50% rate of return is 12.69% as indicated by the gray line. Though the system does cross below the grey line that simply means that this real life iteration, was one of those that preformed lower than what 50% of the same strategy iteration are expected to perform at.

Monte Carlo Results: Market System

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Trading Parameters

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

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

Key Results at Select Confidence Levels

Confidence (%)	Rate of Return (%)	Max Drawdown (%)	Return-DD Ratio	Mod. Sharpe Ratio
50	9.782	6.145	1.592	0.1273
60	9.019	6.145	1.468	0.1183
70	8.252	6.145	1.343	0.1094
80	7.386	6.145	1.202	0.09908
85	6.848	6.145	1.114	0.09241
90	6.153	6.145	1.001	0.08377
91	5.986	6.145	0.9741	0.08195
92	5.817	6.145	0.9467	0.07984
93	5.617	6.145	0.9141	0.07729
94	5.409	6.145	0.8802	0.07488
95	5.211	6.145	0.8481	0.07208
96	4.953	6.145	0.8060	0.06866
97	4.633	6.145	0.7534	0.06469
98	4.231	6.145	0.6885	0.05957
99	3.509	6.145	0.5711	0.04997
100	0.3745	8.237	0.04547	0.007668

Monte Carlo Results at 95.00% Confidence

Total Net Profit: $5,211.27	Max Number of Shares: 100,000
Final Account Equity: $105,211.27	Minimum Number of Shares: 1
Return on Starting Equity: 5.211%	Average Number of Shares: 80,065
Profit Factor: 1.216	

Largest Winning Trade: $2,195.54	Largest Losing Trade: ($613.64)
Largest Winning Trade (%): 2.204%	Largest Losing Trade (%): -0.6059%
Average Winning Trade: $497.22	Average Losing Trade: ($288.99)
Average Winning Trade (%): 0.4766%	Average Losing Trade (%): -0.2740%

Average Trade: $36.49	Win/Loss Ratio: 1.764
Average Trade (%): 0.03686%	Win/Loss Ratio (%/%): 1.783
Trade Standard Deviation: $584.89	Max Consecutive Wins: 8
Trade Standard Deviation (%): 0.5556%	Max Consecutive Losses: 7

Worst Case Drawdown: ($6,677.17)	Return/Drawdown Ratio: 0.8481
Worst Case Drawdown (%): 6.145%	Modified Sharpe Ratio: 0.07208
Average Drawdown: ($1,739.27)	
Average Drawdown (%): 1.627%	

Figure 43: Monte Carlo #2

Another Monte Carlo of 10,000 iterations shows profits slightly lower to the last with 95% confidence of a profit level of $5211.27. From the chart above, the largest winning trade is $2195.94 and the average winning trade is $497.22. The win/loss ratio of 1.764 is higher though with my total number of winning trades as almost double my losing trades. Indicative of consistency though, all the numbers are still in the same ballpark.
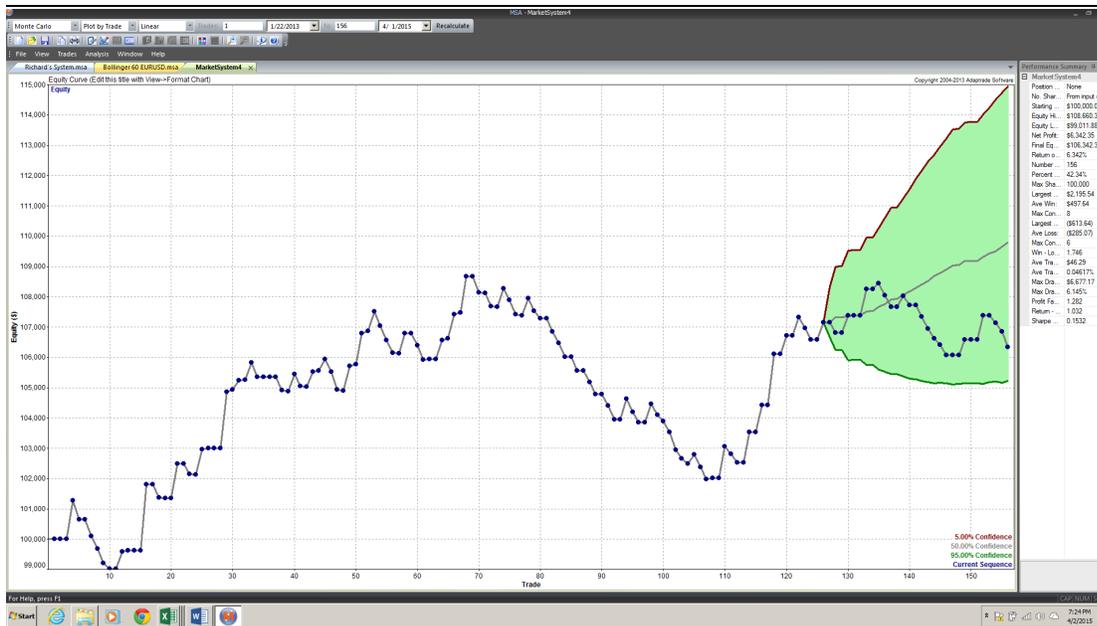
Figure 44: Cone Test

This analysis process takes the latest thirty trades and predicts the 5% CL to 95% CL range. Instead of taking my entire trading list, this predicts the future market with the consideration of the recent market change. All of my trading exist between that green areas, which means my strategy can still be a good representation of the future market and indicates consistency

Other optimization I did for my trading system is the optimization for net profit and rate of return based off of position sizing. Below we can see the a percent of equity position sizing would have optimized profit.
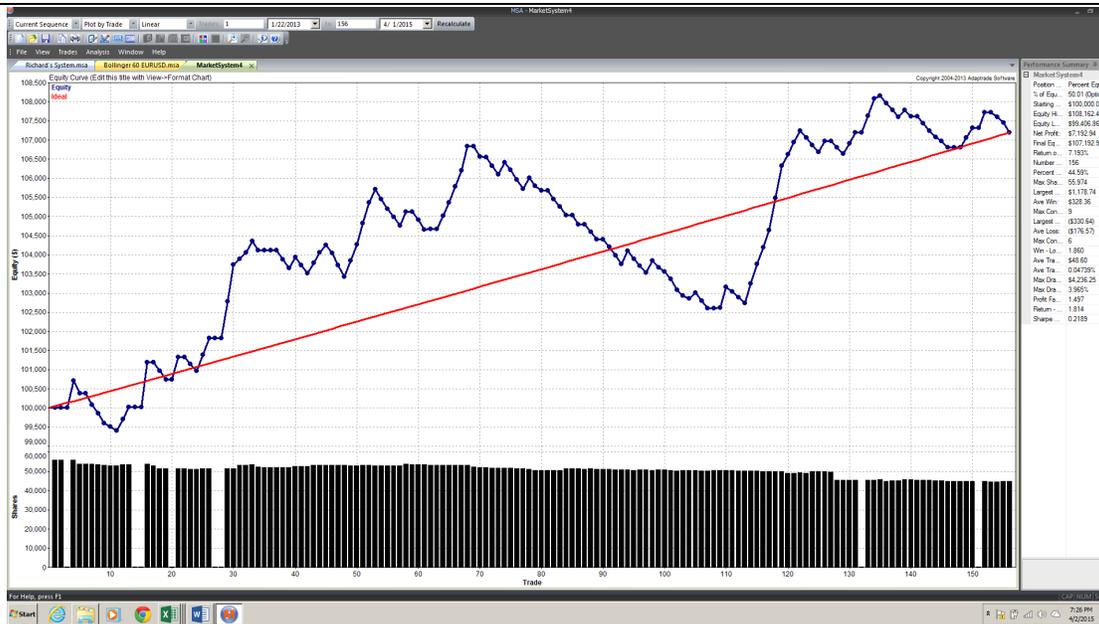
Figure 45: Percent of Equity Position Sizing

System Quality

Here is a table outlining the Expectancy, Expectunity (Annualized Expectancy), Opportunities and system quality.

Expectancy (Profit or Loss Per Dollar Risked Per Trade)	0.39	0.18			
Opportunities (Trades/Year)	71.18		Std Dev R Multiples	2.0991	
Annualized Expectancy (Expectunity) (Profit or Loss Per Dollar Risked Per Year)	27.53	12.93	System Quality	2.3013	Total profit/loss per dollar risked relative to the total variability of the profit/loss per dollar risked => Dimensionless

Figure 46: System Quality Report

Since my strategy only trades roughly seventy times a year, due to having very selective rules, there is not a lot of opportunity to profit, though when the opportunities arise the system is profitable. The risk however is rather low since it risked only $0.39 per every dollar in profit per trade. Since there are not too many trades per year, the annualized expectancy, which is the

Expectunity, is around $27.53. This is the total amount of profit being made per risked every year showing that one could expect decent profitability if they had ample opportunity.

The system quality is around two, which means the total profit/loss per dollar risked is about two times relative to the total variability of the profit/loss per dollar risked. Overall this is still a positive reflection on system quality, and would be a great system for very risk averse traders who wanted to ensure gains and were willing to take large position sizes when the strategy does act.

Code
See Appendix A.

Dead Ends
The major dead end of my strategy is that due to the number of conditions I have as entry rules, my strategy does not trade as often as it supposed to. With all that conditions, the system cannot find matching market sometimes, thus there's no trade. By setting up a higher profit target and stop loss, my strategy is suffering from a huge loss and less profit. Therefore this is something I could fix in my future modifications. But at this moment, this is a major drawback for my system.

Other Information

RSI:[40]
It's a momentum based oscillator that compares a stock's recent gains to its recent losses.
RSI = 100 − [100/ (1+RS)], so if the indicator rises to 70, then turns down, it's considered a bearish sign. Conversely, if the indicator moves to below 30 and then turns up, it's taken as a bullish sign.

Additionally, the crossing of the 50 line may confirm a trend change, however, experience shows if the RSI oscillates between 80 and 40 the stock is in a bullish mode, and if it bounces between 60 and 20, it's bearish.
If both the price and RSI of two moving averages are larger, the trend is up, on the contrary, if both of them are smaller, the trend is down. And if price is larger and RSI is smaller, the trend is sideways to up, of reversed, the trend is sideways down.

Bollinger Bands:
It's a band plotted two standard deviations away from a simple moving average, to measure volatility. Bollinger Bands widen when markets become more volatile, and contract when markets are less volatile. The closer the prices move to the upper band, the more overbought the market, and the closer the prices move to the lower band, the more oversold the market.

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[40] http://www.stock-charts-made-easy.com/relative-strength-index.html

Bollinger Bands Strategy

Description

      This is a simple strategy that uses Bollinger Bands as its primary indicator. The Bollinger Band™ is an indicator consisting of an N-period moving average, and two bands, K multiplied by N-period standard deviation below and above the moving average. Thus there are three bands total.

Figure 47: Bollinger Bands Strategy

It is commonly accepted in statistical theory that, for a normal model, 95% of the data lies within two standard deviations of the mean. Here, an average price is used as the mean, and so statistically the price should stay within two standard deviation of the average 95% of the time (if K=2 is used). If it is within two standard deviations it is between the bands. Therefore, if price goes beyond the band, there is a high chance that it will come back.

Another idea used in the strategy is a simple, two moving average cross strategy. If the faster moving average is above the slower one, there is a high chance of an uptrend, and vice versa.

This strategy exploits these two ideas in a following way. When price "just jumps back" into the bandwidth (crosses the upper or lower band of the Bollinger Bands) and if trend signals that price will go in the direction toward the middle of bandwidth (by judging which moving average is above the other), the strategy goes long or short depending on the trend. The strategy exits when either trend changes or stop loss gets triggered.
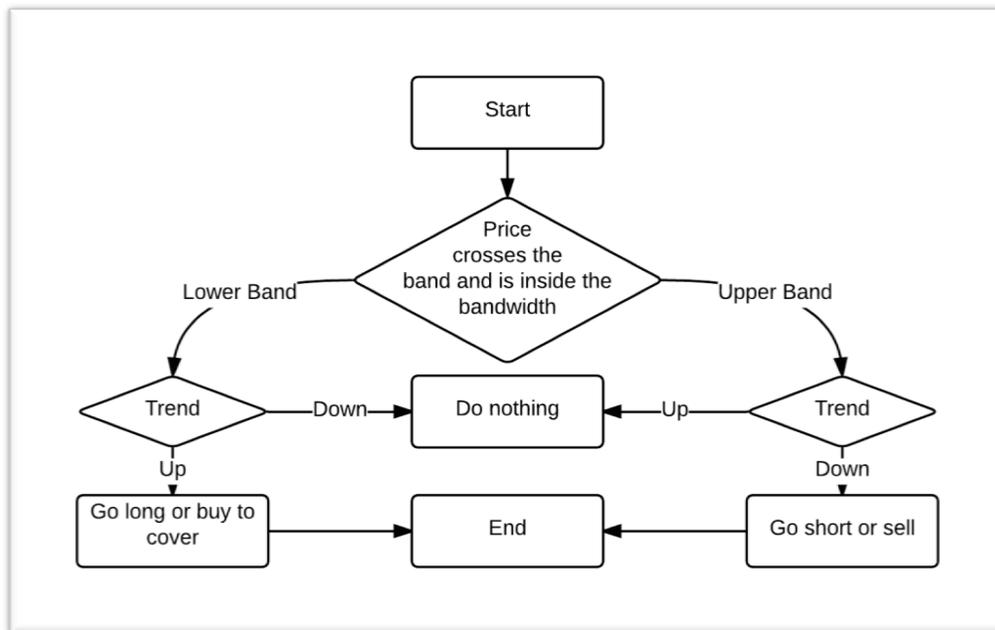
Figure 48: Bollinger Band Flowchart

Setup / Entry

Going long
- Setup is an uptrend indicated by the faster moving average being above the slower one.
- Entry is the price "jumping in bandwidth" from the below.

Going short
- Setup is a downtrend indicated by the faster moving average being below the slower one.
- Entry is the price "jumping in bandwidth" from the above.

Exit
- Strategy signals "sell" or "buy to cover" due to a change in trend indicated by a shift in which moving average is above the other.
- Stop loss signals an exit due to a loss, the size of which was predetermined to indicate the strategy was incorrect in taking the position.

Applications
This strategy works well on volatile markets where the strong trend is absent. It has been profitable for the currency pair *EURUSD* and equities *AAPL*, *GOOGL*, *IBM* and *YHOO*.

Optimization
A general optimization was performed maximizing the gross profit and changing the stop loss amount from $75 to $225 with a step of $15. As well a change was made to the *MALength* parameter from 10 to 30 bars with a step of 2 bars. The optimal combination is different for each symbol tested, though they are all around the same parameters, indicating that the optimization is not over fitting to any one data set.
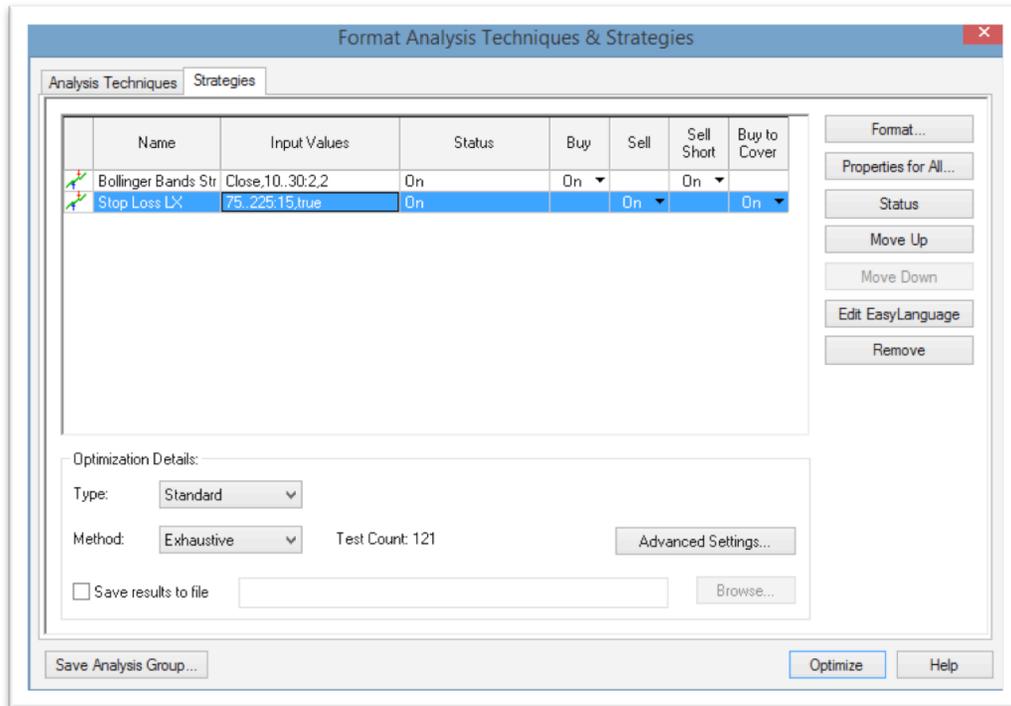
Figure 49: Bollinger Band Optimization

Walk Forward

A Walk Forward optimization confirmed that the system is likely to be consistent. It indicated that no run constituted an overly large percent of the overall profit, and the system is likely to net a profit in almost all cases.

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

Figure 50: Bollinger Band Walk Forward

Performance report and Analysis

The following figure includes an analysis of the strategy's performance on the EURUSD.

Strategy Performance Report

	All Trades	Long Trades	Short Trades
Total Net Profit	$ 100,034.40	$ 39,721.60	$ 60,312.80
Groos Profit	$ 619,931.00	$ 266,973.40	$ 352,957.60
Gross Loss	$ (519,896.60)	$ (257,251.80)	$ (292,644.80)
Profit Factor	1.19	1.17	1.21
Total Number of Trades	3066	1790	1276
Percent Profitable	39.82%	31.51%	51.49%
Average Winning Trade	$ 507.72	$ 473.36	$ 537.23
Average Loosing Trade	$ (283.17)	$ (186.27)	$ (475.07)
Largest Winning Trade	$ 5,474.00	$ 4,063.00	$ 5,474.00
Largest Loosing Trade	$ (4,328.00)	$ (1,001.50)	$ (4,328.00)
Max. consecutive wining trades	7	8	12
Max. consecutive loosing trades	12	19	11
Return of initial Capital			100.03%

Input Parameters

Key	Value	Optimization
BPrice	Close	None
MALength	16	10..30:2
StdDevNum	2	None
Stop Loss LX: Ammount	195	75..225:15
Stop Loss LX: Position Basis	TRUE	None
Strategy	Bollinger Bands Strategy + Stop Loss LX	

Symbol Info

Key	Value
Symbol	EURUSD
Interval	Minute
Interval Settings	5 minutes bar
Range	10 years back

Calculations

System Quality	First Trade	Last Trade	Days per Year	Strategy Calendar Days	Number of Trades	Expectancy R Mult 1	Expectancy R Mult 2	Expectuity R Mult 1	Expectuity R Mult 2	Opportunities	Std Dev R Multiples
8931.90	12/01/2004	11/28/14	335	3649d	3066	353.27	23.11	99436.36	6505.87	281.48	2.19

Figure 51: Bollinger Band Performance Report

Monte Carlo analysis was performed on trades generated by this strategy on *EURUSD* symbol (60 minutes chart, 5 years ago from April 1st). Analysis shows that the rate of return on that particular sample is 53% with 100% confidence. Max drawdown is 22% with 99% confidence.

Key Results at Select Confidence Levels

Confidence (%)	Rate of Return (%)	Max Drawdown (%)	Return-DD Ratio	Mod. Sharpe Ratio
50	53.53	10.57	5.064	0.2330
60	53.53	11.38	4.705	0.2298
70	53.53	12.37	4.327	0.2264
80	53.53	13.65	3.922	0.2224
85	53.53	14.57	3.675	0.2197
90	53.53	15.72	3.406	0.2162
91	53.53	16.06	3.332	0.2154
92	53.53	16.39	3.266	0.2146
93	53.53	16.78	3.190	0.2135
94	53.53	17.22	3.108	0.2124
95	53.53	17.73	3.019	0.2113
96	53.53	18.33	2.921	0.2098
97	53.53	19.10	2.802	0.2081
98	53.53	20.14	2.657	0.2056
99	53.53	21.89	2.445	0.2022
100	53.53	31.16	1.718	0.1852

Monte Carlo Results at 95.00% Confidence

Total Net Profit: $53,533.30   Max Number of Shares: 100,000
Final Account Equity: $153,533.30   Minimum Number of Shares: 100,000
Return on Starting Equity: 53.53%   Average Number of Shares: 100,000
Profit Factor: 1.956

Figure 52: Bollinger Band Monte Carlo

The equity curve was also potted. Notice it has a strong average uptrend indicated by the red line.

Figure 53: Bollinger Band Equity Curve

Next, an oval was generated around the average equity curve, indicating where the systems equity should always reside statistically. Plot points sometimes go outside of the normal area, but they go higher, which is positive that system generates some returns, but indicates minor inconsistencies.
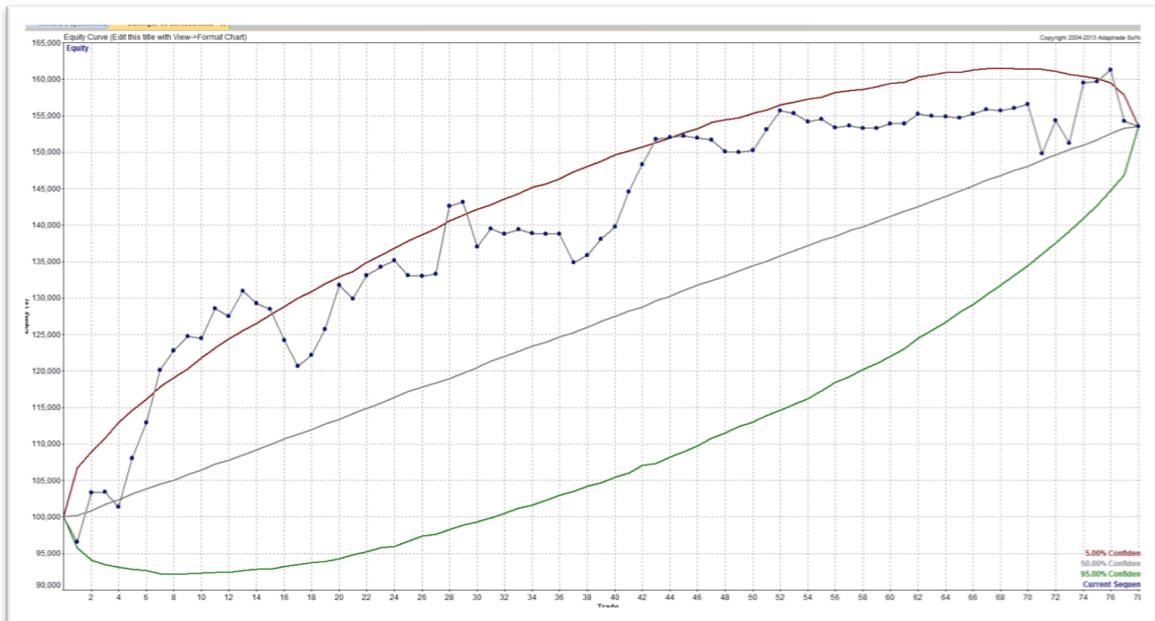
Figure 54: Bollinger Band Statistical Test

According to the analysis, if additional trades were generated, the rate of return would be at least 44% with 99% confidence and maximum dropdown would be less than 10% with the same confidence level. These are very strong indicators in support of the systems quality.

Key Results at Select Confidence Levels

Confidence (%)	Rate of Return (%)	Max Drawdown (%)	Return-DD Ratio	Mod. Sharpe Ratio
50	68.33	7.842	8.711	0.3095
60	65.69	7.842	8.375	0.3003
70	62.78	7.842	7.997	0.2898
80	59.32	7.842	7.544	0.2770
85	57.29	7.842	7.274	0.2695
90	54.91	7.842	6.948	0.2601
91	54.33	7.842	6.872	0.2577
92	53.67	7.842	6.786	0.2551
93	53.01	7.842	6.677	0.2519
94	52.12	7.842	6.530	0.2487
95	51.01	7.842	6.391	0.2451
96	50.06	7.944	6.209	0.2407
97	48.77	8.424	5.951	0.2362
98	46.94	9.188	5.423	0.2279
99	43.81	10.39	4.460	0.2160
100	31.75	17.87	1.927	0.1612

Figure 55: Bollinger Band Confidence Levels

As a final test for quality, a cone was projected out after N number of trades using the average equity curve line slope. If the equity curve resided entirely within the cone for remainder of the trades within the system, then it indicated consistency and predictability of future earnings. As one can see in the figure below, though the equity curve resided below the average slope, it remained entirely within the cone again confirming quality of the system.
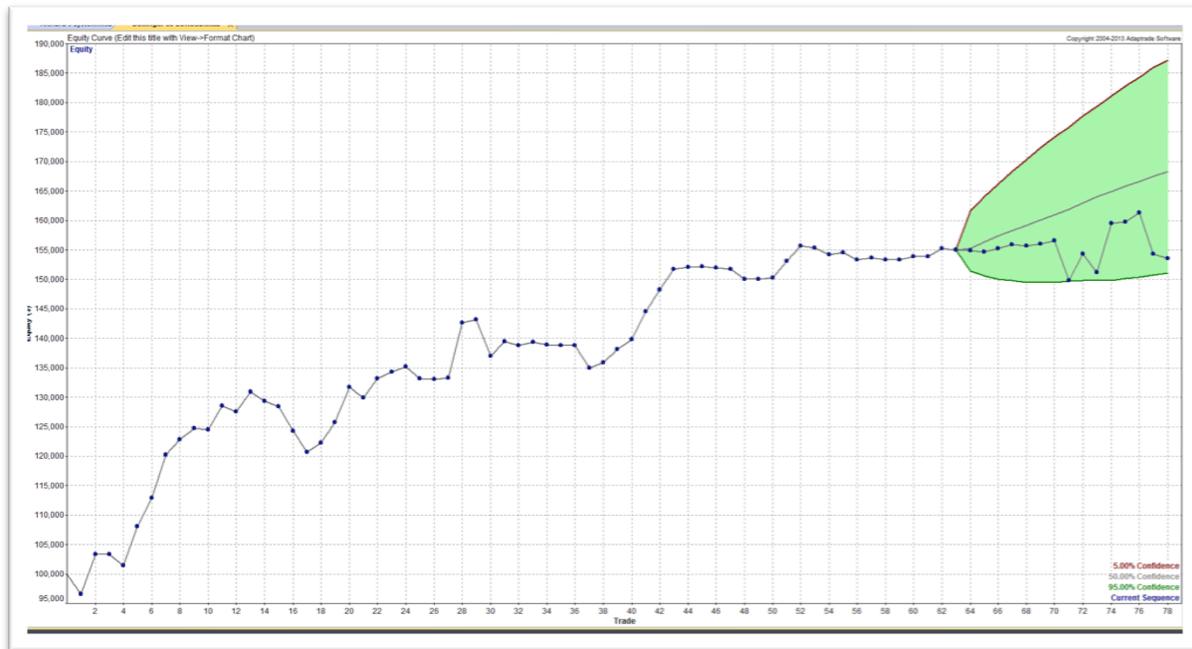
Figure 56: Bollinger Band Projected Cone

Observe Expectancy and Expectunity in the previously displayed figure below. Below are the meanings of systems quality calculations:

- **Expectancy**
  - R Mult 1: profit or loss per dollar risked per *trade* computed via the *average* loosing trade (*$353.27* profit in this case);
  - R Mult 2: profit or loss per dollar risked per *trade* computed via the *largest* loosing trade (*$23.11* profit in this case);
- **Opportunities**: average number of trades per year (*281.47* trades in this case)
- **Expectunity** (annualized expectancy)
  - R Mult 1: profit or loss per dollar risked per *year* computed via the *average* loosing trade (*$99436.36* profit in this case);
  - R Mult 2: profit or loss per dollar risked per *year* computed via the *largest* loosing trade (*$6505.87* profit in this case);
- **System Quality**: total profit or loss per dollar risked relative to the total variability of the profit or loss per dollar risked (*$8931.90* profit in this case, dimensionless, the higher the better)

As one can see both the R multiples are very high for this system meaning there is a lot of profit per dollar risked. As well, the system provides ample opportunity to be in the market, trading on average 281 trades per year. Finally the overall system quality rating is high, and the higher the better.

Strategy Performance Report

	All Trades	Long Trades	Short Trades
Total Net Profit	$ 100,034.40	$ 39,721.60	$ 60,312.80
Groos Profit	$ 619,931.00	$ 266,973.40	$ 352,957.60
Gross Loss	$ (519,896.60)	$ (257,251.80)	$ (292,644.80)
Profit Factor	1.19	1.17	1.21
Total Number of Trades	3066	1790	1276
Percent Profitable	39.82%	31.51%	51.49%
Average Winning Trade	$ 507.72	$ 473.36	$ 537.23
Average Loosing Trade	$ (283.17)	$ (186.27)	$ (475.07)
Largest Winning Trade	$ 5,474.00	$ 4,063.00	$ 5,474.00
Largest Loosing Trade	$ (4,328.00)	$ (1,001.50)	$ (4,328.00)
Max. consecutive wining trades	7	8	12
Max. consecutive loosing trades	12	19	11
Return of initial Capital			100.03%

Input Parameters

Key	Value	Optimization
BPrice	Close	None
MALength	16	10..30:2
StdDevNum	2	None
Stop Loss LX: Ammount	195	75..225:15
Stop Loss LX: Position Basis	TRUE	None
Strategy	Bollinger Bands Strategy + Stop Loss LX	

Symbol Info

Key	Value
Symbol	EURUSD
Interval	Minute
Interval Settings	5 minutes bar
Range	10 years back

Calculations

System Quality	First Trade	Last Trade	Days per Year	Strategy Calendar Days	Number of Trades	Expectancy R Mult 1	Expectancy R Mult 2	Expectunity R Mult 1	Expectunity R Mult 2	Opportunities	Std Dev R Multiples
8931.90	12/01/2004	11/28/14	335	3649d	3066	353.27	23.11	99436.36	6505.87	281.48	2.19

Figure 57: Bollinger Band System Quality

Code

See code in Appendix A.

This strategy works extremely poorly on trending assets. Since the core of this strategy is a volatility indicator it garners large losses for strong trends as it looks to play support and resistance line. I was even unable to optimize for trending stocks at all.

Precision Strategy

Description

This strategy is similar to the previously discussed Bollinger Bands system in that it also exploits the idea of prices being inside some band that lays a certain amount of standard deviations away from an average of some form. My Precision Strategy plots a regression line (the line such that all points on the graph are as close to it as possible) and two parallel lines which are K (K is usually 2) standard deviations above and below the regression line. The standard deviations remain standard deviations in price. Also the regression line is plotted only accounting last N (usually 10) bars.

There are three other plots on the chart – price, simple moving average and exponential moving average. When any (or all, depending on the strategy setup) of these indicators cross out of the bands created from the regression line and then come back into the bands, the strategy buys, sells, or does nothing depending on a regression line slope (which indicates trend). If the slope of the regression line disagrees with the other indicators, nothing is done.

The last feature of this strategy is that it takes into account trends in other timeframes. For example, if the strategy is functioning on a daily chart and the trend is up, but the hourly and monthly trends are down on their respective charts, strategy will not enter a position. The following figure illustrates the Precision Strategy in action.

Figure 58: Precision Strategy
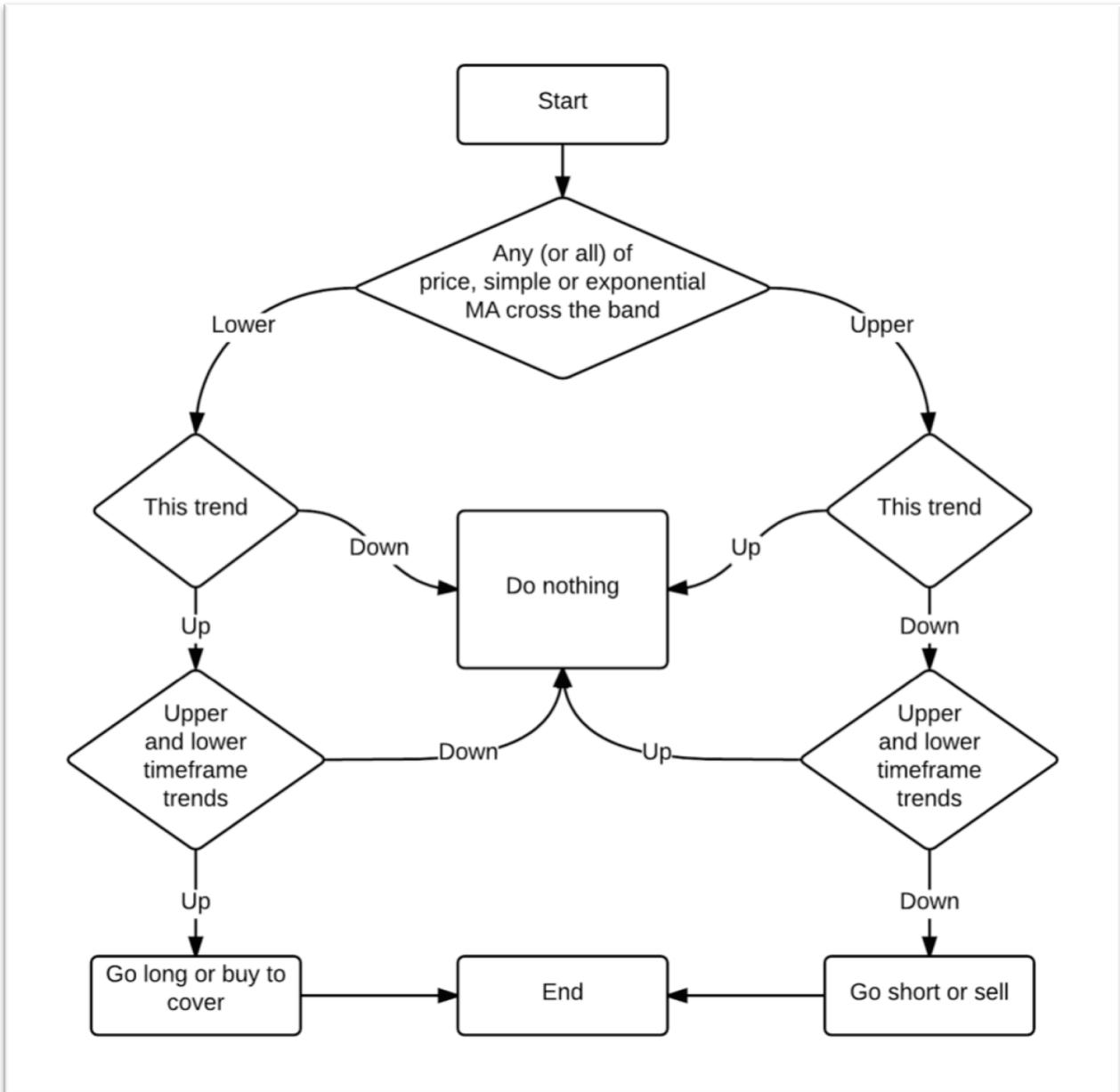
Figure 59: Precision Strategy Flowchart

Going long
- Setup is an uptrend in the regression line on both the upper and lower timeframes.
- Entry is one of the indicators "jumping in bandwidth" from the below.

Going short
- Setup is a downtrend in the regression line on both the upper and lower timeframes

- Entry is one of the indicators "jumping in bandwidth" from the above.

Exit
- Strategy signals "sell" or "buy to cover" due to s shift in regression trend.
- Stop loss signals an exit due to a loss, the size of which was predetermined to indicate the strategy was incorrect in taking the position.

Applications

This strategy works well on volatile markets where the strong trend is absent. It has been profitable for the currency pair *EURUSD* and equities *AAPL*, *GOOGL*, *IBM* and *YHOO*.

Optimization

This Indicator can't be optimized since it is not automated.

Walk Forward

This Indicator can't be Walked Forward since it is not automated.

Performance report and Analysis

This strategy is a manual one, relying on me to enter into and exit out of positions. As well it is selective, requiring multiple conditions be fulfilled to indicate entering a position. Due to these factors there is not enough data to compile a robust report and analysis.

System Quality

Since this strategy is mainly manual one and makes trades rarely there is not enough data to compile a any meaningful measure of system quality.

Code

See code in Appendix A.

Dead Ends

This strategy requires trader's attention – it is a manual strategy. I was unable to automate it. It still requires much of fundamental and sentiment analysis.

Batyrlan Nurbekov's Trading Systems

Bollinger Bands and Stochastic Oscillator Fusion based Strategy

Description

Relevant Terms Overview

Since standard deviation is a measure of volatility, *Bollinger Bands* are relevant when trying to measure the volatility of the market. This is due to the fact the Bollinger Bands widen when the standard deviation increases and contract when it decreases. [41]

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[41] http://www.investopedia.com/articles/technical/102201.asp

Therefore, Bollinger Bands consist of a *middle band* (center line) that is calculated as the exponential moving average, *upper* and *lower bands* that are calculated by the addition or subtraction of the standard deviation from the middle band.

The Stochastic Oscillator is a technical indicator that compares a security's closing price to its price range over a given time period. The oscillator's sensitivity to market movements can be reduced by adjusting the time period or by taking a moving average of the result.[42]

FastK is an indicator that is defined by the following formula:

FastK=100*(C-L)/(H-L), where

C – The most recent closing price

L – The low of the 14 previous trading sessions

H – The highest price traded during the same 14-day period.

FastK is generally used as a raw measure that formulates the momentum behind the oscillator.

FastD is another indicator that is a 3-period simple moving average of *FastK*. This indicator is generally treated as the smoothed version of *FastK*. Additionally, this indicator is equivalent to the *SlowK* indicator. S*lowD* is a further smoothed version of *SlowK* indicator, which is also calculated as a 3-period simple moving average of *SlowK*.

Strategy Description

The strategy combines *Bollinger Bands* with *Stochastic Oscillator* in order to produce the buy or sell short signal. More specifically, the strategy waits for the price to cross the *upper* or *lower* Bollinger band. This setup indicates that the market is volatile and big change in current price trend might occur.

Then, the strategy waits for the SlowK and SlowD crossing to generate a signal (buy or sell short). This ensures that there is a short-term momentum that usually indicates the reverse in the current price trend. The strategy exits the position once the price reaches the *middle* Bollinger band.

Additionally, the strategy sets the stop loss at the amount specified by the input argument.

Strategy Description

The strategy combines *Bollinger Bands* with *Stochastic Oscillator* in order to produce the buy or sell short signal. More specifically, the strategy waits for the price to get lower than the *lower* Bollinger band or higher than the *upper* Bollinger band. This setup indicates that the market is volatile and big change in current price trend might occur.

---

[42] http://www.investopedia.com/articles/technical/102201.asp

Then, the strategy waits for the SlowK and SlowD crossing to generate a signal (buy or sell short). This ensures that there is a short-term momentum that usually indicates the reverse in the current price trend. The strategy exits the position once the price reaches the *middle* Bollinger band.

Additionally, the strategy sets the stop loss at the amount specified by the input argument.

Flowchart
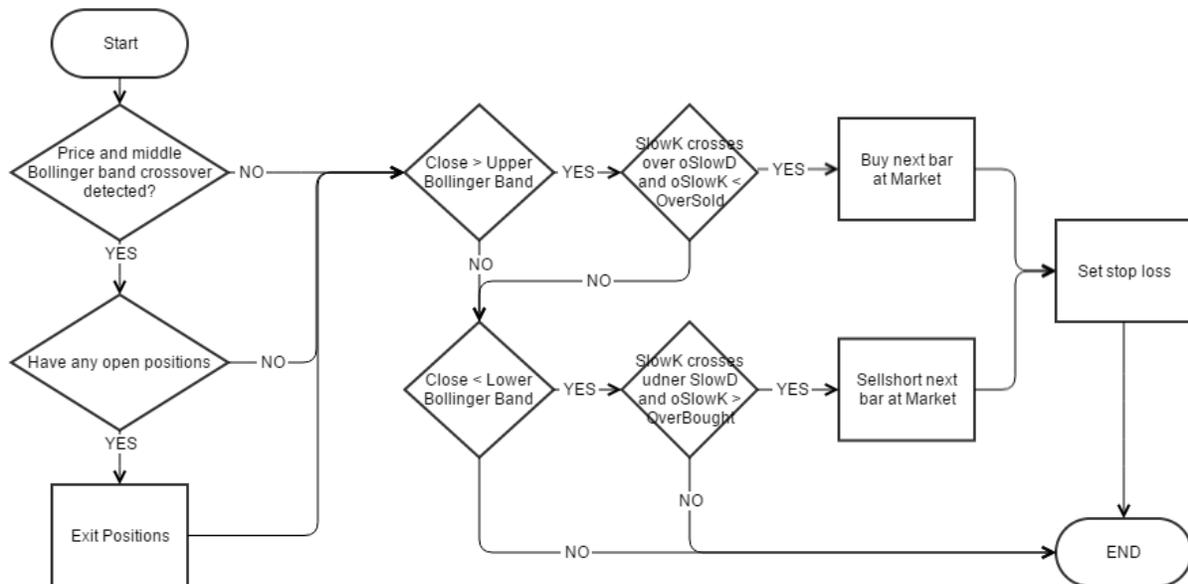
Figure 60: Bollinger Band And Stochastic Fusion Flowchart

Setup / Entry

Going long
- Setup is when the price crosses over the lower Bollinger Band.
- Entry should satisfy the following three conditions (assuming that we have checked the three bars immediately following setup):
    o   SlowK has crossed over SlowD.
    o   SlowK is below "Oversold" threshold on the stochastic.
    o   The close price of the current bar is larger than the close price on the setup bar (confirmation of long trend).

Going short
- Setup is when the price crosses under Upper Bollinger Band.

- Entry should satisfy the following three conditions (assuming that we have checked the three bars immediately following setup):
  - o SlowK has crossed under SlowD.
  - o SlowK is above "Overbought" threshold on the stochastic.
  - The close price of the current bar is smaller than the setup close price (confirmation of short trend).

Exit

- If the price intersects Middle Bollinger Band (which is calculated as the average of Upper and Lower Bands) then the strategy exits whatever position it has taken.

Applications

The strategy is applicable to volatile assets. It's profitable when whatever asset's price the strategy is deployed on keeps fluctuating between being overbought and oversold. This strategy would not be recommended on any assets that are trending.

Optimization

Both a standard optimization and a walk-forward optimization were performed. Both utilized the same following parameters and iterated over many trials, with small changes to these parameters to find the optimal value of each for the strategy (with the corresponding *Start, Stop* and *Increment* in parentheses):

1) Stop Loss Value (0, 500, 20)
2) Bollinger Band Length (1, 30, 2)
3) Number of deviations down (1, 5, 1)
4) Number of deviations up (1, 5, 1)
5) Stochastic length (1, 40, 1)
6) Oversold threshold (10, 30, 1)
7) Overbought threshold (70, 90, 1)
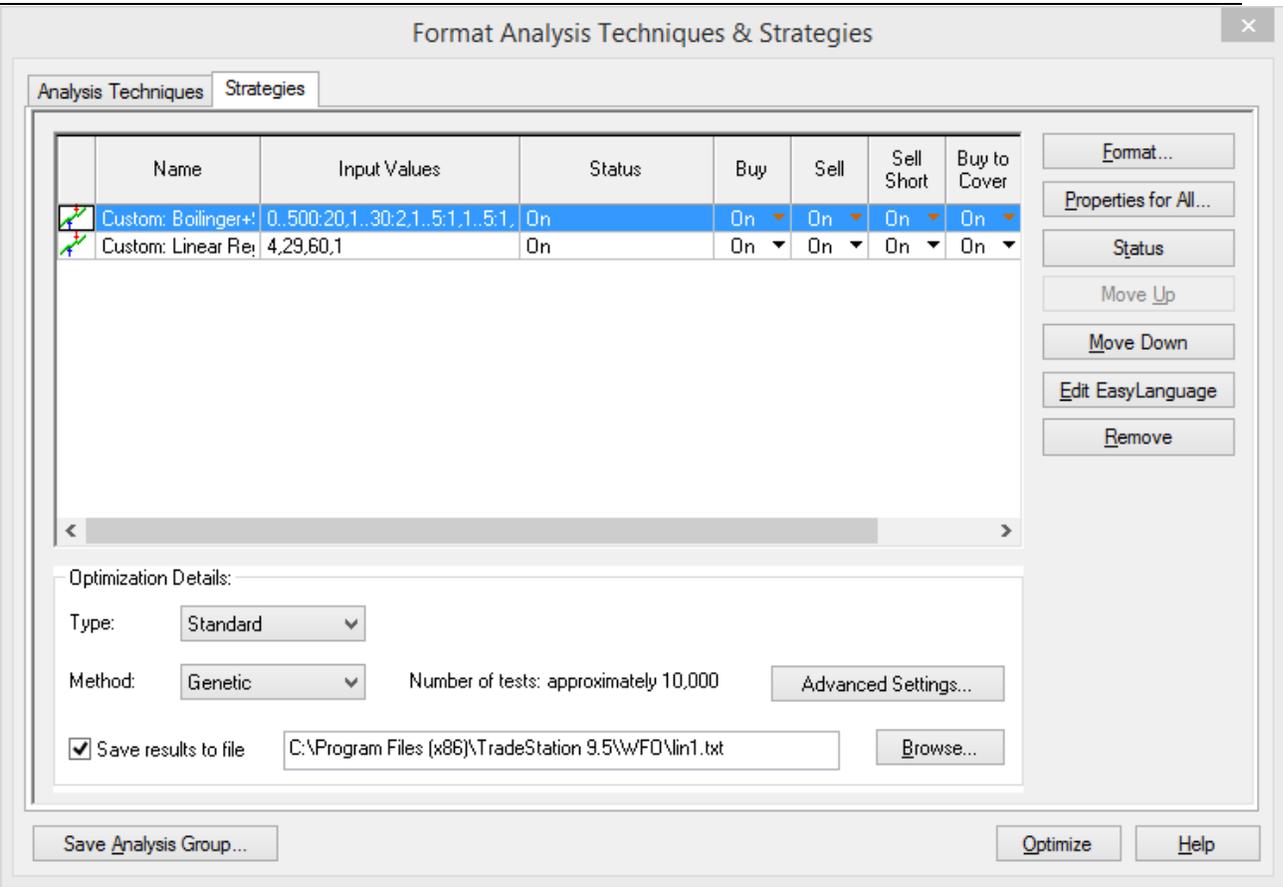
Figure 61: Settings Applied during Optimization

Above are the optimized parameters highlighted in blue.

Walk Forward

The system performed as expected during the walk-forward analysis shown on the figure below.

```
Walk-Forward Analysis Results :  OOS=20%  WFRuns=10

   Symbol:    EURUSD_5min                    Strategy:    bolliNew6
```

	Test Criteria	Result	Comment
1	Overall Profitability	Pass	Total Profit > 0. System is likely
			to perform profitable on unseen data
2	Walk-Forward Efficiency	Failed	Walk-Forward Efficiency < 50%. System is likely to perform in future
			at a rate of less than 50% of those achieved during optimization
3	Consistency of Profits	Pass	50%+ of walk-forward runs were profitable.
			System is likely to be successful in future.
4	Distribution of Profits	Failed	Walk-forward run #6 contributed
			more than 50% of Total Net Profit.
5	Maximum Drawdown	Pass	No individual run had a drawdown of more than 40%
			of initial capital.
	OVERALL RESULT	FAILED	

Figure 62: Walk Forward Results

We need to notice that the strategy is a scalping strategy by nature, which means that we get small varying amounts of profits over large amount of trades. The strategy is going to win many trades, but not win a lot on each. This property of the strategy is misunderstood by the walk forward analysis and so two entries gave the "Failed" result, causing an overall failure.

First of all, it is obvious that the distribution of profits will be different with the change of the input parameters because the system might have different amount of entry or exit opportunities for each particular set of parameters. Due to its scalping nature, a small change in parameters will have a large effect due to its affect on so many winning trades.

Secondly, the strategy might generate different amount of profits for the different time frames due to the same reason: different amount of opportunities. Additionally, the strategy uses stop loss to cut the drawdown, which also leads to different amount of profits over different periods of time. By all this reasoning, having "Failed" as a result of measuring Walk-Forward Efficiency is not concerning. .

On the other hand, we can see that the system has an overall profitability larger than 0. It also generates consistent profits and it does not have large drawdowns (due to the usage of stop loss). Thus the Distribution of Profits failing due to one of the trades accounting for a large portion of profit doesn't concern us, because the stop loss stops the opposite from happening, one trade accounting for a large loss.

Overall, the Walk Forward Optimization says "Fail," but when we take into consideration the nature of the strategy, the failures aren't truly flaws in the strategy, and thus the Walk Forward was a positive indicator of future profitability.

Performance report and Analysis

The following figure includes an analysis of the strategy's performance on the EURUSD currency pair (5 min chart):

Performance Summary			2014/11/17 - 2015/04/16			
Total Net Profit	$8,534.20					
Gross Profit	$41,953.30		Gross Loss	$-33,419.10		
Total # of trades	559		Percent profitable	55.64%		
Number winning trades	311		Number losing trades	248		
Largest winning trade	$1,455.00		Largest losing trade	$-1,748.00		
Average winning trade	$134.90		Average losing trade	$-134.75		
Ratio avg win/avg loss	$1.00		Avg trade (win & loss)	$15.27		
Median trade	$10.00		Std.Deviation	$229.95		
Max consec. winners	12		Max consec. losers	8		
Avg # bars in winners	20		Avg # bars in losers	18		
Max intraday drawdown	$-4,930.50		Profit Factor	1.26		
Max intraday drawdown %	4.93%		Return on Initial Capital	8.53%		

Figure 63: Performance Summary

As we can see in the figure above, the average winning trade amount is almost equal to the average losing amount. The strategy generates a positive net profit by having a larger amount of winning trades. Overall, the strategy had $15.27 of profit per trade, and a lower value like such is to be expected due to its scalping nature.

System Quality

Below are the meanings of systems quality calculations:
- **Expectancy**
    - R Mult 1: profit or loss per dollar risked per *trade* computed via the *average* loosing trade
    - R Mult 2: profit or loss per dollar risked per *trade* computed via the *largest* loosing trade
- **Opportunities**: average number of trades per year
- **Expectunity** (annualized expectancy)

- R Mult 1: profit or loss per dollar risked per *year* computed via the *average* loosing trade
- R Mult 2: profit or loss per dollar risked per *year* computed via the *largest* loosing trade
- **System Quality**: total profit or loss per dollar risked relative to the total variability of the profit or loss per dollar risked

System quality	First Trade	Last Trade	Days per Year	Strategy Calendar Days	Number of trades	Expectancy	Expectunity	Oppportunities	Std Dev R Multiples
1.1175592	2/27/2015	4/16/2015	365	48	223	**R Mult 1:** 0.12 **R Mult 2:** 0.02	**R Mult 1:** 206.85 **R Mult 2:** 33.02	1,695.73	1.6299447

Figure 64: Bollinger Band System Quality

As we can the system generates a lot of opportunities. However, the expectancy value is relatively low per trade. This is due to the reasons discussed above about the system being a scalping system in nature. The Expectunity shows a far better idea of the long-term profitability of the system. As well the system quality is greater than one, which is what we want.

Code
See Appendix A

Dead Ends
The strategy is not applicable to the assets with the clear trend. This is due to the usage of stochastic indicator that is mostly applicable to the volatile assets.

Linear Regression Based Strategy

Description
The strategy uses linear regression channels to enter and exit the market. Specifically, it buys when the current close crosses over the Lower Linear Regresion Channel (it is calculated as LinRegValue – Standard Deviation) and sell when the current close crosses under the Upper Linear Regression Channel (it is calculated as LinRegValue + Standard Deviation).

The strategy also uses the stop loss to exit the position when the certain predetermined value of loss is reached.

During the course of this strategy I designed a custom condition for the entry of it into any position that greatly helped profitability. The entry makes sure that the strategy doesn't immediately buy when one of the regression channels is reached. It checks the nth bar in the

future (n is specified by the input parameter). If the close of that bar is higher or lower depending on the position type (buy or sell short), then the strategy opens the position. If this condition is not met then it doesn't enter any position.

Flowchart
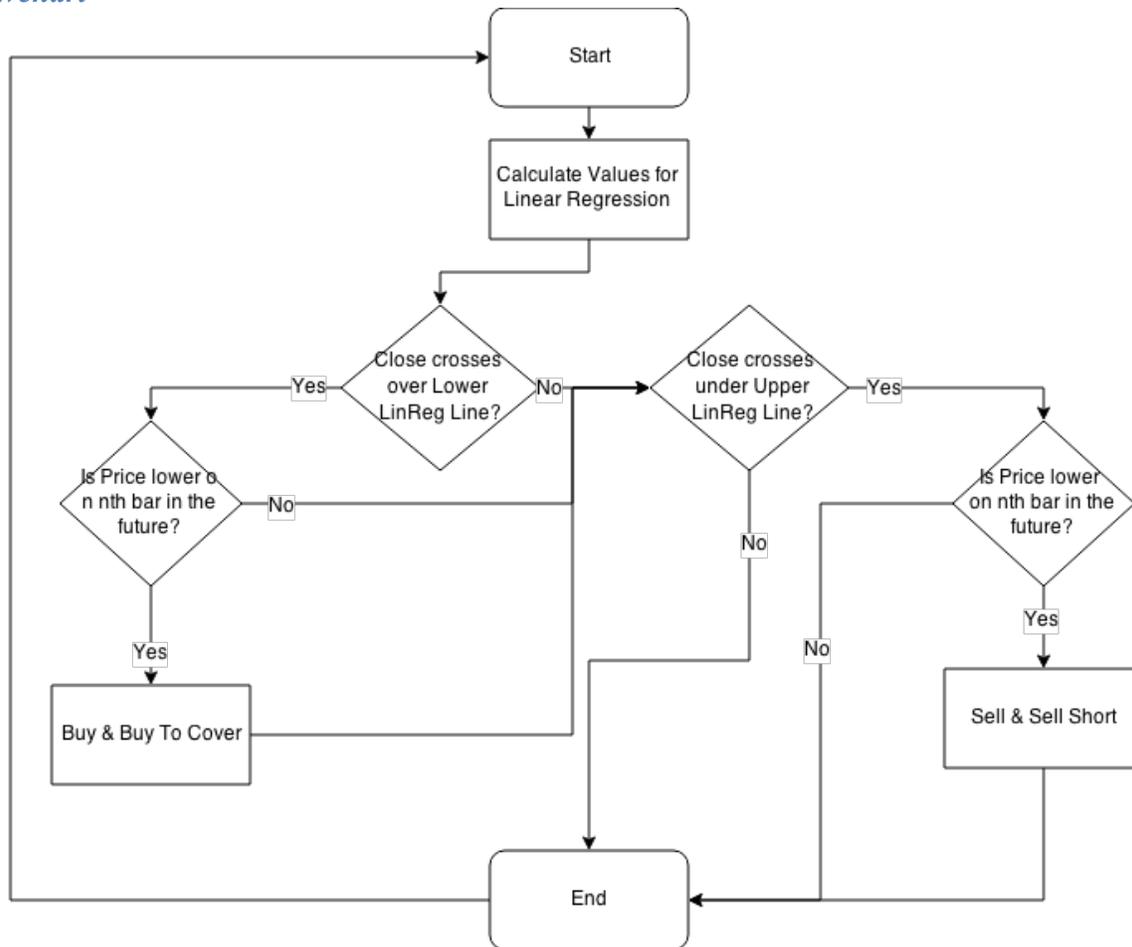
Figure 65: Linear Regression Flowchart

Setup / Entry

Going long
- Setup occurs when the price crosses over the Lower Linear Regression Line (that is calculated by shifting the regular regression line by n multiple standard deviations down, where n is defined as a parameter that can be optimized)
- Entry should satisfy the following condition (assuming that we check n bars in the future after setup, where n is defined as a parameter that can be optimized):
  - o The close price of the current bar is larger than the setup close price (confirmation of long trend)

Going short
- Setup occurs when the price crosses under the Upper Regression (that is calculated by shifting the regular regression line by n multiple deviations up, where n is defined as a parameter that can be optimized)
- Entry should satisfy the following condition (assuming that we check n bars in the future after setup, where n is defined as a parameter that can be optimized):
    - The close price of the current bar is smaller than the setup close price (confirmation of long trend)

Exit

The exit is triggered in the event that the assets price and future price satisfying the conditions for the reverse direction from the position that was taken. For example if the strategy was long, then the conditions for the strategy to short must be filled before it exits the long. This a stop and reverse system.

Applications

The strategy is applicable to volatile assets. It's profitable when whatever asset's price the strategy is deployed on keeps fluctuates within a predictable range, which is determined by the regression channels. This strategy can handle underlying trends, though volatility of shorter term price is needed.

Optimization

Both a standard optimization and a walk-forward optimization were performed. Both utilized the same following parameters and iterated over many trials, with small changes to these parameters to find the optimal value of each for the strategy (with the corresponding *Start, Stop* and *Increment* in parentheses):

1) Back period (1, 5, 1)
2) Length (1, 30, 2)
3) Stop loss value (0, 500, 10)
4) Standard deviation multiplier (1, 10, 1)
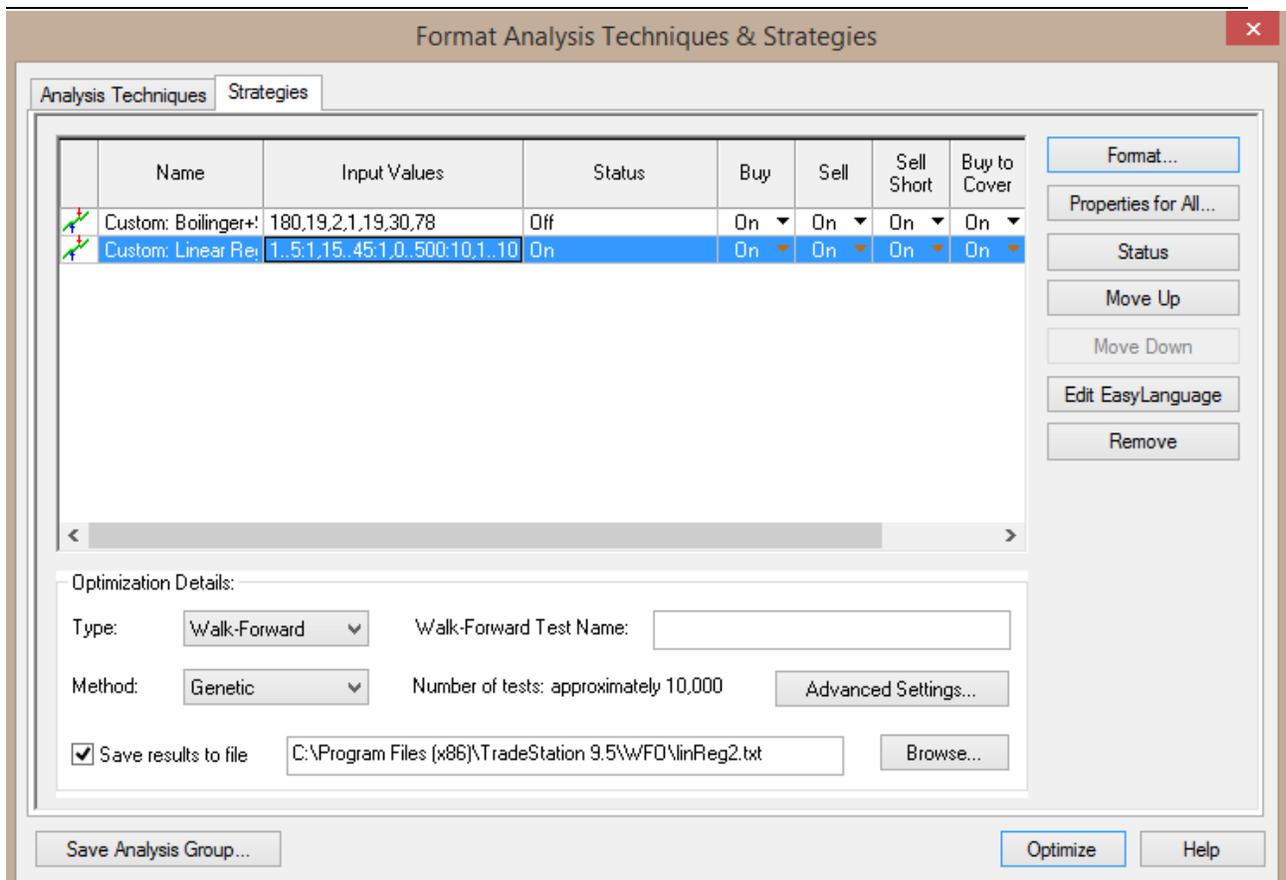
Figure 66: Optimized parameters

Above are the optimized parameters highlighted in blue.

Walk Forward
The results that the walk-forward analysis came out as expected, again there was a failure due to the nature of the system.

Walk-Forward Analysis Results : OOS=20% WFRuns=10

Symbol: EURUSD_5min   Strategy: LinReg1

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

Figure 67: Linear Regression Walk Forward

As we can see, the only entry that produced a "Failed" value is the Walk-Forward Efficiency. This is due to the usage of the stop loss in the strategy. Similar to the last strategy, the stop loss would cause large differences within parameters. Additionally, the strategy is always in the market. Therefore, the rate at which profit is generated might vary significantly over different time intervals. As well, some optimizations might last very long if the market makes no significant changes, yet others may not due to a highly volatile market.

Most importantly the strategy generated overall profitability larger than 0, an even profit distribution and good consistency of profits with respect to differences in time frame.

Performance report and Analysis
The following figure includes an analysis of the strategy's performance on the EURUSD currency pair (5 min chart):

Performance Summary			2014/11/16 - 2015/04/16		
Total Net Profit	$17,055.59				
Gross Profit	$82,095.39		Gross Loss	$-65,039.80	
Total # of trades	1640		Percent profitable	45.98%	
Number winning trades	754		Number losing trades	886	
Largest winning trade	$1,096.00		Largest losing trade	$-1,010.00	
Average winning trade	$108.88		Average losing trade	$-73.41	
Ratio avg win/avg loss	$1.48		Avg trade (win & loss)	$10.40	
Median trade	$-7.00		Std.Deviation	$160.46	
Max consec. winners	9		Max consec. losers	12	
Avg # bars in winners	14		Avg # bars in losers	9	
Max intraday drawdown	$-4,052.01		Profit Factor	1.26	
Max intraday drawdown %	4.05%		Return on Initial Capital	17.06%	

Figure 68: Linear Regression Performance

The average winning trade is $108.88, which is typical for the trend prediction strategy due to its propensity to win relatively as many times as it loses, but win bigger than it loses. The intraday drawdown was almost -$4052.71, though this is expected, since the strategy is always in the market therefore it is prone to the large drawdowns. Additionally, the number of trades was relatively large, giving anyone who uses this strategy ample opportunity to profit. This might be caused by the volatile nature of the testing asset, but also a large factor is that, again, the strategy is always in the market.

Monte Carlo analysis was performed on trades generated by this strategy on Apple's five-minute chart, ranging as far back as 10,000 bars (from April 1st).

It is especially important to note when considering the Monte Carlo that the optimization was not performed prior to running Monte Carlo analysis. This means the Monte Carlo will indicate lower profitability than possible.

The analysis below shows that the rate of return on that particular asset is 3.821% on the starting equity with 100% confidence. Max drawdown is 5.495% with 100% confidence.

```
Monte Carlo Results: Market System                                    _ □ X
File  Edit  Help
Trading Parameters                                                      ▲

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

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

Key Results at Select Confidence Levels

Confidence (%)   Rate of Return (%)   Max Drawdown (%)   Return-DD Ratio   Mod. Sharpe Ratio
50               3.821                2.175              1.757             0.08581
60               3.821                2.325              1.644             0.08562
70               3.821                2.521              1.516             0.08541
80               3.821                2.771              1.379             0.08516
85               3.821                2.945              1.297             0.08501
90               3.821                3.163              1.208             0.08484
91               3.821                3.214              1.189             0.08480
92               3.821                3.267              1.170             0.08475
93               3.821                3.330              1.147             0.08470
94               3.821                3.404              1.123             0.08464
95               3.821                3.484              1.097             0.08457
96               3.821                3.573              1.069             0.08450
97               3.821                3.720              1.027             0.08442
98               3.821                3.856              0.9910            0.08429
99               3.821                4.131              0.9250            0.08407
100              3.821                5.459              0.7000            0.08325

Monte Carlo Results at 95.00% Confidence

Total Net Profit: $3,821.00            Max Number of Shares: 100
Final Account Equity: $103,821.00      Minimum Number of Shares: 100
Return on Starting Equity: 3.821%      Average Number of Shares: 100
Profit Factor: 1.281

Largest Winning Trade: $987.00         Largest Losing Trade: ($595.00)
Largest Winning Trade (%): 0.9502%     Largest Losing Trade (%): -0.5986%
Average Winning Trade: $179.44         Average Losing Trade: ($150.94)
Average Winning Trade (%): 0.1741%     Average Losing Trade (%): -0.1505%

Average Trade: $20.43                  Win/Loss Ratio: 1.189
Average Trade (%): 0.02033%            Win/Loss Ratio (%/%): 1.188
Trade Standard Deviation: $241.18      Max Consecutive Wins: 5
Trade Standard Deviation (%): 0.2405%  Max Consecutive Losses: 9

Worst Case Drawdown: ($3,609.00)       Return/Drawdown Ratio: 1.097
Worst Case Drawdown (%): 3.484%        Modified Sharpe Ratio: 0.08457
Average Drawdown: ($808.82)
Average Drawdown (%): 0.7915%                                           ▼
```

Figure 69: Linear regression Monte Carlo Analysis

The equity curve was also plotted. It has a strong average uptrend indicated by the red line.
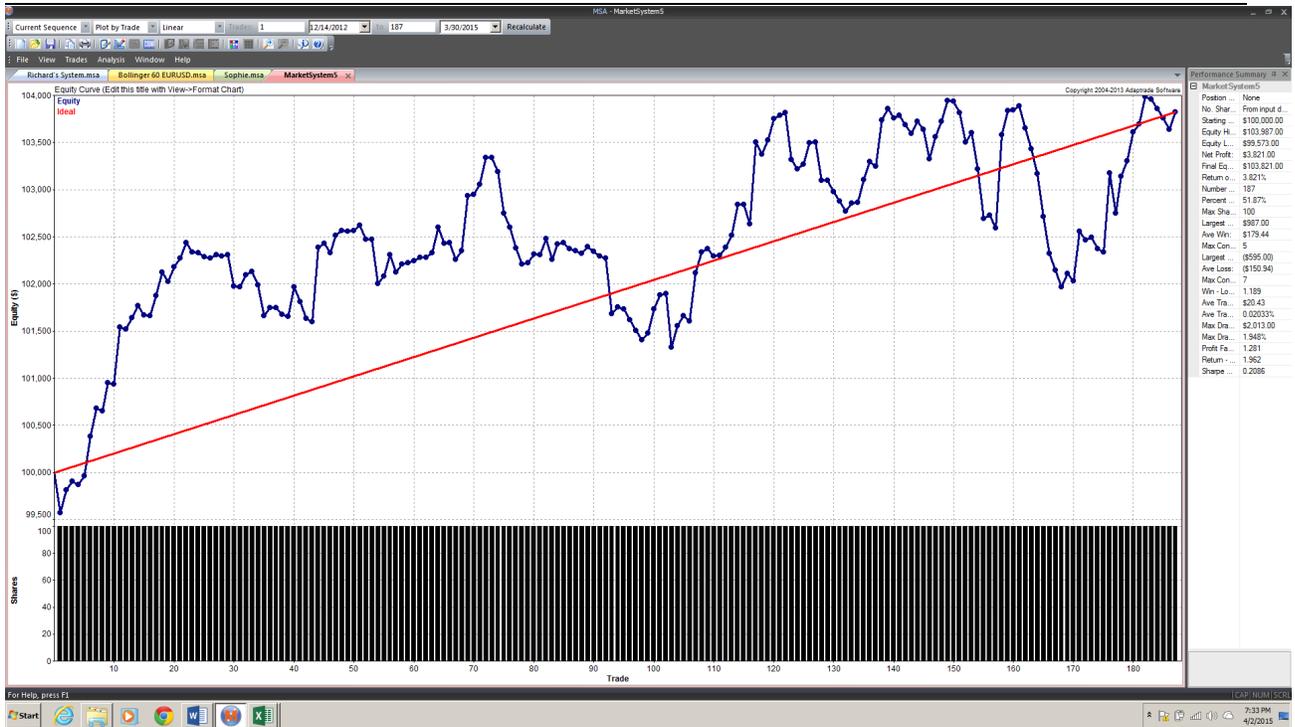
Figure 70: Linear Regression Equity Curve

Next, an oval was generated around the average equity curve indicating where the systems equity should always reside statistically. The curve always stays inside of the area bounded of the oval, except for one instance where the system the curve breaks through the upper bound of oval. However, this should not be considered as an inconsistency because that breakout indicates that the strategy generated more profit than it was expected at one particular moment. For all other instances the strategy demonstrates remarkable consistency.
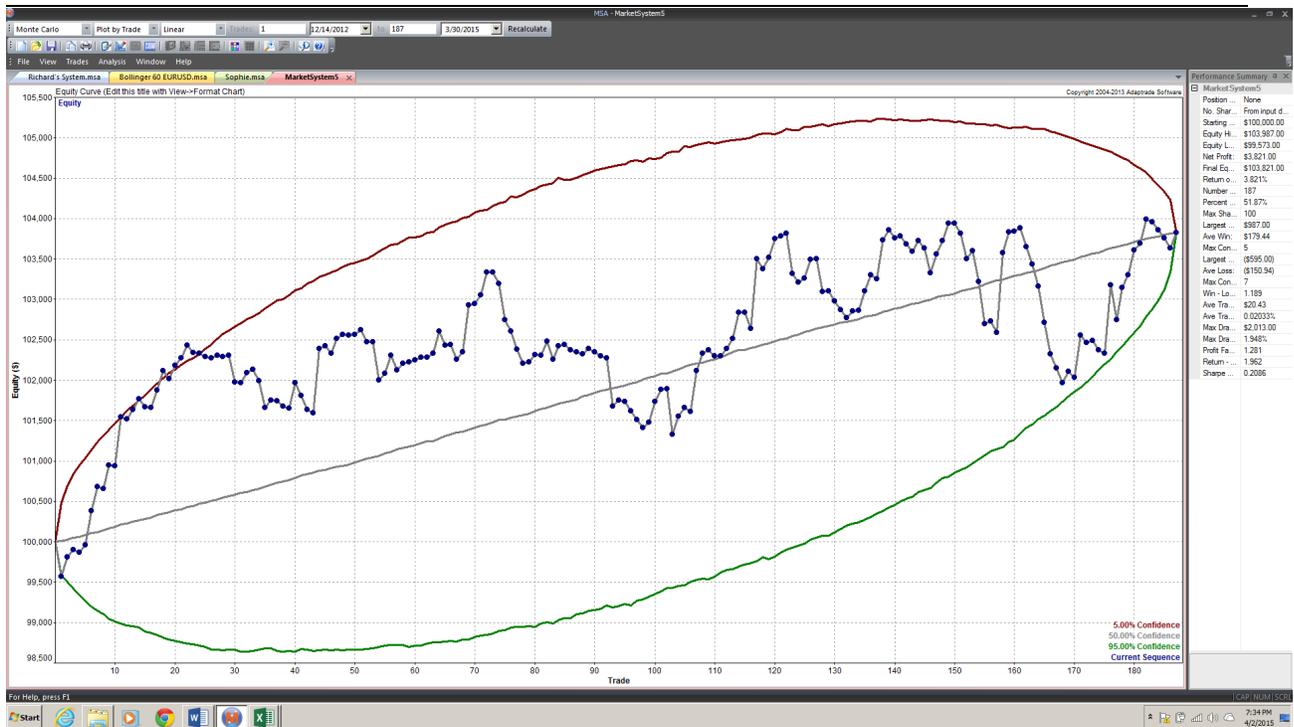
Figure 71: Oval Generated Around Average Equity

Monte Carlo analysis was also performed for the testing data set. It shows that the rate of return would be equal to 1.202% on average, if we were to trade with the new data. Considering the fact that the strategy was not optimized and the asset was selected randomly, this is a very good result that shows that the strategy can generate a positive rate of return without any optimization and domain knowledge about the asset.

```
Monte Carlo Results: Market System                                    _|□|X|
File  Edit  Help
Market System: MarketSystems                                              ▲

Trading Parameters

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

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

Key Results at Select Confidence Levels

Confidence (%)   Rate of Return (%)   Max Drawdown (%)   Return-DD Ratio   Mod. Sharpe Ratio
50               3.117                1.948              1.569             0.07785
60               2.825                1.948              1.405             0.07065
70               2.509                2.030              1.223             0.06319
80               2.142                2.272              0.9762            0.05383
85               1.904                2.428              0.8141            0.04822
90               1.617                2.636              0.6350            0.04110
91               1.544                2.684              0.5982            0.03941
92               1.476                2.755              0.5572            0.03772
93               1.397                2.818              0.5118            0.03570
94               1.308                2.881              0.4745            0.03324
95               1.202                2.977              0.4185            0.03081
96               1.073                3.081              0.3591            0.02763
97               0.9090               3.209              0.2902            0.02358
98               0.6970               3.393              0.2062            0.01803
99               0.3480               3.726              0.1007            0.009822
100              -1.262               5.097              0.000             -0.02919

Monte Carlo Results at 95.00% Confidence

Total Net Profit: $1,202.00                Max Number of Shares: 100
Final Account Equity: $101,202.00          Minimum Number of Shares: 100
Return on Starting Equity: 1.202%          Average Number of Shares: 100
Profit Factor: 1.089

Largest Winning Trade: $868.00             Largest Losing Trade: ($595.00)
Largest Winning Trade (%): 0.8457%         Largest Losing Trade (%): -0.5818%
Average Winning Trade: $148.77             Average Losing Trade: ($153.48)
Average Winning Trade (%): 0.1457%         Average Losing Trade (%): -0.1496%

Average Trade: $6.43                       Win/Loss Ratio: 1.007
Average Trade (%): 0.006616%               Win/Loss Ratio (%/%): 1.012
Trade Standard Deviation: $231.84          Max Consecutive Wins: 5
Trade Standard Deviation (%): 0.2264%      Max Consecutive Losses: 7

Worst Case Drawdown: ($3,094.00)           Return/Drawdown Ratio: 0.4185
Worst Case Drawdown (%): 2.977%            Modified Sharpe Ratio: 0.03081
Average Drawdown: ($641.93)
Average Drawdown (%): 0.6215%                                              ▼
```

Figure 72: Monte Carlo Analysis for the Testing set

Lastly, a cone was projected for equity curve of the testing data set. As we can see on the figure below, the mentioned equity curve mostly remained within the bounds of the cone. It broke the upper bound only once in the very beginning, which indicates that the strategy generated more profit than it was expected. This shows that the strategy is robust and will most likely perform well on the unseen (new) data.
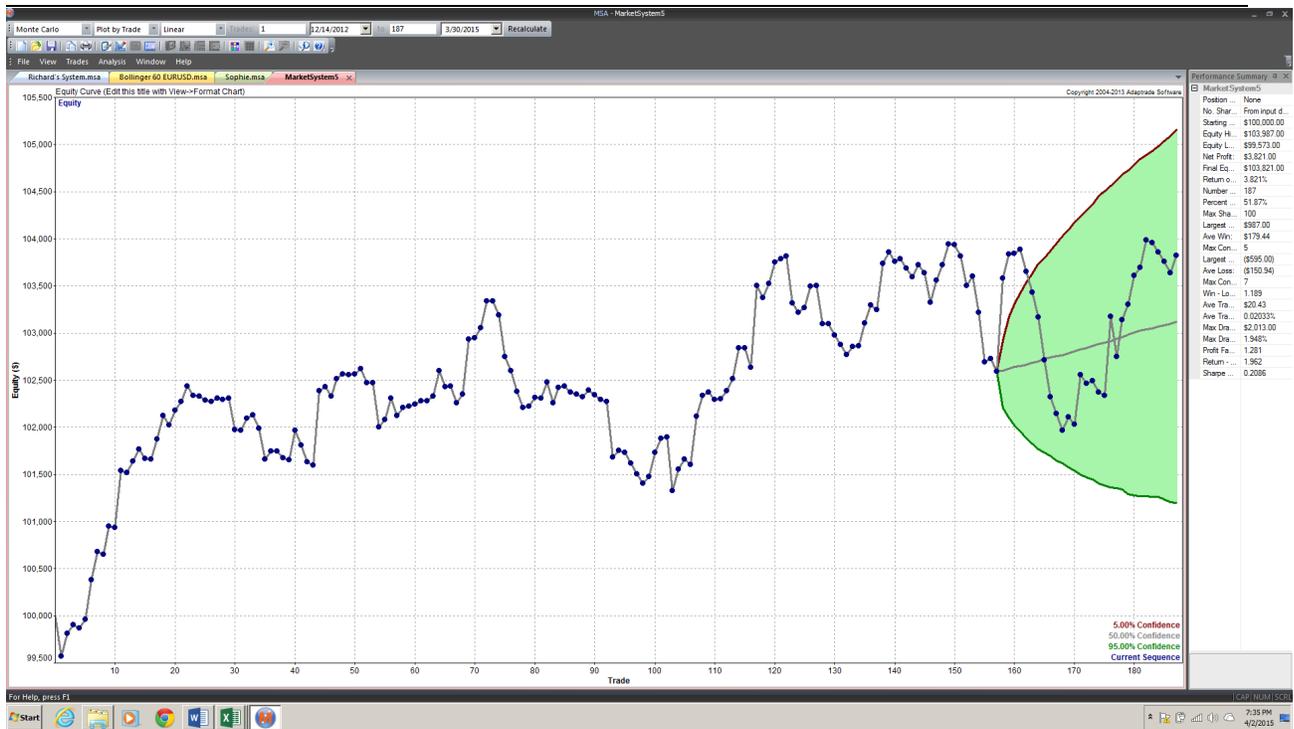
Figure 73: Projected cone for the testing data

System Quality

A description of the parameters used for the system quality estimation is given in the previous strategy.

System quality	First Trade	Last Trade	Days per Year	Strategy Calendar Days	Number of trades	Expectancy	Expectunity	Oppportunities	Std Dev R Multiples
1.03158338	3/24/2015	4/16/2015	365	23	184	**R Mult 1:** 0.16 **R Mult 2:** 0.03	**R Mult 1:** 478.56 **R Mult 2:** 80.08	2,920.00	2.15504304

Figure 74: System Quality

The number of opportunities is a very large giving any trader many chances to profit. This is due to the fact the strategy is always in the market because instead of exiting some particular position when it comes time to take profits, the system it reverses the position. As well, the Expectunity is

high, around $500, meaning that for every dollar is risked annually, there should be large profits. The overall system quality is also above one, passing the threshold of one that all profitable strategies should cross if they are going to be used.

Code
See code in Appendix A

Dead Ends
There were no significant dead ends worth mentioning.

K Means Clustering Based Prediction Algorithm

Description

Main logic
The algorithm utilizes K-Means clustering in order to create groups of stocks. These groups are represented by their centroids (the points that are located in the center of created cluster based on the distance metric).

K-Means clustering
Firstly, K-means clustering algorithm randomly selects the cluster centroids and assigns the points to the closest cluster.

Secondly, it computes the centroid position of each cluster. Note: the centroid is not necessarily a specific point in cluster; it is just an average of all the points in the cluster.

Algorithm overview
First of all, the algorithm consecutively creates different amounts of clusters and calculates special metric called Sum of Squared Errors (SSE) that indicates how good our clustering is. *Note: the smaller distance between the centroid and the points that belong to the cluster, the smaller SSE is.*

After that it plots the number of clusters against SSE metric:
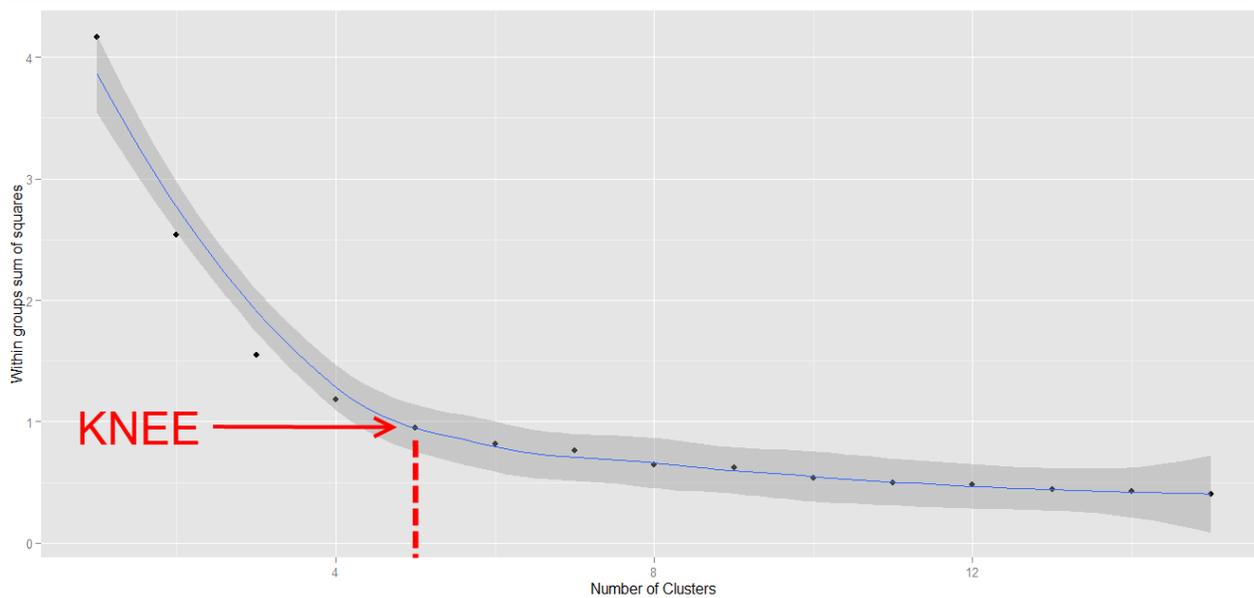
Figure 75: K Means Clustering

It is the responsibility of the user to select the appropriate number of clusters that the algorithm will work with.

Cluster number selection process
In order to select the appropriate number of clusters, it is enough to just find a "knee" point (also sometimes called "elbow" point) on the graph and see what number of clusters it corresponds to (the number on x axis).

Correlation Analysis
Finally the algorithm also computes the autocorrelation between the produced centroids. It also normalizes the autocorrelation to so that all the values are in the interval [0, 1].

Results
The algorithm came up with the following centroids:

Cluster	High	Low	Close
1	0.009	-0.065	-0.049
2	0.030	-0.008	0.021
3	0.007	-0.029	-0.019
4	0.069	-0.009	0.055
5	0.009	-0.009	0.001

Figure 76: Clusters

As we can see, these centroids represent five different types of days:

1 - The close price is much lower than the previous day's close price (-0.049).

2 - The close price is moderately higher than the previous day's close price (0.021).

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3 - The close price is moderately lower than the previous day's close price (-0.019).

4 - The close price is much higher than the previous day's close price (0.055).

5 - The close price is almost equal to the previous day's close price (0.001).

It also computed the autocorrelation matrix:

Cluster	1	2	3	4	5
1	**0.58**	0.14	0.22	0.02	0.03
2	**0.37**	0.23	0.28	0.04	0.08
3	**0.38**	0.21	0.28	0.05	0.07
4	0.16	0.22	**0.30**	0.13	0.19
5	0.20	**0.30**	0.19	0.14	0.17

Figure 77: Correlation

Therefore, for AAPL stocks if the previous day's close price was much lower than the close price the day before, then it is very likely that (with 58% of certainty) that this day's close price will be also much lower. We can also notice a couple of more interesting patterns that were marked by bold font and underscore.

Future Development
This strategy could have vast potential applied in cooperation with others. Applying this type of analysis technique in combination with other analysis techniques (such as regression channels) to predict the day's close price is how it was used, and how it should continue to be developed.
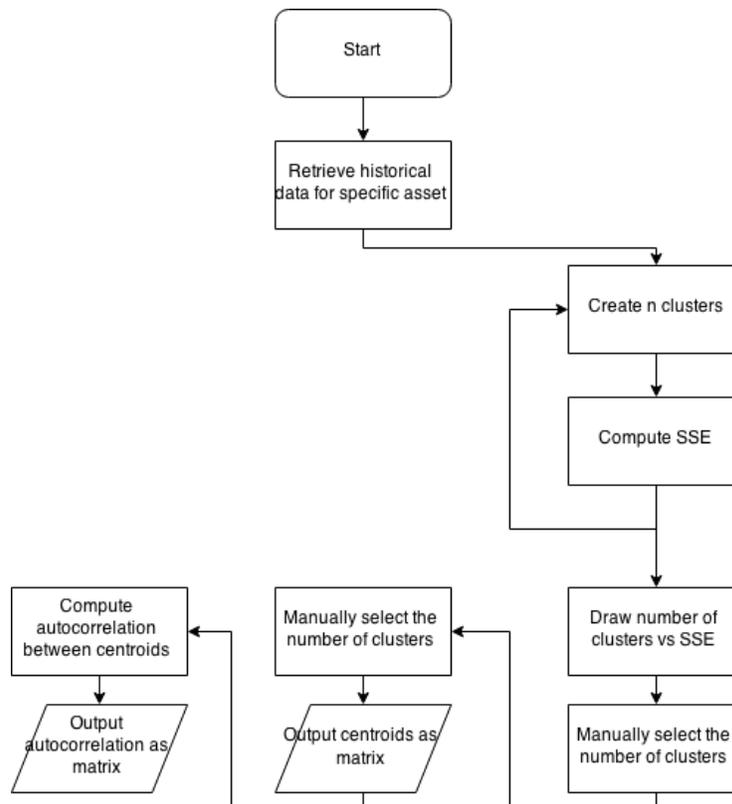
Figure 78: K Means Clustering Flowchart

Setup / Entry
- After performing the correlation analysis, the probabilistic threshold can be used as a setup. For example, we can choose the probability 60% and higher as our setup to enter the position.
- Entry would occur upon generating a prediction with this probabilistic threshold or higher.

Exit

This section is not applicable to the prediction algorithm listed above because it lacks the functionality of exits. However, the correlation analysis can be exploited in order to make a decision about the exit. For instance if you generate a prediction with a certain probability that the market will move against your position, you could exit.

Applications

This section is not applicable to the prediction algorithm listed above because it does not perform trading automatically. The strategy works well on a certain group of assets as opposed to a certain type of market.

Optimization

This section is not applicable to the prediction algorithm listed above because the algorithm is not an automated strategy.

Walk Forward

This section is not applicable to the prediction algorithm listed above because the algorithm is not an automated strategy.

Performance report and Analysis

As this is only a predictive indicator, not an actual automated trading system; it is impossible to generate a performance report and analysis. As well, its ability to predict varies greatly from asset to asset.

System Quality

As this is only a predictive indicator, not an actual automated trading system; there are no trades to use in evaluating system quality. However, if there has been substantial enough integration of this indicator with a strategy (Since it was developed to late), then it would be possible to generate reports of system quality and performance analysis. Unfortunately there was not enough time.

Code

See Code in Appendix A

Dead Ends

The prediction algorithm does not have dead ends

Neural Networks Based Prediction Algorithm

Description

This algorithm uses neural networks to make specific predictions of the closing price at the end of each day.

These predictions are based on the date and open price at the beginning of each day. The algorithm trains the neural network using the data over the last 5 years.
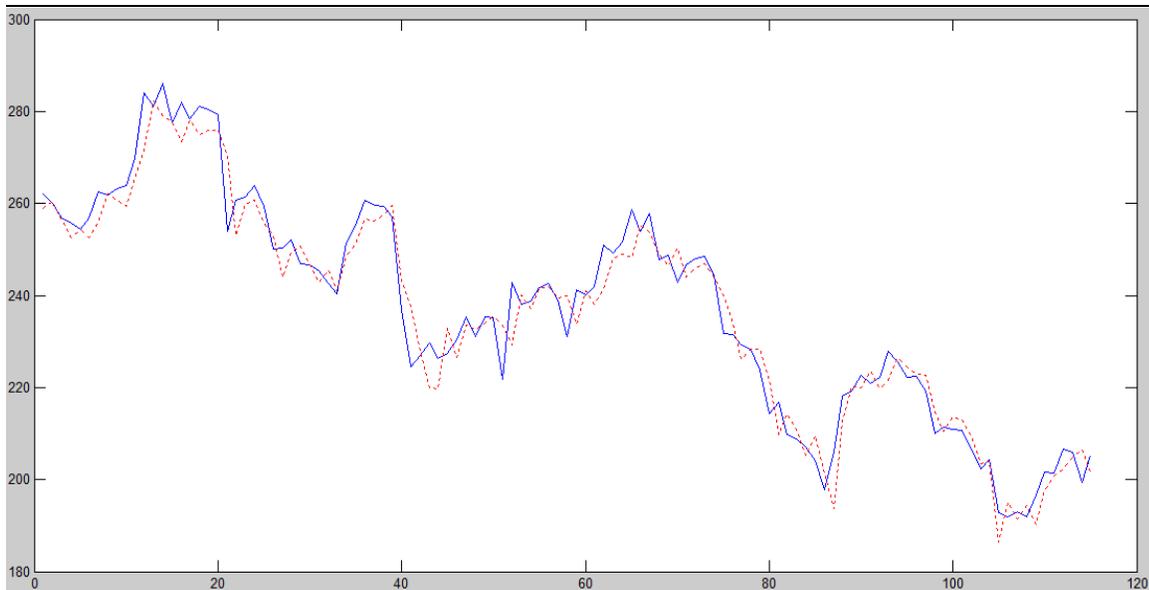
Figure 79: Neural Network Prediction

In the chart above the comparison of the predictions (shown in red) with the actual closing prices (shown in blue) can be seen.

Detailed Overview

The first step in the process is the algorithm imports the data for the price of an asset over whatever amount of time is specified. It is important to note that the user should run the portion of the code that is responsible for the import of data manually.

Next, the algorithm splits the data into two data sets: a training set and a testing data set. The algorithm then actually trains the neural network, consisting of two neurons, using the price data. Specifically, the algorithm tries to find the best combination of connections between those two neurons and the weight values assigned to those connections such that the predicted price that the neurons would give as an output comes as close as possible to the actual price.

At this point the neurons have only seen the training set not the testing set. After training the neurons, the algorithm outputs its predictions for what the testing data set should be and then plots them. The algorithm then takes the testing set, and plots it on the same graph as the predicted values, which are then easily compared to judge for accuracy.

Result Analysis

When we compare two curves we can see that it predicts the actual curvature precisely. However, we can also notice the lag associated with the prediction since the prediction curve seems to be shifted a bit to the right. The predictions appear so follow the price not precede them. We can solve this problem by trying to increase the number of neurons in the neural network or retrieve the larger portion of data for the training set. However, knowing there is a slight lag in the predictions can be very powerful, since the prediction exists before the data does. This way we can catch moves confirmed with the predictions, once they begin in the data.

Future Development

In the future the neural network could be expanded using of more neurons, which will give even more precise results. As well, this should be paired with an automated strategy that will help confirm predictions and take positions.

Flowchart
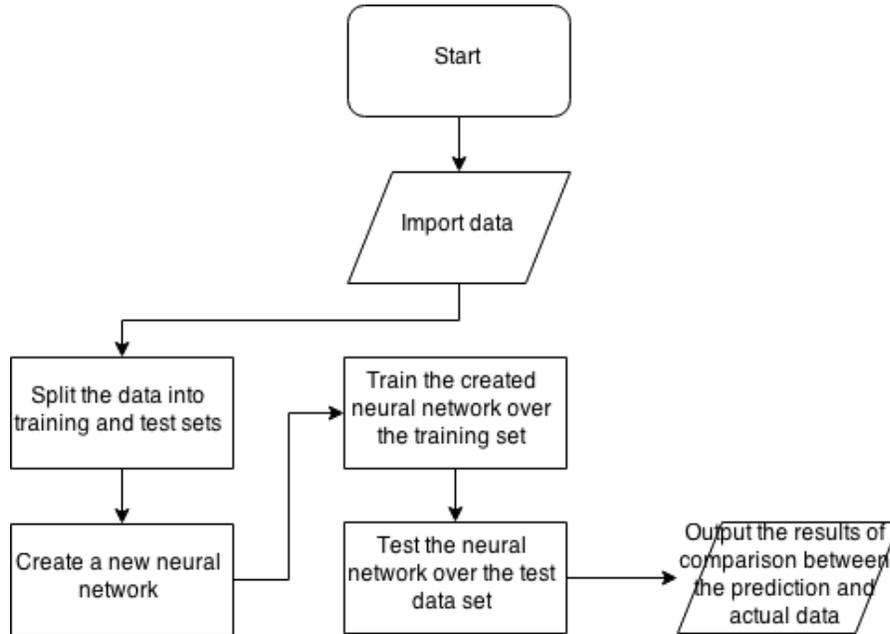
Figure 80: Neural Network Flow Chart

Setup / Entry

This is only a prediction algorithm and so there is no setup or entry. If the system predicts accurately on a stock, one could enter a position whenever they feel the most opportune time.

Exit

This is only a prediction algorithm and so there are no exits. If the system predicts accurately on a stock, one could enter and exit a position whenever they feel the most opportune time.

Applications

The prediction algorithm is generally applicable for the assets that are not too much affected by the external factors. Additionally, it generates predictions very well for the assets that do not have sharp price fluctuations.

Optimization

TradeStation can't optimize this. However, finding the stocks it predicts most accurately is a form of optimizing it.

Walk Forward

TradeStation can't perform Walk Forward on this algorithm.

This section is not applicable to the prediction algorithm listed above because the algorithm is not an automated strategy.

System Quality

Since the Neural Network Prediction Algorithm only is only just that, a prediction algorithm, system quality can't be evaluated since no trades were made by it. However, the system is noticeably more accurate on certain stocks than others. On some stocks its predictions are dead on while others it appears very out of sync. So once one finds a stock that the system predicts well, there is limitless potential indicating a great system, however there is some lack of consistency that it doesn't work on every stock.

Code

See code in Appendix A.

Dead Ends

The prediction algorithm does not work for assets that are affected strongly by some external factors. For example, the prediction algorithm does not work very well for the Forex market, because currencies are heavily dependent upon the economy situation in the countries, and the economy is usually heavily affected by the external factors such as natural disasters or anything else of that nature.

Additionally, the algorithm is not applicable for assets that show frequent price fluctuations. It generally tends to create "false" peaks for those kinds of assets.

System of Systems

Overview

Prediction Layer

The prediction layer of the strategy is the first factor that decides whether of not our groups cumulative system is going to enter into a position. In total we have four predictive indicators: Richard's Excel Analysis System, Dmytro's Precision Strategy, and Batyr's K Means Clustering Strategy as well as his Neural Network. The essential idea of the predictive layer is to have the predictive methods all working in unison to help generate accurate predictions as to where the price of an individual, or group of assets will go.

However, this does not mean that each strategy is given equal weight, and it is important to note, that some indicators, such as the Neural Network predict in detail what the price of the asset will be in the future, while others such as the Excel Analysis System only present a buy, sell, or hold signals. This means that if the Neural Network and Excel Analysis system were to agree, they would only be agreeing on the underlying message of buy, and the further detailed information given by the Neural Network would be evaluated more closely with the confirmation layer. As well there is a nice balance and flexibility allowed by the predictive layer depending on which weights are assigned to which strategy. An Example is that Neural Network is hard to run on a large group of assets, but the Excel Analysis and the K Means Clustering Systems are built for such endeavors, so there really isn't a limitation as to what we can apply this layer to.

At the beginning of each week, the weights of each system would be evaluated and reassigned. A weight is distributed to a strategy based on its perceived level of correctness. The level of correctness needed to merit a certain weight on a strategy is hard to quantify and so it falls to more of consensus and judgment based decision. For instance, if the Precision Strategy and the K Means Clustering Strategy were giving poor predictions one week resulting in mostly incorrect indications, but the Excel Analysis System and the Neural Network were giving strong predictions, then the next week the first two strategies would most likely receive a weight of around .1 while the other two would receive a weight around .4. Yet, there is no formula that dictates these weights are more appropriate than giving the first two the weight of .2 and the second two the weight of .3.

In order for the idea of a taking a position to move past the prediction layer, systems of assigned weights must agree with one another on said position and their weights must add up to at least .5. For example if the Excel Analysis System generated a buy signal on Exxon Mobil, and so did the Precision strategy, this signal of "Buy Exxon Mobil" would continue onto the confirmation layer. We are aware that .5 is rather low threshold, however this is simply a prediction layer, and we wished to allow the system to have ample opportunities to confirm or deny ideas within the confirmation layer, as opposed to throwing out too many simply in the first layer.

Confirmation Layer
The confirmation layer is also a series of weighted systems, however these systems are weighted by allocation of money and they actually make trades. The confirmation layer is composed of five strategies: Richard's Triple Moving Average System, Sophie's Multi-Timeframe System, Dmytro's Bollinger Band System, and Batyr's Bollinger Band system as well as his Linear Regression Based System.

Each system is deployed on the assets, types of markets, and time frames that they have individually been proven successful on. It is okay to have more than one system allocated to a specific asset. As the prediction layer indications flow down to the confirmation layer, they go to whichever system is assigned the asset of the underlying prediction. For example, if the prediction layer passed down "Buy Exxon Mobile" and the Triple Moving Average System was assigned to Exxon Mobil, the Triple Moving Average System would then confirm or reject the initial prediction, with it's own indication. If the prediction confirmed, then the Triple Moving Average System would take a position in Exxon Mobil in accordance with its overall weight within the cumulative strategy and its internal position sizing guidelines.

Each confirmation layer strategy is given a weight based on it's profitability, expectancy, Expectunity, and overall system quality ratings. Unlike the prediction layer, this weight is a percentage of overall equity. For a $100,000 portfolio, a system may acquire the weight of .2, meaning that it is allocated $20,000 to trade with. Again the weights are somewhat of a judgment call, though there is quantitative data to help. Within each system, the weight of the positions taken has already been devised by strict rules that made each strategy a success in the first place.

There are two options if a strategy within the confirmation layer is underperforming to a significant degree. If the prediction layer systems that are passing down info are making strong enough predictions as deemed by the group, then the prediction layer can overrule the

confirmation layers indications, and essentially use the system as a puppet for buying and selling. If this is not the case, the system can be given a weight of zero, and retired for a predetermined period of time, during which the other remaining strategies will take over the assets that were once the dysfunctional system's.

As some systems become more profitable and others less, the weighting of assets can be redistributed after an adequate amount of time to collect statistically significant data and allow longer term systems to be profitable must be given.

As there are many predictions flowing down constantly, on many assets there is no concern of a lack of trading occurring within the confirmation layer

Profitability

Though there is not statistically significant data to prove the profitability of this system, there is statistically significant data proving the profitability of each individual system. With the added security of the prediction layer acting to weed out some of the poor decisions made by each individual system on their own, this should further include profitability individually and ensure profitability overall.

Mutual Fund

On 7 November 2014 our team virtually invested $1,000,000 in five funds. The choice of which funds to invest in was based on what we identified as the eight most influential parameters of any mutual fund:

- **Net Expense** (measure of what it costs an investment company to operate a mutual fund)[43]
- **Total Assets** (total market value of the securities in a mutual fund's portfolio)[44]
- **Load** (sales charge or commission)[45]
- **Average Annual Return** (percentage figure used when reporting the historical return, such as the three-, five- and 10-year average returns of a mutual fund)[46]
- **YTD return** (return for the period beginning January 1st of the current year up until today's date)[47]
- **Fee level** (general level of all fees associated with investing into the fund)

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[43] http://www.investopedia.com/terms/e/expenseratio.asp

[44] http://www.investopedia.com/terms/a/asset_size.asp

[45] http://www.investopedia.com/terms/l/loadfund.asp

[46] http://www.investopedia.com/terms/a/aar.asp

[47] http://www.investopedia.com/terms/y/ytd.asp

- **Turnover** (measure of how frequently assets within a fund are bought and sold by the managers)[48]

Out of 22 available funds that were presented to WPI faculty, our group selected five to remain somewhat diversified, but still be able to maximize profits. It's important to not that a mutual fund is already a group of stocks in itself, and so diversification across mutual funds is somewhat less important since they are already diversified in themselves. This table shows the summary of the allocation of our funds as of November 10th.

Fund	Net expense	AVG annual return	YTD return	Fee level	Amount invested
NBRIX	0.85%	18.30%	20.68%	Bellow Average	$400,000
FUSVX	0.66%	18.65%	11.80%	Low	$275,000
AVUAX	0.81%	16.54%	13.28%	Below Average	$150,000
LMESX	0.89%	15.79%	8.44%	Above Average	$125,000
CEYIX	0.65%	17.01%	8.64%	Below Average	$50,000

Figure 81: Mutual Fund Start

At the time of April 4th, the time of this writing, the investment summary as follows.

Fund	Total returns	Amount invested	Profit	Amount left in fund	Total amount
NBRIX	31%	$400,000	$124,000	$524,000	
FUSVX	26%	$275,000	$71,500	$346,500	
AVUAX	28%	$150,000	$42,000	$192,000	$1,279,750
LMESX	23%	$125,000	$28,750	$153,750	
CEYIX	27%	$50,000	$13,500	$63,500	

Figure 82: Mutual Fund Finish

After only five months our team's portfolio has gained 28% profit on the original equity invested. This equals to $279,750, and if this were used as a basis for the expected annual rate of return, our group would expect over a 50% return on original equity.

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[48] http://www.investopedia.com/terms/p/portfolioturnover.asp

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

Conclusion

There were over double the number of successfully created systems, indicators, or prediction algorithms than there were group members that participated in this IQP. That alone is an achievment in itself, however it is all the more of an accomplishment when taking into account the sheer diversity and profitablility of the strategies, indicators and algorithms presented. Platforms were utilized were not simply limited to TradeStation, but included also programs as common as Excel and as sophisticated as MatLab.

Richard O'Brien developed both a strategy in TradStation, The Triple Moving Average System, and an indicator in Excel. The Triple Moving Average System effectively used traunching to minimize risk by taking larger positions as smaller pieces at different times. The system had the typical characteristic of a trend following system, losing more trades than winning, however used intelligent risk management and position sizing to minimize these losses and turn a large overall profit. It excelled in all aspects of system quality as well, notably providing massive opportunity for trading.

Richard's Excel Analysis System has the ability to automatically pull data from the Internet about the full S&P 500. It then analyzes them using certain thresholds with respect to designated price points and benchmarks. Though it is an indicator, it has limitless future possibilities as it operates within Excel, such a flexible environment. additions to the indicator in the near future include custom made momentum indicators and mathematically calculated risk of a portfolio. Though there were not enough trades with it to generate statistically significant data, on it's current trades it has turned profits on most positions taken, and an overall profit. It would be a great tool to combine with strategies.

Sophie's Multi-Timeframe Strategy revolves around trading the USDJPY during the historically proven best timeframes to do so. The strategy then considers three exponential moving averages—14, 21, and 50 EMAs in different timeframes, to decide whether it should go long, or not take a position. This strategy does not go short. The basic two timeframes are five-minute bar and sixty-minute bar charts. The strategy commences by comparing the EMAs in the two timeframes separately and then checks with Bollinger bands to see if indications agree. One major advantage of this strategy is that due to its very picky trading conditions, once it actually does trade it's mostly profitable. That's a drawback as well though; there are not enough trades per week for one to use this strategy as a professional trader. This strategy is ideal for a low risk, consistent profit type of trader, like those people with day jobs. It would be a very good strategy is people are willing to perform long term automated trading in TradeStation.

Dmytro Bogatov develped two strategies, one which became the evolutionary product of the other. The first system is a Bollinger Bands Strategy. It is an effective and profitable combination of the core ideas which govern Bollinger Bands and Moving Averages. The Bollinger Bands were effectively optimized and used as triggers to enter positions for when price crossed them. To ensure correct momentum indications and mitigate some risk, moving averages

allowed positions to be taken that seemed to appear consistent with current trends. Using the combination of signals, the strategy was able to be very profitable and avoid large draw downs typical with trend following systems

The Precision Strategy was the evolution of the former system. It uses the same core ideas but with some very notable and distinct improvements. Regression lines are used instead of the Bollinger bands and their slope indicates trend. This way all the signals are not coming from one tool creating a more efficient and simple system. The other major improvement is that strategy takes into account multiple timeframes with respect to trends. This way, one can be assured that momentum I especially strong if both short term and long term trends agree, and especially weak if they do not. This aspect of risk management made the system more picky, though brought the added benefit of accuracy and further profitability.

Batyr Nurbekov developed two strategies and two prediction algorithms. Batyr first developed a Bollinger Band System. The Bollinger Bands and Stochastic Indicator fusion based strategy is a scalping strategy. It should be used in combination with other strategies. The primary purpose of this strategy is to generate a small amount of profit per trade for the large amount of trades over time. It should be applied to the volatile assets, and passed all measures of system quality and optimization.

His second strategy was the Linear Regression based strategy. It is a great strategy for the assets that show a clear trend (non-volatile assets). However, after performing Monte Carlo analysis we figured out that the strategy is able to generate a positive amount of profit even without optimization for a randomly selected asset.

Batyr's third development, The K-Means clustering algorithm developed in R language, showed itself as a very useful tool for the prediction of the price movement by the end of the day on a certain asset that is being analysed. It should primarily be used as one of the factors that is considered before entering the position, but not the only factor. The output that this algorithm produces can be fused with the output from Neural Network prediction algorithm to achieve higher accuracy of the predictions.

Lastly, The Neural Network prediction algorithm developed in MATLAB showed very promising results. It was able to predict the price movement of a specific asset one day in advance. Considering that the Neural Network consisted of only one hidden layer and three neurons this was a truly exciting result, and there is a large area for growth. There are a lot of opportunities for the further research, such as increasing the number of input features and building more complex layer structure for Neural Network.

Using all the individual systems, indicators, and prediction algorithms a combined strategy was created composed of two layers: a prediction layer and a confirmation layer. The prediction layer generates many buy or sell signals, which are then either confirmed or denied when passed to the confirmation layer. The prediction layer is composed of indicators and prediction algorithms which can't actually trade, and the confirmation layer is composed of actualy automated systems. The two layer system was designed as a form of risk management, to attempt to filter out some of the bad positions indicators or prediction algorithms suggest take by reconciling them with

another system. Due to the underlying profitability of each system, there is strong confidence in profitability of of the combined system. As well, due to the diversity of the indicators, prediction algorithms, and systems, there is a vast amount of flexibility within the combined system to trade different types of markets, trends, volatility, and more. More profitable aspects of the system are rewarded by having their weights either in money alloted or in importance of indication increased over time.

In addition to to all the other strategy work, the group was tasked with the challenge to create a profitable portfolio of mutual funds. The group was given the exact same mutual funds that are offered to the WPI faculty, at the same time that they are presented to on the funds and how they opporate. The group put together a diverse portfolio of five mutual funds, stretching across multiple industries, and accrued a profit of 28% return on equity, in little more than five months. As well, something that was very important to the group was flexibility in investing in the assets, and so while risk and year to date return on equity were large factors in determining which funds invest in, entry and exit fees also played a large role. All of the funds have low fees, meaning that an investor could shift out of them at any time, providing macximum control of finances with maximum profitability.

Some limitations in the project revolved mostly around time and fiscal opportunity. As full-time students at WPI, group members did not have the ability to constantly monitor the markets, and so their trading resembled that of those with day jobs. Most of the analysis that occurred was outside market hours, and though automated strategies helped to overcome this issue of time since students didn't need to manually trade everything, ultimately it was a large limitation. Fiscal limitations greatly affected position sizing and risk. As college students, it was important to learn how large of a position one can take, and how risky this position is. Though this can be slightly overcome by margin, fiscal limitations always have strong impacts on profitability.

This project not only resulted in nine profitable, scientifically developed trading systems, indicators, or Prediction algorithms as well as profitably managed mutual funds but also in the exploration of intelligent and responsible financial management. It instilled the ability the control one's own financial future in each of the respective group members. Though this project may come to an end after the end of this term, many of these systems will be worked on and refined in order to be used personally professionally by the group members that created them and the lessons of how to develop and analyze profitable systems as well as manage one's owns risk and overall understand one's own financial situation will be carried forth far beyond the project.

Recommendations

As a further area of research the possibility of fusing all of the strategies and statistically analyzing the result of the sum total would be a worthy area to be investigated. Though profitability of the underlying strategies, and feasibility of the system of systems is a great achievement, it would be interesting to investigate correlations of profitability between system of systems and individual systems.

Since the developed system consists of a various types of strategies that are applicable to different types of assets the new system might be made very robust. Finding area of specialty for

the system of systems would also yield very important results. More specifically, the functionality of dynamic asset type classification might be integrated into the developed system in order to accurately determine the most applicable strategy. This can be made using a clustering algorithm.

Additionally, the decision made by the system can be dynamically checked using the prediction algorithm used in this research. This will decrease the amount of loss due to the incorrectly predicted price movements by the described systems. Another recommended area of further study would be to find pairings of prediction algorithm and confirmation strategy that work especially well together on specific assets and timeframes.

The amount of possibilities is extremely broad to recommend further areas of research, and to recommend usage of the strategies with, however they mostly center on the further integration and analysis of strategies working with each other.

APPENDIX A: CODE

Richard O'Brien's Code

Triple Moving Average System

{{{{{ IMPORTANT: IN ORDER FOR THIS CODE TO WORK CORRECTLY YOU HAVE TO MAKE SURE THE BOX IN FORMAT STRATEGIES =====>
 PROPERTIES FOR All =====> GENERAL TAB =====> Checkalert BOX ON : "ALLOW UP TO 2 ENTRY ORDERS IN THE DIRECTION AS THE CURRENTLY HELD" }}}}}}

 {{{{{ THIS IS CURRENTLY DESIGNED FOR EQUITIES HAVING THE VARIABLE Order_Amount = 500 }}}}}}

 {{{{{ Order_Amount IS AN INPUT FOR SAKE OF CONVENIENCE WHEN CHANGING WHAT YOU WANT TO TRADE (EX: CURRENCIES => STOCKS
 BUT DO NOT EVER CHANGE IT WHILE THE STRATEGY IS RUNNING OR YOU WILL UNLEASH PANDORAS BOX ON YOUR WALLET }}}}}}

 inputs:

 double Price(Close),
 {Price series to use in the calculation of the HMA }

 EMA_length (5),
 {# of bars included in EMA}

 EMA_displace(0) ,
 {The initial displacement of the EMA curve for manual adjustments }

 SMA_length (17),
 {# of bars included in SMA}

 Hull_length (9),
 {number of bars to use in calculation of the HMA}

 Hull_displace(0),
 {number of bars to displace the plot of the HMA; negative
 values of this input displace the plot to the right, positive values displace
 the plot to the left}

 int Tranche_Amount (20000),
 {An input that allows you to change the amount of shares ordered in a tranche}

 int Order_amount (80000);
 {An input that allows you to change the amount of shares ordered on the initial position}

 Variables:

```
double Hull_line(0),
{Starts the Hull line at 0 for a base }

double EMA_line (0),
{Starts the EMA line at 0 for the base}

NP (0),
{net profit variable}

int Hull_Position (0),
{Keeps track of the Hulls current market position}

int EMA_Position (0),
{Keeps track of the Hulls current market position}

int Can_trade (3),

double SMA_line (0);
{Starts the SMA line at 0 for a base}




{{{{{{{{{{ HULL CODE }}}}}}}}}}


Hull_line = HMA( Price, Hull_Length );


{{{{{{{{{{ EMA AND SMA CODE }}}}}}}}}}

NP = Netprofit;
{Allows you to keep track of net profit to see if winning or losing trades}

MP = MarketPosition;
{Returns 1 if long, -1 if short, 0 if not in market}


EMA_line = XAverage( Price, EMA_length );
{CALCULATING EMA MOVING AVERAGE }


SMA_line = AverageFC( Price , SMA_length );
{CALCULATING SMA MOVING AVERAGE }




{{{{{{{{{{{Can_trade Conditions}}}}}}}}}}}

If Hull_line crosses over SMA_line then
```

```
            Can_trade = Can_trade + 1;
If Hull_line Crosses under SMA_line then
            Can_trade = Can_trade + 1;

If NP < NP[1] and NP[1]< NP [2] and NP [2] < NP [3] then begin;
        Can_trade = 0;

         If Hull_Position > 0 then begin;
                    Sell all contracts Next bar at market;
                    Hull_Position = 0 ;
                    EMA_Position = 0 ;
                    First_Hull = 0
                    First_EMA = 0
        End;

        If Hull_Position < 0 then begin;
                    Buy to cover all contracts next bar at market;
                    Hull_Position = 0 ;
                    EMA_Position = 0 ;
                    First_Hull = 0
                    First_EMA = 0
        End;

End;
{If there are three losses in a row, can trade goes to 0, all open positions are closed
 and the strategy takes a break for 3 intersections}

{{{{{{{{{{Buy and Sell Conditions}}}}}}}}}}


{{{{{{{{{{Entry Conditions for Hull}}}}}}}}}}

If Hull_Position = 0 then begin;
        If Hull_line > SMA_line then
                    Buy Order_Amount shares next bar at market;
                    Hull_Position = Order_amount;
        If Hull_line < SMA_line then
                    Sell Short Order_Amount shares next bar at market;
                    Hull_Position = - Order_amount;
End;

If EMA_Postion = 0 then begin;
        If EMA_line Crosses Over SMA_line then
                    Buy ("BOT") Tranche_amount shares next bar at market;
                    EMA_Position = Tranche_Amount;
        If EMA_line Crosses Under SMA_line then
                    Sell short ("SOT") Tranche_amount shares next bar at market;
                    EMA_Position = - Tranche_Amount ;
End;
```

```
{{{{{{{{{{Reversal Conditions for Hull}}}}}}}}}}


If Can_trade >= 3 then begin;

If Hull_Position = Order_amount then begin;
        If Can_trade >= 3 then begin;
                If Hull_line crosses under SMA_line then
                        Sell Short ("SH") Order_amount shares next bar at market;
                        Hull_Position = - Order_amount;
        End;
End;

If Hull_Position = - Order_amount then begin;
        If Can_trade >= 3 then begin;
                If Hull_line crosses over SMA_line then
                        Buy ("BH") Order_amount shares next bar at market;
                        Hull_Position = Order_amount; ;
        End;
End;




{{{{{{{{{{Tranche Conditions and reversal conditions for EMA and SMA cross}}}}}}}}}}
If Can_trade >= 3 then begin;

If EMA_Position = Tranche_amount then begin;
        If Can_trade >= 3 then begin;
                If EMA_line crosses under SMA_line then
                        Sell short ("ST") Tranche_amount shares next bar at market;
                        EMA_Position = - Tranche_amount;
        End;
End;


If EMA_Position = - Tranche_amount then begin;
        If Can_trade >= 3 then begin;
                If EMA_line crosses over SMA_line then
                        Buy ("BT") Tranche_amount shares next bar at market;
                        EMA_Position = Tranche_amount;
        End;
End;
```

Excel Analysis System

Sub BtnRefresh()

```
'Defining the variable W as the worksheet
Dim W As Worksheet
```

```vba
    Set W = ActiveSheet

'Finding the last row and giving it a number
Dim Last As Integer
    Last = W.Range("A1000").End(xlUp).Row

'Creating a string of the all the symbols in the chart
Dim Symbols1 As String
Dim symbols2 As String
Dim symbols3 As String

Dim x As Integer

'Iterate through every symbol in the list and add it to the string
For x = 2 To 175
    Symbols1 = Symbols1 & W.Range("A" & x).value & "+"
Next x

For x = 176 To 350
    symbols2 = symbols2 & W.Range("A" & x).value & "+"
Next x

For x = 351 To Last
    symbols3 = symbols3 & W.Range("A" & x).value & "+"
Next x

'Take off the last +
Symbols1 = Left(Symbols1, Len(Symbols1) - 1)
symbols2 = Left(symbols2, Len(symbols2) - 1)
symbols3 = Left(symbols3, Len(symbols3) - 1)


'Build the URLS
Dim URL1 As String
Dim URL2 As String
Dim URL3 As String
Dim DIVURL1 As String
Dim DIVURL2 As String
Dim DIVURL3 As String
    URL1 = "http://finance.yahoo.com/d/quotes.csv?s=" & Symbols1 & "&f=svl1hgc1kjt8"
    URL2 = "http://finance.yahoo.com/d/quotes.csv?s=" & symbols2 & "&f=svl1hgc1kjt8"
    URL3 = "http://finance.yahoo.com/d/quotes.csv?s=" & symbols3 & "&f=svl1hgc1kjt8"
    DIVURL1 = "http://finance.yahoo.com/d/quotes.csv?s=" & Symbols1 & "&f=sydqr1"
    DIVURL2 = "http://finance.yahoo.com/d/quotes.csv?s=" & symbols2 & "&f=sydqr1"
```

```vb
     DIVURL3 = "http://finance.yahoo.com/d/quotes.csv?s=" & symbols3 & "&f=sydqr1"

'Getting the data from Yahoo Finance
 Dim http1 As New WinHttpRequest
 http1.Open "GET", URL1, False
 http1.Send

 Dim http2 As New WinHttpRequest
   http2.Open "GET", URL2, False
   http2.Send

 Dim http3 As New WinHttpRequest
   http3.Open "GET", URL3, False
   http3.Send

 Dim Dhttp1 As New WinHttpRequest
   Dhttp1.Open "GET", DIVURL1, False
   Dhttp1.Send

 Dim Dhttp2 As New WinHttpRequest
   Dhttp2.Open "GET", DIVURL2, False
   Dhttp2.Send

 Dim Dhttp3 As New WinHttpRequest
   Dhttp3.Open "GET", DIVURL3, False
   Dhttp3.Send

'Storing the responses from the data query
 Dim response1 As String
 Dim response2 As String
 Dim response3 As String
'Storing the Dividends responses from the data query
 Dim Dresponse1 As String
 Dim Dresponse2 As String
 Dim Dresponse3 As String

   response1 = http1.ResponseText
   response2 = http2.ResponseText
   response3 = http3.ResponseText
   Dresponse1 = Dhttp1.ResponseText
   Dresponse2 = Dhttp2.ResponseText
   Dresponse3 = Dhttp3.ResponseText
```

```vba
 ' Splitting up the responses since they are strings massive strings of all the symbols and all
their data.
 ' We need all the symbols split into different strings,so we split by new line
 Dim Lines1 As Variant
 Dim sLine1 As String
 Dim values1 As Variant
   Lines1 = Split(response1, Chr(10))

 'Iterate over the first 175 lines (the ubound of lines1)
 For x = 0 To UBound(Lines1)
   sLine1 = Lines1(x)
   'If there is a comma in the line split it, becuase we get error for empty line at end if not.
   If InStr(sLine1, ",") > 0 Then
     'Split lines by symbol
     values1 = Split(sLine1, ",")
     Cells(x + 2, 1).value = Replace(values1(0), Chr(34), "")
     Cells(x + 2, 3).value = values1(1)
     Cells(x + 2, 4).value = values1(2)
     Cells(x + 2, 5).value = values1(3)
     Cells(x + 2, 6).value = values1(4)
     Cells(x + 2, 7).value = values1(5)
     'Cells(x+2,8) are a percent change calculated in the sheet
     Cells(x + 2, 9).value = values1(6)
     Cells(x + 2, 10).value = values1(7)
     Cells(x + 2, 11).value = values1(8)
   End If
 Next x

 'Add in the Dividend info
 Dim DLines1 As Variant
 Dim DsLine1 As String
 Dim Dvalues1 As Variant
   DLines1 = Split(Dresponse1, Chr(10))

 'Iterate over the first 175 lines (the ubound of lines1)
 For x = 0 To UBound(DLines1)
   DsLine1 = DLines1(x)
   'If there is a comma in the line split it, becuase we get error for empty line at end if not.
   If InStr(DsLine1, ",") > 0 Then
     'Split lines by symbol
     Dvalues1 = Split(DsLine1, ",")
     Cells(x + 2, 12).value = Dvalues1(1)
     Cells(x + 2, 13).value = Dvalues1(2)
     Cells(x + 2, 14).value = Replace(Dvalues1(3), Chr(34), "")
```

```vba
      Cells(x + 2, 15).value = Replace(Dvalues1(4), Chr(34), "")
   End If
Next x



'Do the same for response 2
Dim Lines2 As Variant
Dim sLine2 As String
Dim values2 As Variant
   Lines2 = Split(response2, Chr(10))

'Iterate over the first 175 lines (the ubound of lines1)
For x = 0 To UBound(Lines2)
   sLine2 = Lines2(x)
   'If there is a comma in the line split it, becuase we get error for empty line at end if not.
   If InStr(sLine2, ",") > 0 Then
      'Split lines by symbol
      values2 = Split(sLine2, ",")
      Cells(x + UBound(Lines1) + 2, 1).value = Replace(values2(0), Chr(34), "")
      Cells(x + UBound(Lines1) + 2, 3).value = values2(1)
      Cells(x + UBound(Lines1) + 2, 4).value = values2(2)
      Cells(x + UBound(Lines1) + 2, 5).value = values2(3)
      Cells(x + UBound(Lines1) + 2, 6).value = values2(4)
      Cells(x + UBound(Lines1) + 2, 7).value = values2(5)
      'Cells(x+2,8) are a percent change calculated in the sheet
      Cells(x + UBound(Lines1) + 2, 9).value = values2(6)
      Cells(x + UBound(Lines1) + 2, 10).value = values2(7)
      Cells(x + UBound(Lines1) + 2, 11).value = values2(8)
   End If
Next x


 'Add in the Dividend info
Dim DLines2 As Variant
Dim DsLine2 As String
Dim Dvalues2 As Variant
   DLines2 = Split(Dresponse2, Chr(10))

'Iterate over the first 175 lines (the ubound of lines1)
For x = 0 To UBound(DLines2)
   DsLine2 = DLines2(x)
   'If there is a comma in the line split it, becuase we get error for empty line at end if not.
   If InStr(DsLine2, ",") > 0 Then
      'Split lines by symbol
      Dvalues2 = Split(DsLine2, ",")
```

```vba
      Cells(x + UBound(DLines1) + 2, 12).value = Dvalues2(1)
      Cells(x + UBound(DLines1) + 2, 13).value = Dvalues2(2)
      Cells(x + UBound(DLines1) + 2, 14).value = Replace(Dvalues2(3), Chr(34), "")
      Cells(x + UBound(DLines1) + 2, 15).value = Replace(Dvalues2(4), Chr(34), "")
    End If
  Next x

  'Do the same for response 3
  Dim Lines3 As Variant
  Dim sLine3 As String
  Dim values3 As Variant
    Lines3 = Split(response3, Chr(10))

  'Iterate over the first 175 lines (the ubound of lines1)
  For x = 0 To UBound(Lines3)
    sLine3 = Lines3(x)
    'If there is a comma in the line split it, becuase we get error for empty line at end if not.
    If InStr(sLine3, ",") > 0 Then
      'Split lines by symbol
      values3 = Split(sLine3, ",")
      Cells(x + UBound(Lines1) + UBound(Lines2) + 2, 1).value = Replace(values3(0), Chr(34), "")
      Cells(x + UBound(Lines1) + UBound(Lines2) + 2, 3).value = values3(1)
      Cells(x + UBound(Lines1) + UBound(Lines2) + 2, 4).value = values3(2)
      Cells(x + UBound(Lines1) + UBound(Lines2) + 2, 5).value = values3(3)
      Cells(x + UBound(Lines1) + UBound(Lines2) + 2, 6).value = values3(4)
      Cells(x + UBound(Lines1) + UBound(Lines2) + 2, 7).value = values3(5)
      'Cells(x+2,8) are a percent change calculated in the sheet
      Cells(x + UBound(Lines1) + UBound(Lines2) + 2, 9).value = values3(6)
      Cells(x + UBound(Lines1) + UBound(Lines2) + 2, 10).value = values3(7)
      Cells(x + UBound(Lines1) + UBound(Lines2) + 2, 11).value = values3(8)
    End If
  Next x

  'Add in the Dividend info
  Dim DLines3 As Variant
  Dim DsLine3 As String
  Dim Dvalues3 As Variant
    DLines3 = Split(Dresponse3, Chr(10))

  'Iterate over the first 175 lines (the ubound of lines1)
  For x = 0 To UBound(DLines3)
    DsLine3 = DLines3(x)
    'If there is a comma in the line split it, becuase we get error for empty line at end if not.
    If InStr(DsLine3, ",") > 0 Then
```

```
     'Split lines by symbol
     Dvalues3 = Split(DsLine3, ",")
     Cells(x + UBound(DLines1) + UBound(DLines2) + 2, 12).value = Dvalues3(1)
     Cells(x + UBound(DLines1) + UBound(DLines2) + 2, 13).value = Dvalues3(2)
     Cells(x + UBound(DLines1) + UBound(DLines2) + 2, 14).value = Replace(Dvalues3(3),
Chr(34), "")
     Cells(x + UBound(DLines1) + UBound(DLines2) + 2, 15).value = Replace(Dvalues3(4),
Chr(34), "")
   End If
 Next x


 End Sub
```

Jiacong (Sophie) Xu's Code

Multi-Timeframe System

Inputs:
Price (Close), PositionBasis (True), Length (9), Length1 (26), Length2 (40),
Length3 (98), Displace (0), EntryMar (False);

Variables:
Avg (0), FourteenAvgExp(0), TwentyoneAvgExp(0), FiftyAvgExp1(0), FiftyAvgExp2(0),
StDev (0), Sum (0), VarLen (0), BarNum(0), UpperB (0),
LowerB (0),
Counter (0), //Count bars within time
Counter2 (0), //Count bars not within time
LimitPrice(0), exitmarPrice (0), EntrySetup (true), ProfitTarget(0),
RSI1 (0,data1), //Relative Strength Index
RSI2 (0,data2),
BullishFlag (False);

//Bullish when price is above 200 period MA
BullishFlag = Close > (Average (Close data2, 200));

//RSI Total = RSI From Today Closing Price +
//   RSI From Yesterday's Closing Price + RSI From Two Days Ago Closing Price
RSI1 = RSI(Close data1, 2) + RSI(Close[1] data1, 2) + RSI(Close[2] data1, 2);
RSI2 = RSI(Close data2, 2) + RSI(Close[1] data2, 2) + RSI(Close[2] data2, 2);

//Trade Time Period
FourteenAvgExp = XAverage (Price, Length1) of data1;
TwentyoneAvgExp = XAverage (Price, Length2) of data1;
FiftyAvgExp1 = XAverage (Price, Length3) of data1;
FiftyAvgExp2 = XAverage (Price, Length3) of data2;

```
//Condition0 = Time < 1200 and Time > 2000;
//Condition1 = Time > 1200 and Time < 2000;
Condition2 = TwentyoneAvgExp crosses above FiftyAvgExp1 and
                        FourteenAvgExp crosses above TwentyoneAvgExp;
Condition3 = TwentyoneAvgExp crosses below FiftyAvgExp1 and
                        FourteenAvgExp crosses below TwentyoneAvgExp;
Condition4 = (Currentbar - BarNum) < 5;



//Bollinger Band Range
StDev = StandardDev (Price, Length1, 1);
UpperB = Avg + 2 * StDev;
LowerB = Avg - 2 * StDev;

If (BullishFlag) And (RSI1 < 80) And (RSI2 > 40) and
        Condition1 and Condition2 and
        EntryMar = true and Condition4 then
        Begin
                limitPrice = Highest (High,10);
                exitmarPrice = Lowest (Low,10);
                ProfitTarget = limitPrice + exitPrice;

                If UpperB < FiftyAvgExp2 and
                        FiftyAvgExp2 < LowerB then
                        Begin
                                if Counter <= (Length + VarLen - 1) then
                                Begin
                                        Sum = Sum + Price[Counter];
                                        Counter = Counter + 1;
                                End;
                                Buy next bar at limitPrice limit;
                        End;
        End;


If (BullishFlag) And (RSI1 < 80) And (RSI2 > 40) and
        Condition1 and
        Condition3 and EntryMar = true and Condition4 then
        Begin
                limitPrice = Highest (High,10);
                exitmarPrice = Lowest (Low,10);
                ProfitTarget = limitPrice + exitmarPrice;

                If UpperB < FiftyAvgExp2 and
```

```
                              FiftyAvgExp2 < LowerB then
                      Begin
                              if Counter <= (Length + VarLen - 1) then
                              Begin
                                      Sum = Sum + Price [Counter];
                                      Counter = Counter + 1;
                              End;
                              Sell next bar at ProfitTarget limit;
                      End;
        End;

Sum = 0;
VarLen = 0;
Counter = 0;

//Profit Target and Stop Loss
If PositionBasis then
        SetStopPosition
Else
        SetStopContract;

SetStopLoss(3000);
SetProfitTarget(1000);

Value99 = WriteTrades32(0, 0, 0, 10, 1, "E:\TradeData.txt");
```

Dmytro Bogatov's Code

Bollinger Bands Strategy

{Bollinger Bands Strategy}

```
Input:
        BPrice(Close),  // price for band
        MALength(20),        // moving average length
        StdDevNum(2);        // number of standard deviations

Variable:
        LBand(0),      // lower band
        UBand(0),      // upper band
        FastAvg(0),    // fast moving average
```

```
        SlowAvg(0); // slow moving average
```

{Computing values}
LBand = BollingerBand(BPrice, MALength, -StdDevNum);
UBand = BollingerBand(BPrice, MALength, StdDevNum);
FastAvg = AverageFC(BPrice, Round(0.5*MALength, 0));
SlowAvg = AverageFC(BPrice, Round(1.5*MALength, 0));

{conditions for going long}
if CurrentBar > 1 AND BPrice crosses over LBand AND SlowAvg < FastAvg then
        Buy("BBandBuy") next bar at LBand stop;

{conditions for going long}
if CurrentBar > 1 AND BPrice crosses below UBand AND FastAvg < SlowAvg then
        SellShort("BBandSell") next bar at UBand stop;

Precision Strategy

Input:
        NumberOfBars(10),
        NumberOfStdDevsUp(2),
        NumberOfStdDevsDown(-2),
        GraphOption(3),
        ThisData(1),
        LargerData(2);

Variables:
        Price(close),
        PrevPrice(Close),
        CenterVal(0),
        UpperVal(0),
        LowerVal(0),
        PrevUpper(0),
        PrevLower(0),
        SimpleMA(0),
        PrevSimple(0),
        ExpMA(0),
        PrevExp(0),
        ThisUpTrend(1),
        LargerUpTrend(1),
        BuyCondition(false),
        SellCondition(true);

LargerUpTrend   = LinearRegressionBands(NumberOfBars, Price, NumberOfStdDevsUp, NumberOfStdDevsDown, GraphOption, CenterVal, UpperVal, LowerVal, PrevUpper, PrevLower, False) of Data(LargerData);

ThisUpTrend   = LinearRegressionBands(NumberOfBars, Price, NumberOfStdDevsUp, NumberOfStdDevsDown, GraphOption, CenterVal, UpperVal, LowerVal, PrevUpper, PrevLower, False) of Data(ThisData);

SimpleMA   = AverageFC(Price, NumberOfBars)[0] of Data(ThisData);
ExpMA   = XAverage(Price, NumberOfBars)[0] of Data(ThisData);
Price   = Close of Data(ThisData);

PrevSimple   = AverageFC(Price, NumberOfBars)[1] of Data(ThisData);
PrevExp   = XAverage(Price, NumberOfBars)[1] of Data(ThisData);
PrevPrice   = Close[1] of Data(ThisData);

BuyCondition =
        (Price > LowerVal AND PrevPrice < PrevLower AND ThisUpTrend = 1 AND LargerUpTrend = 1);

SellCondition =
        (Price < LowerVal AND PrevPrice > PrevLower AND ThisUpTrend = 0 AND LargerUpTrend = 0);

{BuyCondition =
        (Price crosses above LowerVal AND SimpleMA crosses above LowerVal AND PrevExp crosses below PrevLower AND ExpMA crosses above LowerVal) OR
        (Price crosses above LowerVal AND PrevSimple crosses below PrevLower AND SimpleMA crosses above LowerVal AND ExpMA crosses above LowerVal) OR
        (PrevPrice crosses below PrevLower AND Price crosses above LowerVal AND SimpleMA crosses above LowerVal AND ExpMA crosses above LowerVal) AND
        ThisUpTrend = 1 AND LargerUpTrend = 1;

SellCondition =
        (Price crosses below UpperVal AND SimpleMA crosses below UpperVal AND PrevExp crosses above PrevUpper AND ExpMA crosses below UpperVal) OR
        (Price crosses below UpperVal AND PrevSimple crosses above PrevUpper AND

SimpleMA crosses below UpperVal AND ExpMA crosses below UpperVal) OR
        (PrevPrice crosses above PrevUpper AND Price crosses below UpperVal AND SimpleMA
        crosses below UpperVal AND ExpMA crosses below UpperVal) AND
        ThisUpTrend = 0 AND LargerUpTrend = 0;}

If BuyCondition Then

```
        Buy("Precision Buy") next bar at market;

If SellCondition Then
        SellShort("Precision Sell") next bar at market;

Print(ELDateToString(Date), " ", Time:4:0);
Print(
        "                    CenterVal: ",   CenterVal:1:5,
        ",   UpperVal: ",               UpperVal:1:5,
        ",   LowerVal: ",               LowerVal:1:5,
        ",   SimpleMA: ",               SimpleMA:1:5,
        ",   ExpMA: ",                  ExpMA:1:5,
        ",   Price: ",            Price:1:5,
        {",   PrevUpper: ",      PrevUpper:1:5,
        ",   PrevLower: ",       PrevLower:1:5,
        ",   PrevSimple: ",      PrevSimple:1:5,
        ",   PrevExp: ",         PrevExp:1:5,
        ",   PrevPrice: ",       PrevPrice:1:5,}
        ",   ThisUpTrend: ",     ThisUpTrend:1:0,
        ",   LargerUpTrend: ", LargerUpTrend:1:0);
```

Linear Regression Bands

```
Input:
        NumberOfBars(Numeric),
        Price(Numeric),
        NumberOfStdDevsUp(Numeric),
        NumberOfStdDevsDown(Numeric),
        GraphOption(Numeric),
        oCenterLine(NumericRef),
        oUpperBand(NumericRef),
        oLowerBand(NumericRef),
        oPrevUpper(NumericRef),
        oPrevLower(NumericRef),
        Indicator(TrueFalse);

Variables:
        SumX(0), SumXX(0), SumY(0), SumXY(0), m(0), // slope
        _c(0), SDev(0), Left(0), Right(0), LowerLine(0), CenterLine(0),
        UperLine(0), Flag(0), Color(Yellow), oUpTrend(false);

Once
        Begin
                SumX = (NumberOfBars*(NumberOfBars+1))/2;
```

```
                SumXX = (Square(NumberOfBars)*NumberOfBars/3 + Square(NumberOfBars)/2)
+ NumberOfBars/6;
        end;

For Value1 = 1 to NumberOfBars
        Begin
                SumY = SumY + Price[Value1 - 1];
                SumXY = SumXY + Value1*Price[NumberOfBars - Value1];
        End;

m = ((NumberOfBars*SumXY) - (SumX*SumY)) / (NumberOfBars*SumXX - Square(SumX));
_c = (SumY - (m*SumX))/NumberOfBars;

//Print("Price: ", Price);
//Print("SumY: ", SumY);
//Print("m: ", m, " _c: ", _c, " SumX:", SumX, " SumXX:", SumXX);

If m > 0 then
        Begin
                Color = Green;
                oUpTrend = true;
                //Print("UPPPPP");
        End
Else
        Begin
                Color = Red;
                oUpTrend = false;
                //Print("DOWNNNN");
End;

Left = m + _c;
Right = NumberOfBars*m + _c;
If Indicator Then
        SDev = StandardDev(Price, NumberOfBars, 1);

//Print("SDev: ", SDev);

SumY = 0;
SumXY = 0;

If LastBarOnChart AND GraphOption = 2 then
Begin
        SDev = StandardDev(Price, NumberOfBars, 1);
        CenterLine = Tl_new(D[NumberOfBars-1], T[NumberOfBars-1], Left, D, T, Right);
```

```
                LowerLine = Tl_new(D[NumberOfBars-1], T[NumberOfBars-1],
                Left+NumberOfStdDevsDown*SDev, D, T, Right+NumberOfStdDevsDown*SDev);
                UperLine = Tl_new(D[NumberOfBars-1], T[NumberOfBars-1],
                Left+NumberOfStdDevsUp*SDev, D, T, Right+NumberOfStdDevsUp*SDev);
End;

If LastBarOnChart AND GraphOption = 3 then
Begin
        If Flag = 0 then
                Begin
                        SDev = StandardDev(Price, NumberOfBars, 1);
                        CenterLine = Tl_new(D[NumberOfBars-1], T[NumberOfBars-1], Left, D, T,
                        Right);
                        LowerLine = Tl_new(D[NumberOfBars-1], T[NumberOfBars-1],
Left+NumberOfStdDevsDown*SDev, D, T, Right+NumberOfStdDevsDown*SDev);
                        UperLine = Tl_new(D[NumberOfBars-1], T[NumberOfBars-1],
Left+NumberOfStdDevsUp*SDev, D, T, Right+NumberOfStdDevsUp*SDev);
                        Flag = 1;

                        Tl_setcolor(CenterLine, Color);
                        Tl_setcolor(LowerLine, Color);
                        Tl_setcolor(UperLine, Color);
                End;
End;

oCenterLine = Right;
oLowerBand = Right+NumberOfStdDevsDown*SDev;
oUpperBand = Right+NumberOfStdDevsUp*SDev;
oPrevLower = oLowerBand - m;
oPrevUpper = oUpperBand - m;
LinearRegressionBands =  IFF(oUpTrend, 1, 0);
```

Precision Position
Input:
```
        Unit(Numeric),
        NumberOfBars(Numeric),
        Price(Numeric),
        STDs(Numeric),
        oTrend(NumericRef);
```

Variable:
```
        CenterVal(0),
        UpperVal(0),
        LowerVal(0),
```

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```
        PrevUpper(0),
        PrevLower(0);

oTrend = LinearRegressionBands(NumberOfBars, Close, STDs, -STDs, 1, CenterVal, UpperVal,
LowerVal, PrevUpper, PrevLower, True);

{
If Unit < LowerVal Then
        Result = 100*(Unit - CenterVal)/(UpperVal - LowerVal)
Else If Unit > UpperVal Then
        Result = 100*(Unit - CenterVal)/(UpperVal - LowerVal)
Else
        Result = 100*(Unit - CenterVal)/(UpperVal - LowerVal);
}
{

Print(
        "                    CenterVal: ",   CenterVal:1:5,
        ",   UpperVal: ",               UpperVal:1:5,
        ",   LowerVal: ",               LowerVal:1:5,
        ",   Unit: ",                   Unit:1:5,
        {",   PrevUpper: ",     PrevUpper:1:5,
        ",   PrevLower: ",      PrevLower:1:5,
        ",   PrevSimple: ",     PrevSimple:1:5,
        ",   PrevExp: ",        PrevExp:1:5,
        ",   PrevPrice: ",      PrevPrice:1:5,}
        ",   Result: ",         (100*(Unit - CenterVal)/(UpperVal - LowerVal)):1:5
);
}
PrecisionPosition = 100*(Unit - CenterVal)/(UpperVal - LowerVal);
```

Batyrlan Nurbekov's Code

<u>Bollinger Bands and Stochastic Oscillator Fusion based Strategy</u>

```
inputs:
        StopLossValue(200),
        BollingerLength(  20 ),
        NumDevsDn(  2 ) ,
        NumDevsUp(  2 ) ,
        {The following vars are used for stochastic}
        StochasticLength(  14 ),
        OverSold(  20 ),
```

```
        OverBought(  80 );

variables:
        LowerBand( 0 ),
        UpperBand( 0 ),
        MiddleBand( 0 ),
        {The following vars are used for stochastic}
        oFastK( 0 ),
        oFastD( 0 ),
        oSlowK( 0 ),
        oSlowD( 0 ),
        x( 0 ),
        buySignal( 0 ),
        sellShortSignal( 0 );

Value1 = Stochastic( H, L, C, StochasticLength, 3, 3, 1, oFastK, oFastD, oSlowK, oSlowD );
MiddleBand = BollingerBand( Close, BollingerLength, 0 );
LowerBand = BollingerBand( Close, BollingerLength, -NumDevsDn );
UpperBand = BollingerBand( Close, BollingerLength, NumDevsUp );
If Close crosses over MiddleBand then begin
        Buytocover next bar at Market;
end;
if Close crosses under MiddleBand then begin
        Sell Next bar at Market;
end
Else begin
        if Close < LowerBand then begin
                if oSlowK crosses over oSlowD and oSlowK < OverSold then
                Begin
                        Buy next bar at Market;
                        Setstoploss(StopLossValue);
                End;
        End;
        if Close > UpperBand then begin
                if oSlowK crosses under oSlowD and oSlowK > OverBought then
                Begin
                        Sellshort next bar at Market;
                        Setstoploss(StopLossValue);
                End;
        End;
End;
```

Linear Regression Based Strategy

Inputs:
BackPeriod(2),
Length(30),
StopLossValue(100),
SdMultiplier(1);

variables:
UpperLinReg(0),
MiddleLinReg(0),
LowerLinReg(0),
SD(0);

SD = StandardDev(Close[BackPeriod], Length, 2);
MiddleLinReg = LinearRegValue(Close[BackPeriod], Length, 0);
UpperLinReg = MiddleLinReg + SdMultiplier*SD;
LowerLinReg = MiddleLinReg - SdMultiplier*SD;

If Currentbar > BackPeriod then
Begin
  If Close[BackPeriod] crosses over LowerLinReg and Close > Close[BackPeriod] then
  Begin
    Buytocover next Bar at Market;
    Buy next Bar at Market;
    SetStopPosition;
    Setstoploss(StopLossValue);
  End;

  If Close[BackPeriod] crosses under UpperLinReg and Close < Close[BackPeriod] then
  Begin
    Sell next Bar at Market;
    Sellshort next Bar at Market;
    SetStopPosition;
    Setstoploss(StopLossValue);
  End;
End

K Means Clustering Based Prediction Algorithm

```
require(quantmod)
require(ggplot2)
Sys.setenv(TZ="GMT")
getSymbols('SPY',from='2000-01-01')
```

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```r
nasa=tail(cbind(Delt(Op(SPY),Hi(SPY)),Delt(Op(SPY),Lo(SPY)),Delt(Op(SPY),Cl(S
PY))),-1)

#display the graph with the
wss = (nrow(nasa)-1)*sum(apply(nasa,2,var))
for (i in 2:15) wss[i] = sum(kmeans(nasa, centers=i)$withinss)
wss=(data.frame(number=1:15,value=as.numeric(wss)))

png('numberOfClusters.png',width=500)
ggplot(wss,aes(number,value))+geom_point()+
  xlab("Number of Clusters")+ylab("Within groups sum of
squares")+geom_smooth()

kmeanObject=kmeans(nasa,5,iter.max=10)
kmeanObject$centers
autocorrelation=head(cbind(kmeanObject$cluster,lag(as.xts(kmeanObject$cluster
),-1)),-1)
xtabs(~autocorrelation[,1]+(autocorrelation[,2]))

y=apply(xtabs(~autocorrelation[,1]+(autocorrelation[,2])),1,sum)
x=xtabs(~autocorrelation[,1]+(autocorrelation[,2]))

z=x
for(i in 1:5)
{
  z[i,]=(x[i,]/y[i])
}
```

Neural Networks Based Prediction Algorithm

First of all, we need to import the data separately as matrix:
```
uiopen('table.csv')
```

Then, we can run the following code:
```matlab
A = [table(:, 1) table(:, 2)];
Close = table(:, 5);

if (size(A, 1) > size(A, 2))
    A = A';
end
if (size(Close, 1) > size(Close, 2))
    Close = Close';
end

N = size(A, 2)

A_train = A(:,1:(9*N)/10);
A_test = A(:,(9*N)/10+1:N);
Close_train = Close(:,1:(9*N)/10);
Close_test = Close(:,(9*N)/10+1:N);

net = newff(A_train, Close_train, 3)
```

```matlab
Close_train_sim = sim(net, A_train);
figure, plot(Close_train);
hold on;
plot(Close_train_sim,'r:');
hold off;

net = train(net,A_train,Close_train);

[Close_train_sim, pf] = sim(net, A_train);
figure, plot(Close_train);
hold on;
plot(Close_train_sim,'r:');
hold off;

[Close_train_sim, pf] = sim(net, A_test);
figure, plot(Close_test);
hold on;
plot(Close_train_sim,'r:');
hold off;
```

APPENDIX B: RICHARD O'BRIEN'S JOURNAL

B Term, October 2014 – December 2014

Richard O'Brien

Week: November 2, 2014 – November 8, 2014

Strategy Overview

To begin B Term I have begun developing a strategy that trades based off three moving averages. The strategy in its current form is basic. Right now, it currently trades based off the intersection of a Hull Moving Average (HMA) and a Simple Moving Average (SMA). Then it adds a tranche equal to the original position when the Exponential Moving Average (EMA) and the SMA intersect. Each intersection of the HMA and SMA reverses the position originally taken by the intersection of the EMA SMA. As well each intersection of the EMA and SMA reverses the position of the tranche taken.

Future Development

As the term progresses I hope to expand on this strategy in a few ways. First I hope to add in stop losses. This is tricky, since I would need to place them far enough so that the moving averages have flexibility, yet close enough so that it is more beneficial than just using the moving average intersections as exits and reversals. Second, I hope to add in an aspect to the strategy that when the strategy loses three times in a row, it automatically stops trading for a few intersections. I hope to accomplish this by adding a variable, lets call it "inter" and the strategy can only trade when it is greater than 4. If the strategy loses three times in a row the variable "inter" is set to 0 and each cross adds one to the variable "inter." This would essentially make the strategy sit out a few plays because the market has gone directionless. All of this and more I hope to do in the future but for now it seems to be a profitable strategy from back checking the strategy over the past 3 months data (September 9 – November 9). This was not optimized to avoid curve fitting.

TradeStation Strategy Performance Report - SPY 33 min (10/10/2014-10/31/2014)

Display: Column View

TradeStation Performance Summary

	All Trades	Long Trades	Short Trades
Total Net Profit	$9,115.28	$10,450.14	($1,334.86)
Gross Profit	$12,555.14	$10,830.12	$1,725.02
Gross Loss	($3,439.86)	($379.98)	($3,059.88)
Profit Factor	3.65	28.50	0.56
Roll Over Credit	$0.00	$0.00	$0.00
Open Position P/L	$2,970.02	$2,970.02	$0.00
Select Total Net Profit	$9,115.28	$10,450.14	($1,334.86)
Select Gross Profit	$12,555.14	$10,830.12	$1,725.02
Select Gross Loss	($3,439.86)	($379.98)	($3,059.88)
Select Profit Factor	3.65	28.50	0.56
Adjusted Total Net Profit	$3,069.74	$5,648.78	($4,309.07)
Adjusted Gross Profit	$7,809.74	$6,408.74	$0.00
Adjusted Gross Loss	($4,740.00)	($759.96)	($4,309.07)
Adjusted Profit Factor	1.65	8.43	0.00
Total Number of Trades	14	7	7
Percent Profitable	50.00%	85.71%	14.29%
Winning Trades	7	6	1
Losing Trades	7	1	6
Even Trades	0	0	0
Avg. Trade Net Profit	$651.09	$1,492.88	($190.69)
Avg. Winning Trade	$1,793.59	$1,805.02	$1,725.02
Avg. Losing Trade	($491.41)	($379.98)	($509.98)
Ratio Avg. Win:Avg. Loss	3.65	4.75	3.38
Largest Winning Trade	$4,335.02	$4,335.02	$1,725.02
Largest Losing Trade	($899.98)	($379.98)	($899.98)
Largest Winner as % of Gross Profit	34.53%	40.03%	100.00%

Performance Summary | Trade Analysis | Trades List | Periodical Returns | Performance Graphs | Trade Graphs | Settings

Analysis of General Market Conditions and News

The SPY has been trending for the entire month of October, first down and then up. It appears to be reaching a small leveling off point, though the trend has been very strong. This is the first reason why I intend on deploying my strategy on the SPY. The graph below illustrates this point

I have also been reading the news to try to either confirm or refute this position I have that the SPY will trend in the up coming week. I believe it may correct briefly, but will continue to trend upwards with the holidays coming. One article on the Wall Street Journal (WSJ) stuck out in particular. The article "U.S Stocks Headed Into A Sweet Spot" by E.S. Browning, ultimately said that most people expect stocks to rise strongly the next few months. It specifically said, "Over the past 100 years, the best three-month stretch for stocks has been November through January." Browning even specifically referenced the S&P 500 saying; "The S&P 500 shows a similar trend since 1928, the period for which data on that index are available. It has risen an average 3.4% over the three months." Thus, I believe that my assumption that the SPY will trend upwards should be correct.

As well I found an article on seekingalpha.com titled "Will SPY Decline after QE3 Ends" by Soma Bull. The article discusses how the Fed ended QE3 and asks the question of whether or not the SPY will continue its upward trend. The article concludes that it expects a correction, though that simply means that a correction will occur and the trend will continue. Either way, my strategy does well in trends or corrections, because it is a trend following system. Thus as long as the market doesn't go directionless I am happy.

Trading & Actual Performance

This week I traded 33-minute bars, simply to be unique. I though they were an adequate choice though next time I intend to go with a smaller time interval for a quicker reacting strategy. The Strategy made 6 trades, for a total of two reversals, one profitable and one not. This week I had many technical difficulties. The first trade should have been a profitable short, however, I went above My "Max overnight position size" with a tranche and so my entire strategy malfunctioned. I caught this mistake when I was down $400. Then the strategy went long the SPY, and when I cam back on Friday to close out my position for the weekend, I had no power. Thus I am currently up $800 on the SPY, but cant change anything until Monday. Technical difficulties got the best of me this week. For all the trading performance, a overview of the entire trading and performance can be seen in the report above.

Trade Break Down

Time Interval: 33-minute Bars
Equity Traded: SPY (S&P ETF)

Date	Trade	Quantity	Price
11/03/14	Buy	500	202.10
11/04/14	Sell	500	201.27
11/04/14	Sell Short	500	201.27
11/04/14	Sell Short	500	201.39
11/05/14	Buy to Cover	500	201.74
11/05/14	Buy	500	201.74
11/10/14	Sell	500	203.39

Charts

SPY – 30 Min Bars

SPY – 30 Min Bars

Week: November 9, 2014 – November 15, 2014

Strategy Overview

I was able to fix the bugs with the Strategy so that it hopefully won't malfunction again. I clearly defined the trading conditions for the entries and tranches as well as reversals, before they were more dynamic rules. In regards to the overnight position size issue, I decided to trade currencies this week, the USDJPY, and so I will hopefully not have the same issue. Currencies operate on another account. I also added a feature this week, that if the strategy runs into three trades in a row that are not profitable, it is to shut down for 3 trades. This is to save myself from the automation; if my underlying assumption that the market is trending is no longer true, my strategy will be wrong 3 times in a row and will shut down for 3 trades. Thus it either gives me time to check and see if my assumptions are incorrect, or gives the market time to reestablish a trend.

Future Development

My next endeavor is to tackle a stop loss feature. This isn't as simple as it seems since my entries and tranches both run off calculations that keep track of their current position in the market so they each individually know what to do. For example, my hull moving average knows when it is just entering into a trade for the first time, because its current market position is 0, or if it needs to reverse a trade because it is currently long or short. Thus I will need the stop loss to somehow reset these calculations back down to 0, so the moving averages won't think they are still long or short.

Additionally I want to stop deploying my strategy on only one equity or currency. Next week I intend to size down position sizes and deploy on multiple areas of the market.

Analysis of General Market Conditions and News

The SPY has continued to trend up though its movement this past week was nothing major. The S&P 500 up 0.7% at 2031.92 according to the Wall Street Journal[49], and the major reason for this was that reports showed jobs increased modestly in October, meaning unemployment declined. This was found in the article Morning MoneyBeat Asia: Dow, S&P 500 Eke Out Records. You can see the relatively small change last week on the chart below.

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[49] http://blogs.wsj.com/moneybeat/2014/11/09/morning-moneybeat-asia-dow-sp-500-eke-out-records/?KEYWORDS=sp

Since I exited my position at the end of last week in the SPY and I do not foresee any major correction, I wish to deploy my strategy elsewhere. If I deploy it on the SPY I fear the strategy simply will never enter, because it will continue to modestly trend upwards. Thus I am going to deploy my strategy of the USDJPY. Recently the USDJPY made a massive move because Japan's central bank announced a huge stimulus (Abenomics on Steroids). This could be a great time to enter USDJPY because the Japanese Yen is so weak and the dollar is relatively strong. There was an article on FXStreet.com entitled "USDJPY: Could We See a Deep Pullback off 115"[50] which also made me very eager to enter the USDJPY. Essentially the article discusses that the USDJPY could be due for a major correction, after all the excitement that happened immediately after the announcement of the stimulus. Thus I will deploy on the USDJPY.

Trading & Actual Performance

As the week progressed I continuously received errors every time I tried to let the strategy trade automatically. By Thursday I concluded that this must be that I am trying to order larger position sizes than I am allowed, and so I created a new variable called Tranche_amount for when the exponential moving average crosses the simple one, and have reduced it to ¼ the initial position. I will have to further research just how far onto margin I am allowed to go.

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[50] http://www.fxstreet.com/analysis/indices-insider/2014/11/10/02/

Trade Log

Date	Time	Trade	Type	Quantity ($)	Price
11/11/14	11:18 AM	USDJPY	Buy	100,000	115.81
11/11/14	11:36 AM	USDJPY	Sell	100,000	115.60
11/11/14	11:36 AM	USDJPY	Sell	200,000	115.60
11/11/14	1:24 PM	USDJPY	Buy	200,000	115.64
11/11/14	1:24 PM	USDJPY	Buy	200,000	115.55
11/11/14	1:42 PM	USDJPY	Sell	200,000	115.61
11/13/14	2:18 PM	USDJPY	Sell	100,000	115.61
11/13/14	2:18 PM	USDJPY	Sell	25,000	115.75
11/13/14	3:12 PM	USDJPY	Buy	125,000	115.75
11/13/14	3:30 PM	USDJPY	Buy	125,000	115.75
11/14/14	9:28 AM	USDJPY	Sell	125,000	116.61

Chart

USDJPY – 60 Min Bars (Though the strategy runs on 18 minute bars)

My computer is unable to load data for USDJPY, but this is a chart of 18min bars.

Week: November 16, 2014 – November 22, 2014

Strategy Overview

This week I intend to deploy a strategy on USDJPY again though I am going to have it take far smaller position sizes. I also intend to add a stop-loss functionality to the strategy. The smaller position size is so that I can diversify. I intend to manually trade Apple and the SPY as well this week. Thus I will be in a major currency pair, an ETF and a technology stock this week.

Future Development

This week I am meeting with a professor to discuss Markewitz's portfolio theory. Essentially the idea of it is that you minimize risk while maximizing return and diversifying a portfolio. I will look to implement the mathematics and statistics behind his methods in the weeks to come. I also intend to look at multiple time frames, if not next week then the week after.

Analysis of General Market Conditions and News

One of my group members, Batyr, went long on Apple last week and has done extremely well. He says he believes it could go up more with the recent release of the newest IPhone and the holiday season at hand. Carl Icahn seems to agree with Batyr, saying in an article "Shares At Half Price" on the Wall Street Journal that he believes the apple share is still very undervalued, and expressing his hope that Apple more aggressively buy back shares while their price is low.[51] I believe I'm going to listen to him and go long on apple since he owns 53-millions shares. I'm also going to deploy the same strategy on the USDJPY this week. Last week it was profitable. The Japanese Central Bank just began the stimulus and article on the Wall Street Journal "Japan Falls into Recession" is discussing how their GDP fell marking another impending recession.[52] I hope to take advantage of an upward trend between USDJPY. Lastly I intend to manually trade the SPY, starting off by going long on Monday, since November and December are typically great months for stocks.

Trading & Actual Performance

This week I did well on the manual trades of SPY and Apple, but did not do well on the USDJPY. The worst part was that the USDJPY made a large uptrend and I could have made over 1,500 pips in 3 days, but again technical difficulties got me. My internet cut out for 10 minutes at the end of Monday and then my strategy had to undergo data corrections and wanted me to close my position. So I closed the position only to have the strategy not enter into another one as the USDJPY moved to record highs. Then once it hit $118 I committed the greatest sin of all and went against my strategy by selling 100,000 USDJPY. It just continued higher.

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[51] http://blogs.wsj.com/moneybeat/2014/10/09/shares-at-half-price-read-carl-icahns-new-letter-to-apple/?KEYWORDS=Apple

[52] http://online.wsj.com/articles/japan-falls-into-recession-1416182404?mod=WSJ_hp_LEFTTopStories

The worst part is the reason I completely automate a strategy is because I trust it more than myself on that particular equity or currency, so these ridiculous data corrections and other nonsense keep ruining my profits. If this was real money I would be furious. Next week I intend to make my strategy enter the market as soon as I deploy it by changing some code. Over the thanksgiving break I also intend to begin connecting by remote desktop to a computer at home. This way, I will stop having difficulties with my Internet.

Finally, while I was trying to get profit and loss data, my TradeStation account was claiming I made a lot of short trades from a while back, and had lost roughly $6,000 on them this week. Instead of dealing with yet another possible strategy error gone awry, I just reset all my accounts. I figure this way I start with a clean slate and don't have to deal with a strategy error having hid a bunch of short positions somewhere, and me having to go find them, and report losses on all of them. All my performance reports will now be from 11/22/14 onwards.

On a side note, to close out my manual trades I used trailing stops.

Trade Log

USDJPY

There was a rather large error in the trades, which is why I had to reset the account. There are not only strange position sizes, but also orders where my strategy clearly wouldn't have ordered anything. See the chart.

SPY

Date	Time	Trade	Type	Quantity	Price
11/17/14	9:30 AM	SPY	Buy	150	203.86
11/18/14	9:30 AM	SPY	Buy	350	204.51
11/21/14	1:10 PM	SPY	Sell	500	206.32

APPLE

Date	Time	Trade	Type	Quantity	Price
11/17/14	9:30 AM	AAPL	Buy	350	114.31
11/18/14	9:30 AM	AAPL	Buy	250	113.98
11/21/14	9:32 AM	AAPL	Sell	600	117.15

Charts

USDJPY - 60 Min Bars

SPY – 30 Min Bars

APPLE – 30 Min Bars

Week: November 23, 2014 – November 29, 2014

Strategy Overview

This week I plan on investing almost identical to last week. I intend to manually trade Apple and the SPY. I will have a larger position size in apple as opposed to last week since I made more profits off of it, and a slightly smaller position in the SPY. I will deploy my fixed automated strategy on the USDJPY. The automated strategy will trade on 18 min bars. Though I anticipate an interruption in this strategy because this week I will be transitioning to connecting via remote desktop to my computer at home, which has more stable Internet.

This week I also referenced multiple time frames in regards to the manual trades of the SPY and Apple. Though a time frame of weekly bars, and daily bars both had upward trends.

Future Development

I met with a professor to discuss Markewitz's portfolio theory. Having gotten insight and research materials from the professor, I intend to develop a strategy that chooses what to manually invest in based off the suggestions from the corresponding mathematics.

I have also decided to take on building another strategy. I wish to be able to deploy more than one automated strategy a week. This one will be drastically different than the current strategy though. It will make use of 52-week highs, analyst's profit targets, a risk measure and some other features. I hope to begin building it this week.

Analysis of General Market Conditions and News

I went long the SPY and Apple again this week because it is the week of Black Friday. I intend to stay in these positions for the next week or two at least, depending on if I can exit at a high price and re-enter at a lower price later. I was rather skeptical about Black Fridays impact on the market, but an article on WSJ titled, "Wall Street on Black Friday: Believe the Hype" encouraged me to re enter my long that got erased due to my resetting of my account.[53]

As for deploying my strategy on the USDJPY again this week, I want to take advantage of the strong-weak currency pair. As I saw last week, there is still a lot of movement in the USDJPY. Japans Economy is doing terribly, having officially fallen into a recession and Abenomics have gone into overload with the tax increases pushed off (sales tax) and having launched a massive stimulus effort.[54] Thus I will deploy my strategy on the USDJPY and have it trade standard lots.

Trading & Actual Performance

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[53] http://www.wsj.com/video/wall-street-on-black-friday-believe-the-hype/F3A53494-4286-4077-AA41-EA4F1C2D0640.html?KEYWORDS=market+going+up

[54] http://online.wsj.com/articles/abes-tax-delay-launches-aggressive-1416316049?KEYWORDS=japan+tax

This week I made roughly a $1,700 profit on 900 shares of Apple on Monday and Tuesday, sold it through a stop loss designed to lock in profits, and then bought back in at a lower price almost immediately after. I am currently up roughly $300 more, and am waiting until next week to make a move on the position.

On the SPY I am currently down approximately $100 and own $400 shares. With Black Friday having just passed and the Christmas season fast at hand, I intend to wait for the SPY to go up, and do a similar maneuver to what I have done with Apple. I hope to sell at a high price and then buy back at a lower price very soon after.

As I discussed in my Future Development section, for the USDJPY I was only able to deploy the strategy for 2 days. I am working on installing TradeStation onto a computer with more stable Internet and being able to remote desktop onto it. Thus I missed some major profits, however it is in the name of future consistency.

Trade Log

APPLE

Date	Time	Trade	Type	Quantity	Price
11/24/14	9:30 AM	AAPL	Buy	900	116.80
11/25/14	10:00 AM	AAPL	Sell	900	118.70
11/25/14	12:30 PM	AAPL	Buy	900	118.40

SPY

Date	Time	Trade	Type	Quantity	Price
11/24/14	9:30 AM	SPY	Buy	200	207.12
11/25/14	10:00 AM	SPY	Buy	200	207.50

USDJPY

Date	Time	Trade	Type	Quantity ($)	Price
11/24/14	2:30 AM	USDJPY	Sell	80,000	11.857
11/24/14	3:40 AM	USDJPY	Buy	160,000	118.248
11/24/14	2:00 PM	USDJPY	Sell	180,000	118.312
11/25/14	3:12 AM	USDJPY	Buy	200,000	117.966
11/25/14	7:24 AM	USDJPY	Sell	200,000	118.034
11/25/14	8:54 AM	USDJPY	Buy	200,000	118.187
11/25/14	9:48 AM	USDJPY	Sell	200,000	117.927
11/25/14	3:30 PM	USDJPY	Buy	200,000	117.951
11/25/14	6:04 PM	USDJPY	Sell	100,000	117.909

Charts

USDJPY – 30 Min Bars (Though the strategy ran off 18 minute bars)

APPLE – 30 Min Bars

SPY – 30 Min Bars

Week: November 30, 2014 – December 6, 2014

Strategy Overview

This week I have successfully transferred my TradeStation activities to a more stable internet environment. Many of my previous technical difficulties and poor performances were due to poor Internet connectivity at my current location, so I brought the computer I was using home, have it hooked up to stable internet, and am utilizing remote desktop to make changes.

The strategy I am deploying on the USDJPY is the same strategy I built up to A-term and some of B-term. I am currently developing a new strategy and will hope to implement it lightly next week, and fully by the end of B-term.

Future Development

The new strategy I am developing is an adaptation from a set of indicators my father uses to invest. It is extremely different from what I had done before, looking at 52 week highs and targets, as well as other key numbers. I am looking to have this strategy assess multiple stocks, and then continue forth and invest into the ones it gets good readings from.

I am also looking into Markewitz's Portfolio Theory, and hope to apply it to my investing by the end of B-term.

Finally, I am going to deploy my strategy on longer time frames and also begin investing with options this week. I know a fair amount about options; I have just been focused elsewhere

Analysis of General Market Conditions and News

This week I intend on deploying my strategy on the USDJPY market again. With nothing to interfere in my strategy (internet), I wish to take control of a continually weakening Japanese Yen and strong U.S. Dollar pair. This week an article on the WallStreet Journal, "Moody's Downgrades Japan's Credit Rating", reaffirmed my belief that the Japanese Yen will continue to weaken. Basically the article discussed how Prime Minister Shinzo Abe is having trouble stoking inflation and growth even with the massive stimulus Japan's Central Bank has begun. Thus Moody's downgraded Japan's credit over fears of them having trouble cutting the current fiscal deficit in the future.[55]

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[55] http://online.wsj.com/articles/moodys-downgrades-japan-debt 1417425248?mod=WSJ_hp_LEFTWhatsNewsCollection

I will also stay long Apple and the SPY. I actually increased my position in Apple by 500 shares since the stock price dropped ridiculously in todays opening hour. I was reading the WSJ and actually came across the article, "U.S. Stocks Open Lower," and then went to go check on my positions only to find apple had plummeted roughly $8 in the opening hour of the market. That's a buying opportunity if I ever saw one so I took advantage, knowing that my underlying assumptions that Apple and the SPY will continue up in the next two months should stay correct.

Trading & Actual Performance

This week made some money trading the USDJPY though began losing profits around Thursday. On Thursday the USDJPY appeared to be going directionless, so I shut my strategy off for the week, having already made over $1,000 in profit this week and then was dismayed to see that is made a very large move Friday. It is unfortunate, and next time I will let my strategy endure the rough patch so that it may reap the rewards on the other side, though I was abiding by the "cut your losers short" philosophy. On a separate note I intend to deploy on a larger time frame because my strategy is getting too caught up in the "noise" as my trade log will reveal.

Apple dropped considerably, plummeting $7.00 in the opening hour this Monday. Notice the one extremely steep red candle on the chart. I realize it's a supposed sin to buy against the market, but I bought in at what I consider a bargain around $116, upping my position to 1400 shares. I didn't see any reason in the news for Apples drop and it's still supposed to become the first company to be valued at one trillion dollars. Nothing refutes my original philosophy of buying Apple, so I got in deeper.

The SPY also dipped in on Monday and Tuesday, however similar to Apple, there was no apparent reason for the dip besides a natural correction. I wanted to either buy Apple or the SPY when these dips occurred, but I bought Apple because its dip seemed more irrational. I'm currently up a few hundred on the SPY.

Trade Log

APPLE

Date	Time	Trade	Type	Quantity	Price
12/01/14	10:30 AM	AAPL	Buy	500	116.15

Position Size
1400

SPY

Position Size
400

USDJPY

Date	Time	Trade	Type	Quantity ($)	Price
11/30/14	11:18 PM	USDJPY	Buy	80,000	
11/30/14	11:45 PM	USDJPY	Sell	180,000	
12/01/14	1:00 AM	USDJPY	Buy	200,000	
12/01/14	1:30 AM	USDJPY	Sell	200,000	
12/01/14	7:00 AM	USDJPY	Buy	200,000	
12/01/14	8:30 AM	USDJPY	Sell	200,000	
12/01/14	11:30 AM	USDJPY	Buy	180,000	
12/01/14	12:00 AM	USDJPY	Sell	180,000	
12/01/14	2:00 PM	USDJPY	Buy	180,000	
12/02/14	12:00 AM	USDJPY	Sell	80,000	
12/02/14	1:40 AM	USDJPY	Sell	100,000	
12/02/14	02:00 AM	USDJPY	Buy	100,000	
12/03/14	02:18 AM	USDJPY	Buy	80,000	
12/03/14	02:54 AM	USDJPY	Sell	180,000	
12/03/14	09:48 AM	USDJPY	Buy	100,000	
12/03/14	04:42 PM	USDJPY	Buy	380,000	
12/04/14	01:06 AM	USDJPY	Sell	200,000	
12/04/14	01:42 AM	USDJPY	Buy	200,000	
12/04/14	02:18AM	USDJPY	Sell	380,000	
12/04/14	2:54 AM	USDJPY	Buy	200,000	
12/04/14	3:12 AM	USDJPY	Sell	200,000	
12/04/14	4:24 AM	USDJPY	Buy	200,000	
12/04/14	8:30 AM	USDJPY	Sell	200,000	
12/04/14	10:00 AM	USDJPY	Buy	200,000	
12/04/14	11:00 AM	USDJPY	Sell	200,000	
12/04/14	1:30 PM	USDJPY	Buy	200,000	
12/04/14	3:30 PM	USDJPY	Sell	180,000	
12/04/14	5:00 PM	USDJPY	Sell	20,000	

Charts

USDJPY – 30 Min Bars (Though the strategy ran off 18 minute bars)
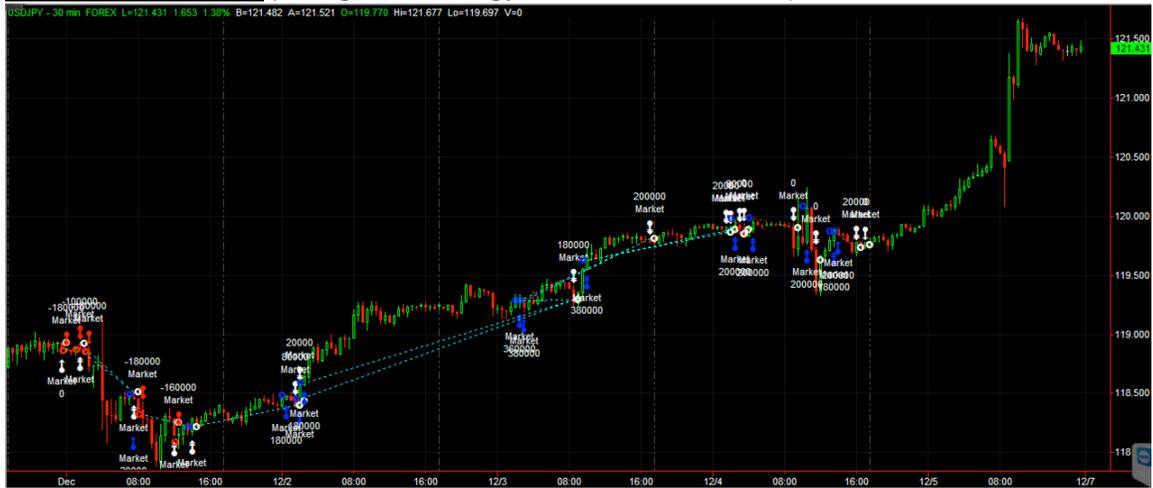
APPLE – 30 Min Bars

SPY – 30 Min Bars

Week: December 7, 2014 – December 13, 2014

Strategy Overview

This week I am going to expand my trading to the options markets. As I have mentioned, I have read a few books on options, so my only difficulty should be learning OptionsStationPro. I am thinking that I will sell some puts on the SPY because even if the options get exercised, I want to be long the market. I may need to wait to free up some capital though since I have so much tied up in Apple right now.

I am also still developing my strategy. I have been doing research on which indicators I want to use to assess company worth, and am doing research on how to apply a strategy to multiple equities at the same time, aside from just deploying it on many equities one at a time. Until I am finished this strategy, I will continue to use my moving average strategy on USDJPY, and will still be manually trading the SPY and APPLE.

Additionally, I edited the code of my strategy to make it more efficient and take out some excess. I think it preforms better now. I also discovered a way to force a strategy to adhere to where my account actually is in the market to avoid inconsistencies.

Future Development

I am still continuing to develop the strategy, which evaluates companies based off certain indicators and then tells me which one to buy/sell. Though deciding which indicator I want is taking a lot of research, and figuring out how to code it is as well. I fear I may have to finish this over Christmas break, which wouldn't be that bad.

Analysis of General Market Conditions and News

Again I am deploying the strategy one the USDJPY to try to take advantage on an extremely weak Japanese Yen and a relatively strong U.S dollar. The news only keeps getting worse for Japan's economy. Whether it is reports coming out that say Japan's companies are feeling pessimistic about current and upcoming conditions[56], or it is reports of machinery orders falling by 6.4%, which is a strong indicator of capital expenditure[57]. It also doesn't help that there is a sales tax increase in the pipeline for Japan, about to inhibit consumers.

Additionally, the recent dropping of Apple stock to prices as low as 110, is nonsensical. Apple's IPhone 6 and Apple Pay are getting great reviews, with Apple Pay supposed to be a "big leap" for Smartphones[58]. Apple is projected with one-year projections over 120 by many sources,

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[56] http://www.wsj.com/articles/optimism-waning-at-japan-inc-1418176823?KEYWORDS=japan

[57] http://www.wsj.com/articles/japan-machinery-orders-fall-6-4-1418257633?KEYWORDS=Japan

[58] http://www.wsj.com/articles/iphone-6-review-apples-cure-for-android-envy-1410915695?KEYWORDS=IPhone+6

even Yahoo[59], and is supposed to become the first one trillion dollar market cap stock. There is nothing that justifies a $10 per share drop in two weeks and so as "the oracle" Warren Buffet says, I will "be greedy when others are fearful and be fearful when others are greedy." I'm going to keep adding to my long Apple position.

Trading & Actual Performance

There appears to be slight discrepancy between the trade manager, the performance report and the charts. When I add up the trade manager trades, I have all profits, but the chart and the performance report show that I had a roughly equal balance of profit and loss, so there is a slight discrepancy. The chart doesn't even have my first trade recorded so, that might be where the troubles ensue. Nothing major though.

This week I was sad to see that my strategy on the USDJPY still needs many adjustments in order to function the way I want it too. First, I will move up the time interval again, I believe to 45-minute bars, because there is still slightly too much "noise" being taken into consideration. Secondly I thought simplifying the code would fix a slight problem I was having with the inconsistencies in the size of the position the strategy takes every reversal. However, this does not seem to have worked, and so I will need to re-evaluate how my strategy is being told to reverse positions. Perhaps though, a change I intend to make next week, making my strategy actually begin calculating on the bar where I deploy it, not a historical bar, will help. Additionally, I have been including the time of day my strategy makes trades every week in the Trade Log, but as I examine each all the charts, I still have not been able to recognize any pattern towards time of day I want to be trading USDJPY.

Again Apple finished low this week, around $110. As I have previously stated, there is no reason for this drop, except for illogical fear. Thus I am staying long Apple and continuing to increase my positions as it drops illogically.

After seeing how the SPY followed Apple down last week, once I saw Apple drop, I quickly sold my shares of spy for a very minor loss of around $200, and bought into apple around $111. I think Apple is the place to be right now, and the SPY dropped roughly $5 a share after I sold it, so I'm happy I got out when I did.

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http://finance.yahoo.com/q;_ylc=X1MDMjE0MjQ3ODk0OARfcgMyBGZyA3VoM19maW5hbmNlX3dlYgR mcjIDc2EtZ3AEZ3ByaWQDBG5fZ3BzAzkEb3JpZ2luA2ZpbmFuY2UueWFob28uY29tBHBvcwMxBHBxc3RyYA wRxdWVyeQNBQVBMLARzYWMDMQRzYW8DMQ--?p=http%3A%2F%2Ffinance.yahoo.com%2Fq%3Fs%3DAAPL%26ql%3D0&type=2button&fr=uh3_finance _web&uhb=uh3_finance_vert&s=AAPL

Trade Log

APPLE

Date	Time	Trade	Type	Quantity	Price
12/08/14	3:30 PM	AAPL	Buy	400	112.42

Position Size
1800

SPY

Date	Time	Trade	Type	Quantity	Price
12/08/14	3:30	SPY	Sell	400	206.68

Position Size
0

USDJPY

Date	Time	Trade	Type	Quantity ($)	Price
12/07/14	11:30 PM	USDJPY	Sell	100,000	121.500
12/08/14	12:00 AM	USDJPY	Buy	220,000	119.300
12/09/14	2:30 PM	USDJPY	Sell	380,000	118.964
12/10/14	4:30 AM	USDJPY	Buy	160,000	118.602
12/11/14	3:30 AM	USDJPY	Sell	160,000	118.390
12/11/14	8:30 PM	USDJPY	Buy	160,000	118.806
12/11/14	4:00 PM	USDJPY	Sell	180,000	119.073
12/12/14	10:30 AM	USDJPY	Buy	300,000	118.873

Position Size
Long $200,000

Charts

USDJPY

APPLE

SPY

Week: December 14, 2014 – December 18, 2014

Strategy Overview
Seeing as my strategy apparently has some large bug in it, I am taking a break from developing my new strategy and trouble shooting/re-evaluating my triple moving average strategy. Hopefully I will find time to fix it before the week is through. Yet, It is finals week, and anticipating that I may not have time too, I am just going to play the USDJPY manually this week, and am currently long two standard lots.

My manual trading is rather limited this week in equities because of how large my position has become in Apple. I currently own 1850 shares of Apple, and am leveraged pretty strong. I bought 50 shares this morning at around $110 and intend to make a quick profit on them. Once Apple hits somewhere around $112 I'm going to take profits on that very small position and look to take a position in the SPY.

Future Development
I intend to continue creating the new strategy I am working on. Also I hope to work out any bugs left in the current triple moving average strategy that I have been implementing. For more info on future development see the <u>Concluding Report</u>.

Analysis of General Market Conditions and News
The U.S. recently came out with some strong numbers, such as retail sails having rose 0.7%, and the central bank is starting to look more hawkish now that Quantitative Easing is finished[60]. I also can't find any good news coming out about Japan's economy or the Yen, so I figure it's a good time to be long the Yen. The Yen also dropped last week from 121 to 118, where it has frequently been hitting support recently.

The Wall Street Journal had a really nice summary of Apple stock[61]. It discusses how Apple fluctuated between $109.58 and $111.87 on last Friday. It is currently trading at a PE ratio of 17.06, which although may seem high is actually not high at all for the technology sector. As well, the RSI on apple 41.37, almost right in the middle of being overbought and over sold. I personally don't trust the RSI all that much, but it's nice to see that the RSI has Apple nowhere near 70, being over sold. It's also currently trading above it's 50 day moving average of 108.57, but for the past two months stock price has been consistently increasing, so I don't see that as being a negative point. Over all this report doesn't support any immediate jump in Apple, but it does imply Apple is meeting support around $110 as it did two weeks ago, and I think my long positions will soon become very profitable.

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[60] http://www.wsj.com/articles/dollar-rises-against-yen-euro-on-strong-u-s-retail-sales-1418311397?KEYWORDS=Yen

[61] http://online.wsj.com/article/PR-CO-20141215-904720.html

Trading & Actual Performance

My long position in the USDJPY had a drop early in the week but finished the week almost exactly where it started. I set a sell order at 120.50 and currently the USDJPY is at 118.77. I think I am just going to leave the order there, since the SPY rebounded roughly $6, which is indicative that sentiments about the U.S economy and dollar are still strong. I think in the coming weeks the USDJPY will at least touch my price and give it a chance to execute. I have made no other trades though this week so there is essentially no profit or loss this week.

Unfortunately I had no position in the SPY this week because it rebounded roughly $6 a share. But you can't cry over profits you don't have.

One of my positions on Apple triggered. It was a position of 50 shares long, which then sold for roughly $1.50 a share more later that day. Technically I can count it as a loss from my earliest position, which would be good for tax reasons, but from my lowest price long position it was a profit. I am close to another limit order I have set as well which will take further "losses" that are actually profits. Look at the chart and what I am saying will become clearer if there is any confusion.

Trade Log

APPLE

Date	Time	Trade	Type	Quantity	Price
12/13/14	9:30 AM	APPLE	BUY	50	110.73
12/13/14	1:30 PM	APPLE	SELL	50	112.00

USDJPY

Position Size
Long $200,000

Charts

APPLE

SPY

USDJPY

Concluding Report

Tasks Accomplished & Progress Made

By the end of A-term my automated trading was not very sophisticated, but I had dabbled using a few rudimentary strategies: two moving averages and Bollinger Bands mostly. A major accomplishment of B term was creating the triple moving average system I set a goal towards making in A-term, and refining it. The triple moving average strategy not only knows where it is in the market at all times because of a custom tracking system I made, but also can turn itself off if it loses too many trades in a row. I am also proud that I made it tranche (buys into a full lot, by using two smaller buys) in order to limit risk. It has been very profitable this term, the only issue being that the person using it has to determine where they will deploy it, and Internet inconsistencies interrupted it a lot earlier in the term. I also learned one final lesson about my strategy; deploy it on longer time intervals, other wise it gets too caught up in the "noise." The code for this strategy is after the appendix. I have also begun developing a radically different strategy, which I hope will also aid my manual trading. This strategy will look at indicators I deem important for a multitude stock (hopefully the full S&P once I'm finished) and then will tell me, which ones to trade and what to do (buy or sell). I may even empower it to trade the top 5 stocks, and then I'll use the rest of the info to trade manually. There are many challenges with this strategy though. The first is determining which indicators are most important for a company as it relates to stock price. The second is to figure out how to code a strategy that will look at more than one equity at a time. The third would be making it be able to actually trade the five stocks it ranks as the best. I quickly discovered it was too ambitious to create by the end of B-Term, and will attempt to finish it by the end of C-Term

My manual trading also developed immensely this term. In A Term, I would mainly ask others for advice on stocks and do some company research but it wasn't as in depth as it is now. Now I go through the Wall Street Journal a lot more, and even explore other sites like yahoo finance. A-term I would also look around and try to discover new companies, where as this term I decided to specialize in the SPY ETF and Apple. The SPY is an ETF designed to follow the S&P 500, and the S&P is usually a benchmark that people attempt to compete against (generating alpha). I like the idea of competing against the S&P by intelligently trading an ETF of it, so I specialized in that. As well, Apple is supposed to become the first trillion dollar market cap stock, so I think it will be a very interesting place to trade for the next year.

Another notable achievement was beginning my research into Markowitz's Portfolio Theory. The idea of Markowitz's Portfolio Theory is basically that it is a mathematical way to decide how to allocate funds to a portfolio of stocks. One it has mathematically assigned risk, and expected return values to a stock, the theory uses statistical distributions to try to maximize total portfolio return, while minimizing risk. It's graduate level financial mathematics though, so it's going to take me a long time to integrate. Though if I am successful in creating my newest strategy, I intend to incorporate the theory into that. The strategy I am currently developing is essentially a foundation to lay the theory on top of.

Finally I have begun trading options. I am learning options station pro and intend to incorporate it far more in C-Term

Minor Obstacles

One of the most impeding minor obstacles this term has been time. Since I am busy most of the day with classes and other extracurricular, I can't be sitting watching the market. This makes me more motivated to develop automated strategies, and also eliminates the possibility of intraday trading for the most part. Though, automated strategies take a lot of time to develop.

Technology has also been a minor obstacle. I needed to relocate my computer I was using to run TradeStation, because my Internet at school was too unreliable. As well, in roughly the middle of B-term I had to reset my account because of some massive error that happened and lost me thousands of dollars, making many trades that didn't make sense.

Also my account keep registering me for hundreds of thousands of dollars in losses in very short time spans, such as the week of December 6 – December 13. I tried resetting my account but I still have no permanent solution for this.

C-Term Endeavors

In C Term I have short list of main Endeavors.
1. Develop and finish multiple stocks assessing strategy.
2. Expand options trading.
3. Develop another Automated strategy after finishing the first.
4. Expand manual trading to 2 more equities, and specialize in them as well.

WALL ST. IN PANIC AS STOCKS CRASH

Attempt Made to Kill Italy's Crown Prince

C TERM, January 2015 – March 2015

Richard O'Brien

Week: January 15, 2015 – January 24, 2015

Strategy Overview
In review of last term I had four main goals I wanted to accomplish in C term.

5. Develop and finish multiple stocks assessing strategy.
6. Expand options trading.
7. Develop another Automated strategy after finishing the first.
8. Expand manual trading to 2 more equities, and specialize in them as well.

This past week (and over break) in manual trading I mainly focused on freeing up capital that was tied up in Apple. I had made a very substantial bet that Apple was and is undervalued, though it hasn't paid off and I'm not willing to wait a year. Thus I have been trying to minimize losses as I exit my Apple position. I have been looking into two other companies to expand into, and currently I am watching oil companies very closely due to the recent drop in oil prices.

Regarding automated strategies, I have continued to program my strategy that will assess multiple equities at one time and decide what to invest in. I have also continued to refine my search of key indicators that this strategy will be based off, and have begun assigning weights to these indicators.

Future Development
By the end of next week I intend to have one of the two new equities I will be manually trading decided. I intend to begin focusing on this new stock and taking positions in it, just as I have with Apple and the SPY this past B-term. I will also hopefully free up more capital from Apple.

With regards to the automated strategy, I intend to have it up and running hopefully well before the end of the term. After a considerable amount of research, I decided to look into using standard indicators (volume, 52 week high, etc.) as opposed to strictly mathematical ones since they are so advanced and difficult. Hopefully once I have the strategy up and running I will be able to add in a mathematical component.

Analysis of General Market Conditions and News
The reason I am going to choose an energy company to specialize in is because oil prices are just so ridiculously low. This has been hurting all the energy companies to such a point that, "The S&P Small Cap 600 Energy index, has swooned 47% in the past six months."[62] This is even more of a drop since the broader S&P rose by about 4%. The time to buy energy companies may not be right now, since the floor may be as much as 10% away, but it is very soon and I want to know exactly when that is. Thus I may take a small position in the SPY next week, simply because it has continued to rise, though I'm focusing mostly on energy.

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[62] http://www.wsj.com/articles/is-it-time-to-invest-in-energy-stocks-1422028657

In regards to deploying my triple moving average automated strategy, I will continue to use it on the USDJPY. The Euro (dropped) and the Swiss Frank (rose) have both made extremely big moves recently, with the Swiss Frank not having a cap against the Euro anymore and the Euro dropping to near 11-year low against the dollar[63]. This does sound promising for my strategy since both these currencies are moving considerably, however they are moving to quickly for my strategy I feel. My strategy does well with trending, not with sharps raises and drops. My strategy simply can't react quick enough to not lose money. Thus I am going to keep in in the USDJPY.

Trading and Actual Performance

I edited the code of the triple moving average strategy and it appears to be working fine now. Though there is still a discrepancy between strategy orders and the orders displayed in a different tab.

Regarding the apparent losses mounting in the performance graph, because of the reduction in my holding of Apple I am taking losses. Though this all depends if someone looks at me selling from the oldest long positions or the most recent long positions. From the most recent long positions, both times is sold I made a profit; though from the oldest long positions, both times I sold I took a considerable loss.

These losses are being offset by the profitability of the automated strategy. The automated strategy is making a slight profit, and not only is it keeping me profitable, but it is also offsetting the losses from Apple. I expect this trend to continue unless there is a large rise in Apple stock soon.

Trade Log

APPLE

Date	Time	Trade	Type	Quantity	Price ($)
12/26/14	3:08 PM	AAPL	Sell	400	114.50

Position Size (Shares)
1400

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[63] http://www.wsj.com/articles/european-bonds-hit-record-highs-after-ecb-move-1422003601

USDJPY

Date	Time	Trade	Type	Quantity	Price ($)
1/20/15	12:30 PM	USDJPY	Sell	80,000	118.572
1/22/15	1:00 PM	USDJPY	Buy	180,000	118.000
1/22/15	11:00 PM	USDJPY	Sell	180,000	118.373
1/23/15	12:30 AM	USDJPY	Buy	160,000	118.645
1/23/15	2:00 AM	USDJPY	Sell	180,000	118.265

Position Size ($)
Short 100,000

Chart

USDJPY – 30 Min Bars (This chart has some errors with profit & loss lines)

APPLE – 30 Min Bars

Week: January 25, 2015 – January 31, 2015

Strategy Overview

My week in manual trading went exceptionally well for reasons I will discuss later in the Analysis of General Market Conditions and News section. Ultimately though, I was successful in my goal of freeing up capital that had been locked up in Apple for over a month. I was still 1400 shares long Apple at the beginning of this week, and over the previous month I had been as deep as 1800 shares long (roughly $180,000). It simply made no sense why Apple had retraced back from $119 to as low as $103 since November. For this reason I was willing to stick it out even though at one time I was -$15,000, or roughly 15% of my portfolio, just on Apple. Everything was also tied up in Apple as I did small trades with its minor fluctuations, taking small profits, however I was becoming locked into the position for too long. I decided I wan going to be out by the end of January, and on Wednesday Apples prices soared back to $117.50. I immediately got out 400 of shares at 117.50 and then exited my full 1000 remaining shares at $116.00. With all the new capital free, and having only taken a minor loss (maybe a few $100 over all) I turned my attention to Exxon Mobile and the SPY. Though Apple soared the Spy did not, and though oil is down, Exxon is a great buy. Exxon is one of the companies I intend to become a specialist in out of the two. It is very large, has a massive presence in the energy sector, a lot of information available about it, and is currently hurting due to oil.

I also made very exciting progress with my automated strategy I have been working on. I decided to create it in Excel, that way after this year I wouldn't lose the strategy, and no matter what as I grow as an investor, I will always be able to use and edit the strategy. This week I learned how to create a macro and do some scripting in Excel, and was able to script a program that takes key data off of a website (Yahoo Finance) brings it onto Excel and allocates it to specific cells. I decided I am going to use point indicators, such as 52 week high and low, momentum indicators such as 200 day and 50 day moving average and am going to use a volatility indicator I develop from the average of the differences of moving averages. I have included the excel script under the Code section in the appendix. There is currently no flow diagram.

Future Development

In regards to manual trading, I am going to do more research on Exxon. Off my current research and feeling of the markets, I have entered into a long position of 300 shares, but I want to become an expert in Exxon. Hopefully I will gain a strong understanding for the stock. I also will continue to search for another stock which peaks my interest and that I can become an expert in.

With Automated trading, I will continue to develop my excel indicator. I intend to have it expand to taking the information of all 500 stocks in the S&P 500 by next week. Hopefully, I will be able to start working on how it assesses the stocks after that.

Analysis of General Market Conditions and News

The reason Apple sprung up in the markets on Wednesday the 28th is because they came out with an absolutely stellar earnings report. They broke records on IPhone sales selling 74.5 million IPhone 6s, and Apple's earnings of 74.6 billion "handily exceeded" any of their most bullish estimates (68 billion)[64]. It had a large ripple effect on the market, especially the S&P, which is why after the jolt reaction the S&P dropped back down and I bought into it around $200.

As well, oil has been falling absolutely relentlessly recently, and I believe it may be near a bottoming out point. On the 29th, oil traded below $44 a barrel for the first time since 2009, and many investors are starting to think oil is due for a "major correction."[65] Though other traders make a valid argument that oil technology and production within the United States has progressed immensely recently and we should expect oil prices to skyrocket any time soon. Over all, I bought Exxon Mobile in the short term, because I too believe that oil I near is bottom point, and that a correction is due. I intend to take advantage of the correction and then do further analysis from there.

Trading and Actual Performance

This weeks trading and actually performance made some interesting discoveries. For some reason this graph looks radically different than the previous graphs I have had in B term. The discrepancy needs to be investigated further, but it shows me incurring more losses over last term.

Overall we can see that I made some profits this week thanks to my automated trading and my ability to get out of Apple at such a favorable price. It was a very fortunate week for me, because I knew Apple would go up to the prices it hit this week, but something kept dragging it down. Thus I couldn't afford to wait another two months for Apple because of the nature of the IQP. I'm glad the earnings report renewed confidence in Apple, though I had to take my out when it came to it and invest my capital elsewhere.

Trade Log

APPLE

Date	Time	Trade	Type	Quantity	Price ($)
1/28/15	9:30 AM	AAPL	Sell	400	117.59
1/28/15	3:30 PM	AAPL	Sell	1000	116.00

USDJPY

Date	Time	Trade	Type	Quantity	Price ($)

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[64] http://blogs.wsj.com/moneybeat/2015/01/27/apple-iphone-sales-set-new-record-stock-pops/?KEYWORDS=AAPL

[65] http://www.wsj.com/articles/crude-oil-futures-weak-in-asia-on-record-high-u-s-supply-1422511088?KEYWORDS=oil

1/26/15	2:00 AM	USDJPY	Buy	200,000	117.934
1/28/15	4:15 AM	USDJPY	Sell	200,000	117.662
1/29/15	4:30 AM	USDJPY	Buy	160,000	117.756
1/29/15	10:15 AM	USDJPY	Sell	160,000	117.875
1/30/15	11:30 AM	USDJPY	Buy	80,000	117.443

XOM

Date	Time	Trade	Type	Quantity	Price ($)
1/29/15	9:30 AM	XOM	Buy	200	88.44
1/29/15	10:30 AM	XOM	Buy	1oo	86.57

SPY

Date	Time	Trade	Type	Quantity	Price ($)
1/28/15	3:50 PM	SPY	Buy	400	200.20

Chart

USDJPY – 60 Min Bars

APPLE – Daily Bars

SPY – 60 Min Bars

XOM – 60 Min Bars

Week: February 1, 2015 – February 7, 2015

Strategy Overview
As I continue forwards with manual trading of equities, I have determined that I will become an expert in an equity in the financial sector, most likely a bank. I am unsure which bank to choose as of right now though. I want to look back at some data from the recession and see how certain big banks were affected. I did well in my recent trades of Exxon Mobile, the most recent company I have decided to become and "expert" in, and so I am reassured that I should expand my trading to another company. I am currently and "expert" in the SPY (an exchange traded fund mimicking the S&P 500) Apple (a technology company), and Exxon Mobile (an energy company), so I think financials will bring nice diversification to my portfolio.

In regards to my latest strategy, progress has been slower than I would have hoped. I know Python which gives me a nice background in coding, however excel uses VBA, and so I have had to teach myself the language as I go. I have made much progress though, and am almost completely done the "functional" aspects necessary for excel to set up the framework (Scrape data from internet and then set it up in excel spreadsheets correctly and intelligently). Soon I will be able to customize the indicators from the data I develop and make it user friendly.

Future Development
For the manual trading aspect of my IQP, I intend on pinning down a bank to become an expert in and trade regularly. I will look at some data from the recession to see how it deals with downturns and compare it to now. That way I will have a full idea of what I am getting into.

In regards to automated trading, I intend to have the functional aspects of the excel scripting finished by the end of the next week, and even hopefully begin building indicators.

Analysis of General Market Conditions and News
The market conditions were exactly as I expected them to be. I went long the SPY and Exxon Mobile (XOM) at the end of last week because I felt they were both being largely affected by oils price plunge, which would reverse soon. Fortunately, It reversed sooner than I expected, and crude's price rose this week making XOM stock jump $4 and the SPY jump roughly the same. I took my profits on Tuesday of a few thousand dollars, and then stayed out for the rest of the week. Unfortunately crude price continued rising until Thursday, and more money could have been made in the SPY, but I have learned never to regret a profit. Oil prices are very volatile right now, with them dropping as much as 8% some days and then rallying back 5% the next, so I intend to wait and take advantage of the next dip in oil causing XOM and the SPY to come with it.[66]

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[66] http://www.thestreet.com/story/13037135/1/exxon-mobil-xom-stock-rallies-today-along-with-crude-prices.html?puc=yahoo&cm_ven=YAHOO

As well, a very strong jobs January jobs report is keeping me optimistic about keeping my automated strategy in the USDJPY. The past three months have created over one million jobs, and January beat its estimated.[67] This shows strength in the U.S economy and the U.S. dollar, and I intend to continue taking advantage of the weakness of the Japanese Yen.

Trading and Actual Performance

This week my previous analysis of the market paid off, and I profited from both the strategy I deployed on the USDJPY and the manual trading.

Exxon was right near the bottom of its recent down turn around $88, and so I jumped in quickly, and then jumped out when it rebounded to $92. I felt as though it was going to lose momentum around $92, just as it had a few times previously, and so I made the correct decision and got out before it stagnated for the rest of the week.

I intended to get out of the SPY at $205, with a limit order I set, however something went wrong and it got me out around $203. In the end I missed some of the upward momentum, which I expected, but I still made a profit.

On the USDJPY, I made small profits all week. I discovered that if I interjected into my automated strategy and made it take profits sometimes, it is a lot more effective. I then just restart it. I am considering programming exits into the triple moving average strategy after I finish the current one I am working on. I also need stop losses. I was lucky to offset a large loss in the week with an immediate, large gain, but had I put in a stop loss, I could have had simply a large gain.

Finally, I shorted Amazon this past week. It rose very high off an earning report (which wasn't very exceptional), and I think it is very overvalued. This is just a gut instinct with no strong backing, so I took a small position.

Trade Log

USDJPY

Date	Time	Trade	Type	Quantity	Price ($)
2/01/15	9:30 PM	Buy	USDJPY	100,000	117.576
2/02/15	7:15 AM	Sell	USDJPY	200,000	117.588
2/03/15	5:00 AM	Buy	USDJPY	200,000	117.412
2/03/15	2:00 PM	Sell	USDJPY	180,000	117.487
2/06/15	8:45 AM	Buy	USDJPY	180,000	118.276
2/06/15	11:00 AM	Sell	USDJPY	100,000	119.027

XOM

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[67] http://www.wsj.com/articles/jobs-report-u-s-adds-257-000-jobs-unemployment-ticks-up-to-5-7-1423229564?KEYWORDS=job+

Date	Time	Trade	Type	Quantity	Price ($)
2/03/15	12:00 PM	XOM	Sell	300	92.00

SPY

Date	Time	Trade	Type	Quantity	Price ($)
2/03/15	9:30 AM	SPY	Sell	400	203.31

Chart

USDJPY – 60 Min Bars

SPY – 60 Min Bars

XOM – 60 Min Bars

Week: February 8, 2015 – February 14, 2015

Strategy Overview

For manual trading I didn't see any good opportunities to go long this week. I also have not decided witch financial stock I want to become an expert in yet. I have watched numerous ones the past week such as JP Morgan, Citi Group, Deutsche Bank and more, yet I haven't seen one that really sticks out to me. If I were to choose right now I would choose Goldman Sachs, because they are differentiated in that they are going to continue their trading focus as opposed to becoming a market maker more as other banks are doing. I will continue to watch this week and decide at the end of next week. As well, I feel that the market is due for a correction, say for instance if oil drops one day, and so I have taken out a few small short positions.

For automated trading I was told about the Yahoo Finance API, which will allow me to pull data much faster from the web than I was before. Though it requires seriously overhauling my code, I have been spending most of the week trying to change my code to use the API, as opposed to pulling from individual HTML pages. This takes especially long since I am teaching myself VBA as I go in order to be able to script in Excel. However I have made major strides and intend to be done the functional aspects next week now. I am fine with delaying my strategy a week because it will be orders of magnitude faster than it currently is.

Future Development

For manual trading I intend to have the fourth company that I will be an expert in by the end of next week.

For automated trading, I intend to be finished the functional aspects of pulling data from Yahoo Finances API. I also hope to start constructing the indicators within excel. This should be better now as well since I will be able to pull more precise data then before.

Analysis of General Market Conditions and News

This week I may have been somewhat off with feelings of the market. I felt as though the market was very overbought this week, for no apparent reason, Apple Especially. Apple stock climbed to 127 from 120 the past week, and the last time it made such massive gains in a week, it plummeted like a rock immediately after. Thus I took a small short position regardless of their recent earnings. However their earnings, and that of other tech stocks are a concern. I was reading an article in the Wall Street Journal that discussed how the difference between inflated tech prices now and the prices during the tech bubble, is that the companies have the earnings reports to back up the lofty price[68]. This does concern me, however I'm going to stay short for the beginning of next week, and reevaluate my position as I hear more news.

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[68] http://www.wsj.com/articles/tech-leads-the-way-as-nasdaq-climbs-buoyed-by-sectors-earnings-1423876310

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I also read another very interesting article regarding "sin stocks."[69] I have been looking for areas to broaden my portfolio of manual trading into, and I chose a financial stock to become an expert in next, but after that I am strongly considering delving into sin stocks. Sin stocks are companies that are focused around tobacco, gambling, military, or anything the general citizen might see as morally questionable. However many times before, and in this article, I have heard and read that these stocks present a great opportunity, because their negative stigmas often play an undo role in lowering their price. I intend to look into these in the future.

Trading and Actual Performance

My performance this week from both automated and manual trading was not very strong. I suffered a small drawdown of only a few hundred dollars, though this is not counting the short trades I am currently negative on that I have not closed yet. There will probably be more significant change at the end of next week when I decide what to do with my manual trades, however even if it is losses my automated trading should offset it with small profits in the week to come. I have only once before seen my automated trading strategy lose money two weeks in a row.

Trade Log

USDJPY

Date	Time	Trade	Type	Quantity	Price ($)
2/12/15	2:30 AM	Buy	USDJPY	100,000	120.284
2/12/15	3:30 AM	Sell	USDJPY	200,000	119.196
2/13/15	4:15 AM	Buy	USDJPY	200,000	118.852

AMAZON

Position Size (Shares)
50

APPLE

Date	Time	Trade	Type	Quantity	Price ($)
2/11/15	12:30PM	Short	AAPL	200	124.30

Chart

USDJPY – 60 Min Bars

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[69] http://blogs.wsj.com/moneybeat/2015/02/13/sin-vestors-can-reap-smoking-hot-returns/

AMAZON – 60 Min Bars

APPLE – 60 Min Bars

Week: February 14, 2015 – February 22, 2015

Strategy Overview

For manual trading I decided that the fourth company I wanted to specialize in was Goldman Sachs. They have kept a more risky attitude when it comes to their investment banking businesses and this makes them enticing to become acquainted with since it could mean large rewards. Other banks have shifted to more of a market making approach as opposed to straight out investing since the big financial meltdown of 2008, however Goldman thinks its core to their business practices and isn't changing. This week I went long Goldman Sachs even though they were at what seemed to be a high, just to try to get a feel for the stock. They briefly dipped, however I have become profitable from it now and have set a profit target of $500. Additionally, MY short on Apple from the previous week was apparently misguided, and so I need to cut my losses and get out at the beginning of next week.

I made major strides in my automated strategy this week. The coding that I had to teach myself and then preform was far more advanced then I thought, luckily I found a YouTube video that was very helpful,[70] and through this coupled with vehemently searching the Internet for answers, I was able to complete the functional aspects of the code. I was correct in thinking that the performance would increase by orders of magnitude, as it did. I cut the time to run the program from somewhere over ten minutes, to roughly fifteen seconds. I am also able to pull much more, and much more specific data now.

Future Development

For manual trading I intend to look into pharmaceuticals next week, simply because I know nothing about the area and I know that it can be an area of high risk but also high profits. When my second strategy is complete I will also merge it with my manual trading and start making more well thought out decisions using it.

For automated trading I will be constructing the indicator section next week. This entails deciding which information to pull and how to use it to give the best, most logical indicators. I have put a lot of thought into this already, yet I still anticipate this to be a large process.

Analysis of General Market Conditions and News

I found an article this week that especially inspired me to want to become an expert in Goldman Sachs. This article discussed how bankers will be able to go through the federal rulebook and identify rules that they feel are outdated or unnecessary[71]. If a rule were overturned that had some sort of regulation on investment banks direct investing practices, such as those created after 2008, then it could mean a major lift for Goldman. Overall, it would be difficult to get any recent rule changed, however the idea that bankers are being allowed to go through the rules, not only leaves hope but also indicates they are regaining peoples trust, which is a good sign.

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[70] https://www.youtube.com/watch?v=iSlBE3CWg5Q
[71] http://blogs.wsj.com/moneybeat/2015/02/20/round-two-for-bank-pushback-on-outdated-or-unnecessary-rules/

And then there is Greece. There is a lot to say about Greece, but not nearly enough pages in this report. Greece has been floating on billions of bailout euros for about five years, and this past week was almost going to have to leave the euro because its international creditors (especially Germany) weren't going to help them anymore. However, they appear to have struck some sort of deal, which is good because then the shock affect of Greece leaving the euro won't ripple through the markets[72]. Basically I'm keeping an eye on Greece to ensure that noting major happens which could cause ripple effects into the USD or the American stock markets, which it easily could just from the pandemonium it would cause.

Trading and Actual Performance

There was nothing truly remarkable about this week. My automated strategy lost some money in trades. In manual trading as well, my short on Apple hurt me, though I am in a good position in Exxon Mobile and Goldman Sachs. I have been waiting a few weeks for a correction that I anticipate coming soon, as it typically does when things are as overbought as they appear, however one doesn't appear to be coming, and so I will have to seriously reevaluate my future decision making on short trades, and become more aggressive with long trades.

Trade Log

USDJPY

Date	Time	Trade	Type	Quantity	Price ($)
2/15/15	10:30 PM	USDJPY	Sell	100,000	111.497
2/16/15	5:30 AM	USDJPY	Buy	100,000	118.505
2/17/15	9:00 AM	USDJPY	Sell	100,000	119.280
2/18/15	9:00 AM	USDJPY	Buy	200,000	118.783
2/19/15	6:15 AM	USDJPY	Sell	200,000	118.651
2/19/15	2:00 PM	USDJPY	Buy	200,000	118.944
2/19/15	3:30 AM	USDJPY	Sell	180,000	119.006
2/19/15	2:00 PM	USDJPY	Buy	80,000	118.468

EXXON

Date	Time	Trade	Type	Quantity	Price ($)
2/18/15	1:00 PM	XOM	Buy	400	91.00
2/19/15	1:00 PM	XOM	Buy	100	90.13

GOLDMAN SACHS

Date	Time	Trade	Type	Quantity	Price ($)
2/18/15	9:30 AM	GS	Buy	50	190.81

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[72] http://www.wsj.com/articles/greeces-negotiations-enter-more-important-stage-says-tsipras-1424522628

AMAZON

Date	Time	Trade	Type	Quantity	Price ($)
2/17/15	9:30 AM	AMZN	Buy	50	376.20

Chart

AMAZON – 60 Min Bars

EXXON – 60 Min Bars

GOLDMAN SACHS – 60 Min Bars

APPLE – 60 Min Bars

USDJPY– 53 Min Bars

170

Weeks: February 23, 2015 – March 6, 2015

Summary of Weeks

As I had gathered more than enough trades in order for my Triple Moving Average strategy to have statistically significant results, I did not deploy it on the USDJPY for these two weeks. Instead I be funneled all of my efforts into completing the Excel Analysis System I was building and continuing to teach myself VBA in order to have it automatically pull data from the internet with just the click of a button. Thus there are no trade reports this week, only the finished product of the Excel Analysis system.

My excel indicator was completed, though it still lacks a momentum indicator, I was going to use custom built moving averages to create, and a mathematical calculation of portfolio/stock risk. I intend to use something along the lines of Markowitz's Portfolio theory for this. I have already looked into this and decided it was a far longer-term project than this IQP would allow.

Concluding Report

Tasks Accomplished & Progress Made

The two major accomplishments of the term were completing the two strategies: the Triple Moving Average System and the Excel Analysis System.

I was able to work out all the bugs in the Triple Moving Average System, which were still pestering me at the beginning of the term. Once this was finished, I was able to allow it to trade the USDJPY while only monitoring it about once a day to make sure nothing had gone wrong. I was able to fix a bug where the position sizing wouldn't calculate correctly, and one where it would go on spurts of trading every bar. Finally, I was also able to make it so the calculations that kept track of my position in the market would not be interrupted by any disruptions due to technical difficulties, by having the system always be checking with TradeStation to double check its current position.

The Excel Analysis System was probably the most major accomplishment of the term. Not only did I tech myself VBA and code Excel to pull data from the Internet in an extremely efficient manner, I also was able to build an indicator within Excel that decided whether to buy or sell if certain thresholds were met. Though it is still a work in progress and I was not able to manually generate any trades for statistically significant data, I was able to create a functional model outside TradeStation that I will use going forwards in my other investing activities.

Minor Obstacles

In regards to the Triple Moving Average System, the only minor obstacle that remains is somehow programming in stop losses. This becomes extremely complex with the calculations that are occurring to keep track of the market position and the positions of the moving averages. Though, the system does very well using the stop and reverse method, so this really isn't an issue.

Minor issues in regards to the Excel Analysis System mostly involved teaching myself a computer language, and finding the most efficient way to query Yahoo Finance for data. Originally I tried to pull from each HTML page, but that took too long and so I discovered that Yahoo Finance has an API.

D-Term Endeavors

In D Term I have short list of main Endeavors.
1. Continue building the Excel Analysis system.
2. Statistically analyze the Triple Moving Average system.
3. Write IQP Report.

I will most likely begin writing my report at the beginning of D term and so I do not intend to include a D term journal.

B Term, October 2014 – December 2014

Richard O'Brien

Week: November 2, 2014 – November 8, 2014

Analysis of General Market Conditions and News

This week I'm still observing the currency market. From what I see among the currency pairs provided, US Dollar is increasing comparing to other currencies. Especially USDJPY has already reached a ratio of 112, which means the US Dollar is coming back to its place in the market. The direction of the US dollar has been strengthening indicating US economy has become stronger than before gradually.

According to Forex Factory market analysts, AUDUSD[73] signals bearish continuation due to the strengthening US stock market. The reason behind the fact that the Aussie Dollar fell recently is that the iron ore and coal prices were depressed, and China shut down some of its steel mills to control the air pollution issue. Thus the link between Chinese Yuan, US Dollar and other currencies are influenced.

Trading & Actual Performance

Due to the news indicating a major fall in AUDUSD, I entered the market when USD is at a lower rate and exit the market after AUDUSD fell to a lower price level, manually. This graph shows that USD price is strengthening comparing to the AUD market.

TradeStation Performance Summary			Collapse ⌃
	All Trades	**Long Trades**	**Short Trades**
Total Net Profit	$7,400.82	$7,400.82	$0.00
Gross Profit	$7,400.82	$7,400.82	$0.00
Gross Loss	$0.00	$0.00	$0.00
Profit Factor	n/a	n/a	n/a
Roll Over Credit	$441.59	$441.59	$0.00
Open Position P/L	$0.00	$0.00	$0.00
Select Total Net Profit	$7,400.82	$7,400.82	$0.00
Select Gross Profit	$7,400.82	$7,400.82	$0.00
Select Gross Loss	$0.00	$0.00	$0.00
Select Profit Factor	n/a	n/a	n/a
Adjusted Total Net Profit	$2,167.65	$2,167.65	$0.00
Adjusted Gross Profit	$2,167.65	$2,167.65	$0.00
Adjusted Gross Loss	$0.00	$0.00	$0.00
Adjusted Profit Factor	n/a	n/a	n/a
Total Number of Trades	2	2	0

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[73] http://www.theaustralian.com.au/business/opinion/reasons-behind-australian-dollars-dazzling-drop/story-fnp85nwc-1227114468419?nk=c61b474aad5fbdf1d816d0c181eda755

Chart

AUDUSD performance:
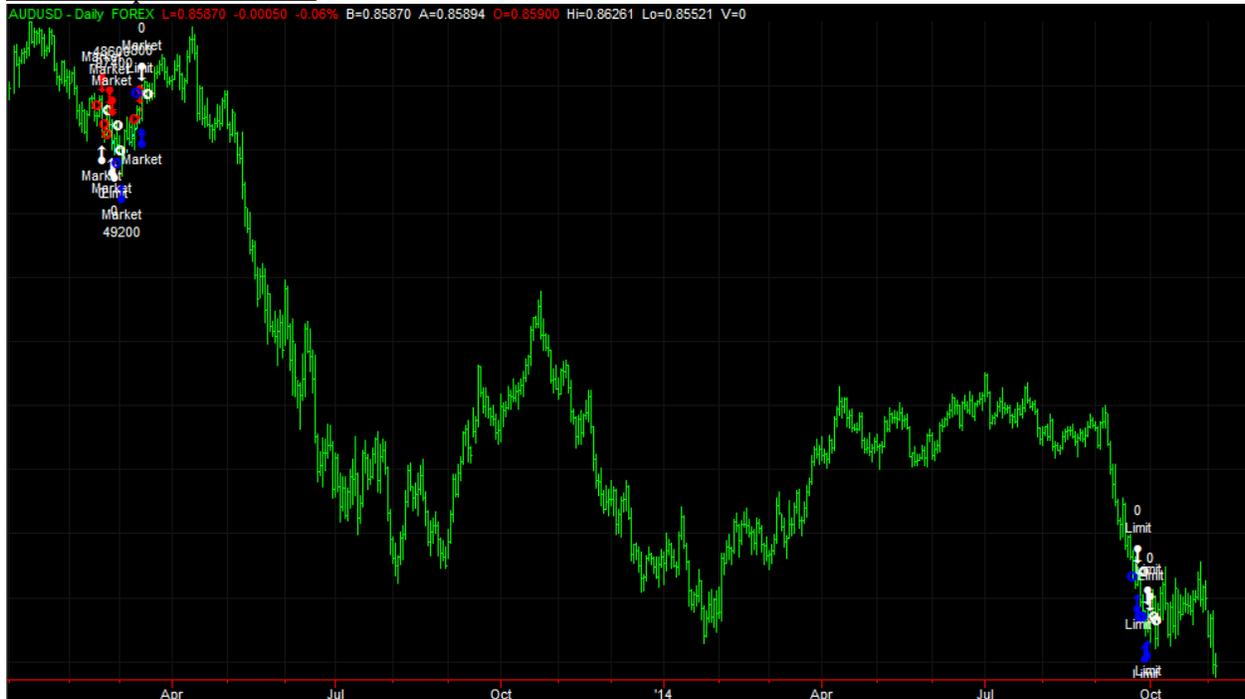
Week: November 16, 2014 – November 22, 2014

Strategy Overview

I did a little bit of modification to my code this week.

Basically, it tells TradeStation to trade based on simple moving averages. By having a slow moving average (SMA) and a fast moving average (FMA), it buys when FMA crosses above SMA, and sellshort if it's the opposite condition;

And if MarketPosition = 1, which means it's a long position, and if the close price is smaller than SMA, tradestation would Buy to Cover the next bar at market;

And if MarketPosition = -1, which means it's a short position, and if the close price is greater than FMA, tradestation would sell next bar at market.

Future Development

I'm still learning how to put a time frame into my EasyLanguage code to perform automated trading within a period of time, such as seasonal or off-peak time period.

Analysis of General Market Conditions and News

One interesting piece of news[74] that I've found out this week is that growing economy doesn't guarantee stock gains. According WSJ, most economic indicators have little value in predicting the market's future course. Market rarely moves intuitively, which means even if investors make assumptions, they might not know how markets will react in reality. Sometimes I use what happened to a country's economy to get a general idea of what the market would do accordingly. Now this seems not reasonable anymore since the economy and the market may not be related.

In general, the market this week shows some volatility. I decided to stay within the currency market so that I can have a clearer perspective of what I traded and planned to trade. By what I observed from different currency pairs that include US Dollar, the general condition doesn't show much pattern and the chart analysis are all over the place with zigzags.

Trading & Actual Performance

TradeStation Performance Summary			Collapse ☆
	All Trades	**Long Trades**	**Short Trades**
Total Net Profit	$3,441.12	$3,441.12	$0.00
Gross Profit	$3,441.12	$3,441.12	$0.00
Gross Loss	$0.00	$0.00	$0.00
Profit Factor	n/a	n/a	n/a
Roll Over Credit	$9.89	$9.89	$0.00
Open Position P/L	$0.00	$0.00	$0.00
Select Total Net Profit	$3,441.12	$3,441.12	$0.00
Select Gross Profit	$3,441.12	$3,441.12	$0.00
Select Gross Loss	$0.00	$0.00	$0.00
Select Profit Factor	n/a	n/a	n/a
Adjusted Total Net Profit	$0.00	$0.00	$0.00
Adjusted Gross Profit	$0.00	$0.00	$0.00
Adjusted Gross Loss	$0.00	$0.00	$0.00
Adjusted Profit Factor	n/a	n/a	n/a
Total Number of Trades	1	1	0

The uptrend in USDJPY still shows its consistency this week. And this week I traded NZDUSD and USDJPY. Although I only traded for 2 times but the performance report attached above was generated since Nov.1st, 2014 and it showed a relatively good profit.
One good thing about this week is that my profit finally turned around from a total of -$300 to a positive number, $7440. This indicated that I finally did something that would bring me some benefits. USDJPY has been going upward for a long time, which has a lot to do with the

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[74] http://online.wsj.com/articles/a-growing-economy-doesnt-guarantee-stocks-will-rise-1415372093

Japanese Economy and the decisions they've made in the past a few months. And for NZDUSD, I accidently traded that currency pair that I didn't realize it until I generated the performance report. I guess NZDUSD brought me major profit this week.

Trade Log

Below is the trade log for this week:

Date	Time	Trade	Type	Quantity	Price
Oct,31st	16:59	NZDUSD	Buy	300,000	$0.78
Nov,14th	16:59	NZDUSD	Sell	$3959.7	$0.79
Oct,31st	16:59	USDJPY	Buy		¥112.31

Chart

USDJPY 60min chart:

Week: November 23, 2014 – November 29, 2014

Strategy Overview

This week I've been considering how to code my trading strategy based on volume of a certain time frame. First I set a condition that if the bars (counts bars within a period of time) are greater than the Start Time and smaller than End Time, and then if a fast moving average crosses above a slow moving average, the counter would add one to itself and buy next bar at market. If it's the opposite, it would SellShort next bar at market. My strategy would keep track of the total sum of bars that's within or not within the time frame and reset after an action (Based on the tutorial of EasyLanguage).

I searched for a time period for the best trades for Asian moves[75]. And it shows that I should set my trading hour between 2pm and 6am Eastern time.

Average Hourly Moves in EURUSD
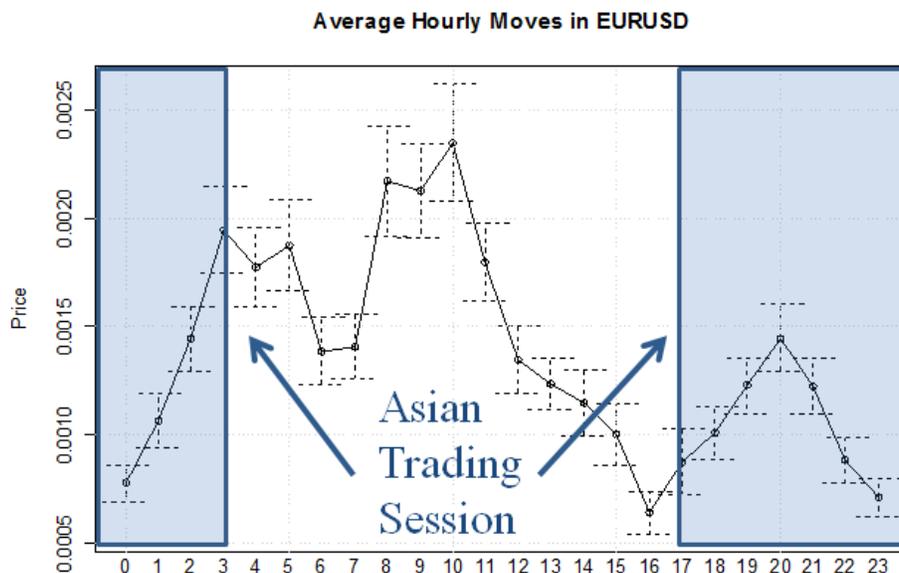
Future Development

I will learn to have several indicators in my trading strategy to trade for different systems in my future development that I will test it out and try to maximize my profit. Or I would look into how to apply different strategies at once as different conditions to trade different markets.

Analysis of General Market Conditions and News

In Wall Street Journal, I realized that governments in Europe and Japan are determined to drive their currencies down against the dollar, which scares a lot of people. Since Foreign stocks are in red this year (Japan is in recession, Europe is stagnating and the dollar is booming), US investors pulled more than $2 billion out of international stock mutual funds and exchange-

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[75] http://www.dailyfx.com/forex/technical/article/special_report/2011/12/12/When_is_the_Best_Time_of_Day_to_Trade_Forex.html

traded funds. Foreign stocks can be an effective hedge against a rise in US interest rates. Also, the natural gas price has lost some of its steam and fell 5% on Friday. Investors has pulled back on trades to reduce risk.

The market this week has been bearish. USDJPY, USDCAD, NZDUSD, and GBPUSD are all indicating a potential down trend in US dollars. But in general US dollar is still booming since the recovery.

Trading & Actual Performance

This is the trading performance for USDJPY before November 23, 2014. I didn't sell my USDJPY trades before I wrote this journal and I cannot trade during the weekend in TradeStation. And for the TM (Toyota Motor), I just applied my trading strategy so there's no trade yet.

TradeStation Performance Summary			Collapse ⌃
	All Trades	**Long Trades**	**Short Trades**
Total Net Profit	$2,306.62	$2,306.62	$0.00
Gross Profit	$2,324.16	$2,324.16	$0.00
Gross Loss	($17.54)	($17.54)	$0.00
Profit Factor	132.53	132.53	n/a
Roll Over Credit	$43.90	$43.90	$0.00
Open Position P/L	$0.00	$0.00	$0.00
Select Total Net Profit	$2,306.62	$2,306.62	$0.00
Select Gross Profit	$2,324.16	$2,324.16	$0.00
Select Gross Loss	($17.54)	($17.54)	$0.00
Select Profit Factor	132.53	132.53	n/a
Adjusted Total Net Profit	($35.07)	($35.07)	$0.00
Adjusted Gross Profit	$0.00	$0.00	$0.00
Adjusted Gross Loss	($35.07)	($35.07)	$0.00
Adjusted Profit Factor	0.00	0.00	n/a
Total Number of Trades	2	2	0

Chart

USDJPY 5min chart:
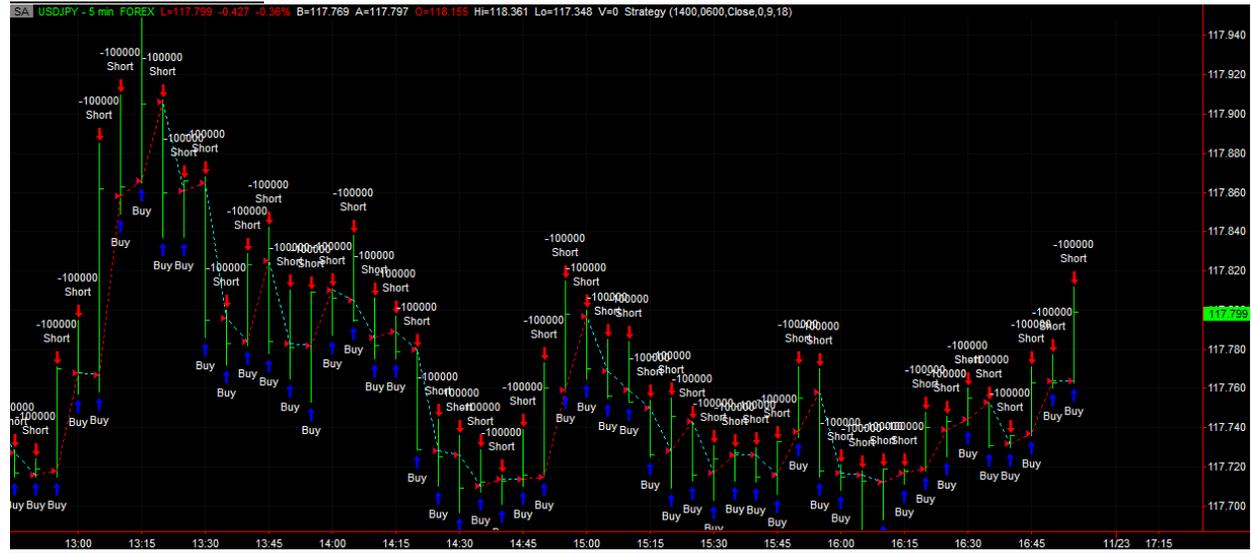
TM 5min chart:
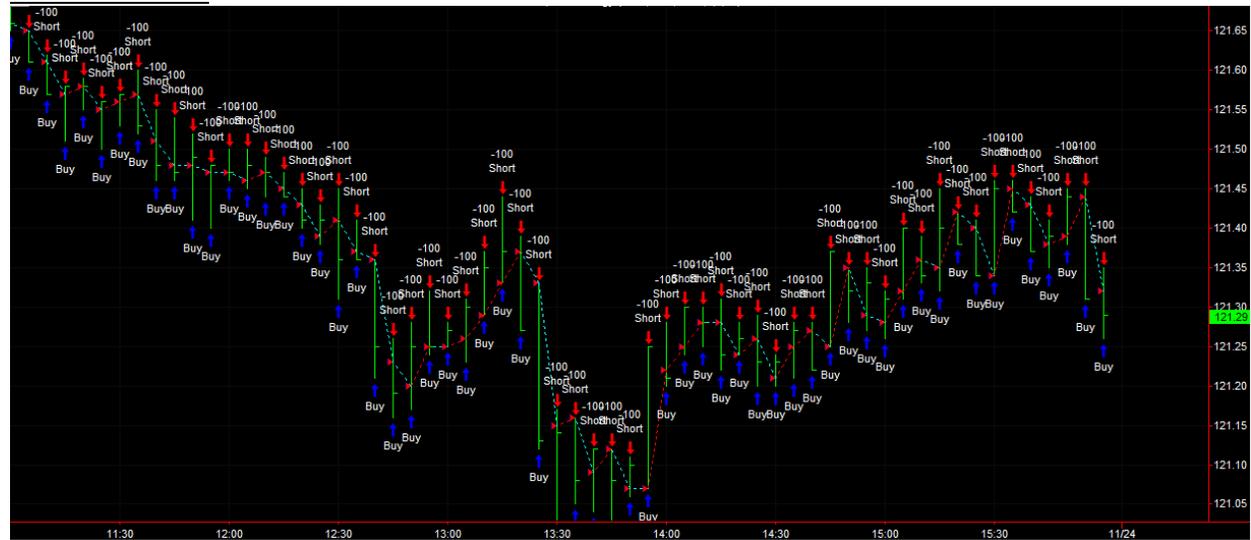
Week: November 30, 2014 – December 6, 2014

Strategy Overview
This week my strategy remains the same, there's not much of modification. Besides that if I'm not trading currency my strategy still follows the time frame I set up for currency pairs before Thanksgiving break.

Future Development
I'm still looking into indicators and different strategies that might generate a clearer view of the trend.

Analysis of General Market Conditions and News
According to Wall Street Journal[76], "Gold fell as weaker oil prices and a firmer dollar pressured investors' appetites for protection from inflation". Gold fell $21.40, 1.8%, which is the lowest settlement level since November 13th. The Precious metal also dropped 1.9%. With oil prices in retreat, manufacturing costs are going down as well. As the Dollar is in an advanced situation against most other currencies, gold is becoming more expensive for byers in other countries when Dollar strengthens against their home currencies. This week the market has been bullish since December is coming: "Bulls aim their horns at December", according to Wall Street Journal.

Trade Log
I'm observing the market for different brands and stores. Black Friday Sale is making the market unpredictable for different stores. I bought 100 shares of
Amazon at $337.99 and waiting for a better position to sell it in the future.

Date	Time	Trade	Type	Quantity	Price
Nov,29th	18:19	AMZN	Buy	100	$337.99

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[76] Wall Street Journal, November 29-30,2014, *Gold Slips and Falls On Oil's Crude Patch*, B5

Chart

Macy's 60min chart:
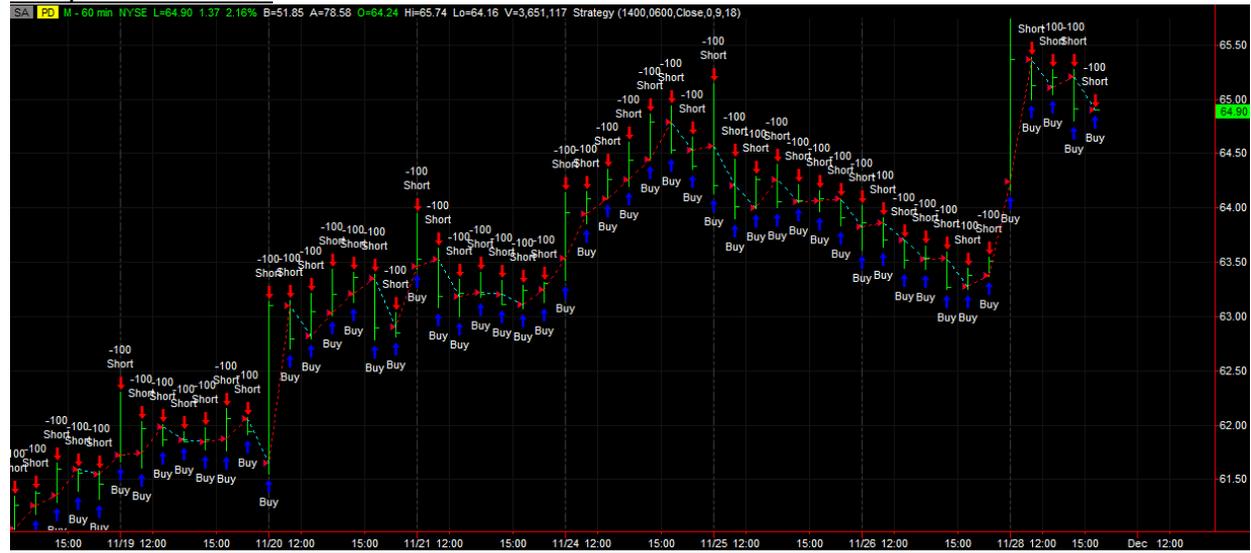
Amazon's 5min chart:

Amazon's 60min chart:

Week: December 7, 2014 – December 13, 2014

Strategy Overview
This week I added a region which is formed by two standard deviation up and down the simple moving average to my trading strategy based on Bollinger Band. The upper band equals the average price plus two s.d. and the lower band equals two s.d. down.
I set two conditions to determine the buy region and sell region: to buy when price crosses above the lower band, and sell when the price crosses under the upper band.

Future Development
There's an unused condition which is about if price crosses under/above the simple moving average, and I didn't figure out whether to buy or sell at which price, which means that remains something that I need to accomplish in the coming week. Also, I should look for different theories and strategies that may assist my EasyLanguage strategy to gain more profit and add a stop loss to it. Since Amazon kept going downward and I should set up a stop loss in the code to prevent me from losing more money in the market.
Also, I need to start learning more detailed things about different indicators so that it would help me predict uptrend or downtrend more precisely.

Future Development (related to the platform)
For my TradeStation Platform, random trading happens sometimes, which means TradeStation would trade something in the background without informing the user. I should figure out why this is happening and if there's a way to stop this since this might cause a huge loss (although it made me gaining profit for now).
Also I used the trading app to trade during the day and it tells me the open/filled orders, however, TradeStation in my PC would delete the trading logs when I generate my performance report. These problems are as significant as creating a trading strategy due to the fact that all of them may influence my performance in the future.

Analysis of General Market Conditions and News
Japan Government Bonds rose recently[77]. The massive bond buying was still driving the bond market after Moody's Investors Service. According to Shuichi Ohsaki, a bond strategist at Bank of America says that it's abnormal that people risk their money and buy JGBs even when their prices are high.

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[77] http://online.wsj.com/articles/japan-government-bonds-rise-as-market-shrugs-off-downgrade-1417518742

Moody's Corp.
MCO (U.S.: NYSE)

REAL TIME 12:20 PM ET 12/02/14

$**100.02** USD

0.35 0.35% ▲

VOLUME 647,105

| 1 DAY | **5 DAY** | 1 MONTH | 3 MONTH | YTD | 1 YEAR | 3 YEAR |

$ %

Today's Open **99.94**   Prior Day Close **99.67** (12/01/14)

Performance Today   MCO 0.35% ▲   DJIA 0.35% ▲   S&P 500 0.46% ▲   Financials 0.66% ▲

Moody's cited Prime Minister Shinzo Abe made a decision last month: to delay another increase in the sales tax, which effectively prioritizing growth over fiscal overhaul temporarily. But this move drew attention back to Japan's public debt (nearly 2.5 times the size of its annual GDP).

This week I traded USDJPY and it was going upward in general. Last time I thought that because of Black Friday and Cyber Monday sale, the market of different online merchandize companies such as Amazon may be influenced by this, however, Amazon is dropping significantly that I will lose $2700 if I want to pull my 200 shares out of the market, so I left them in the market and wait for a potential chance that I can pull them out when it won't cost me that much. Alibaba stock, Yahoo, and USDJPY all have a potential uptrend. USDJPY has reached 119.355 by the time I started the report, and BABA is also performing very well. However, I was going to invest in Apple, however it has a huge downfall and some of my group members were actually in the market.

Trading & Actual Performance

Nov.1st – Dec.3rd (Great)

TradeStation Performance Summary   Collapse ⌃

	All Trades	Long Trades	Short Trades
Total Net Profit	$23,600.00	$23,600.00	$0.00
Gross Profit	$23,600.00	$23,600.00	$0.00
Gross Loss	$0.00	$0.00	$0.00
Profit Factor	n/a	n/a	n/a
Roll Over Credit	$0.00	$0.00	$0.00
Open Position P/L	$0.00	$0.00	$0.00
Select Total Net Profit	$23,600.00	$23,600.00	$0.00
Select Gross Profit	$23,600.00	$23,600.00	$0.00
Select Gross Loss	$0.00	$0.00	$0.00
Select Profit Factor	n/a	n/a	n/a
Adjusted Total Net Profit	$0.00	$0.00	$0.00
Adjusted Gross Profit	$0.00	$0.00	$0.00
Adjusted Gross Loss	$0.00	$0.00	$0.00

Dec.1st – Dec.6th (Not so great)

TradeStation Performance Summary   Collapse ⌃

	All Trades	Long Trades	Short Trades
Total Net Profit	($1,494.26)	($154.31)	($1,339.95)
Gross Profit	$950.33	$6.31	$944.01
Gross Loss	($2,444.58)	($160.62)	($2,283.96)
Profit Factor	0.39	0.04	0.41
Roll Over Credit	($2.47)	$0.00	($2.47)
Open Position P/L	$0.00	$0.00	$0.00
Select Total Net Profit	($312.52)	($154.31)	($158.21)
Select Gross Profit	$950.33	$6.31	$944.01
Select Gross Loss	($1,262.84)	($160.62)	($1,102.22)
Select Profit Factor	0.75	0.04	0.86
Adjusted Total Net Profit	($2,370.97)	($212.32)	($2,435.03)
Adjusted Gross Profit	$649.81	$1.85	$610.25
Adjusted Gross Loss	($3,020.78)	($214.16)	($3,045.28)
Adjusted Profit Factor	0.22	0.01	0.20

(TradeStation deleted all of my record before December, so I have to generate the performance report separately. And the trade log only contains trades since Dec, 1st)

Trade Log

(Profitable Trades)

Date	Time	Trade	Type	Quantity	Price
Dec.3rd	9:52	USDJPY	Buy	100,000	￥121.40
	12:00	USDJPY	Sell	100,000	￥121.52
Dec.5th	12:07	GBPUSD	Buy	100,000	$1.56
	13:00	GBPUSD	Sell	100,000	$1.56
	2:00	USDJPY	Sell	100,000	￥121.53
	10:00	USDJPY	Buy	100,000	￥121.40
	13:00	USDJPY	Sell	100,000	￥121.52
	14:00	USDJPY	Buy	100,000	￥121.47
	15:02	GBPUSD	Buy	100,000	S1.56
	16:01	GBPUSD	Sell	100,000	S1.56

Chart

USDJPY's 60 min Chart:

Yahoo 5min chart:

Week: December 14, 2014 – December 18, 2014

Analysis of General Market Conditions and News

Stocks [78]are falling following the oil price drop. Oil was making new lows on Monday morning, falling more than 3% average. Stocks in Europe were also trading lower (UK and France down 0.8% and Germany's Dax down 0.5%).

Identify Strong Currency

For identifying a strong currency to trade, we could use different trading platforms that professor Hakim showed us during the meetings. Or we can create different indicators that may provide us a strong trend in TradeStation.

I would like to identify which currency is strengthening or weakening most rapidly, and this could be developed based on the moving averages or Bollinger bands. There's a trading rule saying that "Always pair the strong with the weak", so that I could identify the strongest of the month and pair it up with the weakest of the month. Then if this works, it would be added to my code and then make more profit.

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[78] http://www.businessinsider.com/us-market-update-december-8-2014-12

Concluding Report

This term has been a really good term for my group mates and me to learn a lot of stuff in Trade Station and even other resources. I learned a lot such as analyzing funds, coding, go through news and then relate them to the market condition and do predictions, etc. What I did this term is basically used the strategy of fast moving average and slow moving average in EasyLanguage to find the trend of currency pairs or stocks.

As I implement this strategy into TradeStation, at first it was not so great despite the fact that TradeStation sometimes would misbehave and cause my positions to go away without being noticed. Then I went through different tutorials in TradeStation and then I found out that maybe it's because of the fact that a single strategy would not indicate the market the best. Then I added a time frame just for USDJPY to have an idea of when to trade Asian currencies is the most profitable. After adding the "StartTime" and "EndTime" thing into coding, I think it actually worked when I implement the strategy. My code would tell TradeStation to trade if it's within the time frame I set, otherwise it would do nothing. So my idea was to check the time frame first, if it's within, then follow the moving average strategy, if it's out of range, don't trade. Then I modified my code to add Bollinger band, which is basically based on two standard deviations up and down the average, and then see if the price has crossed the upper or lower range and then buy or sell accordingly.

I'm working on adding an indicator that would suggest the strongest currency and the weakest currency and then trade that pair according to the result it generated. Although I don't know for sure what I have in mind would work in TradeStation EasyLanguage or not, I would try to look into this indicator and then work it out.
Moreover, I would find a better trading platform during the break since my TradeStation kept trade things randomly, and I cannot do anything about it. So maybe if I work with another program that has less bugs in it, it would turn out better.

This term has been a very interesting term that I actually learned how to code as a beginner in computer languages. This is a very huge success for me and it stimulated my interest in investment and trading. And thanks to my partners and great professors in this first 1/3 unit of this wonderful project, I actually learned to solve problems and work on things I've never heard of.

C TERM, January 2015 – March 2015

Week: January 15, 2015 – January 24, 2015

Strategy Overview
This week Professor Hakim suggested that we should have color coding in our radar screen. So I created an indicator in EasyLanguage with the suggested code:
(Example screenshots)

```
Vars:
  BT(0),
  Interval("");

  BT = BarType;
  Interval = "";

  If BT = 0 then
      Interval = NumToStr( BarInterval, 0 ) + "Tick"
  else if BT = 1 then
      Interval = NumToStr( BarInterval, 0 ) + "Min"
  else if BT = 2 then
      Interval = "Daily"
  else if BT = 3 then
      Interval = "Weekly"
  else if BT = 4 then
      Interval = "Monthly"
  else
      Interval = "Unknown";


  Plot1(Interval, "Interval");

  Plot2(" ","CWeek");
  if High >= High[1] and Low >= Low[1] then
      SetPlotBGcolor(2, Green);
  if High <= High[1] and Low <= Low[1] then
      SetPlotBGcolor(2, Red);
```

```
  if High <= High[1] and Low > Low[1] then
      SetPlotBGcolor(2, White);
  if High >= High[1] and Low < Low[1] then
      SetPlotBGcolor(2, White);

  Plot3(" ","Week1");
  if High[1] >= High[2] and Low[1] >= Low[2] then
      SetPlotBGcolor(3, Green);
  if High[1] <= High[2] and Low[1] <= Low[2] then
      SetPlotBGcolor(3, Red);
  if High[1] <= High[2] and Low[1] > Low[2] then
      SetPlotBGcolor(3, White);
  if High[1] >= High[2] and Low[1] < Low[2] then
      SetPlotBGcolor(3, White);

  Plot4(" ","Week2");
  if High[2] >= High[3] and Low[2] >= Low[3] then
      SetPlotBGcolor(4, Green);
  if High[2] <= High[3] and Low[2] <= Low[3] then
      SetPlotBGcolor(4, Red);
  if High[2] <= High[3] and Low[2] > Low[3] then
      SetPlotBGcolor(4, White);
  if High[2] >= High[3] and Low[2] < Low[3] then
      SetPlotBGcolor(4, White);

  Plot5(" ","Week3");
  if High[3] >= High[4] and Low[3] >= Low[4] then
      SetPlotBGcolor(5, Green);
```

It continues till Plot15.

I also added a stop loss position so that it would stop automatically when the price dropped too fast, and I also set the profit Target if I'm not using tradestation so I could get out of my position quick enough to reduce risk.
I should have added the stop loss a long time ago since my Amazon position still brings me a huge loss in the market. I didn't feel it was necessary for my strategy to have stop loss, or profit target. But now I'm fully convinced that if I had it I would get out of my position a long time ago.

Future Development
I'll keep looking for different strategies that's better for currency pairs. Learn from the professionals and add different indicators for my precise observations.

Analysis of General Market Conditions and News
News:

Japanese Government decided to raise salaries [79]for workers to rejuvenate sluggish consumer spending and end deflation. Japan's economic recovery isn't showing much change, and the outcome of this wage talks could have showed a critical impact on the success of Abenomics, which is the aggressive stimulus policy of Mr. Abe's.

This policy is actually aiming to create a cycle where higher profits would lead to more worker pay and consumption, which accounts for 60% of the nations' economic output.

(Consumer demand has stagnated since a national sales-tax increase last April, pushing the economy into a recession. – Wall Street Journal.) Corporate executives and economists agreed that in order to liberate the economy from deflation, bold steps such as the intervention in the wage talks from Abe are needed to reverse the downtrend wage situation.

Market Condition:

USDJPY has been going downtrend and now it's slightly going upward. The price dropped from around 118.80 to 117.20 in a few hours, which was almost 160 pips.

As I observed from my mobile TradeStation app, I can see that most of the currency pairs related to US dollars are going uptrend, which means that US market stopped growing for the last few hours, instead, the Japanese Yen is growing dramatically and now it's falling again. Other companies like Google, Apple, even Amazon, Yahoo, are all going upward for the last few days.

I left USDJPY in the market since winter break, sadly, I lost $1206.55 for now, but I think it will come back so I will leave it in the market until that day comes. But GBPUSD brought me more than $5000 for the past 20 days and I pulled it out of the market today.

---

[79] http://www.wsj.com/articles/japan-government-actively-presses-companies-to-raise-wages-1421874432?KEYWORDS=japan

Price observations for USDJPY:

Date	Time	Price
2015-01-21	13:54	117.895
	17:43	117.908
2015-01-22	9:40	117.284
	13:29	118.231
	17:04	118.501
	18:15	118.665
2015-01-23	8:17	118.009
	10:51	117.609
	22:24	117.737
2015-01-24	10:27	117.756
	16:46	117.756

According to the market observation for USDJPY, the price is lower during the morning period but it raised to a higher price during the afternoon. But this is only within the recent three days, which means that I need to keep observing and come up with a final trading time in my automated trading strategy.

Chart

GBPUSD, NZDUSD, USDJPY 60min charts:
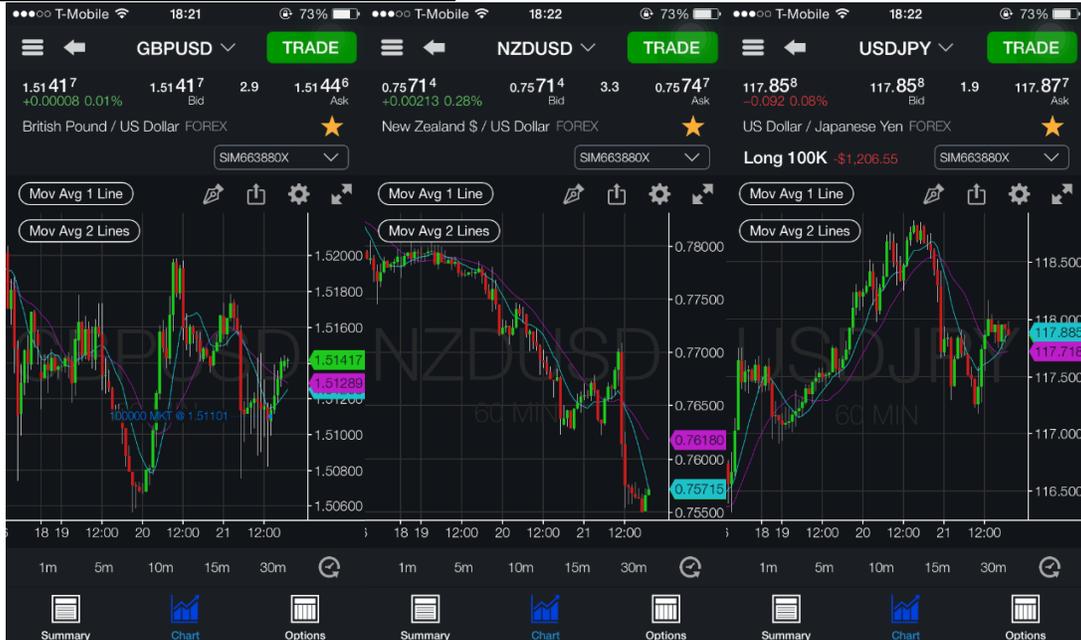
Week: January 25, 2015 – January 31, 2015

Strategy Overview
This week I decided to trade USDJPY based on my observation: from 12AM to 8PM is the best time of the day to trade USDJPY thus I created a condition that covers this period of time. Then during that time period, I'll still use the Bollinger band and moving averages, together with limit prices, profit targets and stop losses. Basically I set the limit price to the highest of the recent 10 bars and exit when it reaches the lowest among the recent 10. And profit target is the sum of limit price and exit price.

I didn't know if this would work but I will use next week to determine if it's relatively effective and profitable.

Future Development
Next week I will focus on the strategy that I should use from 8pm till 12pm the next day. I still don't know what to do when the market is not very bullish. I would figure out another way to detect the uptrend and downtrend during that time.

Analysis of General Market Conditions and News

News:
Amazon is expected to earn a cumulative net profit of $1.9 billion in its entire history while Walmart earned as much in 35 days. The forecasts for annual results Amazon is set to report Thursday: it had shifted further to a loss of 19 cents with analysts forecast an 80-cent loss. However, the reactions of the investors is still unpredictable.

Amazon trades at twice Walmart's multiple compared with an average of 2.5 times over the past decade.

Sub Prime

Consensus forecasts for Amazon's 2014 earnings per share
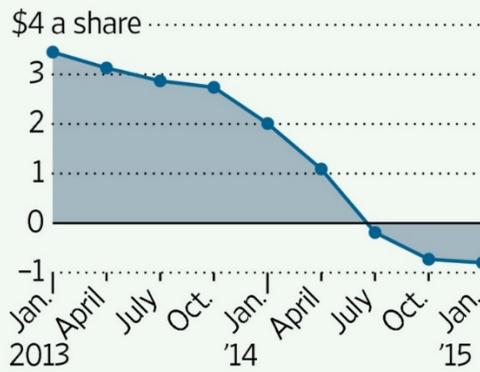
Source: FactSet

Market Condition:

USDJPY is still showing a lot of volatilities this week. As I've been observing the price range during different time of the day, I may get a larger picture of what's happening during each time period.

USDJPY Observations:

Date	Time	Price
2015-01-26	15:11	118.461
	17:54	117.784
2015-01-28	12:43	117.768
	18:32	117.510
	20:44	117.605
2015-01-29	08:53	117.864
	12:05	118.437
	17:01	118.268
	18:41	118.387
2015-01-30	01:58	117.784

	08:01	117.809
	09:04	117.537
	10:05	117.533
	12:18	117.502

From the chart above, I observed that from 8PM the previous day to 12PM the next day, the price tend to be lower, from 12PM to around 8PM, the price is obviously higher. So I will create different strategies based on these observations so I could predict the trend precisely.

Chart

USDJPY 60min charts:

Week: February 1, 2015 – February 7, 2015

Strategy Overview

My Strategy stays the same as last week since I'm still testing that USDJPY strategy. USDJPY has not met my trading conditions so far so I'm still not in the market.

For manual trading, finally I saw profit in Amazon so I pulled myself out of the market. When doing manual trades, I try not to stay in the market for too long so that my small profit won't go away before the big drops.

Future Development

Now that USDJPY remains volatile, I should look into other currency pairs and start developing strategies for them and combine it with the strategy I prepared for USDJPY. I'll start using RSI as an indicator and follow the rule that when RSI is low and moving average is trending higher.

Analysis of General Market Conditions and News

News:

U.S. stocks [80]climbed on Monday and went back to its strong prices.
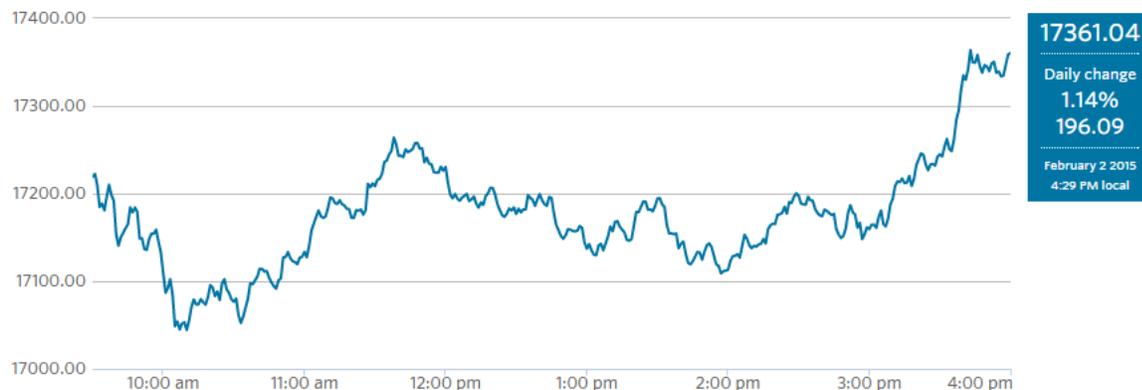
Consumer spending fell 0.3% in December, Personal income rose 0.3% and the price index for personal consumption expenditures fell 0.2% from November according to the Federal Reserve's preferred inflation measure. Many investors say the backdrop for stocks remains positive. According to Mr.Braakman, in addition to low interest rates, the fall in oil prices should promote the consumer spending and benefit the broader economy.

P.S. Apple Inc. shares gained 1.3% (the iPhone maker boosted the size of its bond deal to $6.5 billion Monday).

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[80] http://www.wsj.com/articles/u-s-stock-futures-trade-higher-1422883658

Another piece of news[81] coming from WSJ that caught my eyes:
The price of the fuel has been dropping dramatically recently which has already broken the record. On Jan.26th, the price hit a nearly six-year low of $2.03, which might be caused by the seasonal trends in gas production and demands. Energy Information Administration expects prices at the pump to average $2.33 a gallon this year, down from $3.36 a gallon last year.
It's running out of gas!
Maybe I should take a look at the gas companies and invest.

Market Condition:

This week the market conditions are sort of stabilized. USDJPY is still volatile so I didn't implement my strategy into the market yet. But instead, I did manual trade in GBPUSD, EURUSD and Amazon. By looking into the news last week, Amazon was about to go up, and it did. So I pulled it out of the market as soon as I earned about $500 so I don't go back to where it was. I tried not to be too greedy.
By having a lot of entry rules USDJPY has not yet met my conditions for the entry price so that USDJPY remains in the market.

Trading & Actual Performance since Feb.1st, 2015

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[81] http://blogs.wsj.com/moneybeat/2015/02/02/after-record-decline-drop-in-fuel-prices-may-be-running-out-of-gas/

Trade Log

Date	Time	Trade	Type	Quantity	Price
Feb, 4th	15:29	AMZN	Sell	200	$366.89
Feb, 5th	8:44	GBPUSD	Sell	50K	$1.530
	8:51	EURUSD	Buy	100K	$1.143

Chart

Amazon 60min chart

USDJPY 60min chart:

GBPUSD 60min chart:

EURUSD 60min chart:

Week: February 8, 2015 – February 14, 2015

Strategy Overview

This week I used an indicator[82] that would assist my strategy—an indicator that displays RSI and Bollinger Bands of RSI.

```
{ Bollinger Bands applied to RSI
    Written by: HamFon
    Contact:    ncrowle@sprintmail.com
    Date:       08/27/2002, first version 08/27/2002
    Version:    1.00
    Status:     Gnu Public License - this indicator may be used or shared freely with
                no fee, as long as this original header comment is included.
    Purpose:    Displays RSI and Bollinger Bands of RSI.
}

inputs: BollLength (50), RSILength (14), NumStdDevs (2.1);
{ Recommendations from "Bollinger On Bollinger Bands":
  50:14:2.1
  40:9:2.0
}

variables: RSIValue (0), MidBand (0), StdDev (0);

  RSIValue = RSI (C, RSILength);
  MidBand = AverageFC (RSIValue, BollLength);
  StdDev = StandardDev (RSIValue, BollLength, 1) * NumStdDevs;
  Plot1 (RSIValue, "RSI");
  Plot2 (MidBand + StdDev, "BollUp");
  Plot3 (MidBand - StdDev, "BollDn");
```

After I insert this indicator the USDJPY appears to be like this:

Future Development

There's a huge problem occurred this week: my strategy requires a large amount of data which maybe referencing some database that TradeStation has, so it keeps reporting an error saying

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[82] http://www.hamfon.com/daytrade/HamFonBollRSI-I.txt

that I need to increase the MaxBarsBack option. This week I've been trying to figure out how to solve this problem so that I could use my strategy without any barriers. And I'm still developing a second strategy to deal with multiple currency pairs so this is also my goal.

Analysis of General Market Conditions and News

News[83]

According to WSJ, Yields on Japan's 20-year debt rise as bond prices fall. Earlier February, Japan's 10-year debt rose above Germany's for the first time in decades, reflecting falling European inflation readings and fears that a broad slump in demand for goods and services. Some fund managers and strategists are afraid of the fluctuations that may suggest a selloff that can make the yields higher. Japan's Government debt is about 240% of GDP, which is the highest among the developed countries. Many analysts believes that the rising interest rates would stress the government's finances with higher borrowing costs and affect the banking system, since the Japanese lenders are seeing large losses on government bonds.

Market Conditions

Based on an article[84] in WSJ, there are four reasons to boost our foreign stock exposure:

1. U.S. stocks have outperformed foreign shares over the past 5, 10 and 20 years and the margin of victory has been huge.

2. U.S. stocks now account for more than half of global stock-market capitalization.

3. The dollar has soared in the currency markets, hurting U.S. holders of foreign investments.

4. Most important, many foreign markets are cheaper than U.S. stocks.

This week market has been a little bit stabilized and I could detect some trend but I still need a special indicator to do the job precisely.

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[83] http://www.wsj.com/articles/volatility-in-japan-government-bonds-raises-anxiety-1424291538

[84] http://blogs.wsj.com/totalreturn/2015/02/20/four-reasons-to-boost-your-foreign-stock-exposure/?mod=WSJ_hpp_MIDDLENexttoWhatsNewsFifth

USDJPY has been in good condition and there's still something that I need to fix in my strategy to enter the market more frequently.

## Trading & Actual Performance since Feb.1st, 2015

	All Trades	Long Trades	Short Trades
Total Net Profit	$4,118.08	$4,118.08	$0.00
Gross Profit	$4,511.08	$4,511.08	$0.00
Gross Loss	($393.00)	($393.00)	$0.00
Profit Factor	11.48	11.48	n/a
Roll Over Credit	$1.40	$1.40	$0.00
Open Position P/L	$0.00	$0.00	$0.00
Select Total Net Profit	$4,118.08	$4,118.08	$0.00
Select Gross Profit	$4,511.08	$4,511.08	$0.00
Select Gross Loss	($393.00)	($393.00)	$0.00
Select Profit Factor	11.48	11.48	n/a
Adjusted Total Net Profit	$1,120.61	$1,120.61	$0.00
Adjusted Gross Profit	$1,906.61	$1,906.61	$0.00
Adjusted Gross Loss	($786.00)	($786.00)	$0.00
Adjusted Profit Factor	2.43	2.43	n/a

Performance Summary | Trade Analysis | Trades List | Periodical Returns | Performance Graphs | Trade Graphs | Settings

Trade Log

Date	Time	Trade	Type	Quantity	Price
Jan, 30th	16:00	ANZN	Buy	200	$354.53
	16:59	USDJPY	Buy	100K	¥117.56
Feb, 4th	15:29	AMZN	Sell	200	$366.89
	15:36	GBPUSD	Buy	50K	$1.52
Feb, 5th	8:44	GBPUSD	Sell	50K	$1.53

	8:51	EURUSD	Buy	100K	$1.14
Feb, 11th	00:51	USDJPY	Sell	100K	¥119.54
Feb, 13th	16:59	EURUSD	Sell	100K	$1.14
Feb, 19th	00:11	USDJPY	Buy	50K	¥118.66
	00:50	USDJPY	Sell	50K	¥118.70
Feb, 20th	08:20	USDJPY	Buy	50K	¥119.015
	08:46	USDJPY	Sell	50K	¥119.11

Chart

USDJPY 5min and 60min chart:

Week: February 14, 2015 – February 22, 2015

Strategy Overview

Swing low[85] is set as a low that has at least 2 consecutive higher lows preceding it and 2 consecutive higher lows following it. And Swing high is set as a high that has at least 2 consecutive lower highs preceding it and at least 2 consecutive lower highs following it.

Future Development

Analysis of General Market Conditions and News

News[86]

Japan puts off public pension fund overhaul: "TOKYO—Japan's cabinet put off a large-scale governance overhaul of the nation's $1.1 trillion public pension reserve fund that was advocated by the welfare minister, approving smaller legislation instead." This indicates that Shinzo Abe wasn't in a hurry to change Government Pension Investment Fund after changing the investment strategy a year ago.

Market Conditions

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[85] https://www.dukascopy.com/fxcomm/fx-article-contest/?Identify-And-Trade-With-The=&action=read&id=1212&language=en

[86] http://www.wsj.com/articles/japan-puts-off-public-pension-fund-overhaul-1424756051?KEYWORDS=japan

Prev Close	118.8450	High	119.8450
Open	118.8450	Low	118.7700
52 Wk Low	100.8470	52 Wk High	121.8250

From the chart on the left, we may observe that Japanese Yen has reached a high price of almost 120.

Weeks: February 23, 2015 – March 6, 2015

These weeks I did some minor modifications to my automated strategy and exported all of my trades to calculate expectancy, Expectunity, and system quality. And I did Monte Carlo Analysis to get a general idea of how my strategy performs throughout years of market performances. There's only analyzing process with no trading or market performance report during these weeks.

Concluding Report

This term I accomplished my automated trading strategy. I was able to combine three exponential moving averages into two time frames for trading Asian currency pairs. This strategy is mainly focusing on USDJPY, by having special trading time that I concluded from my observation of the price range, I compared the three exponential moving averages first in the 5min time frame and then switched into the second time frame, 60min chart, to check if the price is among the Bollinger Bands. By having these conditions, I was able to trade USDJPY in a special manner.

However, there is still some further modification needed for this strategy. By having so many conditions in a role, this strategy traded not as often as those easier strategies, which is a major drawback. But once it trades, it can be profitable. I still need to figure out a better stop loss and profit target level to fit my strategy in order to reduce some of the major losses and increase the profit at the same time.

Benefited from this project, I learned how to perform automated trading in TradeStation by having a strategy coded in EasyLanguage. By exporting all data from all trades I made throughout the entire academic year, I did Monte Carlo Analysis as well as other analyzing calculations. This is another good way of learning different aspects of a strategy—both strengths and weaknesses. This will definitely be a good start of investment and trading related activities in my future career and be used as an asset. In D term, I will continue my effort in writing a final report and analyzing my system, and also I may do some minor modifications as needed to improve my strategy.

APPENDIX D: BATYRLAN NURBEKOV'S JOURNAL

Trading System Development IQP – Journal
Submitted by: Batyrlan Nurbekov

B term

Week 1
Important news of the week
Description
Microsoft created an alliance with Dropbox. Now, the users of Dropbox will be able to edit the documents stored on their account directly in Microsoft Office Packet. This feature is especially useful for the users who work with the documents from their tablets. Also, Microsoft will add a synchronization with Dropbox. Therefore, all the changes that were made in the document will be directly transferred to the Dropbox account.

Result
This alliance will allow Microsoft to increase the number of users who buy Microsoft Office packet because there are over 35 billion of Office files stored in Dropbox currently.

Stock Price Effect
After announcing this news the stocks of Microsoft raised from 46.7 to 48.9 over the course of 4 days.

Prediction
The stock prices will reach the limit of 50-51 dollars per share. After that the price will stabilize.

Conclusion
Overall, the prices of Microsoft shares are rising due to right strategic decisions made by its new CEO Satya Nadella.

Trade of the week
During this week I decided to use DriveWealth app (Charlie Wells & AnnaMaria Andriotis. 2014. "A User's Guide to Investing Apps." Wall Street Journal. November 1st & 2nd. Pages B7 & B9.) for Android in order to conduct the trade.

I placed a trade on Tuesday and bought 2000 Microsoft shares and I exited the trade on Friday. The following is the 30 minute chart from TradeStation showing the Microsoft stock prices since

10/20:

This trade resulted in the net profit of 1932 USD.

Week 2

News & Analysis Market Conditions

The survey prospective smartphone buyers conducted by UBS during this week showed that there is an increase in demand for Apple products in China. Also, the survey indicated a favorable share of IPhone 6 Plus sales which means that the users are ready to buy IPhones in spite of the bending screens.

Therefore, UBS set the target price on shares of Apple to $125, up from the previous 115$. Also, the additional poll of the Apple consumers showed that they are ready to use Apple Pay which will even increase the influence of Apple in the market.

The Microsoft's stock prices are stabilized during this week. However, some long trend can be noticed. The price per share went up by 1$ during this week.

Source: http://iphone.appleinsider.com/articles/14/11/11/ubs-ups-apple-price-target-to-125-after- survey-indicates-strong-share-for-iphone-6-plus.

Trades Performance since Nov.1st, 2014

TradeStation Performance Summary			Collapse ⌃
All Trades			
Total Net Profit	$1,074.10	Profit Factor	2.30
Gross Profit	$1,900.50	Gross Loss	($826.40)
Roll Over Credit	$48.10		
Open Position Profit/Loss	($110.00)		
Select Total Net Profit	$1,074.10	Select Profit Factor	2.30
Select Gross Profit	$1,900.50	Select Gross Loss	($826.40)
Adjusted Total Net Profit	($68.01)	Adjusted Profit Factor	0.94
Adjusted Gross Profit	$1,050.57	Adjusted Gross Loss	($1,118.58)
Total Number of Trades	13	Percent Profitable	38.46%

The strategy fits my trading habits very well because it generated relatively small amount of trades (13 trades) since Nov 1st. It gave me the net profit of $1074. However, I think that this number can be improved once I properly fix else if's (this problem is discussed in the next section).

Future Development

In the future I would to implement the monitoring of the trend based on the smaller time intervals to make sure that the trend will last long enough for the strategy to get the profit.

I also realized that EasyLanguage syntax doesn't allow to have else if statements. Therefore, I wasn't able to properly combine the blocks of the program (I put simple if's instead of else if's). The strategy definitely seems very interesting to me and I will definitely continue working on it during the next week.

Trade Log

Below is the trade log for this week:

Date	Time	Trade	Type	Quantity	Price
Nov,12th	10:21	AAPL	Buy	900	$110.78

Week 3

News & Analysis Market Conditions

The prices for the Microsoft stocks are instable and show some downtrend (as we can see from the chart below). However, this downtrend is temporary according to analytics and stocks will continue to rise. The analytics point out that the shares of the Microsoft were overbought and this is the main reason of the downtrend.

Figure 1. Microsoft Stock Prices

The one piece of news that may make the stock prices of Apple rise even higher is the API called Watchkit for iWatch that will be released early next year. This API will allow the developers to "supplement" the notifications that are shown in the smartphone instead of just copying them over (as it is done in another smart watch devices).
Also, analysts are positive that Apple has a plenty of room to go. They support that opinion by the fact that institutional ownership remains below Apple's weighting in S&P 500 [1].

Figure 2. Apple stock prices

Sources:

[1] http://www.valuewalk.com/2014/11/apple-inc-aapl-room-to-grow/

[2] http://finance.yahoo.com/

Trades Performance since Nov.1st, 2014

The strategy worked surprisingly well now when I fixed all the bugs in the code. The most interesting part is that it was **profitable for all the assets** I tried to test it with. Also, I found out that long time frames work better with this strategy (give more profit) than the shorter ones. Additionally, you can see that the percent of profitable trades increased from **38.46%** to **56.02%**!

Future Development

This modified strategy works very well on the market that is not choppy. I will integrate this strategy into the set of strategies developed by our group.

Strategy Overview

The strategy combines Bollinger bands with stochastic in order to produce the buy or sell short signal. More specifically, the strategy waits for the price to cross the upper or lower band. Then, it actually waits for the SlowK and SlowD crossover to generate a signal. The strategy exits the position once the price reaches the middle band. I fixed the bug with the short loss, so that the strategy enters the short position properly.

Also, the strategy was modified so that it sets the stop loss at the amount specified by the input argument.

Methodology Flowchart
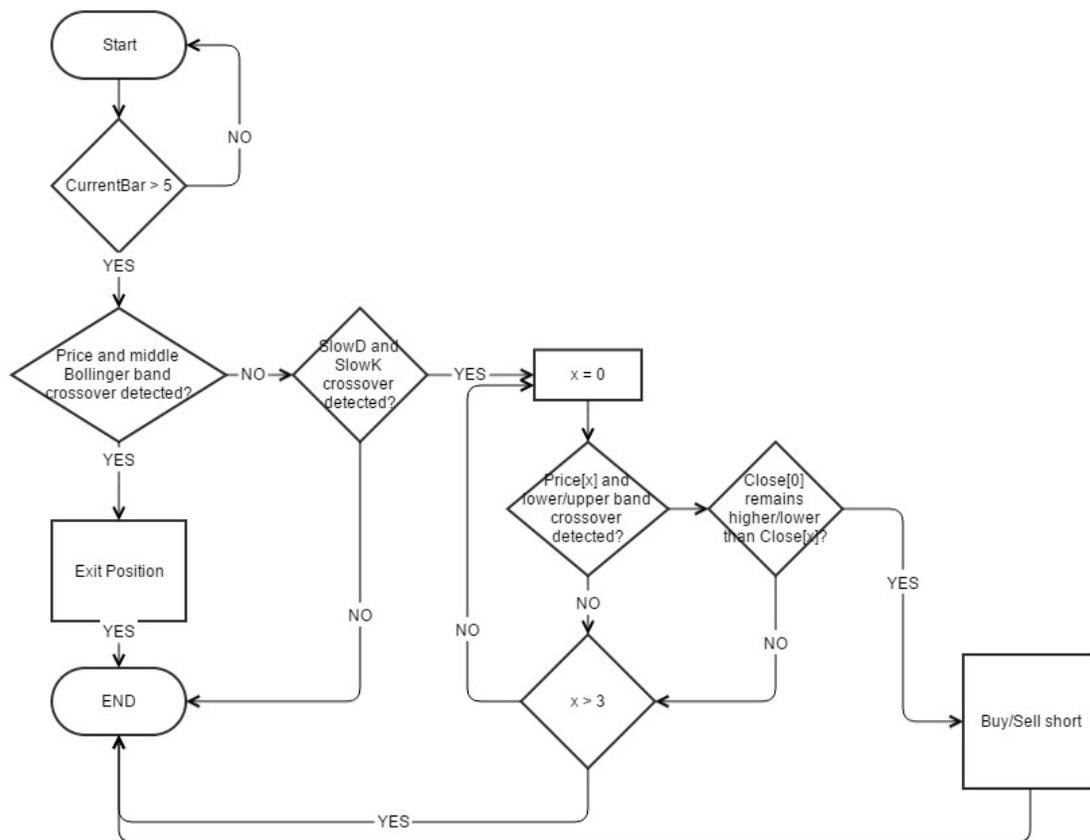
Trade Log

During this week I decided to not close the Apple position. I set the stop loss of 500$. I will wait for the price to rise until 120$.

Below is the trade log for this week:

Date	Time	Trade	Type	Quantity	Price
Nov,12th	10:21	AAPL	Buy	900	$110.78

Week 4

News & Analysis Market Conditions

During this week I added an additional company that I would like to monitor – **Tesla.**
Tesla shares fell almost 1.6% after WirtschaftWoche reported that BMW wasn't considering buying a stake in the. It might be a good time to enter a short sell position.

Tesla Motors
NASDAQ: TSLA - Nov 28 1:07 PM ET

244.52 ▼3.92 (1.58%)

| 1 day | 5 day | 1 month | 3 month | 1 year | 5 year | max |
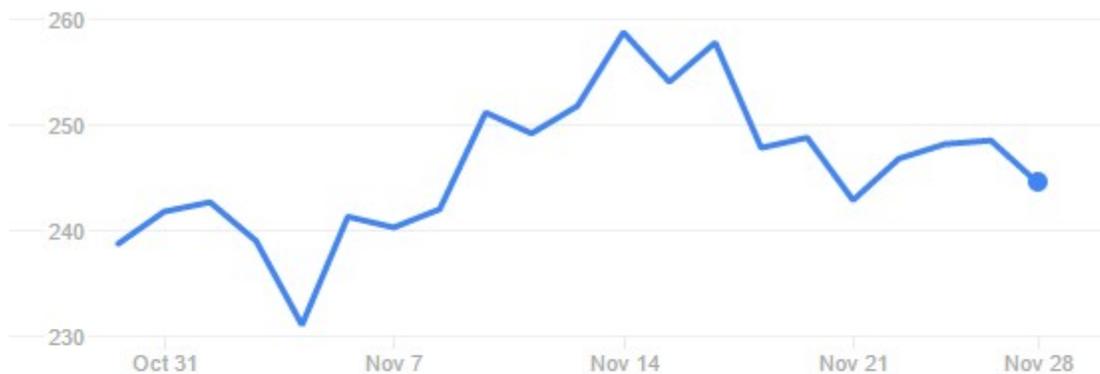
Open	245.35		Market cap	31.15B
High	246.69		P/E ratio (ttm)	-
Low	242.52		Dividend yield	-

Apple's iOS led the way in mobile shopping during this holiday season. Adobe Company that is currently tracking online shopping says that iOS users drove four times as much mobile sales revenue as Android users. Therefore, I expect that the stock prices are going to rise even higher.
Microsoft accidently revealed its plans to buy Accompli, a mobile email startup. This startup will allow Microsoft to increase its presence on Android and iOS platforms. This piece of news already positively impacted Microsoft's stock prices rising them to 47.81$ per share.

Sources:
[1] http://finance.yahoo.com/

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Trades Performance since Nov.1st, 2014

Total Net Profit	$2,191.20	Profit Factor	1.38
Gross Profit	$7,989.80	Gross Loss	($5,798.60)
Roll Over Credit	$58.20		
Open Position Profit/Loss	($75.00)		
Select Total Net Profit	$1,082.50	Select Profit Factor	1.19
Select Gross Profit	$6,881.10	Select Gross Loss	($5,798.60)
Adjusted Total Net Profit	($770.00)	Adjusted Profit Factor	0.89
Adjusted Gross Profit	$6,358.89	Adjusted Gross Loss	($7,128.89)
Total Number of Trades	43	Percent Profitable	55.81%

The strategy performed very well. It generated a good amount of total net profit without any optimization.

Future Development

In the future I will design an entry condition for this strategy.

Strategy Overview

The strategy uses linear regression channels to enter and exit the market. Specifically, it buys when the current close crosses over the Lower Linear Regresion Channel (it is calculated as LinRegValue – Standard Deviation) and sell when the current close crosses under the Upper Linear Regression Channel (it is calculated as LinRegValue + Standard Deviation).

The strategy also uses the stop loss to exit the position when the certain value of loss is reached.

Trade Log

During this week I kept Apple position open. I increased the value of stop loss to 2000$.

Below is the trade log for this week:

Date	Time	Trade	Type	Quantity	Price
Nov,12th	10:21	AAPL	Buy	900	$110.78

Week 5

Strategy Overview

The strategy uses linear regression channels to enter and exit the market. Specifically, it buys when the current close crosses over the Lower Linear Regresion Channel (it is calculated as LinRegValue – Standard Deviation) and sell when the current close crosses under the Upper Linear Regression Channel (it is calculated as LinRegValue + Standard Deviation).

The strategy also uses the stop loss to exit the position when the certain value of loss is reached. During this week I designed an entry for the strategy. The entry makes sure that the strategy doesn't immediately buy when one of the regression channels is reached. It checks the nth bar in the future (n is specified by the input parameter). If the close of that bar is higher or lower depending on the position type (buy or sell short), then the strategy opens the position. Otherwise, it doesn't.

Future Development

During the tests of my strategy I found out that it works very well for "smoothies". In other words, it works well for the assets that are not choppy. Therefore, in the future I will try to implement some automated method to identify these smoothies.

Also, the alternative can be to identify a trend based on the smaller time frames.

Analysis of General Market Conditions and News

SolarCity launched a new application on Thursday that provides real-time energy use data and creates a "social" network for its customers. This event led to the up-trend jump in the stock prices, as you can see on the chart:

Apple still experiences the down trend because of the bearish momentum created on December, 1st. I expect Apple's stock price to rise after the release of iWatch in early 2015.

Tesla is also experiencing the fall of its stock prices. This happens because of the several reasons:

1) Tesla's stock has been overvalued. The volume that it produces is small relative to the stock price. Therefore, it is reasonable that the price dropped that much.

2) The competitors start releasing electric cars as well which also negatively affects the stock price.

3) Tesla's recent purchase of the battery factory is risky because the costs associated with the maintenance and the production for this factory is high.

Therefore, I expect the price to fall significantly over the short term (2-3 month). **Microsoft's** stock prices are still stable and fluctuate around $48 per share. I expect this behavior to continue up until the release of Windows 10's early beta in the beginning of 2015. Also, the prices might reach 50$ over the course of the next 2 weeks because it has announced that Cortana Voice assistant will be present by default in Windows 10.

Trades Performance since Nov.1st, 2014

The following is the performance on GBPUSD <u>without any optimization</u> of parameters:

Total Net Profit	$4,048.60	Profit Factor	2.06
Gross Profit	$7,868.10	Gross Loss	($3,819.50)
Roll Over Credit	($4.40)		
Open Position Profit/Loss	$0.00		
Select Total Net Profit	$4,781.60	Select Profit Factor	2.55
Select Gross Profit	$7,868.10	Select Gross Loss	($3,086.50)
Adjusted Total Net Profit	$1,306.82	Adjusted Profit Factor	1.28
Adjusted Gross Profit	$5,959.81	Adjusted Gross Loss	($4,652.98)
Total Number of Trades	38	Percent Profitable	44.74%

Trade Log

Date	Time	Trade	Type	Quantity	Price
Dec, 2nd	01:47	SCTY	Buy	900	$51.48
Dec, 2nd	01:50	AAPL	Sell	900	$115.12
Dec, 3rd	03:43	TSLA	Sell Short	500	$228.50
Dec, 3rd	03:51	TSLA	Buy To Cover	500	$228.99
Dec, 3rd	03:51	TSLA	Buy	200	$229.05

AAPL - 30 min NASDAQ L=115.00 -0.49 -0.42% B=0.00 A=0.00 O=115.99 Hi=116.08 Lo=114.64 V=38,318,895 ChartTrading ("Classic ...

C term

Week 1
Prediction Algorithm Overview
Main logic
The algorithm utilizes K-Means clustering in order to create groups of stocks. These groups are represented by their centroids (the points that are located in the center of created cluster based on the distance metric).

K-Means clustering
Firstly, K-means clustering algorithm randomly selects the cluster centroids and assigns the points to the closest cluster.

Secondly, it recomputes the centroid position of each cluster. Note: the centroid is not necessarily a specific point in cluster, it is just an average of all the points in the cluster.

Algorithm overview
First of all, the algorithm consecutively creates different amounts of clusters and calculates special metric called Sum of Squared Errors (SSE) that indicates how good our clustering is. *Note: the smaller distance between the centroid and the points that belong to the cluster, the smaller SSE is.*

After that it plots the number of clusters against SSE metric:
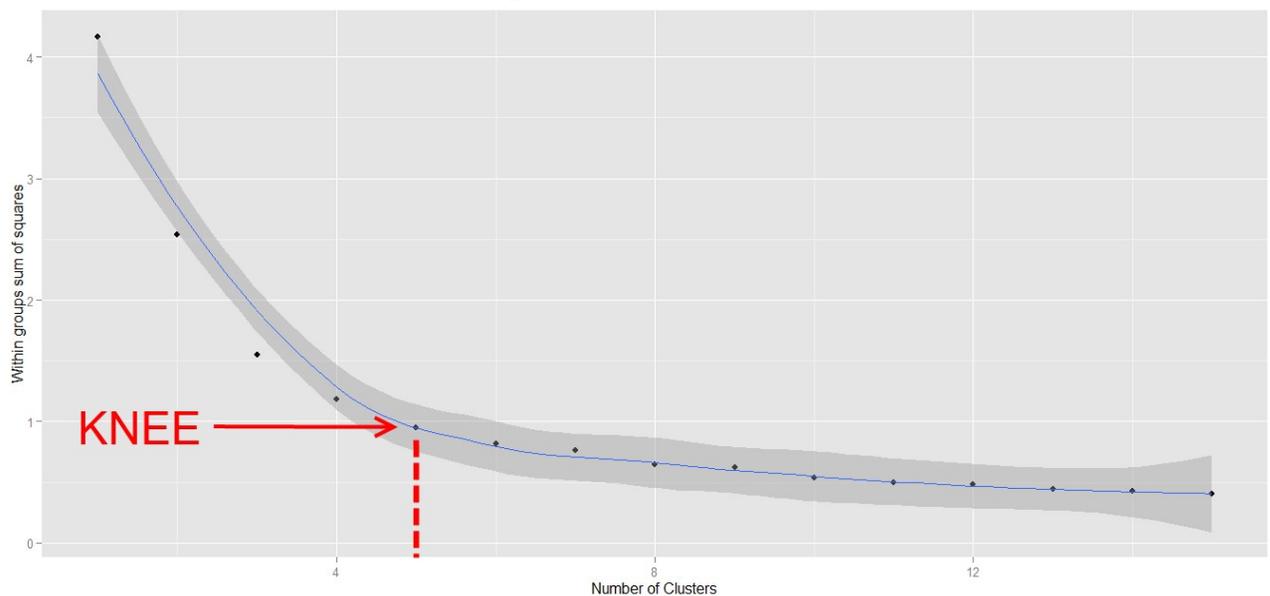
It is the responsibility of the user to select the appropriate number of clusters for the algorithm to work with.

Cluster number selection process
In order to select the appropriate number of clusters, it is enough to just find a "knee" point (also sometimes called "elbow" point) on the graph and see what number of clusters it corresponds to (the number on x axis).

Correlation Analysis
Finally the algorithm also computes the autocorrelation between the produced centroids. It also normalizes the autocorrelation to so that all the values are in the interval [0, 1].

Results

The algorithm came up with the following centroids:

Cluster	High	Low	Close
1	0.009	-0.065	-0.049
2	0.030	-0.008	0.021
3	0.007	-0.029	-0.019
4	0.069	-0.009	0.055
5	0.009	-0.009	0.001

As we can see, these centroids represent five different types of days:

1 - The close price is much lower than the previous day's close price (-0.049).

2 - The close price is moderately higher than the previous day's close price (0.021).

3 - The close price is moderately lower than the previous day's close price (-0.019).

4 - The close price is much higher than the previous day's close price (0.055).

5 - The close price is almost equal to the previous day's close price (0.001).

It also computed the autocorrelation matrix:

Cluster	1	2	3	4	5

1	**0.58**	0.14	0.22	0.02	0.03
2	**0.37**	0.23	0.28	0.04	0.08
3	**0.38**	0.21	0.28	0.05	0.07
4	0.16	0.22	**0.30**	0.13	0.19
5	0.20	**0.30**	0.19	0.14	0.17

Therefore, for AAPL stocks if the previous day's close price was much lower than the close price the day before, then it is very likely that (with 58% of certainty) that this day's close price will be also much lower. We can also notice a couple of more interesting patterns that were marked by bold font and underscore.

Future Development

Apply this type of analysis technique in combination with other analysis techniques (such as regression channels) to predict the day's close price.

Analysis of General Market Conditions and News

Microsoft

Description

Microsoft revealed its new Augmented Reality glasses "HoloLens". "HoloLens" kit allows to embed computer graphics into the real-world around. In perspective it opens infinite possibilities in such areas as prototyping the mechanical devices, advertisement and entertainment. It looks especially appealing after the failure of Google glasses.

Result

The users reacted very positively on this announcement considering the fact that the prototype was developed by the one of industry giants – Microsoft. This guarantees that the project will get widespread.

Stock Price Effect

The stock price went up significantly from 46$/share to 47$/share.

Prediction

The price was in overbought area as we can see on the graph (the slow stochastic oscillator shows that). The price will retract and fall down. Afterwards, it will continue to grow up.

Conclusion

It will be a good time to buy MSFT shares when the price will show a stable uptrend. I will set up an email alert to not miss that point.

Tesla

General condition description

The prices for Tesla's stock will continue to fall. Tesla experiences such a downfall because of the decrease in oil prices, which correspondingly led to the decrease in demand for alternative energy sources.

Prediction

The price will fall drastically during the next week. This is well shown by the stochastic oscillator that indicates that the price is in the overbought area currently.

Conclusion

This is the best time to sell short TSLA position.

Trade Log

Date	Time	Trade	Type	Quantity	Price
Jan, 23rd	01:39	MSFT	Buy	1000	$46.98
Jan, 20th	09:35	TSLA	Sell	1000	$190.84
Jan, 20th	09:36	AAPL	Sell	900	$107.4
Jan, 20th	09:36	SCTY	Sell	200	$47.64

Week 2
Prediction Algorithm Overview
General Description
The algorithm uses neural networks to make the specific predictions of the closing price at the end of each day.

These predictions are based on the date and open price at the beginning of each day. The algorithm trains the neural network using the data over the last 5 years.
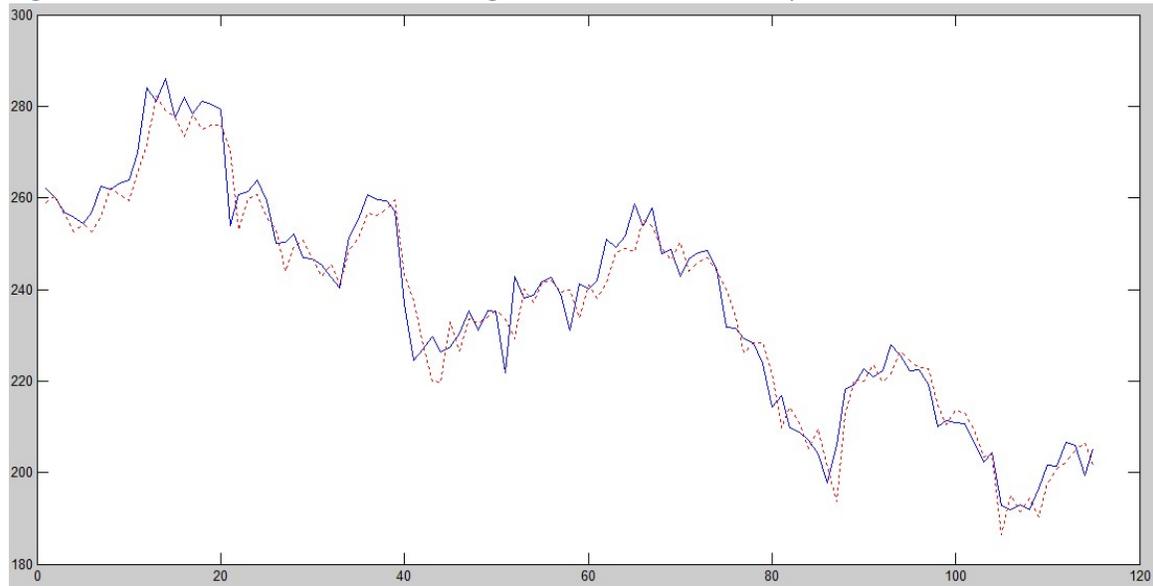
Figure 1. The comparison of the predictions (shown in red) with the actual closing prices (shown in blue).

Detailed Overview
First of all, the algorithm imports the data. It is important to note that the user should run the portion of the code that is responsible for the import of data manually.

Consequently, the algorithm splits the data into two data sets: training and testing data set.

After that the algorithm actually trains the neural network that consists of two neurons. Specifically, the algorithm tries to find the best combination of interconnections between those two neurons and the weight values assigned to those interconnections.

After that the algorithm actually consumes the testing data set that is unknown to the neural network and outputs the plot that shows the comparison between the two actual data and the prediction.

Result Analysis
When we compare two curves we can see that it predicts the actual curvature precisely. However, we can also notice the lag associated with the prediction (the prediction curve seems to be shifted a bit to the left). In perspective we can solve this problem by trying to increase the number of neurons in the neural network or retrieve the larger portion of data for the training set.

Future Development
In the future the network of more neurons might be modeled which will give us even more precise results.

Analysis of General Market Conditions and News

Tesla

Figure 2. Tesla stock prices

Description

Tesla tries to get out of the long downfall that it experienced over the last few months. Over the last week it announced Elon Musk's co-founder is going to create a new project that will involve the electric trucks. Tesla is also successfully testing its first Model X SUV in California. Finally, it released the new firmware for its Model S that makes the car even quicker.

Result

In the result the users started to buy Tesla stocks preparing for the "huge" stock price recover promised by Elon Musk.

Stock Price Effect

Stock price started to retract from falling as you can see on the chart.

Prediction

The prices might start to grow quickly over the course of the next week. By looking at the stochastic slow indicator we can see that the price is almost in oversold area. However, it is still relatively high (relative to the past price).

Conclusion

I will have to watch closely the market conditions of Tesla Company over the next week. If I will see any signs of long trend, I will simply revert my current position.

Microsoft

Figure 3. Microsoft stock prices

Description

The quarterly earnings for Microsoft Corporation were released during this week. The total revenue overall grew from $24.5 billion to $26.5 billion. However, the report has shown no revenue in the mobile sector at all.

Result

In the result the shareholders started to sell the stocks that they currently own.

Stock Price Effect

Poor earnings report have hurt Microsoft so badly that the share price drop is the largest among the 30 Dow Jones Industrial Average stocks so far this year.

Prediction

Microsoft's share price will grow over the course of this year overall because it invests a large amount into the cloud sector and developing sectors, such as wearable computing. However, the price will drop significantly over the course of this month.

Conclusion

The best choice for me in this situation would be to sell the stocks that I purchased during this week when the price will retract from the oversold area and get into the overbought area. In that way the amount I lose will be minimal.

Trade Log

Date	Time	Trade	Type	Quantity	Price
Dec, 27th	01:47	TSLA	Sell Short	100	$51.48
Dec, 27th	01:50	TSLA	Sell Short	300	$115.12
Dec, 27th	03:43	MSFT	Buy	500	$228.50
Dec, 27th	03:51	MSFT	Buy	500	$228.99

Week 3

Neural Network Prediction Algorithm Analysis

Description

During this week I tried to apply the neural network algorithm to the Google stocks (the prices for this company were more or less stable over the last five years). Also, I made some changes to the overall data.

First of all, I got a larger training data set (6 years back into history). Secondly, I increased the number of neurons from 2 to 5.

The result was surprising. The algorithm was able to predict the price fluctuation in advance as you can see on the graph below!
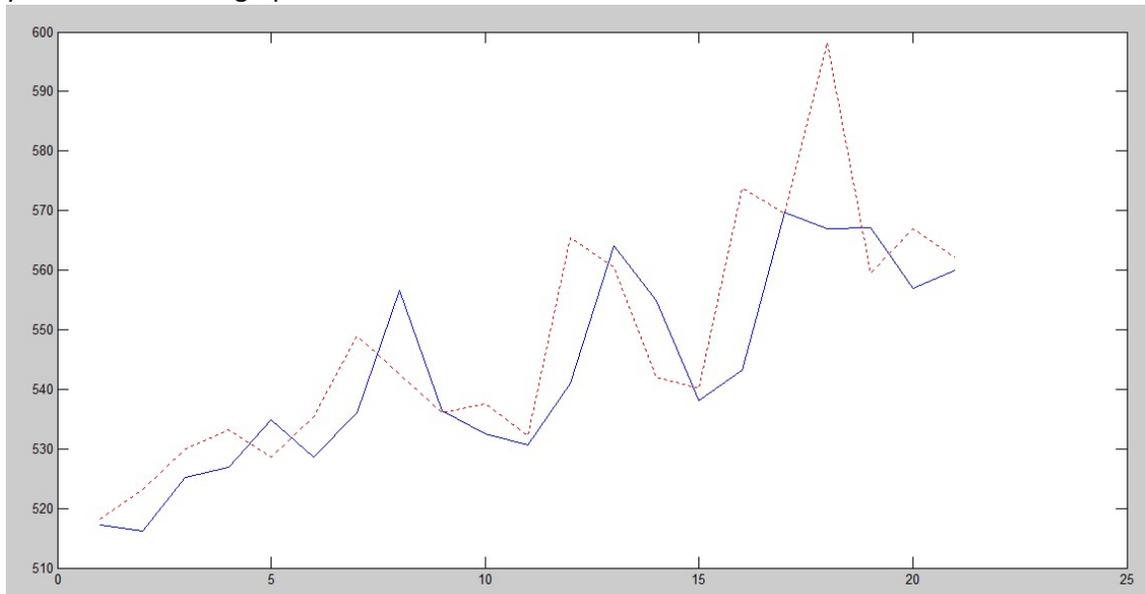
Figure 1. The comparison of the predictions (shown in red) with the actual closing prices (shown in blue).

Future Development

During the next week I will try to combine this prediction algorithm with the clustering algorithm that I developed during the first week. I will also integrate this prediction algorithm into the final system that we are developing.

Analysis of General Market Conditions and News
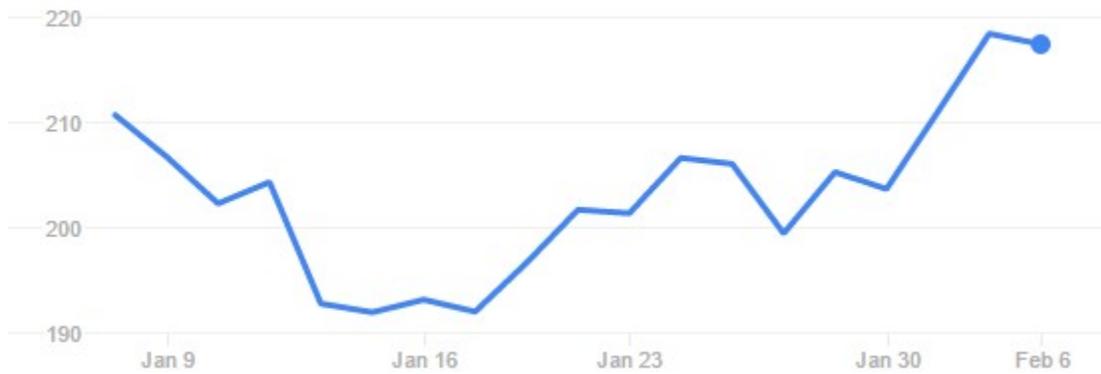
Tesla

Figure 2. Tesla stock prices

Description

Tesla is reporting fourth quarter earnings on Wednesday. Analysts are expecting Tesla to top $1 billion in revenue for the first time.

Result

As a result of the factors mentioned during the last week and the analyst prediction Tesla people started to buy the stocks in large quantities.

Stock Price Effect

The stock prices significantly rose from the last week.

Prediction

The prices are now in the oversold position and the price is on its peak for the past three month.

Conclusion

I should definitely increase the long position size that entered during this week.

Microsoft
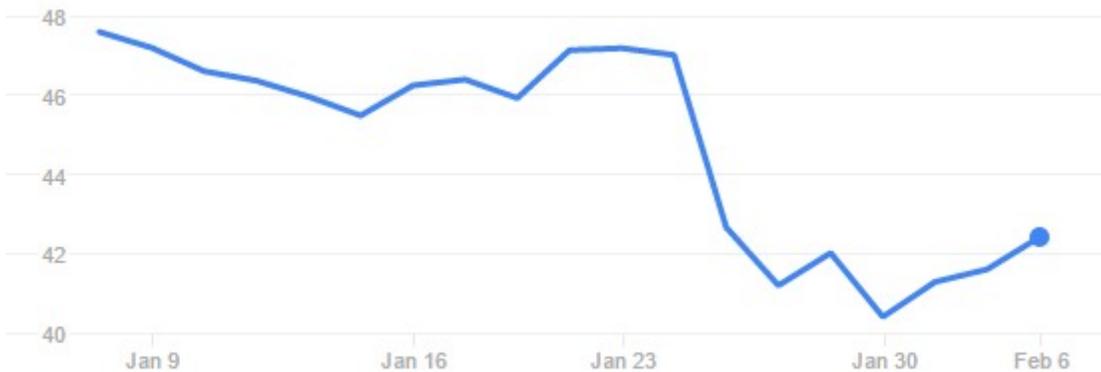
Figure 3. Microsoft stock prices

Description

Microsoft reported that Surface Pro tablet revenue crossed $1 billion. This is also the first time that the company sold more than $1 billion in Surface tablets.

Result

In the result the Microsoft seems to be in a very good shape. Especially, considering the recent announcement of HoloLens glasses. This news also raised the expectations for the Surface Pro 4.

Stock Price Effect

The price did not rise significantly. However, we can notice the long price pattern that appears on the chart above.

Prediction

Since Microsoft had the sudden price drop recently, the prices are expected to rise sharply over the next week. This assertion is supported by the fact that the prices are in the oversold area currently.

Conclusion

I should also increase the size of my current long position for Microsoft.

Trade Log

Date	Time	Trade	Type	Quantity	Price
Feb, 3rd	10:33	TSLA	Buy to cover	400	$214.72

Week 4

Neural Network Prediction Algorithm Analysis

Algorithm analysis

During this week I tried to perform more analysis of the neural network algorithm on the assets that were relatively stable (not affected by any external factors) over the last five years. I also increased the size of the training data. Following that goal I downloaded the historical data for Microsoft stock prices since 1986. I got the next result that shows that algorithm was able to clearly predict all the price fluctuations very precisely (the red line has almost the same shape as the blue one) one day in advance (the red line is shifted one – two units (days) to the left):
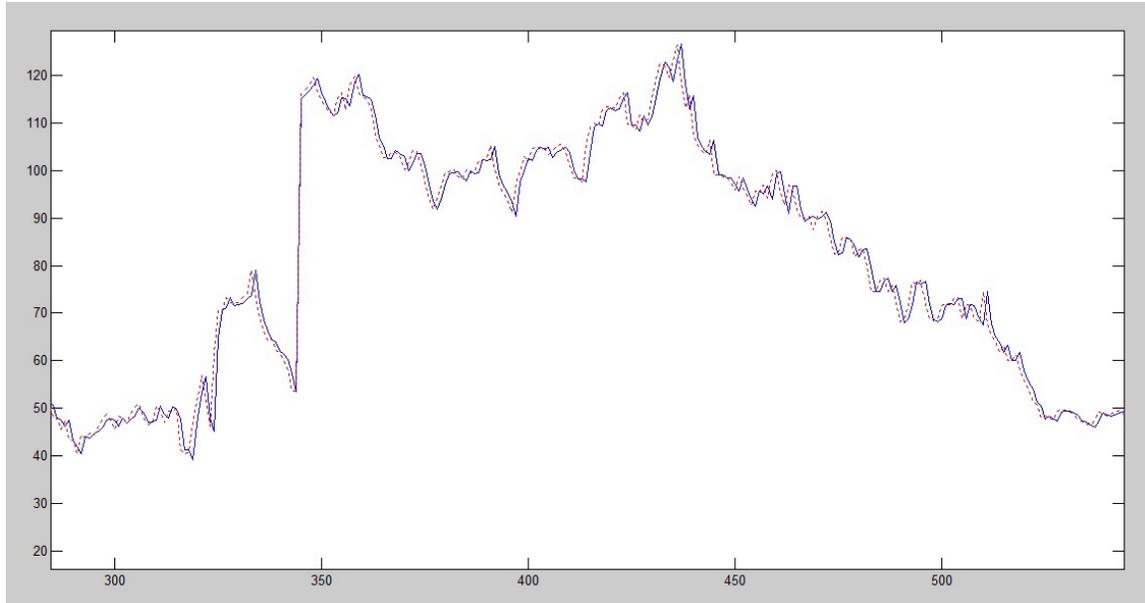
Figure 1. Microsoft: The comparison of the predictions (shown in red) with the actual closing prices (shown in blue).

Also, during this week I decreased the number of Neurons to three, thereby balancing the time needed for building the network and accuracy.

Additionally, I ran the algorithm against Facebook (3 year data) and Apple (data since 2000) stock data:
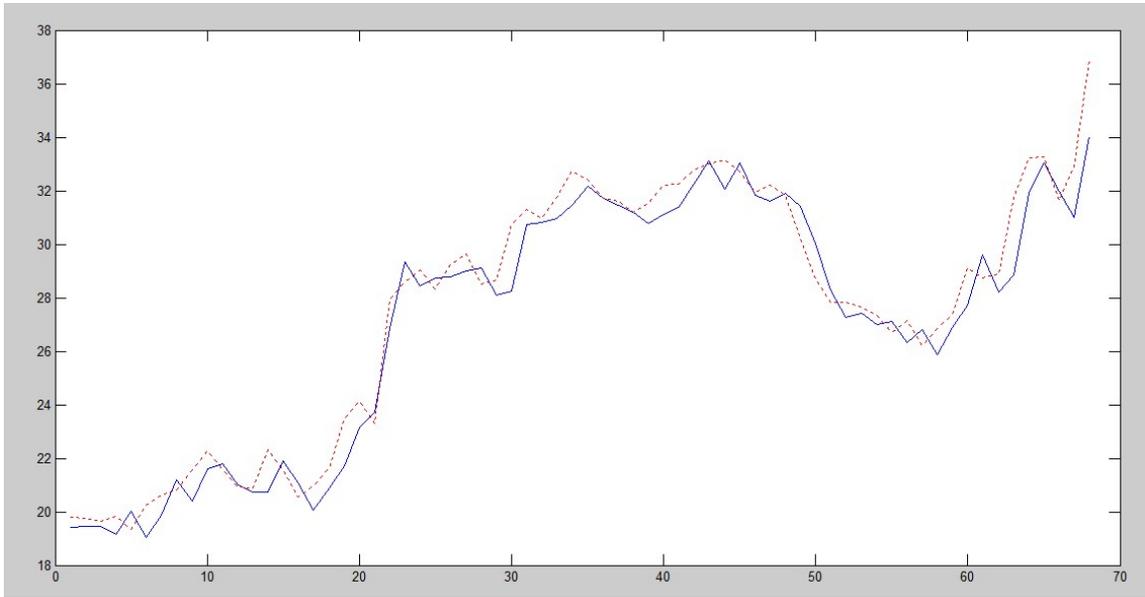
Figure 2. Facebook: The comparison of the predictions (shown in red) with the actual closing prices (shown in blue).
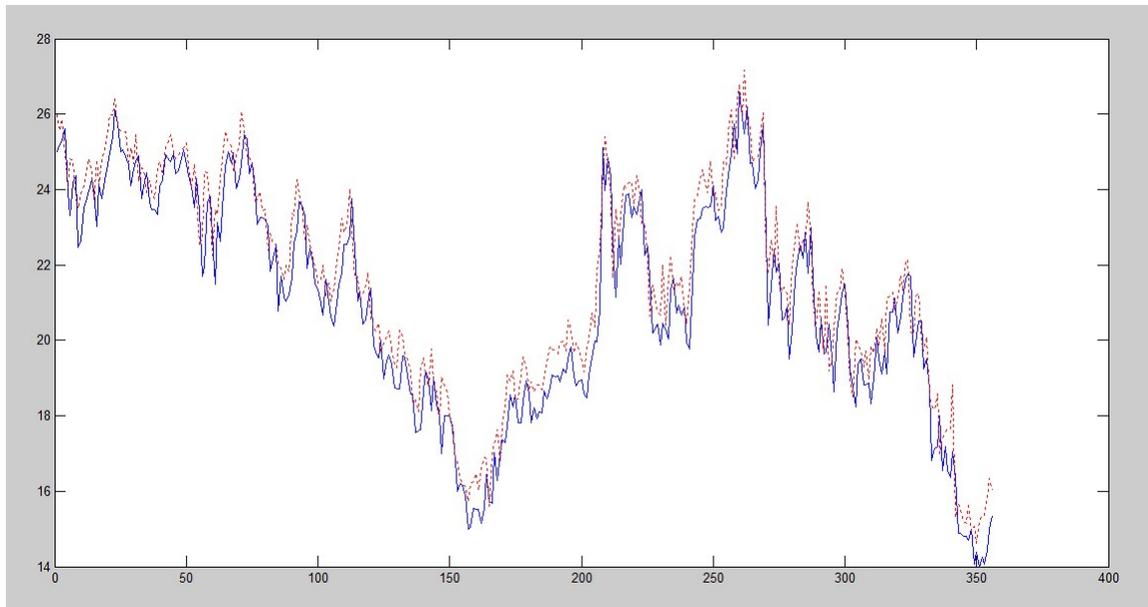
Figure 3. Apple: The comparison of the predictions (shown in red) with the actual closing prices (shown in blue).

By analyzing the results for these three different sets of data we can make the following conclusions:

1) The precision of the algorithm increases with the amount of training data.
2) The number of neurons does not affect the accuracy of the prediction significantly. However, it reduces the time needed to build the model.
3) The algorithm is not effective on the assets that show frequent sharp price fluctuations (the algorithm has a tendency of creating "false" peaks for those kinds of assets).
4) The algorithm is not effective for the assets that were affected by the external factors (as it was seen with Tesla assets).

Future Development

Over the course of the next couple of weeks I would like to write the algorithm that will automatically test the properties listed above for any asset given as input and determine if the precise prediction might be expected from the algorithm for that particular asset.

Analysis of General Market Conditions and News

Figure 3. Tesla stock prices

Description

Apple announced that it builds a new electric car. Additionally, it revealed the size of the project saying that more than a thousand of company's engineers are working on the project at this moment (which implies that the project is relatively large and Apple certainly invested significant amount of budget into it).

Result

As a result the interest for Tesla products decreased. Generally, it is not good news for Tesla because they got a new very strong competitor – Apple.

Stock Price Effect

The stock prices dropped significantly after that announcement as you can see on the chart above.

Prediction

The stock prices are going to continue to fall because they are currently in the overbought area as shown by the indicator.

Conclusion

I should monitor the fluctuations over the next week. If the prices will go higher than $205, I should close my current short position.

Figure 4. Microsoft stock prices

Description

Microsoft has released Windows 10 Technical Preview. New Windows 10 includes a set of new improvements including the new default browser and voice recognition system.

Result

Despite the long list of new features and high expectations the version the technical preview did not receive enthusiastic feedback from the users and tech websites.

Stock Price Effect

This news did not have any effect on the stock prices yet.

Prediction

The Microsoft stock price is expected to fall on Monday. As you can see on the figure above it is currently in the overbought area. Supported by the "cold" user reception of the Windows 10 technical review, the probability of the price drop is high.

Conclusion

I should close the current long position on Monday getting $600 of profit.

Trade Log

Date	Time	Trade	Type	Quantity	Price
Feb, 3rd	2:07	SCTY	Buy	100	$57.39

Week 5

Neural Network Prediction Algorithm Analysis

Algorithm performance analysis for currency data

During this week I tried to run the algorithm with the 3 neurons against currency data. For these purposes I selected three currency pairs: USD/JPY, EUR/USD and NZD/USD. For all three currency pairs I downloaded 20 years historical data. The predictions are shown on the graphs below:
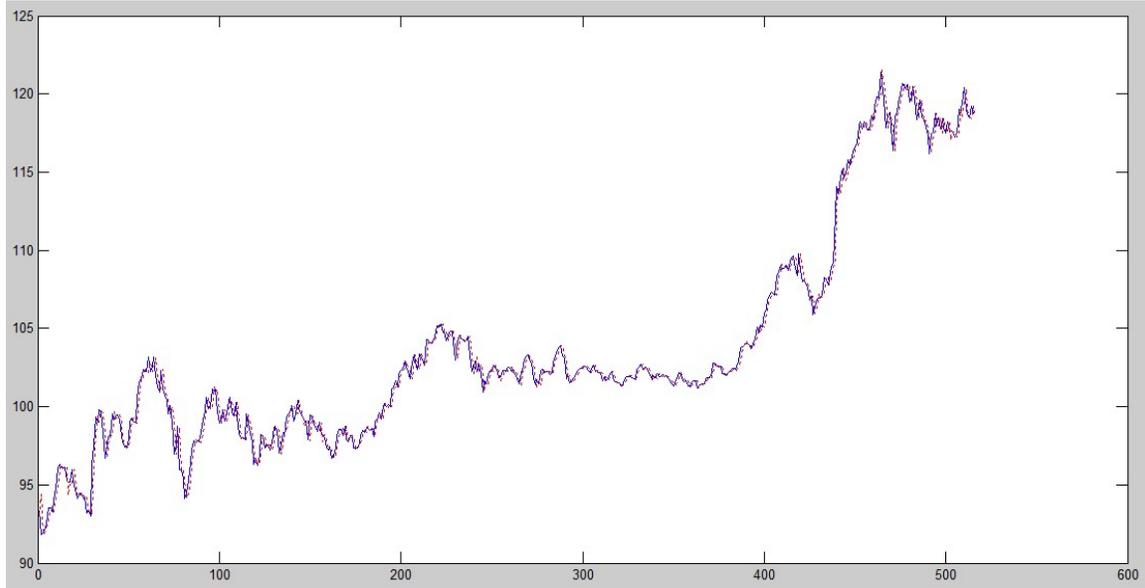

Figure 1. USD/JPY: The comparison of the predictions (shown in red) with the actual closing prices (shown in blue).
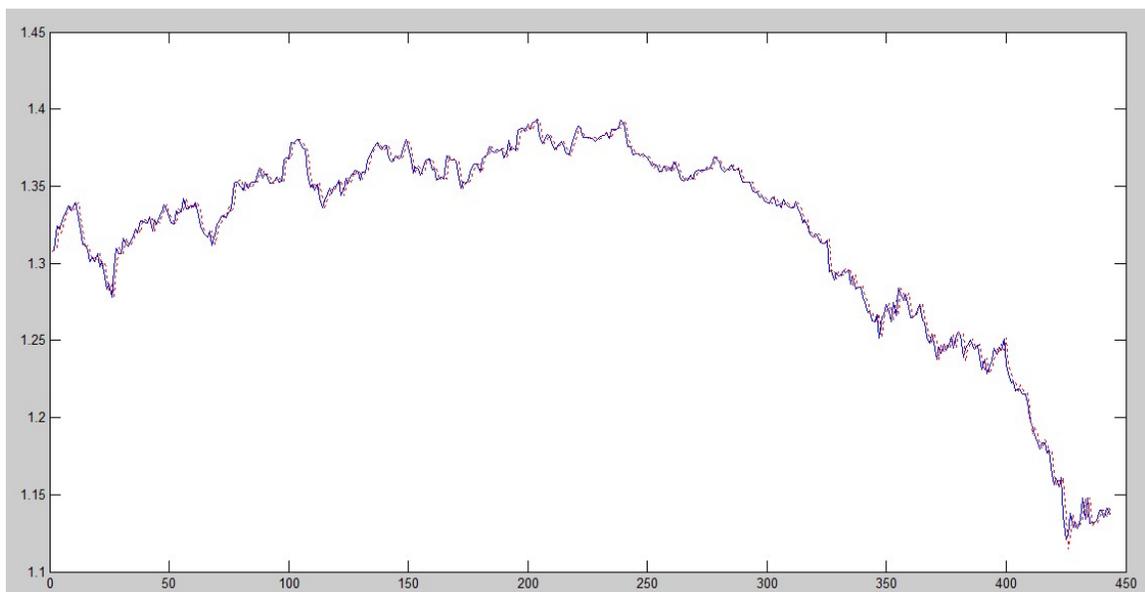
Figure 2. EUR/USD: The comparison of the predictions (shown in red) with the actual closing prices (shown in blue).
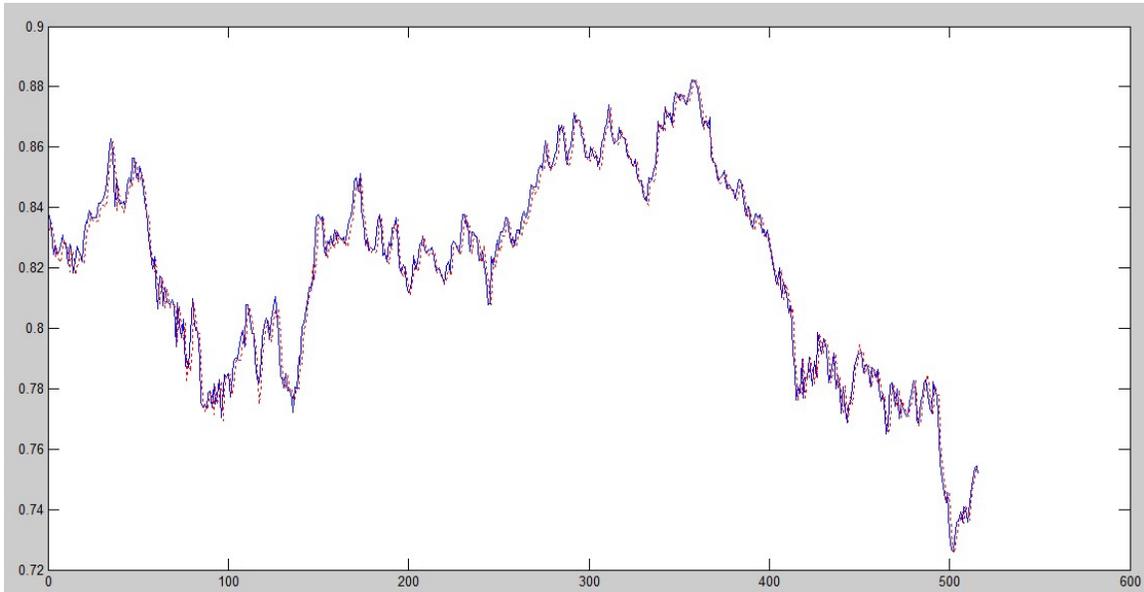
Figure 3. NZD/USD: The comparison of the predictions (shown in red) with the actual closing prices (shown in blue).

As you can see the algorithm did not perform well against currency data. There exists a small lag associated with the predicted closing price (the predicted curve "follows" the actual price with the delay of 1-2 days). Therefore, we can conclude that the algorithm is not applicable for currency data in its current form.

After analyzing the reason behind this result, we can reason that such performance of the algorithm was logical. In the previous journal entry I tried to find the properties of the assets that the algorithm works best for. One of the properties was that the asset should not be affected by any external factors to be well "predictable".

However, almost all of the major currency pairs were affected by the external factors in some way at the specific time periods which leads to a conclusion that they lack the mentioned above property.

Future Development

Improve the algorithm for the well predictable assets by including the other data features such as highest and lowest prices during the day into training data set.

Analysis of General Market Conditions and News

Tesla

Figure 3. Tesla stock prices

Description

One of Morgan Stanley analysts provided an optimistic outlook for Tesla's future. It predicts that the stock prices will reach its new high when the Model X will be released. He also pointed out that the company has the potential to revolutionize the industry in spite of the high expenditures.

Stock Price Effect

The shares gained 3.5% after the announcement.

Prediction

The price is going to continue to rise over the course of the next month.

Conclusion

I should enter the long position in the beginning of the next week.

Microsoft

Figure 4. Microsoft stock prices

Description

Pacific Crest, the one of the famous investment banks, provided a positive update on Microsoft. They expressed confidence that Microsoft is well positioned to grow its hybrid cloud (cloud services such as storage, hosting and computing provided from big data centers) business after speaking with customers and experts.

The market of this sector is estimated to be as much as 50% of enterprise cloud deployments by 2017.

Result

In combination with the other factors this piece of news turned positive attention to Microsoft stocks.

Stock Price Effect

Because of this factor stock prices raised by 0.82% up to $43.85.

Prediction

Price is going to be stable during the next week with small long trend price changes.

Conclusion

I should leave my current long position open during the next week.

Trade Log

Date	Time	Trade	Type	Quantity	Price
Feb, 18th	10:07	SCTY	Sell	100	$58.22

APPENDIX E: DMYTRO BOGATOV'S JOURNAL

Trading System Development IQP – Journal

Submitted by: Dmytro Bogatov

Interactive Qualifying Project Journal

Investment, Trading and Risk Management

Table of Contents

Week 1: November 1 - November 8

Market Conditions

This week my market part (stocks of techno companies) was pretty calm. The stocks I added to my account are **AAPL**, **GOOG**, **MSFT** as primary ones, which I will concentrate on. I have added **IBM** and **YHOO** just to make a feel of market. There is also **EURUSD=X** to keep my eye on currency movements. And the last one is **BZZ14.NYM**. My personal belief is: the lower this index is, the more convenient I can be in my country's safety. My general indicators are **S&P500**, **DOW** and **NASDAQ**. These three reported pretty little movement during the week.

Important News

Since market was stable this week, there are not too many news that interested me.

The first one is about Apple. Fruit company released a new beta version of their firmware for mobile devices (aka iOS), which fixes the bugs that allowed hackers to change the core systems and run unauthorized software (aka jailbreak). That drove *AAPL* up just a little bit.

The second news is about Microsoft. The "corporation of evil" released new versions of Office applications for iOS devices and made them free to use. Honestly speaking, not free, but incorporating freemium model. That lowered the *MSFT* just a bit.

Trading

I did not trade much this week for two reasons: market was steady and my primary concentration was developing a strategy. I would work on "Precision Strategy" shown to us by professor Radzicki in last term. I will create ShowMe's, Indicators and actual Strategy for it. Now, I'm at the state of development.

Performance Report

No trading - no report yet. I would use my already developed strategy next weeks until I finish developing precision one.

Week 2: November 9 - November 15

Portfolio Management Software Report

The software I tested is Yahoo Finance. It's a web service and it allows one to perform some standard set of operations on your investment: create portfolio, add holds, link brokerage accounts, see news updates, etc. Advantages of this software are:

- Web-based service
- Nice mobile applications
- Great news supplier (since Yahoo as a company works quite tightly with advertising and news industries, it has quite good news engine)

But unfortunately, that's it. Comparing this system to our leader - SigFig - I did not notice anything else worth my attention. These are features that are either missing or hard to found:

- Generate specialized reports
- More types of assets to trade
- Transactions (yes, I still can't see how to imitate a trade)

I can't state that these features are missing, but if I can't find them for a long time, it's pretty much equals to the fact that they are not there.

This analysis leads me to the conclusion that SigFig is our choice of software. It not only implements the points marked as advantages for Yahoo Finance, but also does well with the features that are not present in Yahoo product.

Market Conditions

This week techno market behave quite calm being in a little bullish state. Industrial indexes did not move too much, although my portfolio stocks showed an uptrend. Here is just a daily summary.
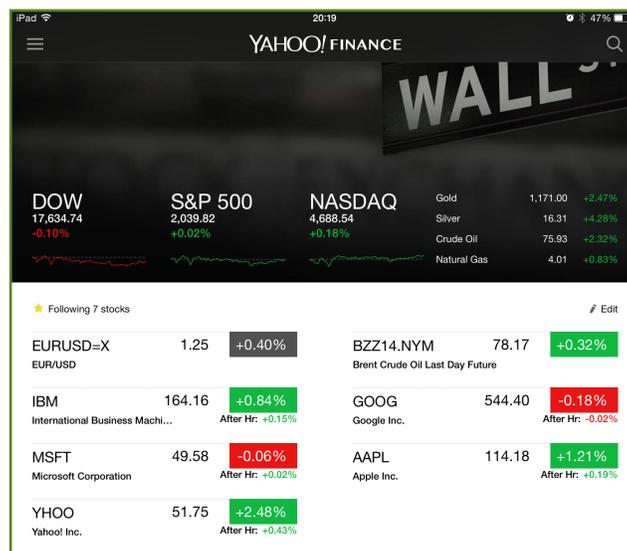
Important News

I did not see great news from techno companies I follow. Obviously, there is not a time for financial report or presentations. However, I found some interesting information about Apple and Russian Stock Market.

"Apple Could Swallow the Whole Russian Stock Market. Take a Look"[1]. Bloomberg has calculated that Apple's (*AAPL*) capitalization (as of end of this week) is not only exceeds the stock market of the largest country in the world, but also the difference is large enough to buy iPhone 6 64 GB Never-lock for every citizen of Russian Federation. *AAPL* is trading *$114.18* per share having market capitalization of *$670B* which makes it the world most expensive company ever. At the same time, total value of all equities trading on Russian market is *$531B*. According to Bloomberg analysis, Apple works well with investors and maintains positive investment climate. At the same time, Russia invades Ukraine which results in sanctions and economic stagnation.

Trading

This week I was able to write an indicator which builds three lines: linear regression line for certain number of bars and two parallel lines certain number of standard deviation up and down. Additionally, I put two moving averages on the plot: simple and exponential. Finally, I construct 6 charts with different timeframes.


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[1] http://www.bloomberg.com/news/2014-11-14/apple-could-swallow-whole-russian-stock-market.html

Performance Report

Still no trading yet. Next week I'll use my back-home computer in Ukraine to keep TradeStation running 24/7. Here is the flow chart of my strategy.
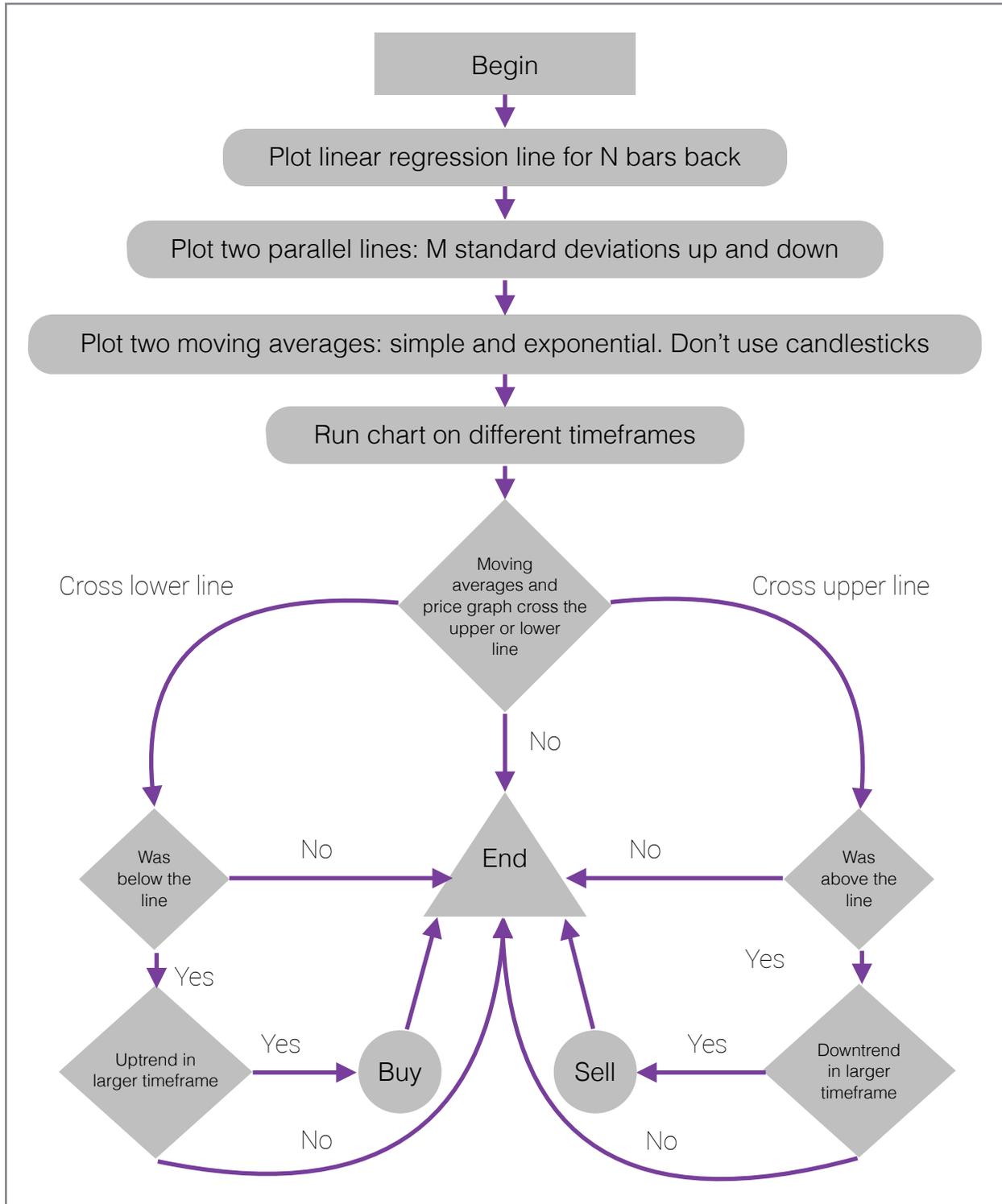
Week 3: November 16 - November 22

Market Conditions

This week techno market behave quite calm being in a little bearish state. Industrial indexes experienced some rapid increase at the 21st November opening. Euro keeps dropping, Oil is cheaper. My techno stocks lost in price, except **AAPL** which is now even higher. Here is just a daily summary. Yahoo Finance shows that all 7 assets are stocks. That is a known bug.
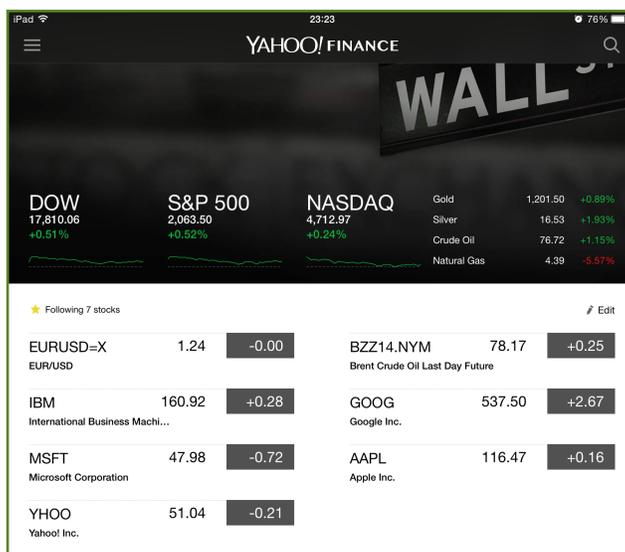
Important News

This time my favorite news is again about Apple. Fruit company released a WatchKit SDK (Software Development Kit). This news is important because SDK gives pretty much solid understanding of what Apple Watch can do and cannot. According to developers who had a chance to touch new toy, "Apple is frustrating and intriguing at the same time". On the one hand developers have almost no access to watch's sensors. Apple Watch does most of its work through an iPhone which limits the potential target of this product to the scope of latest iPhone users. On the other hand, Watch is very concentrated on health. It may happen that Apple will beat pretty new health devices market. Investors liked this news, I think, because AAPL keeps going up.

Trading

This week I was able to run TradeStation on my back-home computer in Kiev. It ran my Bollinger bands strategy and generated some number of trades.

Trades - November 16-22

Date	Time	Trade	Type	Quantity	Price
11/20/14	03:45 PM	EURUSD	Buy	100,000	$ 1.25293
11/20/14	03:45 PM	EURUSD	Buy	100,000	$ 1.25294
11/20/14	01:15 PM	EURUSD	Sell	100,000	$ 1.25243

Performance Report

There is a huge inconsistency between my strategy, trades and performance report. I will work on that this week; probably, I'll reset my accounts. Good news is that it works on the other side of the Earth. I will be including my strategy performance reports after I fix this issue.

Quiz

Let me remind an initial problem. Assume that you shorted one standard lot of **GBPCAD** on Monday, Nov. 17, at 1.7760 and covered your short on Friday, Nov. 21 at 1.7590. Find the response to the following questions and send me a short report. Assume that you use a leverage of 10 to 1 for this trade.

1. How much money in term of dollar do you need for this transaction?
2. What is your profit in term of pips?
3. What is your profit in term of dollar?
4. What is your profit in term of percentage of capital for this transaction?
5. What will be the annualized rate of return?
   Here is my solution.

1. Based on the given leverage, I need one dollar for every ten dollars I trade. The standard lot is $100,000. The answer is **$10,000**.
2. One pip in this case is 0.0001. The change was 0.0170. The answer is **170 pips**.
3. The answer is the product of 0.0170 by $100,000. The answer is **$170**.
4. I win $170 having a capital of $10,000. The answer is **17%**. Pretty high, by the way.
5. Here is the confusion. Our group could not find a single algorithm for determining an annualized rate of return based on a single transaction. These are answer we came up with. Some of them look more reasonable than others. I'm personally inclined to consider **17%** as an answer.
   a) **17%**. Having just one transaction, we reflect this percent over the year.
   b) 1.17 to the power of 52 (weeks per year) equals **351,200%**. Suppose, we increase our capital by 17% every week. Looks unbelievable, but still.
   c) 0.17 multiplied by 52 equals **884%**. In the case we win the same amount of money every week.

Code

```
                            {Precision Strategy: Linear Regression Band Indicator}
1. Input:
2.      NumberOfBars(10),
3.      Price(close),
4.      NumberOfStdDevsUp(2),
5.      NumberOfStdDevsDown(-2),
6.      GraphOption(3);
7.
8. Variables:
9.      SumX(0), SumXX(0), SumY(0), SumXY(0), m(0), // slope
10.     _c(0), SDev(0), Left(0), Right(0), LowerLine(0), CenterLine(0),
11.     UperLine(0), Flag(0), Color(Yellow);
12.
13.Once
14.     Begin
15.             SumX = (NumberOfBars*(NumberOfBars+1))/2;
16.             SumXX = (Square(NumberOfBars)*NumberOfBars/3 + Square(NumberOfBars)/2) + NumberOfBars/6;
17.     end;
18.
19.For Value1 = 1 to NumberOfBars
20.     Begin
21.             SumY = SumY + Price[Value1 - 1];
22.             SumXY = SumXY + Value1*Price[NumberOfBars - Value1];
23.     End;
24.
25.m = ((NumberOfBars*SumXY) - (SumX*SumY)) / (NumberOfBars*SumXX - Square(SumX));
26._c = (SumY - (m*SumX))/NumberOfBars;
27.
28.Left = m + _c;
29.Right = NumberOfBars*m + _c;
30.
31.SumY = 0;
32.SumXY = 0;
33.
34.If LastBarOnChart AND GraphOption = 2 then
35.Begin
36.     SDev = StandardDev(Right, NumberOfBars, 1);
37.     CenterLine = Tl_new(D[NumberOfBars-1], T[NumberOfBars-1], Left, D, T, Right);
38.     LowerLine = Tl_new(D[NumberOfBars-1], T[NumberOfBars-1], Left+NumberOfStdDevsDown*SDev, D, T,
   Right+NumberOfStdDevsDown*SDev);
39.     UperLine = Tl_new(D[NumberOfBars-1], T[NumberOfBars-1], Left+NumberOfStdDevsUp*SDev, D, T, Right
   +NumberOfStdDevsUp*SDev);
40.End;
41.
42.If LastBarOnChart AND GraphOption = 3 then
43.Begin
44.     If Flag = 0 then
45.             Begin
46.                     SDev = StandardDev(Right, NumberOfBars, 1);
47.                     CenterLine = Tl_new(D[NumberOfBars-1], T[NumberOfBars-1], Left, D, T, Right);
48.                     LowerLine = Tl_new(D[NumberOfBars-1], T[NumberOfBars-1], Left
   +NumberOfStdDevsDown*SDev, D, T, Right+NumberOfStdDevsDown*SDev);
49.                     UperLine = Tl_new(D[NumberOfBars-1], T[NumberOfBars-1], Left
   +NumberOfStdDevsUp*SDev, D, T, Right+NumberOfStdDevsUp*SDev);
50.                     Flag = 1;
51.                     If m > 0 then
52.                             Color = Green
53.                     Else
54.                             Color = Red;
55.
56.                     Tl_setcolor(CenterLine, Color);
57.                     Tl_setcolor(LowerLine, Color);
58.                     Tl_setcolor(UperLine, Color);
59.             End;
60.End;
```

Week 4: November 23 - November 29

Market Conditions

      This week techno market behave differently. *AAPL* did quite well - it's going higher and higher. *GOOG* and *YHOO* did not move too much. *MSFT* lost over 2%. Oil market was bearish - Brent Oil *BZZ14.NYM* dropped down to 4-year minimum. In "Important News" section I'll say why. Here is just a daily summary. Yahoo Finance shows that all 8 assets are stocks. That is a known bug. Please note, I added *CLG15.NYM* symbol just to have visual comparison with Brent Oil index.
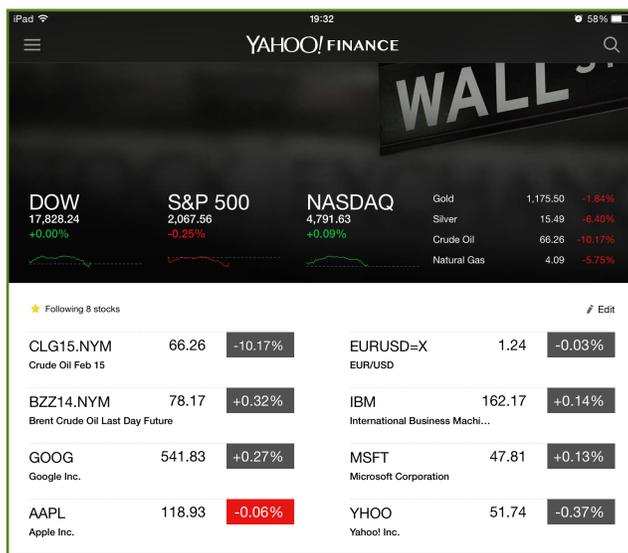
Important News

      My favorite news these days are ones about oil. Major event has occurred this week that definitely worths our attention. ***"Oil prices came crashing down Thursday to trade below $70 per barrel after OPEC announced it was leaving oil production levels unchanged."***[2] Basically, OPEC[3] members were concerned about oil prices falling for half a year. They decided to meet and decide on cutting oil supply to rise demand and therefore prices. However, they could not come to consensus. Some analytics say that even consensus were not able to save oil price. They say, american "shale revolution" and world's initiative to use alternative energy sources dictate oil prices. Anyway, after this news the price of oil futures dropped in average by 7% and came to 4-year minimum. This event triggered another one: Russian Ruble (currency unit) dropped down to historical minimum (50 rubles

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[2] *http://money.cnn.com/2014/11/27/news/opec-oil-prices/index.html*

[3] *Organization of the Petroleum Exporting Countries; interesting fact: USA and Russia are not members of this organization*

per USD). This is a reaction of investors who know how tightly Russian economy depends on gas and oil export.

Trading

This week I was able to run TradeStation on my back-home computer in Kiev. It ran my Bollinger bands strategy and generated some number of trades.

Trades - November 23-29

Date	Time	Trade	Type	Quantity	Price
11/26/14	7:50 PM	YHOO	Buy	100	$ 52.05
11/26/14	7:05 PM	AAPL	Buy	100	$ 118.51
11/26/14	4:30 PM	GOOGL	Sell Short	100	$ 548.37
11/28/14	3:25 AM	EURUSD	Sell	100,000	$ 1.24543
11/27/14	6:52 PM	EURUSD	Sell	100,000	$ 1.24710
11/27/14	3:20 PM	EURUSD	Buy	100,000	$ 1.24805
11/27/14	3:20 PM	EURUSD	Buy	100,000	$ 1.24805
11/27/14	8:15 AM	EURUSD	Sell	100,000	$ 1.25067
11/26/14	8:52 AM	EURUSD	Sell	100,000	$ 1.24740
11/25/14	10:07 AM	EURUSD	Sell	100,000	$ 1.24227
11/25/14	10:07 AM	EURUSD	Buy	100,000	$ 1.24241
11/24/14	9:20 AM	EURUSD	Buy	100,000	$ 1.23960
11/24/14	9:20 AM	EURUSD	Buy	100,000	$ 1.23960
11/24/14	2:30 AM	EURUSD	Sell	100,000	$ 1.23800

Performance Report

Here is my strategy performance report for **EURUSD** symbol for two weeks using 5 minute bars. The strategy that was used is the one developed during ISP - combination of Bollinger Bands, Stop Loss and Moving Averages. Profit Factor of 13.13 makes me happy. The largest and average losing trade is exactly stop loss value.

Current Development

I not only run my already developed strategy on back-hone computer, but also develop new one. As I mentioned before, this strategy is based on precision strategy shown by professor Radzicki. The idea is to create regression line for certain number of bars. Then, two parallel lines are plotted 2 (or possibly 1 or 3) standard deviations up and down. Additionally, simple and exponential moving averages are plotted as well as price curve. These exact analysis techniques are added to different timeframe charts of the same symbol. The setup for buy or sell action is up- or downtrend of larger timeframe chart. Another setup is all three plots (averages and price) being out of regression bands. The trend is given by the slope of regression lines. The entry is the cross of all three plots of a band line. In other word, if plots were below lower band and now crossed this band and this chart's and upper timeframe chart's trend is up, we buy. Opposite conditions are necessary for sell action. My flowchart in week 2 report nicely shows this strategy, except that it does not account upper timeframe charts yet.

The idea is one part of a problem, another one is an implementation. I have coded and indicator for regression bands. The code was given in last report. This week I developed a function from this indicator which returns upper and lower band values for the bar. The hardest thing is to make charts communicate. This technique is called Multi Chart analysis. Programmatically, it is implemented through the framework Global Variables DLL. This framework allows for storing and retrieving primitive values globally. The good news is that I was able to instal it and use. The bad news is that it does not support back-testing. I can't use this framework on historical data. That is an official limitation. If I don't find an alternative for this framework, I will have to test my precision strategy in real time.

Code

My code file are getting larger so I decided not to include them in report file but to attach them separately. The code is exported into *.ELD* file named *DmytroBogatov_PrecisionBundle.ELD*.

Week 5: November 30 - December 6

Market Conditions

Although *S&P500* did well this week (it gained around 1%), these days were hard for *AAPL* (-3.62%) and *GOOGL* (-2.52%). Other assets I follow did not cross 1% borderline. Oil *BZZ14.NYM* is going down.
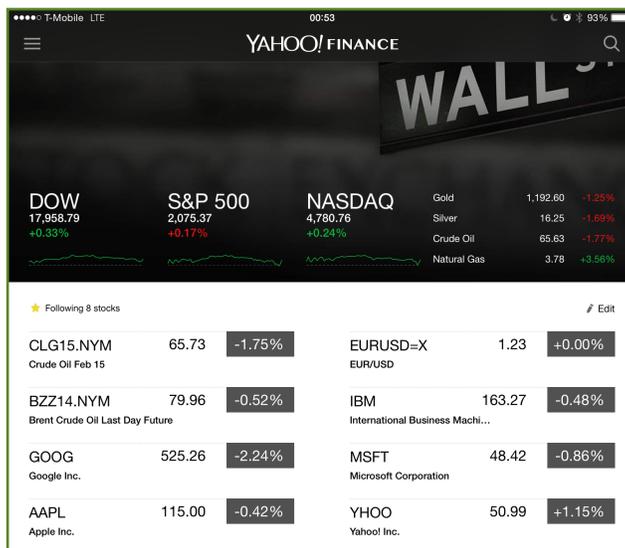
Important News

This week I saw not news, but an article on reuters explaining *AAPL* one-day drop. The article is *"Wall Street falls in broad decline; Apple stumbles"[4]*. It nicely explains that *AAPL* is not the only one equity that went down on Monday. It turns out that due to the number of reports on global economics conditions which indicated a weakness across the globe, many US stocks were affected. Growth struggle, as a result, animal spirit is lower than it could be. Which, in its turn, reflects on the equities market.

Strategy Overview

Bollinger Bands Strategy

This week I kept running my Bollinger strategy on back-home computer. Unfortunately, the Internet is broken in my home this weekend, so I was unable to collect any trades and reports, however, they are there and I will include them in my next report. My apologies for that.

Precision Strategy

Precision strategy development goes pretty well. This week I was able to eliminate Global Variables DLL from my code. Thanks to professor Hakim, I just add a few more

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[4] http://www.reuters.com/article/2014/12/01/us-markets-stocks-idUSKCN0JF26620141201

symbols to my chart, hide them and easily access data on them. Right now my strategy is able at any given moment of time (in other words, on any bar) compute the upper and lower bands of regression line, simple and exponential average and get these values for previous bar. Additionally, I can see another timeframe charts' trends. Now I'm 80% done, which means that I only need to play around with these values and make decisions looking on them.

Future Development

As I mentioned, I'm 80 percent done with my B-term strategy. My checklist for next week is.

- Test computed values (make sure they are calculated as expected)
- Design an indicator somewhat similar to Bollinger bands but using linear regression
- Design a complete strategy (make buy and sell calls)
  On the last week I will optimize the strategy.

Code

```
                              {Precision Strategy}
1. Input: NumberOfBars(10), NumberOfStdDevsUp(2), NumberOfStdDevsDown(-2), GraphOption(3), ThisData(1),
   LargerData(2);
2.
3. Variables: Price(close), PrevPrice(Close), CenterVal(0), UpperVal(0), LowerVal(0), PrevUpper(0),
   PrevLower(0), SimpleMA(0), PrevSimple(0), ExpMA(0), PrevExp(0), ThisUpTrend(1), LargerUpTrend(1),
   BuyCondition(false), SellCondition(true);
4.
5. ThisUpTrend    = LinearRegressionBands(NumberOfBars, Price, NumberOfStdDevsUp, NumberOfStdDevsDown,
   GraphOption, CenterVal, UpperVal, LowerVal, PrevUpper, PrevLower) of Data(ThisData);
6. LargerUpTrend = LinearRegressionBands(NumberOfBars, Price, NumberOfStdDevsUp, NumberOfStdDevsDown,
   GraphOption, CenterVal, UpperVal, LowerVal, PrevUpper, PrevLower) of Data(LargerData);
7.
8. SimpleMA       = AverageFC(Price, NumberOfBars) of Data(ThisData);
9. ExpMA          = XAverage(Price, NumberOfBars) of Data(ThisData);
10.Price          = Close of Data(ThisData);
11.PrevSimple     = AverageFC(Price, NumberOfBars)[1] of Data(ThisData);
12.PrevExp        = XAverage(Price, NumberOfBars)[1] of Data(ThisData);
13.PrevPrice      = Close[1] of Data(ThisData);
14.
15.BuyCondition =
16.     (Price crosses above LowerVal AND SimpleMA crosses above LowerVal AND PrevExp crosses below
   PrevLower AND ExpMA crosses above LowerVal) OR
17.     (Price crosses above LowerVal AND PrevSimple crosses below PrevLower AND SimpleMA crosses above
   LowerVal AND ExpMA crosses above LowerVal) OR
18.     (PrevPrice crosses below PrevLower AND Price crosses above LowerVal AND SimpleMA crosses above
   LowerVal AND ExpMA crosses above LowerVal) AND
19.     ThisUpTrend = 1 AND LargerUpTrend = 1;
20.
21.SellCondition =
22.     (Price crosses below UpperVal AND SimpleMA crosses below UpperVal AND PrevExp crosses above
   PrevUpper AND ExpMA crosses below UpperVal) OR
23.     (Price crosses below UpperVal AND PrevSimple crosses above PrevUpper AND SimpleMA crosses below
   UpperVal AND ExpMA crosses below UpperVal) OR
24.     (PrevPrice crosses above PrevUpper AND Price crosses below UpperVal AND SimpleMA crosses below
   UpperVal AND ExpMA crosses below UpperVal) AND
25.     ThisUpTrend = 0 AND LargerUpTrend = 0;
26.
27.If BuyCondition Then Buy("Precision Buy") next bar at market;
28.If SellCondition Then SellShort("Precision Sell") next bar at market;
29.
30.Print(ELDateToString(Date), " ", Time:4:0);
31.Print("CenterVal: ", CenterVal:1:5, ", UpperVal: ", UpperVal:1:5, ", LowerVal: ", LowerVal:1:5, ",
   SimpleMA: ", SimpleMA:1:5, ", ExpMA: ", ExpMA:1:5, ", Price: ", Price:1:5, ", PrevUpper: ",
   PrevUpper:1:5, ", PrevLower: ", PrevLower:1:5, ", PrevSimple: ", PrevSimple:1:5, ", PrevExp: ", PrevExp:
   1:5, ", PrevPrice: ", PrevPrice:1:5, ", ThisUpTrend: ", ThisUpTrend:1:0, ",    LargerUpTrend: ",
   LargerUpTrend:1:0);
```

Week 6: December 7 - December 13

Market Conditions

This week was terrible for investors. Almost all industrial indexes went down. **AAPL**, **GOOGL**, **MSFT**, **YHOO**, **IBM** dropped. USD weakened (**EURUSD** went up). Oil **BZZ14.NYM** dropped. This trend did not omit other economics, for example **RSX** (Market Vector Russia ETF) lost 11.3% which is inexcusable for such a large country. At the weekly close all my assets are down.
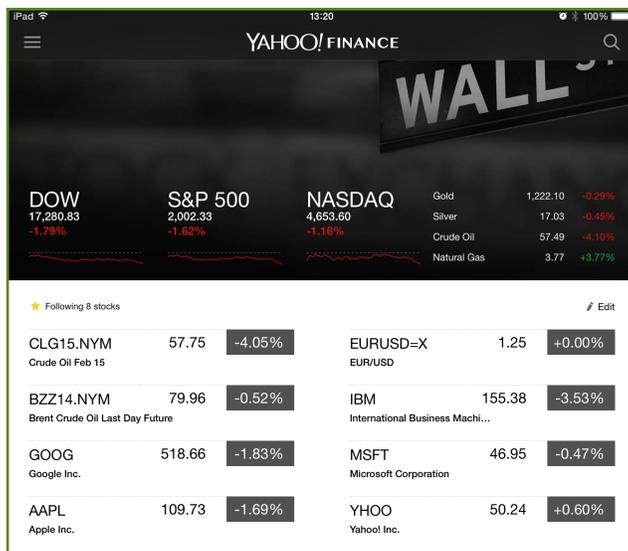
Important News

Here is the article explaining the reasons why market dropped this week. ***"Oil hits stocks; worst week of 2014 for Dow, S&P 500"[5]***. Kate Gibson states that crude oil prices drop is hitting Russian economics. Russia is a partner of Europe and Europe is a partner of US. Therefore, Kate implies, Russian collapse affects US stocks, although not directly. I think, she is right. As I mentioned in a previous section **RSX** lost 11.3% of it's value, S&P500 lost just less than 2%. I believe, it's a fair trade-off for piece and stability in the world.

Strategy Overview

Bollinger Bands Strategy

I have realized why I don't have trades for the weak before - there were no trades. This week, however, I have a few. The table shows a list of them. My assets give me loss this weak because of **S&P500** drop, but **EURUSD** makes me happy.

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[5] *http://www.cnbc.com/id/102263988*

Trades - December 1-13

Date	Time	Trade	Type	Quantity	Price
12/8/14	7:14 PM	YHOO	Sell	100	$ 49.86
12/9/14	4:40 PM	MSFT	Buy	100	$ 47.57
12/9/14	9:12 PM	MSFT	Sell	100	$ 46.82
12/11/14	9:25 PM	IBM	Buy	100	$ 162.26
12/11/14	9:48 PM	IBM	Sell	100	$ 161.50
12/9/14	2:00 AM	EURUSD	Buy	100,000	$ 1.23124
12/10/14	9:45 AM	EURUSD	Sell	100,000	$ 1.23897
12/11/14	12:20 PM	EURUSD	Sell	100,000	$ 1.24368
12/11/14	10:30 PM	EURUSD	Buy	100,000	$ 1.23821
12/11/14	10:30 PM	EURUSD	Buy	100,000	$ 1.23821

Precision Strategy

Precision strategy development is completed. This week I refactored my code and eliminated some bugs. Now strategy works as expected. I modified it in a way that only price curve matters. In other words, when price returns into bands, I buy or sell. Also, trend for this and upper timeframe chart is a required condition. Additionally, I developed an indicator somewhat similar to Bollinger bands which shows the values of bands at any given point. Right now the strategy is balancing around zero net profit. I will continue working on it.

Future Development

My plan on the next week is to play around with precision strategy to make it profitable without parameters optimization. My plan for next term is to design a radar screen supplementary to my precision strategy. It will support for manual trading. Next term I will work primarily on visual indicators.

### *Code*

My code is too large to be copy-pasted into the journal. I attach a copy of code. *Precision Strategy* is the strategy code which decides on buy and sell actions. *LinearRegressionBands* is the function code. Function takes some parameters like price and number of bars and returns linear regression value, bands values, trend and previous values. *Precision indicator* is the indicator.

Week 7: January 18 - January 24

Market Conditions

This week has been enjoyable for investors. Almost all industrial indexes went up. *AAPL* (+5%), *GOOGL* (+7%), *MSFT* (+3.5%), *YHOO* (+6%) rose. USD strengthened (*EURUSD* (-3%) went down). Oil *CLG15.NYM* went up a bit. Some explanation will be provided with the news. You may have noticed that some new symbols appeared on my dashboard. I changed *BZZ14.NYM* to *CLG15.NYM* to see the latest oil price. Additionally, I added *UAH=X* and *RUB=X* to keep track of Ukrainian Hryvna and Russian Ruble exchange rate.
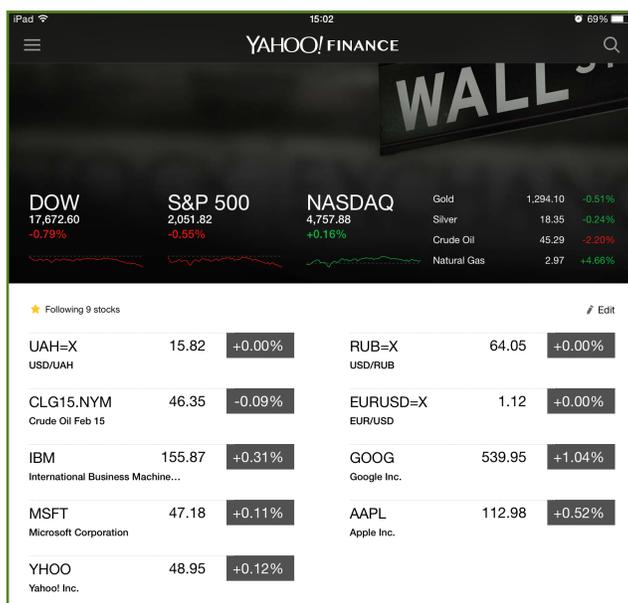
Important News

This week I would like to report two important news.

The first news is the death of the King of Saudi Arabia. *"Saudi Arabia's King Abdullah bin Abdulaziz dies"[6]*. This person was the leader of the greatest oil exporter. His death, although not surprising, affected the commodities market. Market is not sure on what the policy of the new King will be, so oil went up a bit. Nevertheless, it is expected that new leader will not change the policy of the country, so the price did not rise too much.

The second news is about the Microsoft's (*MSFT*) presentation of a technical preview of a new OS, Windows 10. *"Microsoft unveils Windows 10"[7]*. Although this event was supposed to drive *MSFT* up, that did not happen. Some experts say that all new features of Windows 10 are not, in fact, new. Additionally, Microsoft announced that Windows 10 is free to upgrade from Windows 7/8/8.1 (discount is in the effect for the term

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[6] http://www.bbc.com/news/world-middle-east-30945324

[7] http://money.cnn.com/2015/01/21/technology/windows-10/

of one year), which means that company will earn less, as Windows OS sales constituted a big share of Microsoft's earnings.

Strategy Overview

Bollinger Bands Strategy

Testing it last term, I am pretty satisfied with how this strategy works. I will continue testing it this term with Radar Screen. No trades this week, I will put my strategies on automatic trading starting from the next week.

Precision Strategy

Last term I completed my precision strategy but it is not profitable yet. As professor Hakim suggests, I will create a Radar Screen for the strategy and will try to trade it manually. I feel like my strategy is good, I just need to clearly define conditions under which its behavior is the most optimal.

Future Development

As I mentioned before, my goal is to develop a few useful indicators. I will start with the Radar Screen development. I have an idea of how it will look like, so next week I will start coding and testing it.

Code

This week I worked on the code which professor Hakim gave us. I was able to compile (verify) and run his indicator. Here is how it looks.
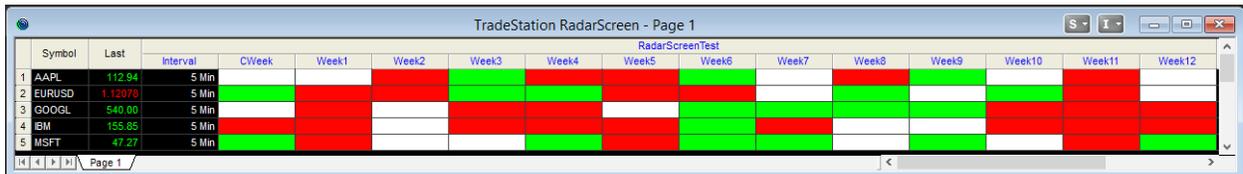
Week 8: January 25 - January 31

Market Conditions

This week has been ambiguous for investors. Although industrial indexes generally lost about 2%, some of the companies went up. As I will explain in the "Important news" section, this week has been important due to the published quarter financial results. To be precise, *AAPL* (+3.5%) set new historical record this week beating the $700B capitalization value. *GOOGL* (+0%) had a major 6% drop, but eventually played back its positions. *MSFT* (-13.5%) disappointed its investors by the financial results which caused a large drop. *EURUSD* (+1%) did not change much and Crude Oil March 2015 contract *CLH15.NYM* (+8%) went up, hopefully, temporarily. *UAH=X* and *RUB=X* dropped. World sanctions make Ruble fall, Hryvna is tied to the Ruble, therefore, it is falling too.
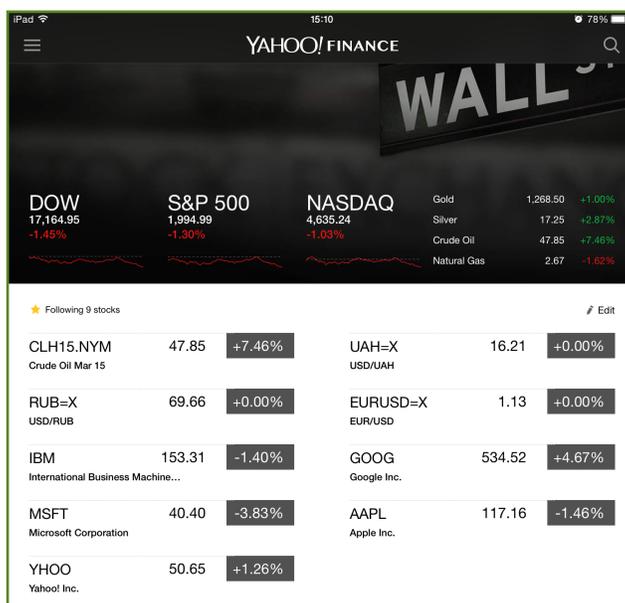
Important News

This week I would like to report two similar important news - financial results.

The first quarter result is the Apple's (*AAPL*) one. Results have positively impressed investors. *"Apple Reports Record First Quarter Results"*[8]. Apple posted record quarterly revenue of $74.6B and record quarterly net profit of $18B, or $3.06 per diluted share. The most profitable quarter ever made the investors happy which resulted in the new historical peak of $120.00 per share.

The second quarter result is the Microsoft's (*MSFT*) one. *"Earnings Release FY15 Q2"*[9]. Microsoft announced revenue of $26.5B for the quarter ended December 31, 2014.

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[8] *http://www.apple.com/pr/library/2015/01/27Apple-Reports-Record-First-Quarter-Results.html*

[9] *http://goo.gl/iPX1Vw*

Gross margin, operating income, and diluted earnings per share ("EPS") for the quarter were $16.3B, $7.8B, and $0.71 per share, respectively. Although sounds good, investors expected better results, which led to the major 13.5% drop.

Strategy Overview

Bollinger Bands Strategy

This week I was able to put my strategy on automatic trading. Here are the generated trades. I tried 10 minutes charts. Something has happened to my position sizes. I investigate it.

Trades - January 25-31

Date	Time	Trade	Type	Quantity	Price
1/27/15	2:20 PM	AAPL	Buy	100,000	$ 110.81
1/30/15	2:50 PM	AAPL	Sell	100,000	$ 119.31
1/30/15	2:50 PM	AAPL	Sell Short	100,000	$ 119.31
1/30/15	1:40 PM	YHOO	Buy	100,000	$ 44.50
1/27/15	9:50 AM	MSFT	Sell Short	100,000	$ 42.56

Precision Strategy

While developing a Radar Screen I was still running my strategy. It generated just one trade. I ran it different symbols with 10 min as a smaller timeframe and 60 mins as a larger one.

Trades - January 25-31-1

Date	Time	Trade	Type	Quantity	Price
1/30/15	2:20 PM	MSFT	Sell Short	100,000	$ 40.92

Future Development

I will continue developing a Radar Screen for my Precision strategy since it does not work well by itself with automated trading. I will also start working on a final report.

Analysis

This week I worked on the Bollinger Bands Strategy analysis. Professor Radzicki mentioned during one of the lectures the way I can analyze a strategy. The analysis involves creating a spreadsheet of trades. For each trade there are two multipliers computed out of trade's net profit and average or largest loosing trade. Then, expectancy and "expectunity" are computed. This way strategies can be compared to each other. Here is the picture of a spreadsheet's final report. Separate file with the complete spreadsheet

should be attached to this weekly entry. Analysis involved over 3 thousands trades, so it is not reasonable to put them here.

Strategy Performance Report

	All Trades	Long Trades	Short Trades
Total Net Profit	$ 100,034.40	$ 39,721.60	$ 60,312.80
Groos Profit	$ 619,931.00	$ 266,973.40	$ 352,957.60
Gross Loss	$ (519,896.60)	$ (257,251.80)	$ (292,644.80)
Profit Factor	1.19	1.17	1.21
Total Number of Trades	3066	1790	1276
Percent Profitable	39.82%	31.51%	51.49%
Average Winning Trade	$ 507.72	$ 473.36	$ 537.23
Average Loosing Trade	$ (283.17)	$ (186.27)	$ (475.07)
Largest Winning Trade	$ 5,474.00	$ 4,063.00	$ 5,474.00
Largest Loosing Trade	$ (4,328.00)	$ (1,001.50)	$ (4,328.00)
Max. consecutive wining trades	7	8	12
Max. consecutive loosing trades	12	19	11
Return of initial Capital			100.03%

Input Parameters

Key	Value	Optimization
BPrice	Close	None
MALength	16	10..30:2
StdDevNum	2	None
Stop Loss LX: Ammount	195	75..225:15
Stop Loss LX: Position Basis	TRUE	None
Strategy	Bollinger Bands Strategy + Stop Loss LX	

Symbol Info

Key	Value
Symbol	EURUSD
Interval	Minute
Interval Settings	5 minutes bar
Range	10 years back

Calculations

System Quality	First Trade	Last Trade	Days per Year	Strategy Calendar Days	Number of Trades	Expectancy R Mult 1	Expectancy R Mult 2	Expectunity R Mult 1	Expectunity R Mult 2	Opportunities	Std Dev R Multiples
8931.90	12/01/2004	11/28/14	335	3649d	3066	353.27	23.11	99436.36	6505.87	281.48	2.19

Week 9: February 1 - February 7

Market Conditions

This week has been bullish for the investors. All US industrial indexes went up - **^GSPC** (3%), **^DJI** (+4%). **AAPL** (+1%) and **GOOGL** (+0%) stayed pretty constant. **MSFT** (+4%) played back some of its lost positions after the weak financial report. **EURUSD** (+0%) tried to rise a few times but bounced back and, therefore, balanced to zero. **UAH=X** (+56%) got its highest value (the lowest value for Hryvna's value). I will explain the reason for it in the "Important news" section.
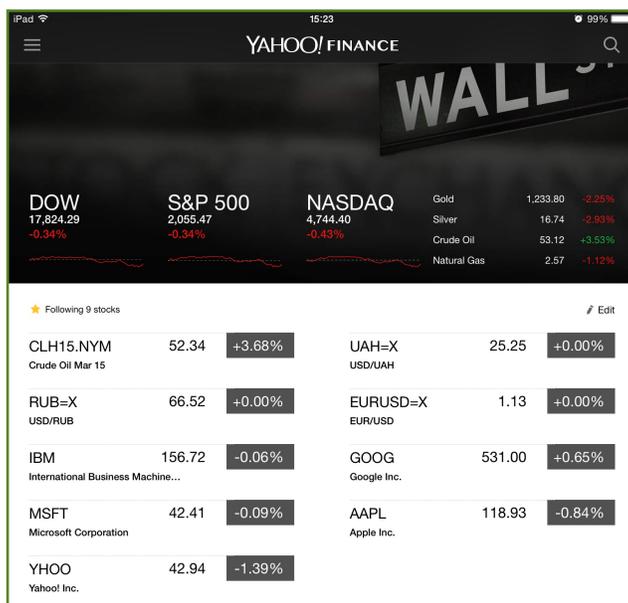
Important News

This week I would like to report two important news from US and Ukraine.

Let me start with the positive news - US **"Employment Situation Summary"**[10]. Without many numbers, the conclusion is that the actual employment situation is slightly better than the predicted one. This strengthened the dollar (**EURUSD** could not break the trend and move up for a long time) and rose national industrial indexes.

The negative news is the value of Ukrainian national currency, Hryvna (**UAH=X**). The difference in the exchange rate between official one from National Bank and the actual one from the real (black) market was significant. This week, National Bank made a decision to stop using so-called "predicative" (fixed) rate and let these two - official and real - exchange rates match. As a result, now 1 dollar costs around 25 Hryvna's. Just a year ago, before

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[10] http://www.bls.gov/news.release/empsit.nr0.htm

revolution and military aggression, 1 dollar was traded for 8 Hryvna's. Drop is more than significant.

Strategy Overview

Bollinger Bands Strategy

My strategy worked pretty well this week. I noticed that all generated trades were placed at the beginning of the week. Here is the screenshot from the back-home TradeStation.

| APL +66 | +66 | | 0 | -EURUSD +1,293 | +1,293 | 0 | +GOOGL +679 | +679 | 0 | -YHOO +126 |
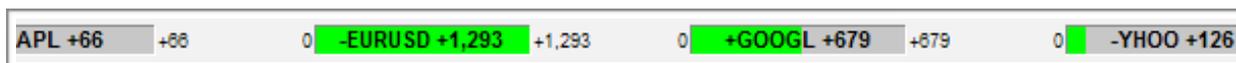
Trades - January 25-31-2

Date	Time	Trade	Type	Quantity	Price
2/2/15	10:16 AM	EURUSD	Sell	100,000	$ 1.13100
2/3/15	6:05 PM	AAPL	Buy	100	$ 118.17
2/2/15	9:40 PM	YHOO	Sell Short	100	$ 44.18
2/2/15	8:10 PM	GOOGL	Buy	100	$ 526.22

Precision Strategy

I was able to program a Radar Screen for the Precision strategy. For now, it shows the deviation of the price from the regression line. Indicator is still under construction, so I do not attach any code yet.

	Symbol	Interval	This unit	1 unit ago	2 units ago	3 units ago	4 units ago	5 units ago	6 units ago	7 units ago	8 units ago	9 units ago	10 units ago
1	AAPL	5 Min	31	23	-20	-40	13	3	-14	21	-8	47	59
2	EURUSD	5 Min	-30	-27	42	33	23	28	42	35	12	9	27
3	GOOGL	5 Min	33	7	-9	-38	10	15	-27	37	-8	38	62
4	IBM	5 Min	26	24	-33	-57	-8	-14	-33	2	-30	-16	12
5	MSFT	5 Min	46	13	-29	-46	-29	-21	-29	0	-8	-4	-4
6	YHOO	5 Min	35	8	-19	-53	-34	-26	-49	-23	-38	-19	-15
7													

TradeStation RadarScreen - Precision — Precision Radar Screen

Future Development

I will continue working on a Radar Screen for my Precision strategy. I want to add a trend indicator for other timeframes, however, TradeStation itself does not provide a proper API for it. I will investigate this issue.

Week 10: February 8 - February 14

Market Conditions

This week has been very bullish for the investors. All US industrial indexes went up - ***^GSPC*** (+2%), ***^DJI*** (+2%). ***AAPL*** (+7%) and ***GOOGL*** (+4%) set new highest values. ***MSFT*** (+4%) is still rising after it lost positions due to the weak financial report. ***EURUSD*** (+1%) rose a bit at the end of the week. ***UAH=X*** (+6%) is still weakening due to the hard economic situation. ***RUB=X*** (-4%) is strengthening due to the rise of oil prices.
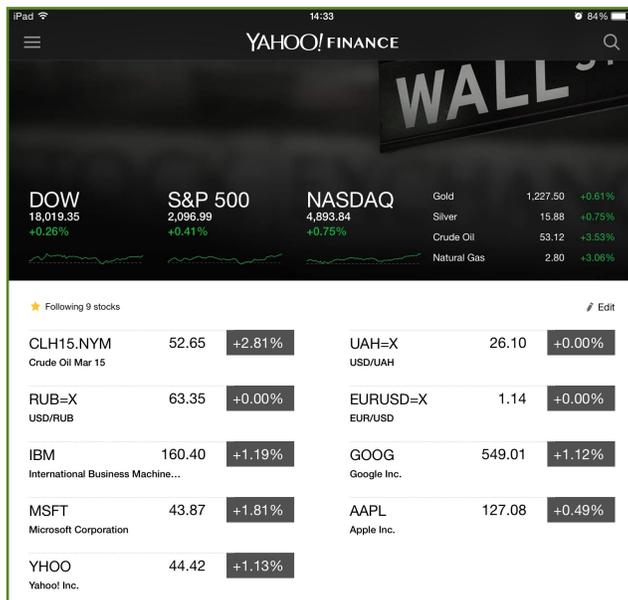
Important News

This week I would like to share some political news strongly related to economics.

Marathon peace negotiations have resulted in a new ceasefire deal for eastern Ukraine in the Belarusian capital Minsk. ***"Ukraine ceasefire: New Minsk agreement key points"[11]***. Briefly, US and EU leaders, eventually, held very strong position against Russian aggression in Ukraine. Under the pressure of the new sanctions signed the Russian president Putin an agreement with the Ukrainian leader Poroshenko and Western leaders. Agreement includes the key points on how to stop a conflict. As leaders say, if ceasefire deal works out, we may hope for the peace, if not, Ukraine announces the martial law across the country. The deadline of ceasefire is just in a few hours (00:00 GMT+2 or 5 PM ET). This news is strongly related to the world economics, especially Ukraine's, Russia's and EU's ones. Depending on how the two sides will obey the agreement, EU may impose or weaken the sanctions.

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[11] *http://www.bbc.com/news/world-europe-31436513*

Strategy Overview

Bollinger Bands Strategy

My strategy worked pretty well this week. Here is the screenshot from the back-home TradeStation.

No trades were generated this week. No, it is not because of technical issues, it is because my strategy decided to keep positions, and it seems to be the right decision.

Precision Strategy

I upgraded my Radar Screen so that now it includes the current interval trend value. I also optimized my code and fixed some color bugs.

|	Symbol	Interval	This unit	1 unit ago	2 units ago	3 units ago	4 units ago	5 units ago	6 units ago	7 units ago	8 units ago	9 units ago	10 units ago	Trend
1	AAPL	Daily	1	-9	3	-22	-64	-37	-38	-42	-61	-67	-86	Up
2	EURUSD	5 Min	22	15	24	-0	-12	-8	-7	31	47	69	55	Down
3	GOOGL	5 Min	51	1	-30	-34	-28	-9	14	10	19	-9	-6	Up
4	IBM	5 Min	-19	-12	26	55	40	12	33	51	30	55	-5	Down
5	MSFT	5 Min	20	-2	-30	-35	-35	-47	-47	-63	-58	-58	-63	Up
6	YHOO	5 Min	26	8	-10	-10	26	26	-19	-10	35	63	35	Down
7														

Future Development

I will continue working on a Radar Screen for my Precision strategy. Next step is figuring out how to put trend for the other timeframes.

Week 11: February 15 - February 21

Market Conditions

This week has been rather bullish for the investors. Major US industrial indexes went up - *^GSPC* (+1%), *^DJI* (+1%). *AAPL* (+2%) and *GOOGL* (-1%) were pretty stable. *MSFT* (+1%) is still recovering after it lost positions due to the weak financial report. It still has to gain at least 7% to catch up with the level it had before the drop. *EURUSD* (-0%) is stable, although I anticipate a change in the near future (see Important News section). *UAH=X* (+7%) is still weakening due to the hard economic situation and military activity. *RUB=X* (0%) is stable, although I expect a change here too (see Important News section).
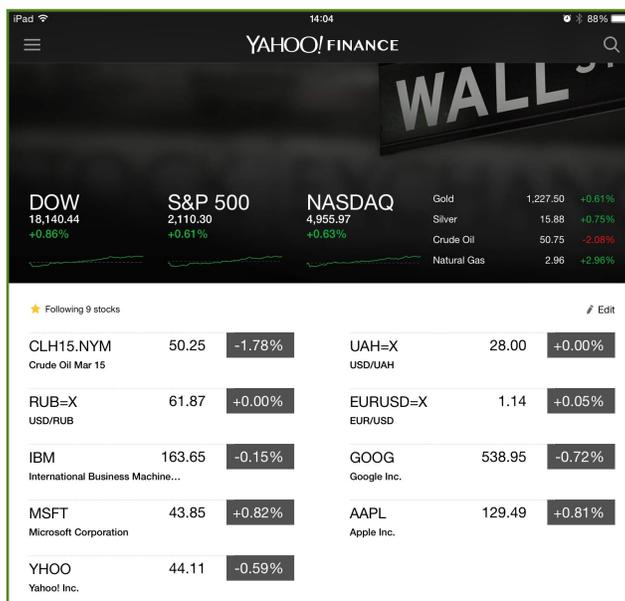
Important News

This week I would like to share three important news.

Europe agrees to extend the bail-out — after Greece drops nearly all its demands. *"Outgamed"[12]*. According to the latest news, EU agrees to extend the financial aid program for Greece for the additional 4 months. In return, EU demands a very well-defined set of reforms. This should strengthen *EURUSD* after the weakness due to the recent government change in Greece.

Moody's has cut its rating on Russia to "junk," and says Russia's economy is headed for a "deep" recession in 2015. *"Russia cut to 'junk' by Moody's"[13]*. As for now, two (S&P and Moody's) out of three (Fitch) rating agencies have cut Russia's rating to "junk" level due to

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[12] http://www.economist.com/news/europe/21644592-deal-struck-extend-bail-out-after-greece-caves-now-syriza-must-answer-its

[13] http://www.businessinsider.com/moodys-cuts-russia-to-junk-2015-2

the low Oil (**CLH15.NYM**) prices, weak national currency, Rubble (**RUB=X**), and military aggression against the neighbor country. This means that a number of funds and governments will have to sell out Russia's bonds and obligations, which, in turn, will lead to their drop in price and Rubble's fall.

Ukraine officially made a decision to call for peacekeeping mission to maintain a peace treaty with Russia. ***"UN to be guided by decision of Security Council on peacekeeping mission in eastern Ukraine"[14]***. This is a last step in resolving a conflict. Negotiations and treaties do not work. Whole city, Debalcevo, has been captured right after Russia signed a peace treaty. This decision strongly affects Eastern Europe's economics and **UAH=X** in particular.

Strategy Overview

Bollinger Bands Strategy

For some reason, I cannot access a back home computer now. All I can see is my open positions and I like them.

Precision Strategy

This week I tried to apply my RadarScreen to different equities and currencies.

Future Development

I will concentrate solely on the Final Report.

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[14] http://www.kyivpost.com/content/ukraine/un-to-be-guided-by-decision-of-security-council-on-peacekeeping-mission-in-eastern-ukraine-381452.html