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Forex Trading System Development

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Forex Trading System Development



An Interactive Qualifying Project
submitted to the Faculty of
WORCESTER POLYTECHNIC INSTITUTE
in partial fulfilment of the requirements for the
Degree of Bachelor of Science

by
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Report Submitted to:

Professor Hossein Hakim
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Abstract

The focus of this report is to demonstrate the process of building a trading system to be used in the foreign exchange market. The report will introduce an overview of the currency market and different trading techniques and concepts used in the construction of a trading system. The process of building a forex trading strategy, from initial formation to optimization, is laid out based on existing research. The results and analysis of the group's own experience building and testing a forex strategy is included to exhibit the method presented in the report.

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1 Introduction

Investing has always served as a tool used to manage personal finances. In this day and age, with the assistance of technology, people have the ability to control the interests composing their investment portfolio. The main idea behind investing money is to generate revenue, in turn easing the burden of saving for retirement and unforeseen expenses. Conventional methods of managing money typically employ the allocation of specified funds to a savings account, under the impression that untouched capital will gradually accumulate interest. Among the more lucrative, and consequently more precarious, approaches to developing an investment plan involves the placement of funds within the various markets available to the financial community; this is done in hopes that the devotion of funds to a particular emerging asset will allow for greater returns than those characteristic of an equivalent stationary deposit in either a savings account or retirement fund. Regardless of the investment technique selected by an investor, however, this individual must prepare themselves to combat the realities of constantly changing asset prices and rates of interest. The strategies associated with doing so formulate the groundwork for an investment technique referred to as trading.

Rather than subjecting a portfolio to the concurrent benefits of an appreciating investment and sufferings of a depreciating one, trading is often aimed at avoiding the oscillations characteristic of a stationary investment. Trading is, however, a skill as much as it is an art; similar to any investment opportunity, trading puts the designated capital at risk. Therefore, in order to reduce the level of risk associated with such investments, a trader must develop a personal strategy allowing for the educated and intelligible delegation of capital. When the necessary precautions are taken, including the adherence to a prearranged plan, this method of managing personal finances can prove incredibly worthwhile. If an individual is willing to adopt

the increased risk associated with this technique, they can substantially increase the profitability of their financial portfolio; the benefits of trading, when executed properly, have the potential to outweigh those of any other investing strategy.

The foreign exchange market is a generally new sector making trading investments that has been gaining popularity within the past decade. The combination of the global scope of the market and the constantly growing trading volume make forex a low risk option when trading. However, like most financial markets there is a learning curve for new traders entering the market. Current resources available cover the concepts behind the market but few go in-depth on how to trade currencies.

1.1 Project Description

This project aims to fill the gap in existing research on building a trading system to effectively trade currencies in the forex market. Utilizing existing research together with conducting our own research as a group, the project attempts to define the process of building a foreign exchange trading system. The research is conducted in the form of individually developing personal trading strategies and recording the experiences to fully understand the aspects of building a system. The final results outline the process an individual should follow to construct a unique trading system based on the experiences gather from our own experiences.

2 Background

2.1 Trading Markets

2.1.1 Stocks

The stock market is the most popular of the available financial markets, consistently outperforming all other forms of investment. The stock market involves the exchanging of shares, or partial ownership, of a publicly-traded corporation. The value of a share is proportional to the total value of the company as a whole; so when the value of the company goes up the value of its stock follows, and vice versa. The investing game involves attempting to identify whether the value of a company is moving up or down, and buying or selling shares to produce a profit. [1]

The transaction of buying and selling shares is referred to as a trade, and is processed through what is known as a stock exchange. In the U.S. there are three main exchanges for trading stocks: the New York Stock Exchange (NYSE), the American Stock Exchange (AMEX), and the NASDAQ. These exchanges operate as auction-style markets that execute trading orders by matching bids and offers between buyers and sellers. The trading activity in these exchanges is regulated by the Securities and Exchange Commission (SEC) to ensure that security markets operate fairly and protect investors. Each exchange allows individual companies to list their stock in the exchange depending on if the company meets the listing requirements for the exchange. International exchanges all over the world are linked together with the major exchanges including: Frankfurt, Hong Kong, Johannesburg, London, Singapore, Sydney, and Tokyo. This means that stocks are constantly traded, around the clock, which explains why stocks sometimes close and open at different prices. [1]

There are two types of participants in the stock market, the traders and the investors; both strive to make money off the market but in two very different ways. The investor is someone who buys and holds stock shares over long periods of time to profit from a company's steady growth. A trader is a person who consistently buys and sells stocks taking advantage of price swings to make a profit. Traders are the people that constantly monitor the market looking for indicators that predict stock movements. Each player creates opportunities with the investor making a low-risk profit over the long term compared to the trader producing high-risk profit over shorter periods of time. [1]

Within the stock market, there two different trade transactions that can occur. The simplest action is a buy order where shares are purchased assuming the stock will rise in price, otherwise known as being bullish, and selling the shares at a higher price. The other involves an order known as selling short, or shorting, where shares temporarily borrowed at a given price are sold; following a drop in the stock price the shares are purchase at a lower price and returned. The anticipation for a stock's price to fall is called a bearish market. These transactions are made through a broker who is responsible for submitting orders to the exchange floor to be filled. Because these transactions can only be made by a licensed broker, a commission charge is tacked on to each trade. However, since 2007 brokers are slowly being replaced by computers due to the speed at which trades can be placed; and with many people trading using computers the process is streamlined without the use of specialists. [1]

The stock market, as a whole, is a popular financial market for investors in the U.S. and internationally. Compared to other investing tools, stock trading is considered more high risk because of the sporadic movement of the market. At the same time stock trading has a fairly large cost of entry requiring a substantial amount of capital in order to be worthwhile.

2.1.2 Commodities

Much of the economic activity of the world is reliant upon the accumulation, and subsequent production, of raw materials. The exploitation and refinement of such naturally-occurring substances is responsible for the employment of a substantial percentage of the private sector. Among the considerably sizable list of goods composing this market are soft commodities, such as agricultural products including corn and wheat, and hard commodities, such as mineral resources including gold and oil. The wide variety of raw materials responsible for fueling this portion of the workforce can be generalized to comprise the commodities market. The exchange of these goods, occasionally termed *the spot market*, constructs a third facet of the global trading empire. Derived from the necessity for traders to purchase such goods “on the spot”, this market allows for the cumulative exchange of all primary products.

Similar to the dependence of supplementary markets, the commodities market is driven by fluctuations of the supply and demand of its assets. This phenomenon maintains the ability to abruptly, often substantially, manipulate the price of the goods within its realm of exchange. The concept, when supplies are plentiful, the price of the raw material usually is low; while the supply of an asset becomes scarcer, however, the price will begin its ascent. [2] The potential for volatility within the commodities market exudes an appearance of the inability to control the price of a specific material. A more thorough analysis, though, proves that this could not be further from the truth.

Despite the seemingly uncontrollable forces of inclement weather, drought, and natural disaster associated with the commodities market, the features of this exchange have been catered to ensure its independence of factors that may hamper the collection of these goods. These overwhelming forces, which generally purport a sense of unpredictability, necessitating a

consistent valuation of the goods to be bought and sold. The solution to negate the possible volatility in the price movement within the commodities market is the introduction of futures contracts. These agreements between the buyer and seller of an asset establish an appropriate value of the commodity during a specified interval of time. Within the agreement are the date that the raw material will be delivered, the quantity of the raw material that is to be delivered, and, of course, the representative price that will be honored throughout the affected period. The types of raw materials traded including: agricultural products (such as corn, grain, and sugar), energy materials (commonly oil and natural gas), and various metals (both precious like gold and silver, and raw such as aluminum and copper). The final requirement of the contract is a safety deposit of ten percent, ensuring that neither participant will back out of the deal.

There are two types of traders that trade within the commodities market, hedgers and speculators. The hedging population is primarily comprised of businesses looking to purchase raw materials to support their manufacturing processes. The populace of speculators consists of those purchasing contracts with the intent of selling them at a later time to generate a profit. Hedgers tend to seek modestly-priced contracts that will protect the business from the unforeseen fluctuations characteristic of the commodities market. A speculator, however, attempts to do the exact opposite; they prey upon the desperation of hedgers during instances of exaggerated fluctuations within the supply and demand of a commodity.

2.1.3 Forex

1. Forex

The Foreign Exchange market, also known as the forex market, consists of an global market that controls the exchange of the world's currencies. The forex market is a fairly new

investment tool due to the introduction of computers and the internet allowing easier access to this large global market. Exchanges in forex involve conversions of funds from one currency to another, similarly to what people do when traveling to a foreign country. When exchanging currencies in a foreign country the transaction is determined by an exchange rate. This exchange rate is the rate at which two currencies are converted determined by the difference between the currencies' values. For example, when converting the U.S. dollar to the Euro, the exchange rate is 0.72 meaning for every dollar converted yields 0.72 Euros. Currency exchange is done for a number of reasons most often relating to buying and selling of goods between countries. [3]

Trading currencies in the forex market takes advantage of changing exchange rates to produce a profit. Similar to stocks and commodities, the price or exchange rate of a currency constantly changes. The major difference currency exchanges introduce is that exchange rate compares the relative value of currencies rather than giving assigning value to shares. The basis of forex trading involves buying or selling a currency in relation to another and then buying or selling is back when the exchange rate moves in favor of the trade. The movement of exchange rates is measured in pips, or percentage in point, usually measured as one ten-thousandth, or 0.0001. The value of a currency is determined by a number of factors but can be more or less boiled down to supply and demand. The level of demand is directly linked to the economy of a country meaning if the economy is doing well there is often a demand for that country's currency. [4]

An important aspect that is unique to the foreign exchange market is the fact that it is not centralized. Being decentralized means that no one corner of the world controls the market making it a truly global market. With a decentralized structure, the forex market is also free of significant amounts of regulation unlike other financial markets such as the stock market. The

market operates similarly to auction-style markets but instead of handing off order to a middleman transactions are made over-the-counter, or directly between buyers and sellers. These transactions are managed by the world's largest banks that control currency exchange rates and act as the backbone of the market. [4]

The forex market is the largest financial market available with daily trading volumes ten times that of the world's stock exchanges combined. Of the three financial markets reviewed, forex has the least risk due to the how currency values fluctuate between ranges unlike stocks where prices and change large percentages in short periods of time. Many first time investors choose to trade forex based on the abundance of resources and the low cost of entry, allowing traders to open accounts ranging from thousands to hundreds. [5]

2.2 Overview of Forex

2.2.1 History of Forex

Before building a trading system to use in the foreign exchange market, it is important to first understand how the market works. The history of the foreign exchange market dates back to the 1944 creation of the Bretton Woods Accord, which established the foundation for the modern structure of the foreign exchange market. The Bretton Woods Accord established the US dollar as the base currency, placing the value of each remaining currency in relation to that of the US dollar. The value of the dollar was to be valued against gold. The world's central banks were responsible for buying and selling US dollars to keep the value of their currencies within 1% of the fixed rate. In 1973, the Bretton Woods system was replaced with a new system that allowed currencies to fluctuate freely against each other, therefore removing the fixed currency values

characteristic of the previous method. This set the beginning of the “fiat currency”, which is what today’s modern currency system follows. [6, 7]

The fiat currency system operates by allowing value of currency to change in relation to other currencies, or in other words using “floating” currencies. The term “fiat” comes from the latin term meaning it “it shall be”. The value of a fiat currency is determined by supply and demand rather than being based on commodities. This means that relative value of a currency is a reflection of the condition of the country’s economy compared to other world economies. The result of establishing world currencies as floating currencies allows the value of currencies to fluctuate according to natural economic cycles. This idea of trading currencies is integrated by anticipating the natural movement of currency values in order to make a profit. However, intelligently predicting the movement of currency requires studying economic changes as well as historical patterns. [4, 8]

2.2.2 Currency Pairs

In order to understand how to trade effectively, it is important to know what goes on during a trade transaction. Trades are placed by either buying or selling a currency pair that represents the exchange rate between two currencies. The process of the buying and selling takes place as a transfer of money itself, in terms of the base currency. Currency pairs are listed leading with the base currency and ending with the quote currency, to which the exchange rate is based. For example, a common currency pair that is traded is the EUR/USD where the EUR, the symbol for the Euro, is the base currency that is either bought or sold. The USD, the symbol for the U.S. dollar, is called the quote currency to which the base currency is compared. When a position is entered, for instance buying the EUR/USD pair, the trader is essentially buying an

amount of Euros betting on the fact that the value of the Euro will increase in comparison to the U.S. dollar. The converse is also true, in that upon deciding to sell the currency pair, the trader is betting that the U.S. dollar will gain value in comparison to the Euro. In the Forex world, similarly to big stocks, there are major currency pairs that are more commonly traded. These are known as ‘Majors’ because they are the most actively exchanged currency pairs; the high ‘liquidity’, or availability of bids and offers, of the pair gives traders the ability to easily enter and exit the market. [4] Listed in the table below are the seven major currency pairs traded in the forex market:

Table 1 - Major Currency Pairs

EUR/USD	Euro vs. U.S. Dollar
GBP/USD	British Pound vs. U.S. Dollar
USD/JPY	U.S. Dollar vs. Japanese Yen
USD/CHF	U.S. Dollar vs. Swiss Franc
USD/CAD	U.S. Dollar vs. Canadian Dollar
AUD/USD	Australian Dollar vs. U.S. Dollar
NZD/USD	New Zealand Dollar vs. U.S. Dollar

The remaining currency pairs including the major currencies are referred to as ‘cross’ currency pairs which do not include the U.S. Dollar; an example of a cross currency pair would be EUR/GBP. Trades places that do not include the trader’s home currency is performed using two separate transactions. This means that the trade is made by buying the EUR/USD and

simultaneously selling the GBP/USD, allowing traders to take advantage of minor currency pairs by utilizing the home currency. The next step in understanding the forex market is to understand the trading system itself. [3, 4, 6]

2.2.3 Market Structure

The modern forex market operates similar to other financial markets with some important exceptions. One significant difference to note is the lack of a centralized exchange through which currencies are traded. Forex transactions are made over-the-counter (OTC) meaning trades are executed directly between two parties without having to go through a centralized exchange. Instead, trades are placed through either a broker, that matches buyers and sellers to complete a transaction, or a dealer, that takes the opposite position to fill the trade. These transactions are paired using a 'bid' and 'ask' system where a broker will match the best bid price, for which the currency is sold, and the best ask price, the price the currency is bought. The difference between these two prices is known as the spread which can be used as an indicator of a currencies liquidity. For example, a currency that is very liquid is being frequently traded resulting in a low spread. Conversely, a less liquid currency with less trading activity commonly had a higher spread. Since there is no commissions when trading forex brokers are compensated using the bid/ask spread. The open nature of forex transactions separates itself from other financial markets but does not prompt a disorganized market of traders. [4, 6]

The lack of a centralized exchange in the forex market has created a tiered structure that separates the different participants in the forex market. The top of the hierarchy is known as the 'interbank market' or 'interdealer market' where trades occur directly between the world's largest banks. The interbank market is only responsible for 20% of the market's trading volume; however, these banks determine the exchange rates as well as currency bid/ask spreads. The next

tier down in the hierarchy contains the smaller organizations outside of banks including hedge funds, corporations, and central banks. These organizations make their transactions through commercial banks since the trade volume is much lower than at the interbank level. And last but not least are the retail traders which are responsible for a majority of the trading volume. Retail traders, or speculators, play the market as individuals to try and make a profit trading through retail brokers. The figure below illustrates the different tiers and groups within the forex market hierarchy. [4, 6]

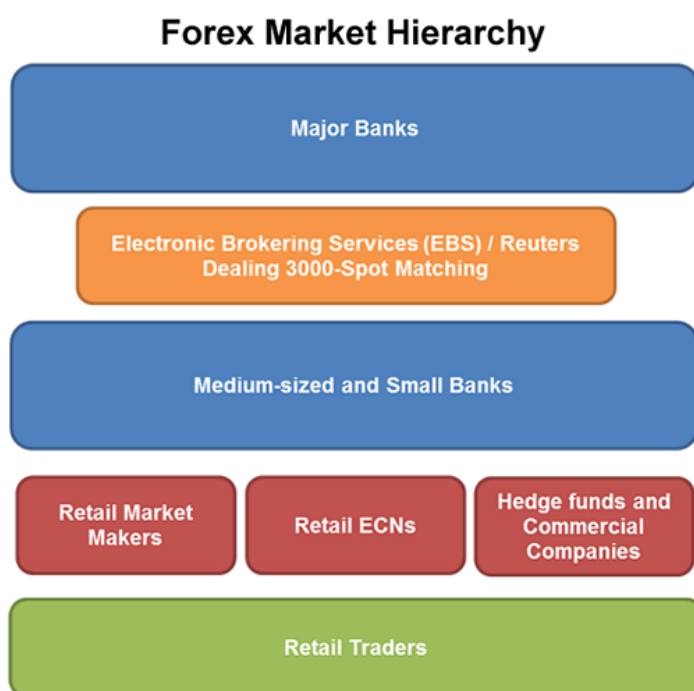


Figure 1 - Diagram of Forex Market Structure^a

2.2.4 Trading Sessions

The forex market, being both decentralized and global market, is open 24-hours a day, unlike other financial markets. The market is open from Sunday to Friday, aligned with the opening of the first local market and the closing of the last. The foreign exchange market is open throughout the entirety of the day because, unlike stocks or commodities, which only show

^a <http://www.babypips.com/school/preschool/who-trades-forex/forex-market-structure>

demand during business hours, there is always demand for currency. The ability of the market to accept trades during the length of the day is attributed to the different time zones and the business hours of local markets. The market hours of a particular time zone is known as a trading session. The 24-hour day can be divided into four major trading sessions: Sydney, Tokyo, London, and New York. Each trading session produces different volumes during the trading period, depending on which local markets are open. For example, the London session marks business hours of the European market; this means that currencies such as the British Pound and the Euro display increased levels of trading activity during this time. Depending on the time zone, sessions can overlap, in which two local markets will be open at the same time. These session overlaps represent the busiest times during the day, producing higher trading volume. This means that the time a trader is in the market can very well dictate which currencies are being traded. [4, 5, 9]

2.2.5 Leverage

A fundamental difference that separates forex from other financial markets is the larger amount of leverage available when trading currencies. The use of leverage allows a trader to borrow capital to perform a trade, also known as buying on margin. Most forex brokers in the U.S. offer a maximum 50:1 leverage, meaning that the trader is execute trades with up to 50 times their account balance. For example, with an account valued at \$1000 and the leverage set at 50:1, the trader will have \$50,000 to trade with from the specified margin. This allows traders to enter larger positions with small amounts of capital. Although the use of leverage is a useful tool, allowing for substantial increases in profit, this aspect proves to be a double edged sword; this is because the use of leverage amplifies both profits and losses. Leverage acts as an

incentive for traders because of the low entry cost, allowing small-time traders to make big trades. With a solid background of the forex market, the next step is to start building a trading system. [4, 8]

2.3 Analysis Techniques

2.3.1 Fundamental Analysis

The price movement of any currency is a direct result of the constant battle between its representative supply and demand. This inversely related pair constantly drives the value of a currency, either up or down, throughout the trading day. Therefore, in order to adequately analyze price movement, one must first consider what elements affect the supply and the demand of a currency. The result of this search leads to fundamentals. Fundamental factors drive the Forex market. [9] They affect both the supply and the demand of a currency.

Fundamental analysis, with regard to its application within the equities market, educates a trader about the true value of a company or commodity. This would involve examining the financial statements of the company and researching the current and future plans for success. With a better understanding of what the value of the asset should be, this trader can then cater their investments to reflect the results of such research; if the stock appears lower than this true value, the trader knows to invest in the company. A fundamental approach to the analysis of the currency market utilizes the same approach. Economic data and other pertinent fiscal records are used to assist an investor in determining the true value of a country, allowing them to determine whether or not to invest in the asset represented by the nation, its currency.

The evaluation of the economic vigor of a nation, as well as that of its respective currency, constructs the foundation of a fundamental approach to the analysis of the foreign

exchange market. The value of a currency is, in essence, a direct reflection of the economic success of the country (or countries), by which it is represented, compared to those of the remainder of the World. Similar to managers within companies of publicly traded stocks, the governing bodies of countries throughout the World are responsible for regularly reporting on the financial health of the nation. These accounts of economic stability generally adhere to a consistent schematic in terms of the time periods captured by each evaluation technique and, consequently, when the information is distributed. This considerable detail is what separates this form of fundamental analysis from a more sentimental evaluation, which will be introduced within the ensuing section.

The premise behind the plausibility of such a fundamental approach to analyzing the behavior of the market is a fairly simple correlation; the relationship between the level of optimism generated by economic data and the future value of a currency are directly proportional. The extensive variety of fiscal records available to traders includes reports of both domestic and foreign matters, each purporting a unique level of market significance.

2.3.1.1 Fiscal Reports and Interest Rates

As alluded to in the previous section, the publication of economic data on behalf of a country is a regular occurrence, one with which investors are very familiar. Successful participation in the equities market requires a general knowledge of the overall economic wellbeing of the nation. If the financial health of the United States wavers, investors must be prepared to identify such an event and prepare to alter their holdings accordingly. A scrupulous trader may also monitor the activities of companies similar to those in which they plan to purchase, in order to further develop their opinions of the opportunity for its success. This is also true of the foreign exchange market. Because the market encompasses the currencies of

nations around the globe, a forex investor must remain knowledgeable of financial statuses of countries all over the world. This remains true independent of the decision, by the trader, in which currencies he or she plans to invest in.

The principal goal of a fundamental approach to market analysis is to gain insight regarding the anticipated price movement during specific social, political, and economic events. The value of a currency is, in essence, a direct reflection of the optimism generated by the publication of economic data and the manner in which this information is perceived. The data responsible for this understanding can be acquired from a variety of different sources. Such data can appear as an annual reporting of economic growth, an adjustment to regulation of interest rates, or even an unpredictable speculative report.

Due to strong correlations between the value of a currency and the fiscal success of its representative nation(s), evaluations regarding economic health and prosperity maintain substantial prominence among fundamental indicators. The Growth Domestic Product (GDP) of a nation is defined as the value of output produced by people, businesses, and government in the country over a particular period. [10][Although typically released in an annual time period, quarterly instances of GDP publication do occur.] This measure of economic strength attempts to assess the cumulative market value of the commodities and services generated by the economy of a nation during the specified frame of reference. There exists a direct correlation between increases in economic production and the appreciation of the individual value of a corresponding currency. The benefit of analyzing the factors mentioned above, as well as those similar but neglected, relates to the acquisition of insight regarding the level of growth within the economy of the nation in question.

Although they provide information regarding the global value of a nation, economic data characteristic of the exports of a nation overlook the value of goods sold within the borders of the country. This information provides incredible pertinence with regard to the assessment of a currency, introducing the factor of inflation. Inflation is a fall in the purchasing power of a currency per currency unit. [11] Typically evaluated on an annual incidence, this factor commonly demonstrates the projected value of a currency with regard to commodities that it may be used to purchase. The Consumer Price Index (CPI) is the standard measure of inflation in the United States. [12] Although most countries accept an inflation value between two and three percent, substantially greater values indicate the impending devaluation of the specified currency. [13] During instances of particularly high rates of inflation, the governing body of a nation may seek resolution through proactive influence.

An interest rate, simply put, is the cost or price of borrowing, or the gain from lending money. [11] The current economy is reliant upon the ability to borrow capital; the public may borrow money from banks to fund an expensive purchase, while banks borrow from the public, by way of savings accounts and the sale of bonds, so that they may loan it to other individuals. The cost of doing so results in a profit on behalf of the lender, referred to as interest; the benefit of this deed lies in the promise of a slight return on the initial offering.

During instances of notably exaggerated inflation, the appeal of lending money is overshadowed by the desires of spending it as a consumer. This phenomenon has the ability to fuel its own growth; as an increasing amount of capital is spent on goods and the supply dwindles, the price of the remaining product increases to reflect the increases in demand. This contributes to the previously existent hikes in inflation. In order to stimulate the desire to loan

money, governing bodies must promote increased rates of interest to entice the public sector to invest, rather than spend, their money.

2.3.1.2 News and Social/Political Events

Although a theoretical evaluation of the global currency market indicates a dependence upon the cumulative impact of economic figures, outside factors maintain fairly significant levels of influence. The elements associated with this type of evaluation include those of a less anticipated nature. These matters, responsible for much of the inexplicably sporadic activity experienced within the market, demonstrate the influence that the political and social agendas of a nation maintain upon the economic strength of its currency. They also highlight the influence that the actions of a governing body within a nation can maintain upon the value of the currency.

The continued military involvements of the United States, initiated during the early portion of the century, provide an exceptional illustration of the fiscal importance of such detached matters. The terrorist attacks on the country in 2001 provoked an outwardly aggressive attempt to combat foreign threats of terrorism, on behalf of the United States government. The levels of offshore military activity allowing for such a commitment would prove to have an adverse effect upon confidence of the United States Dollar. In an unspoken act of worldwide concurrence, traders began to withdraw their assets from the American economy, crippling the value of the Dollar. The resultant price movement of this instance impeccably embodies the deceptively separate relationship between the political agenda of a nation with that of its currency.

An unforeseen event, such as the act of terrorism described above, can have substantial influence upon the strength of a currency. This effect, whether constructive or adverse, may never appear within the scope of a fundamental approach to forex analysis. Regardless of the

suspicious developed by any individual trader during an occurrence of this nature, the final financial outcome is reliant upon those that represent the majority of the investing community. Eventually the forex market comes to a consensus and determines what the correct response should have been. [9] An understanding of this type of reaction, collectively resultant of the opinions held by those invested within the market, will assist with comprehension of more emotional accounts of market analysis.

2.3.2 Market Sentiment

The analysis of the foreign exchange market is not as simple as the previous section would lead some to believe. Adherence to a strictly fundamental approach would leave any system of analysis substantially incomplete. Further investigation unveils the truly naïve character of beliefs that the solitary responsibility for price movement, within any financial market, is a list of fundamental factors. Unfortunately for traders, there exists a vast array of other sources, mainly the opinions of other individuals, which contribute to the continuous battle between the supply and demand of an asset. This is certainly true of the foreign exchange market.

In order to develop a proper opinion of the trend within a market, a trader must first attempt to understand the opinions of others. The formulation of a more inclusive judgment of what price movements may occur in the future is reliant upon the beliefs of others invested within the market. This massive collection of beliefs held by other market participants is referred to as market sentiment. Market sentiment assists traders to determine what the Forex market is doing and why. [9]

2.3.2.1 Working with Others

Suppose, for instance, the owner of a local ice cream parlor develops an idea for a new flavor, peanut-butter-and-jelly ice cream. He has prepared the ice cream in his home several times, and he and his wife enjoy eating it very much. Because of their love of the new flavor, he decides that he would like to begin selling the peanut-butter-and-jelly ice cream in his shop. After a few months, the owner becomes disappointed in the trifling number of customers that have purchased the flavor. On a rather quiet afternoon, he decides to offer one of his patrons a sample of the ice cream in hopes of generating interest in his new flavor. The owner is astounded by the poor review, given by this customer, of the flavor he had been so proud to share with his patrons.

The moral of this brief narrative proves incredibly applicable to the manner in which a wise trader will approach ideas of a new trend within the market. Regardless of the level of confidence an investor maintains in his/her beliefs of what the market is going to do, (s)he must first consult the opinions of others. Human beings are at the foundation of every financial market. [9] Therefore, as a trader, beliefs hold no value until they are compared with those of the remainder of the investing population. Although it may present itself as a seemingly backwards approach, doing so ensures proper placement within the market trend. Every investor in the market is, in essence, attempting to identify the environment of the market in which they are placing capital. Identifying this environment, or current trend of price movement, will allow them to cater their investments to compliment this trend, producing the maximum amount of profit.

The trend of a market is simply the general direction of change in the price of an asset. Although there are only two actual trends, most traders refer to three broad states – trending up,

trending down, or ranging – into which current price movement can be categorized. A market is considered to be trending upwards if the lows of each consecutive bar are higher than those of the previous. Conversely, a market is trending downwards if the highs of each consecutive bar are lower than those of the previous. Serving to encompass all situations between the two, a ranging market is one that may not successively be identified as either an upward or downward pattern.

Sentiment, more generally, refers to the feelings and emotions of market participants. [14] In a more appropriate description, an uptrend is characteristic of an optimistic view of the market, where a downtrend is characteristic of that related to a more pessimistic outlook. A prosperous trading experience is reliant upon the acceptance of the current trend and the establishment of a trading strategy in accordance with such identification. It is important to accept that an individual trade does not possess the influence to manipulate the current trend of a market. Recall the experience of the ice cream parlor owner; regardless of his enjoyment of the peanut-butter-and-jelly ice cream, he could do nothing to influence the preferences of the majority of his customers. Although the efforts of an individual to manipulate a market trend may prove fruitless, there does exist a group among the trading population with the ability to do just that.

2.3.2.2 Role of Central Banks

In a number of economic settings, central banks can considerably affect the price level, and potentially, real economic activity. [15] Central banks are generally responsible for every aspect associated with maintaining an appropriate level of their respective currency. Monetary policy is a common method used by central banks to intervene in forex markets. This is done by

buying or selling large amounts of their home currency causing it to appreciate or depreciate. These methods are executed as short-term immediate fixes to the sometimes resulting in drastic swings in the market. Investors must be mindful of central bank policy to avoid taking positions that are not consistent with the central bank's goals. [6] Since central banks carry so much influence in the value of currencies, it is common for actions from the banks to affect market sentiment.

2.3.3 Technical Analysis

In order to assist the two previously described methods of analysis, traders look to employ a third technique. This strategy, referred to as technical analysis, allows investors to graphically examine the effects of fundamental factors in an attempt to identify the current sentiment of the market. This form of market analysis, reliant upon the use of historical data to predict future trends within a market, serves as the foundation for all other methods of price movement examination. Fundamentally, technical analysis employs the use of explanatory statistics representative of previously recorded price changes. These values allow for the generation of functions that serve to identify recognizable market conditions.

The development of trading strategies utilizing this manner of thought is substantially reasonable. It capitalizes on a lesson taught to most at a very young age; in order to make properly educated decisions moving forward, one must learn from past experiences and previously committed mistakes. A trader, for instance, may construct trading decisions by studying formerly observed tendencies characteristic of a similar market condition. Rather than performing this investigation manually, one can employ a technique from a vast array of developed strategies. These identifiable functions, cumulatively referred to as technical analyses,

can typically be categorized into three general subdivisions – support and resistance, moving averages, and indicators and oscillators.

2.3.3.1 Technical Indicators

Technical indicators are the basic tools of technical analysis. [9] Indicators are created and used, universally, throughout every financial market. Despite the continuously growing number of these tools, most investors maintain an operational repertoire of roughly twenty (in an effort to avoid the addition of unnecessary complexity to their trading strategy). In reality, although traders have seen the development of hundreds of new indicators, most are an indirect variation of a preexistent tool. The majority of these tools can be classified into one of two categories – trending and non-trending, or oscillating – which serves as an indication of the market state in which it should be employed.

A technical indicator provides a view of the forex market with regard to a specific aspect, against which price movement within the market can be compared. Different indicators, therefore, are responsible for highlighting different characteristics of the market. Due to the comprehensive inadequacy of these tools, no such single measure can be defined unambiguously to justify the price movement observed between a pair of currencies. [16] Cumulatively, however, technical indicators provide indication of the direction and relative strength of the price movements to which they are applied. A trader must, hence, rely upon a collection of preferred indicators, only employing their use during the most appropriate and opportune settings.

2.3.3.2 Trending Indicators

As its name suggests, a trending indicator attempts to identify the occurring trend within the price movement seen in a market. It is because of this reliance that many of these graphical aides employ the assistance of some form of moving average.

2.3.3.3 Moving Averages

As mentioned previously, there exist two general steps of technical analysis; the first requires identification of the current trend while the second places reliance upon determination of when to assume a position within the market. The goal of implementing a representative average is to assist in the completion of the first of these goals. A moving average, the most basic quantitative indicator, cumulatively displays a more efficient trend characteristic of the price movement of an asset. The appeal of a moving average is its ability to reduce the typically choppy price movements of the market into a smoother, more legible reflection of this data. It is for this reason that these averages are often regarded as trend lines.

The underlying theme of a successful trading strategy relates to the cohesive interaction of one trader with the remainder of the trading community. The benefits can clearly be seen throughout the use of a moving average. An investor must be mindful of the developing trend and employ a trading strategy that most appropriately complements this. The most efficient manner of exploiting such a trend is to invest in the direction in which the trend is headed.

A secondary complexity of the moving average is the multitude of varieties. The more generic of the two, the Simple Moving Average (SMA), equalizes each facet of price movement within the specified period and determines an average. The Exponential Moving Average (EMA), on the other hand, does so in a manner that distributes decreasing weights to increasingly outdated pricing data.

2.3.3.4 Support and Resistance

Despite the deceptively simple nature of a moving average, a closer review of the tool may illustrate the complexity of its interaction with price movement. While simple in theory, moving averages promote the availability of substantially complex application in practice.[5] As

an average demonstrates the trend set forth by price movement, a distinguishable envelope may become recognizable. Certain levels that appear to constrain the price of the asset become identifiable.

Support is a price level that a currency pair has trouble breaking through to the downside. You will often hear support referred to as the floor of the currency pair price movement. Resistance is a price level that a currency pair has trouble breaking through to the upside. You will often hear resistance referred to as the ceiling of the currency pair price movement. [9]

The use of moving averages during a trending market can prove incredibly useful. Trading in accordance with an ensuing trend provides the most beneficial setting for successful trades. It is when traders begin to bet against the flow of the market that the percentage of winning trades starts to dwindle. The price movement within the market, however, may not always illustrate a consistent trend, necessitating the development of an additional strategy.

2.3.3.5 Oscillating Indicators

Contrasting the nature of its counterpart, an oscillatory indicator does not display any resemblance of the occurring trend in its movement. Rather than provide insight regarding the direction of this trend, oscillatory indicators provide indication of the strength and momentum associated with such price movement. This form of graphical tool assists investors by, essentially, fluctuating between two specified values, in an attempt to identify instances of excessive and mediocre purchase. This, in turn, assists users in deciphering the relative peaks and valleys of pricing data, which have tendencies of becoming concealed within the volatility characteristic of the forex market.

2.3.3.6 Simple Moving Average (SMA)

Perhaps the most basic asset of a technical approach to market analysis, the Simple Moving Average (SMA) serves as a foundation for all other price movement indicators. This indicator can be seen to complement, or account for the premise of, much of the remaining population of technical tools. The SMA is formed by computing the average price of an asset over a specified period, or number of bars. The price data used to do so can represent either the open or closing price of this asset. The name of the average is attributed to the simplicity with which the average is computed. Each instance within the moving period purports an equal significance, regardless of its relativity in terms of time. This detail promotes a diminished sense of sensitivity with regard to incoming price data.

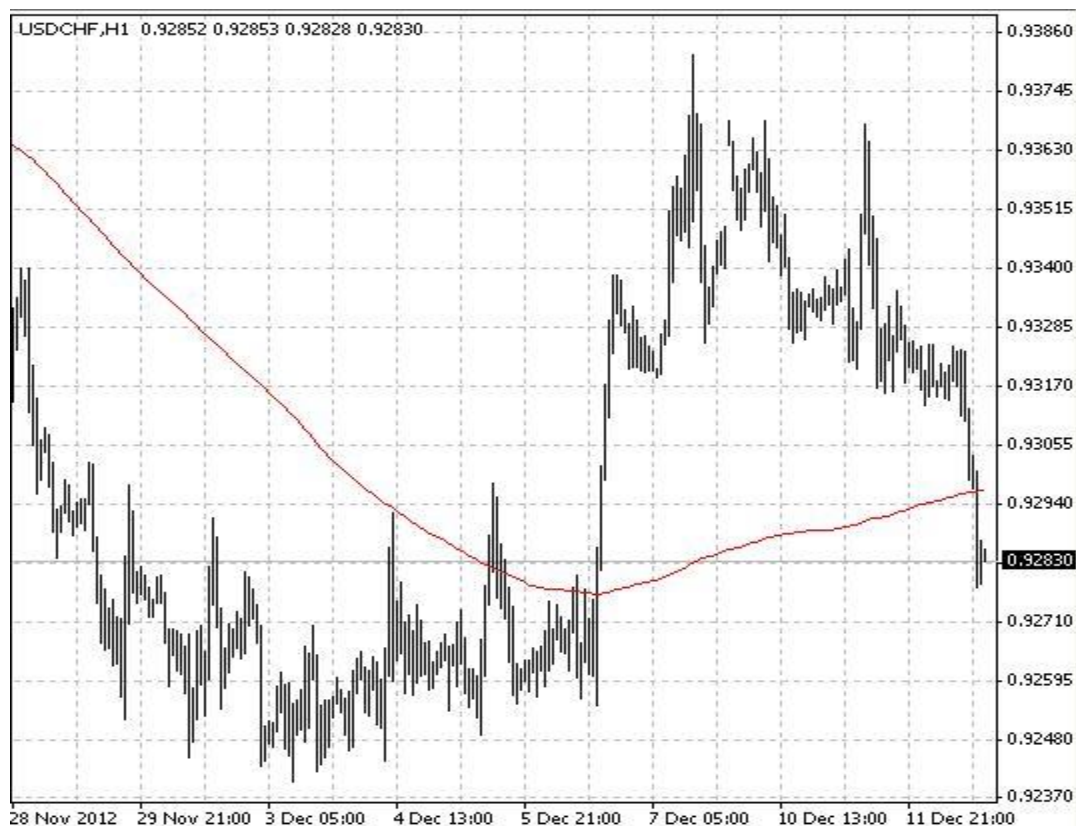


Figure 2 – Example of Simple Moving Average Indicator^b

^b <http://forexzig.com/moving-average/>

Calculation:

$$SMA_N = \frac{\sum_0^N \text{Closing Price}}{N}$$

When N , is the number of bars back from the most recent bar.

2.3.3.7 Exponential Moving Average (EMA)

The Exponential Moving Average (EMA), similar to any other representative average, allows for the complexities associated with many of the other price movement indicators. The EMA is formed in a manner similar to that of the SMA, but places increased significance upon the most recent instances within the current period. For this reason, the average is reliant upon the calculation of a weighting multiplier, which generates the significance of each opening or closing price. Each subsequent price is assigned greater significance than those previous. This attempt to account for the relevance of the price of an asset promotes an increased sense of sensitivity with regard to incoming price data.

Calculation:

$$EMA = (\text{Close} - EMA_{prevbar}) \times multiplier + EMA_{prevbar}$$

$$multiplier = \frac{2}{\# \text{ of bars} + 1}$$

When $EMA_{prevbar}$ represents the Exponential Moving Average of the previous bar

2.3.3.8 Moving Average Crossover Divergence (MACD)

The Moving Average Convergence Divergence (MACD) is a popular indicator among forex traders due to its simplicity when applied as a momentum indicator. The MACD can be categorized as a momentum oscillator, and is therefore most suitable in trending markets. The movement of the MACD indicator combines values from a short, fast moving average, and a

longer, slow moving average, to display changes in momentum. Due to this reliance on moving averages the indicator can be classified as lagging, exhibiting a slow reaction to price movement. The MACD indicator is comprised of three components, the MACD line, signal line, and MACD histogram. The MACD line shows the divergence between the two moving averages to illustrate the upward or downward momentum of a trend.

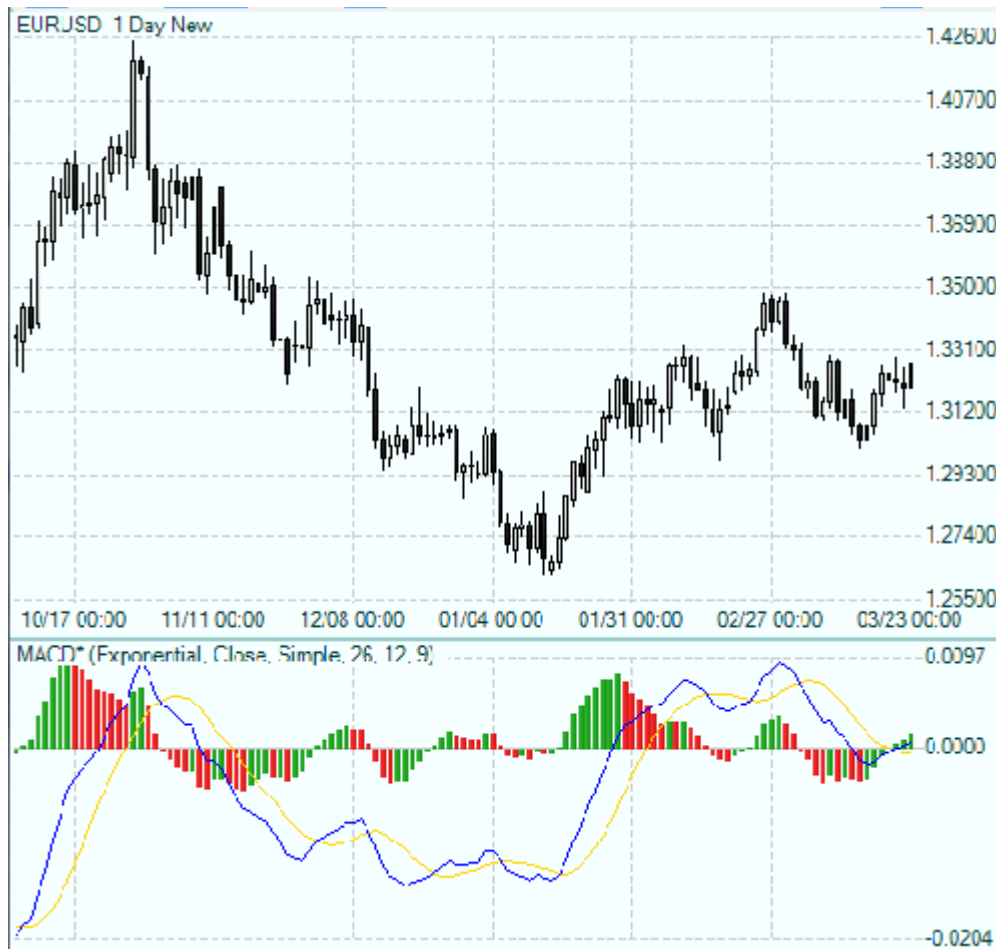


Figure 3 - Example of Moving Average Divergence Convergence Indicator^c

Calculation:

$$MACD = EMA_{12} - EMA_{26}$$

$$Signal = EMA_3[MACD]$$

^c <http://forexzig.com/technical-indicators-macd/>

$$\text{Histogram} = \text{MACD} - \text{Signal}$$

Application:

The versatility of the MACD indicator is highlighted by the various methods of interpreting the data which it produces. The first of these involves the movement of the MACD line with regard to the zero line against which its values are plotted. The position of the MACD line, with respect to the zero line, or centerline, is indicative of the nature of momentum change displayed by the price data. While the MACD line lies above the centerline, the momentum of the asset is assumed to be increasing in the positive direction. Conversely, when the MACD line falls below the centerline, the indicator signals increasing momentum in the negative direction.

In addition to the MACD line, this indicator also utilizes a nine-bar EMA representative of the data, in order to provide a less volatile trendline. The movement of this moving average, referred to as the signal line, in comparison to that of the MACD line, is responsible for the most common signals generated by the indicator. While the MACD line lies above the signal line, the asset is assumed to be exhibiting an uptrend. Conversely, when the MACD line falls below the signal line, the indicator indicates a downtrend within the price movement of the asset.

A third component of the MACD is the use of a histogram, which graphically monitors the difference between movements of the MACD and signal lines. Because of this, directional changes exhibited by the histogram often precede centerline crossovers, providing advanced notification of a reversal in momentum.

2.3.3.9 Bollinger Bands

Bollinger Bands are often used to complement a trend-following trading strategy due to their ability to visually display market volatility. The indicator collectively uses a group of three

simple moving averages to generate a channel, throughout which price movement generally remains bounded. The central SMA, typically representative of a twenty bar period, is bounded by an upper and lower standard deviation. Because these standard deviations are representative of an identical period as the central SMA, the three averages move concurrently. The distance between the upper and lower bands, however, constantly adjusts to reflect the volatility of the asset. As the price movement of the asset becomes increasingly volatile, the channel widens to accommodate the larger standard deviations. This is true of the opposing case; during instances of low market volatility, the standard deviations shrink, tightening the channel.



Figure 4 - Example of Bollinger Bands Indicator^d

^d <http://forexzig.com/bollinger-bands/>

Calculation:

$$\text{Middle Band} = SMA_{20}$$

$$\text{Upper Band} = SMA_{20} + (2 \times SD_{20})$$

$$\text{Lower Band} = SMA_{20} - (2 \times SD_{20})$$

Application:

The channel established by the upper and lower averages of the Bollinger Bands often acts in a manner similar to floors and ceilings of a trendline. Price movement will often oscillate between the two levels, remaining unable to puncture the level established by either an upper or lower barrier. Analysis of this movement has produced the identification of two repeating trends that occur within the Bollinger Bands and identify opportune moments to trade.

The first of these retracement shapes is a *W-Bottom*. Recorded during a downtrend, this signal appears as a reversal, and can be used to capitalize on the ensuing uptrend. “First, a reaction low forms. This low is usually, but not always, below the lower band. Second, there is a bounce towards the middle band. Third, there is a new price low in the security. This low holds above the lower band. The ability to hold above the lower band on the test shows less weakness on the last decline. Fourth, the pattern is confirmed with a strong move off the second low and a resistance break.” [17]

Similar to the *W-Bottom*, the *M-Top*, can be utilized to identify a reversal in the current trend. Essentially the opposite of the *W-Bottom*, the *M-Top* occurs at the close of an uptrend, and signals the impending reversal to a downtrend. “First, a security forges a reaction high above the upper band. Second, there is a pullback towards the middle band. Third, prices move above the prior high, but fail to reach the upper band. This is a warning sign. The inability of the second

reaction high to reach the upper band shows waning momentum, which can foreshadow a trend reversal. Final confirmation comes with a support break or bearish indicator signal.” [17]

2.3.3.10 Relative Strength Index (RSI)

The Relative Strength Index (RSI) is a widely used momentum indicator that simplifies the attempt to display the trade volume of an asset. The RSI can be categorized as a momentum oscillator, and is therefore most suitable in trending markets. Graphically displaying the velocity of price movement, this indicator oscillates between bound values of zero and one hundred. The RSI is comprised of three components, the RS, the average gain, and the average loss.

The calculations conducted to achieve the average gain and loss are traditionally done so over a fourteen-bar period. Because these values also account for their previous values, the averages simultaneously serve to smooth the price movement displayed by the RSI. When graphed, the RSI is normalized to display a range from zero to one hundred. This measure simplifies the process of using the RSI to identify the overbought or oversold nature of an asset.

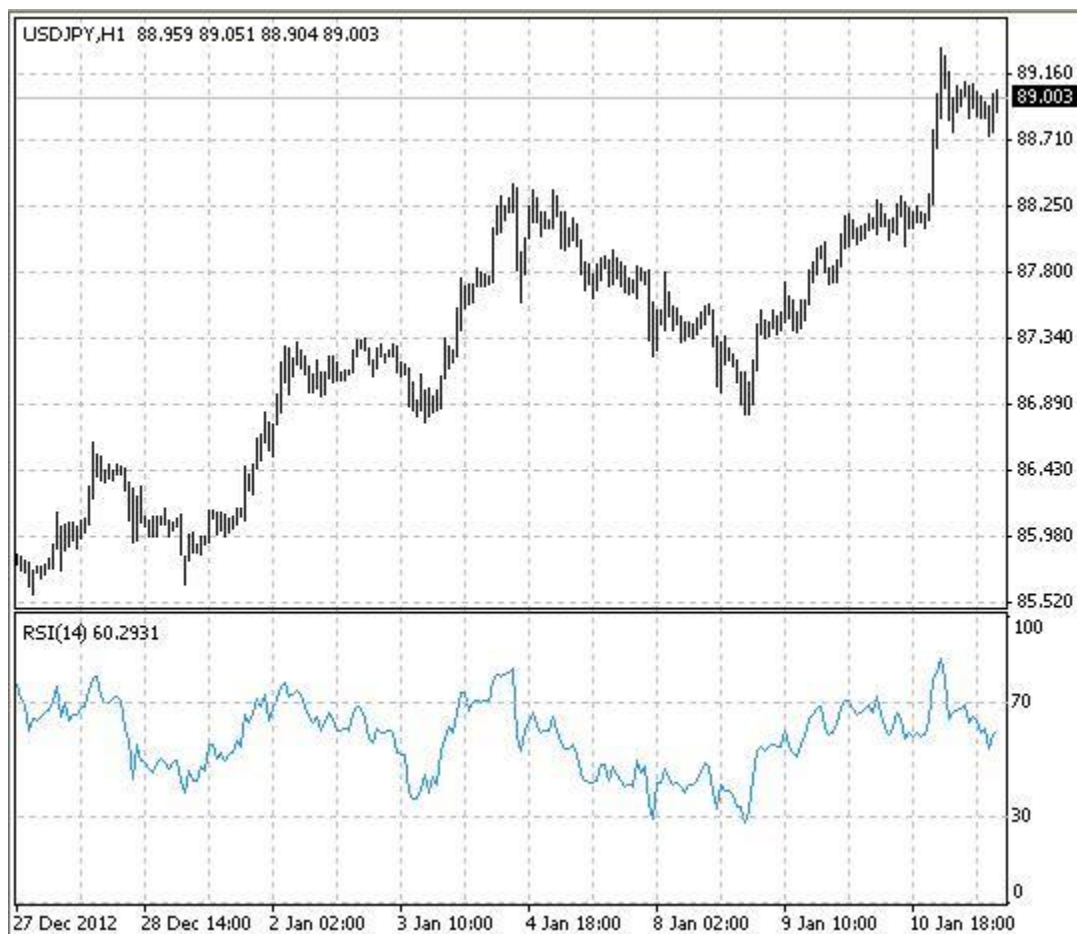


Figure 5 - Example of Relative Strength Index Indicator ^e

Calculation:

$$RSI = 100 - \frac{100}{1 + RS}$$

$$RS = \left[\frac{\text{Average Gain}}{\text{Average Loss}} \right]_{14}$$

Application:

Popular for the normalized scale associated with the RSI, it is commonly employed in accordance with efforts to highlight the overbought or oversold nature of an asset. A currency is assumed to be overbought when the RSI is recorded above 70 and oversold when it is below 30.

^e <http://forexzig.com/relative-strength-index/>

In addition to attempts of analyzing the trade volume of an asset, the RSI purports several other applications with regard to technical market analysis.

A second application of the RSI relates to the anticipation of trend reversals. When the price of an asset records a lower high within an uptrend but the RSI continues to display higher highs, the trend is expected to reverse. Conversely, when the price of an asset records a higher low during a downtrend, while the RSI continues to display lower lows, the trend is expected to reverse.

2.3.3.11 Stochastic Oscillator

The Stochastic Oscillator is a popular indicator among forex traders due to its ability to avoid following the price or volume of an asset. The indicator, instead, monitors the speed of price movement and can therefore be categorized as a momentum oscillator. The movement of the Stochastic Oscillator combines values generated from equations comparing the relative extremes of price data, to display changes in momentum. The indicator is comprised of two components, the %K and the %D, developed through the analysis of the representative lows and highs of recent price movement.



Figure 6 - Example of Stochastic Indicator^f

Calculation:

$$\%K = \frac{\text{Current Close} - \text{Lowest Low}_N}{\text{Highest High}_N - \text{Lowest Low}_N} \times 100$$

$$\%D = SMA_3[\%K]$$

Application:

The most common application of the Stochastic Oscillator attempts to identify the volume of trades associated with an asset. This is done through the selection of overbought and

^f <http://forexzig.com/technical-indicators-stochastic-oscillator/>

oversold levels. As an oscillator the values produced by the indicator range between 0 and 100. The most common overbought and oversold levels are set at 80 and 20 respectively. Low readings below 20 indicate the current price is near a recent low within a time period setting up an oversold condition that can precede a bullish movement. Conversely, high readings above 80 indicate the price is close to a recent high setting up for a bullish move.

Various levels in the indicator can also act as support and resistance levels. Three levels most commonly used are 20, 50, and 80 where the price can bounce or reverse when the indicator reaches that level. By crossing these levels can indicate what phase of the trend the market is in. For example, when the stochastic crosses above 50 on an upward trend means that the upward trend is picking up strength, the opposite goes for downward moving trends. Overall the stochastic indicator can be applied in several different ways, from tracking trend momentum to marking the beginning of trend reversals.

2.4 The Trading System

Then next logical step before jumping into the forex market is constructing a trading system to follow to combine analysis techniques and make concrete trading decisions. Like any project or task it is important to have a systematic plan to approach the problem. In the case of trading it would be easy to go about trading currencies without any particular direction; however the goal of investing in the forex market is to manage your money to make a consistent profit. Consistency is the key to being a successful trader and the use of a trading system is a way to achieve that. When building a complete trading system there are many different elements to consider.

2.4.1 Selecting a Currency Pair

The first step in building a trading system is to select a currency or currencies to trade with. This is important because the foreign exchange market is so large it is hard to keep track of currencies around the world. It is common to narrow the trading pairs to those that involve the trader's home currency, for example the U.S. dollar, because it is easier to keep up to date. The currency pair(s) can be selected based on a number of properties from average volatility, liquidity, and relative strength of currencies. Many new traders choose to trade major currency pairs based on the abundance of news, analysis available, as well as the regular liquidity due to their popularity. Overall, it is important for a trader to select a currency pair that he or she is comfortable trading.

2.4.2 Market Analysis

The next component of a trading system is the use of market analysis to determine trading action. As reviewed above, there are many different ways to analyze the market and how it moves. The key to an effective trading system is selecting a handful of analysis techniques to reference when making trading decisions. Technical analysis is based on charts and indicators that use historical data to predict future price movement. These can vary in complexity from a simple moving average, to a system of many values. However, it is important for a trader to select a technical indicator that he or she can understand and interpret. Otherwise it is difficult to effectively use the indicator if the trader does not understand how it reacts to market movements. Fundamental analysis complements the uses of technical analysis by considering external factors that can influence price movement not related to historical price data. The use of fundamentals involves following global financial news and economic releases to predict the

futures strength of currencies. Compared to technical analysis fundamental is an art because there is no right way to interpret these factors; nonetheless it is important to stay current as to not get caught off guard. No matter the trader's personal preference it is important to reference both technical and fundamental analysis.

2.4.3 Trading Style

An important part of a trader's individual trading system is more or less the style in which they trade. Each trader has different agendas and risk tolerance that changes how and when they trade. Time commitment determines if a trader is more likely to make short-term or long-term trades. For example, a day trader who is able to sit at a computer for longer periods of time will most likely make short term trades with the span of hours to a day and rely on technical analysis to make trades. On the other hand, a trader who has commitments during the day and can only access their account for short periods of time is more likely to make long-term trades that span over several days to a week and rely more on fundamental analysis to make trades. Risk tolerance is another factor that will determine a person's trading style, dictating how and what they trade. For instance, a day trader who is keen on constantly watching the trades while holding a position may choose to range-trade by making small profits from the currency pair's normal fluctuation during the day. Meanwhile, a trader who is more comfortable leaving trades unmonitored is able to leave trades overnight without worrying too much. Selecting a trading style that compliments each individual trader is important in becoming confident and comfortable with trading as a whole.

2.4.4 Risk Management and Position Sizing

The incorporation of risk management to limit losses when trading is an important aspect to include when investing in a market. No matter how much experience a trader has each and every trade place is more or less a gamble. An effective trading system works to both generate winning trades as well as limit the losses from losing trades. The main idea behind risk management is to determine how much of an account a trader is willing to lose in any given trade. Position sizing is the key to managing risk with a trading system, by determining the appropriate amount of currency units to trade to stay within a trader's risk tolerance. This risk management tool helps to control the use of leverage in trades and prevent substantial losses when buying on margin. New traders commonly enter smaller positions until they are more confident in their trading system increasing their risk tolerance gradually. [4, 6]

3 Methodology

The goal of this project was to outline the process of building a trading system when trading currencies in the foreign exchange market. The project focuses on the idea that each individual trader has his or her own particular style of trading and that is reflected in their unique trading system. In order to encompass all aspects of a trading system, several components of forex trading were explored. This section outlines the methods that the team used when building our own individual trading systems.

3.1.1 Establishing an Understanding of the market

In the initial stages of the project focused on learning the fundamentals of the foreign exchange market. As people who have had no background trading in any financial market we believed it was important to understand the market before attempting to trade. However, the vast size of the forex market, the group decided to focus our research at the world's major currencies and their respective economies. The research involved not only keeping up with current news and events in the market but also past articles and reports in order to get a feeling for where each national economy stood relative to one another.

The next step in understand the market was to understand how the foreign exchange market operates and how it affects the value of floating currencies. Although this project investigates the use of the forex market as an investing tool, it was important to understand all of the reasons for exchanging currencies. This included exploring the market structure to break down the various players in the market and the different levels of influence each has on exchange rates. Information on the operation of these market participants was gathered by looking into each level from the big banks and dealers to the individual speculators. The idea of establishing

this basic foundation of foreign exchange was to help answer the questions that could arise when analyzing price movements.

3.1.2 Learning Trading Mechanics

After establishing an understanding of the operation of the market, the next step involved familiarizing ourselves with the ins and outs of retail currency trading. This process involved analyzing currency quotes, or exchange rates, and their role in trading currency pairs; as well as how brokers and dealers determine prices and spreads. Most importantly this covered the various order types available when trading currencies and more specifically when to use them. Lastly, specific traits unique to the foreign exchange market such as the trading sessions and use of leverage and margin were studied to help make decisions surrounding when and how much trade. All of these elements were combined to understand the different positions entered in the forex market and how to profit from trading currencies.

3.1.3 Research of Technical and Fundamental Analysis

With the fundamental knowledge of the market and trading, group studied different analysis techniques to use to make trading decision. The two types of analysis focused on were technical analysis, using technical indicators and statistical methods, and fundamental analysis, using insight from the news and economic changes.

Technical analysis involved studying of charts and indicators that use historical price action to predict future price movement. The group studied the most commonly used technical indicators, understanding how they were calculated as well as how each reacted to movements in the market. Researching many indicators and their various applications to trading allowed each member to think more critically when observing market movements. When applying this to a trading system, being able to understand each indicator individually makes it easier to combine multiple indicators to identify market trends.

Fundamental analysis involved studying financial news from world economies to focus on the factors that can influence currency values. The factors included global economic climate, national economies, financial and political policies, and important current events. The main objective of studying fundamental analysis is to develop 'gut feeling' when making trading decisions and add the human aspect that is absent from technical analysis. The research of both technical and fundamental analysis is important in being able to apply different trading strategies that may include varying use of each technique.

3.1.4 Testing and Evaluating Trading Strategies

The next step in studying the development of a trading system was the act of physically making trades using a trading strategy. During this phase of the project, each member of the group traded individually in order to gain experience using different trading strategies. This allowed the group to explore the factors that attribute to why individual traders develop unique trading systems.

The group began with implementing existing trading strategies widely used in currency trading to grasp the components of a complete trading strategy. From here the members of the group could get a feel for what approaches to forex trading have been used and being to find techniques that they are more comfortable with. The strengths and weaknesses of each strategy was evaluated to help find the effectiveness of accord to the individual.

After testing a sample of complete trading strategies, the group focused on building a unique strategy to trade with. The focus of this stage was to find evaluate the difficulties encountered when constructing a trading strategy to be addressed. In order to test a range of trading scenarios, different trading strategies were tested including: trending, range (non-trending), short-term, and long-term. The remaining components of a trading system were also developed including trading setups, position sizing, entry and exit rules when trading. During

the trading period, information concerning trading decisions and psychology were recorded to better understand the personal side of the process.

4 Process

4.1 Strategy I Process

This section outlines the building of strategy I by group member Michael Poon. As a new trader, it was important to lay down a solid understanding of the foreign exchange market. Much of my research into the market itself was based on introductory websites for beginner traders such as BabyPips^g and Investopedia^h. With a solid understand of the size and scope of the market as well as the various applications of currency trading, the focus shifted to the factors that affect the value of currencies. As a person who does not keep up with world news and events, this became a difficult task as it encompassed not only knowing about the events in the news but establishing an understanding of the global economic climate. The major economic topics in the news during the project involved the recovery from the global recession affecting the major world economies. With central banks around the world implementing monetary policies, it became difficult to grasp which of the world economies were the most stable.

The introduction into forex trading incorporated the use of the Tradestation platform to practice trading using a simulated account and familiarize myself with the use of the trading platform. Many of the first trades made using Tradestation focused on learning how to place trades in the program as well as the types of orders available in forex such as, market, limit, and stop orders. The bid and ask spread was something to be noted when placing limit orders because depending on spread there are cases when the price can move without the order being filled. The simulated accounts used in the project started with an initial balance of \$100,000 with the default leverage ratio set to 50:1, limited by Tradestation.

^g <http://www.babypips.com/>

^h <http://www.investopedia.com/>

While becoming more familiar with using the Tradestation platform, all the members of the group including myself researched an array of technical indicators. Starting with the most primitive indicators, trendlines, and support and resistance levels, I established my understanding of how to read charts. Experimenting with charts included understanding the use of candlesticks as well as plotting the charts under different time intervals. Studying technical indicators began with analyzing the moving averages knowing that many of the other indicators use moving averages in calculations. Existing explanations and applications of each chart indicator were analyzed before applying. Then in order to test the personal understanding of the indicators, Tradestation was used to follow historical charts to make connections between the movements of the indicator and price movement.

As mentioned above, my study of technical indicators started with moving averages. Recommended by our advisor, the Simple Moving Average (SMA) was a good place to start when attempting to identify trends. Using a SMA by itself gave a good snapshot of the trend of the market depending on how far back the average was calculated. The next indicator was the Stochastic Oscillator, a momentum indicator, which seemed very straightforward to interpret, however was not always reliable when applied to charts. Bollinger Bands were next on the list and introduced how an indicator can be used in different scenarios. The concept behind Bollinger Bands measures market volatility and can be applied to ranging, when volatility is low, and to trending markets when volatility is high. The Moving Average Convergence Divergence (MACD) indicator was an easier indicator to understand because of its somewhat simple derivation and logical interpretations of the values produced by the indicator. As a momentum indicator, MACD was usually able to pick up on shifts in momentum corresponding to a trend reversal while in other cases simply reflecting the strength of recent price movements.

Alongside studying technical indicators, the group studied fundamentals related to the factors that affect the value of currencies. To keep track of financial news announcements and updates we checked news sources such as ForexFactoryⁱ and the Wall Street Journal on a daily basis. The majority of the focus in fundamental analysis went towards keeping up to date on recent central bank policies. With much of the world recovering from an economic recession, central banks intervened to guide national economies along a stable path. As a result, central banks forced interest rates down to stimulate the economy; as national economies began to recover, interest rates began rising to more normal levels. The difficulty was making sense of the press releases from the central banks and attempting to predict the movement of interest rates. Many times my own interpretation varied from the abundance of speculation presented by others, which made it difficult to decide between my opinion and the herd mentality.

Aside from central bank releases it was important to keep up with other economic releases as well as observing their effect on exchange rates. The economic calendar was an important tool because it let me know which releases were scheduled to come out during each day. Releases such as GDP, inflation, employment data, and trade balance are all indicators of the economic strength of a nation; however even if the news was definitively good or bad it did not necessarily result in the predicted movement in a currency's value. Knowing this introduced a sense of doubt in the use of fundamental analysis because of its frequent unpredictable results. Nonetheless, it became clear that fundamental analysis was important to trading currencies but difficult to base trading decisions on. Sites such as tradingeconomies.com, that compile all the data reports making an overall evaluation of each country's economic status,

ⁱ <http://www.forexfactory.com/>

The remainder of the fundamental analysis consisted of various pieces and events, not directly tied to national economies, but can still cause currencies to fluctuate. During the early stage of the project the U.S. government shutdown during a budget battle causing the U.S. dollar to fall as a result. Political instability also affected the market in various ways causing unpredictable shifts in exchange rates. Notable events included internal conflict in Turkey and Ukraine causing investors to pull out of emerging markets, and jurisdiction battles in Asia between China and Japan affecting trade in the area. News and event such as these made me aware that the market can change at any time so it is important to avoid these cases or prepare for irregular movements in the market.

From here the process of implementing a trading strategy began, starting with the use of existing strategies and moving toward the conception of my own. The first trading strategy used was based on the simple moving average to trade trending price movements. The use of the strategy introduced the use of setups, when the price moved above or below an average, and entry and exit conditions, during fast-slow crossovers. Shown in Figure 7 below is an example



Figure 7 – Strategy I 2-Line SMA Strategy Chart

of the basic SMA strategy with the setup trends marked in blue, and entry and exit points circled in yellow. This strategy proved to be effective when trading long term trends; however short term trends yielded minimal profits due to the delay of the crossover signals.

While trading other simple strategies, it was important to consider other factors while trading such as, when to trade in relation to time of day, and my availability during the day to sit and trade. Throughout the period of the project my changing schedule forced me to find the most effective way to trade given with the time allotted. This included focusing on short term trades while actively watching the market, and long term trades during large stretches between trading sessions. It became important to categorize the trading strategies on when they were most effective. For instance, using a stochastic strategy was effective for finding trend reversals but only over longer time intervals due to the abundance of false signals produced by with short bars. Bollinger bands worked well to indicate the progression of a trend triggering an entry at the start but also causing me to hold off from entering in the middle of a trend. The MACD strategy was very versatile when trade because of the different applications of the indicator itself. It was effective in picking up intra-day trends; however when using short time intervals the strategy produced many false signals similarly to stochastic.

With the understanding of the strengths and weaknesses of each basic trading strategy the focus shifted to building a personal trading strategy. The first trading strategy combined the trend following properties of a 2-line simple moving average with the trend reversal triggers of stochastic. The trade setup required the market price to be either above or below both; which then moved into the entry trigger with the fast moving average crossing slow in the direction of the trend. The exit trigger occurred when the stochastic oscillator withdrew from the overbought level in a long position or the oversold level in a short. This particular strategy was simple to

follow and was not reliable with slow trends and was frequently unstable during large spikes in price movement.

Further iterations of the trading strategy included using different technical indicators, trading during high volume hours, and focusing on long-term trades. One important refinement included was the emphasis on the momentum of historic price movements. The idea is that it is easier to trade with the market rather than bet against it, and by trading with the price momentum increases the likelihood of producing a profitable trade. The final trading strategy focused on making trades that were in line with a long term trend using indicators for entry and exit triggers. The strategy focused on the use of the MACD indicator on different time interval charts to take a snapshot of the direction of the currency pair. By limiting trades to scenarios that moved with the current trend short or long term trades could be placed and kept overnight without too much worry about any open positions. Shown below in Figures Figure 8, Figure 9 Figure 10 is an example of the trading strategy in terms of trading charts.



Figure 8 – Strategy I: MACD Momentum Strategy Daily Chart



Figure 9 – Strategy I: MACD Momentum Strategy 4-hour Chart



Figure 10 – Strategy I: MACD Momentum Strategy 1-hour Chart

The first chart analyzed is the daily chart, as shown with a drawn trendline to help identify a movement resistance line. My strategy takes advantage of this trend, in this case bullish, and attempts to trade the movements in the same direction demonstrated by the price bouncing off the trendline. With the setup from the daily chart, the 4-hour chart MACD was used to find the most recent shift in momentum. The last chart, 1-hour chart, used MACD and a

two line moving average to find the trigger when the trend was in the right direction and momentum had shifted in the same direction. This strategy limited the number of trades but also allowed me to not have to constantly watch charts when having open positions in the market.

Various other considerations were taken into account during the trading period related to risk management and the psychosocial aspects of trading. At the beginning position sizes were limited to a single standard lot without thinking about the account size. Once a strategy was established, the position size hovered around that of a two percent risk of the account, ranging higher and lower depending on my confidence in the trade setup. A significant number of difficulties came from the psychological side of trading and irrational decisions made impulsively. There were situations where the system's setup conditions would not occur for days at a time causing me to force triggers and entries in order to trade. While other scenarios resulted in holding a losing trade regardless of what the trading system exits were. After falling into these conditions multiple times it became clear that trading discipline is as important if not more important than the system you trade.

In order to tackle issues with making decisions while trading, the strategy incorporated the use of stop-losses and take-profits to define the conditions of when to exit a position. The first applications of a stop loss included placing a stop order 5-10 pip in the opposite direction of the trade. However, early uses of the stop loss yielded premature trade exits that ultimately resulted in a string of losses. Further implementation of stop losses with this strategy required watching trades and recognizing the oscillations of a price during an open position to determine the appropriate stop loss that would not be triggered prematurely. By increasing the range of the stop loss it was understood that positions took on more risk as well as allowing the trade to follow a trend without exiting due to the stop loss. Conversely, scenarios where a profitable

position was held for too long causing the trade's profitability to diminish and possibly end at a loss. To combat this problem the implementation of take-profit orders that are filled when the price moves a certain amount in the direction of the trade, similarly to how stop-losses are used. Ideally the take profit would be adjusted to a price at which the strategy confirms the trend moment will reach. However, the composition of this strategy based on momentum made it difficult to set a take profit level the strategy would reliably reach. Instead the take profit level was set by setting a target profit for each trade and converting that profit into an exit price. The target profit was determined by the strength of the trend indicated by the strategy as well as whether it was long or short term trade.

The ongoing aspect of building the trading system was of course the optimization. Given the generally short time period over which trading took place it was important to explore different methods of optimizing the trading system. Aside from the obvious analysis of equity curves and overall trading performance as a measure of the weaknesses of the trading system; the use of backtesting and computer optimization became an important tool used to optimize the system. Using Tradestation, the parameters of the strategy are defined into rules that can be inputted into the platform in the form of indicator conditions. The strategy was converted into EasyLanguage, code used by the Tradestation platform, and back tested against historical data to evaluate the performance of the strategy. Optimization of the strategy took advantage of the automated trading strategy generated and tested the strategy with different combinations of strategy parameters on historical data. The optimization yielded the performance of each combination of parameters to aid in finding the right input variables to trade with. However even when the performance of an optimized trading strategy looked good in terms of historical

data did not mean the strategy was reliable to trade with. This form of computer refinement helped to get the strategy close but did not produce the ideal strategy.

4.2 Strategy II Process

During this experience it was easiest to create a trading system based off of other's work. Taking what was easiest to understand and then turning it into something a little more complex, by combining multiple different indicators was the approach that was taken creating this strategy. The information taken from the multiple indicators is used for gathering up the all the information that is may be needed to try and have an edge over others in the market today. Having an edge on the market is just another way to possible increasing your chances on producing winning trades. It needs to be known that not every trade that is made is going to be a winning one.

Starting out before even start making trades, background research can be a helpful way to start to feel out the workings of currency market. What was done for this strategy was a starting out by researching major world economies to try and figure out what currency pairs would be traded. Being from the United States this is one that would be easy to understand, follow and already familiar with.

Taking into consideration external factors such as news, time of day, and possibly release of major economic information are other things that should be taken into consideration when creating a trading system that is a custom fit to your financial needs. Researching the country's economy of the currency pair that you possible are trading help with a better outcome on the trades. In this strategy the Australia, China, and New Zealand were the economies under study for a fundamental analysis advantage. The currency pair that this strategy ended up being based on and traded the most was AUD/USD.

After some research was done to narrow down the search on what currency pairs that would be traded the next step in the process was to determine which indicators to use. Choosing

these indicators started as being a trail an error period. After sometime playing with the many different indicators the field was narrowed down to which ones were the easiest to understand. In this situation the main three that were used were Simple Moving Average (SMA), Bollinger Bands, and Relative Strength Index (RSI). Others that were tried were Moving Average Convergence Divergence (MACD) and Parabolic SAR. These were phased out simply because the percentage of winning trades produced used by the others and the ease of use of the others.

After all that was done, the next step was really to learn how the market operated. Some of the basics that were looked into that every currency trader should know are the basic terms. Learning the platform that you are going to be trading on is a minor stepping stone in the process, but still a major component because you don't want to be trading something you don't wish to because of a mistake on the user interface. From the start only one standard lot was used as a baseline for trades.

Always keeping eye on the news is something that every currency trader should do. This part cannot be stressed enough, as soon as you take your eye off future news events could cause the trading system to fail because of news that can swing the market in a direction quickly. This quick swing may only last a short period of time, depending on the reports released before the currency pair settles back to rather normal state. Major things that stick out as either times to trade or make sure you're on the side lines is the release of GDP numbers or whenever there is news involving the Central Banks. Information like this can cause generally large pip jumps in either direction and are sometimes difficult to determine which direction the movement is going to occur.

Starting from the very basics at getting into creating a system was making trades using SMA. The thought behind this was just to use it to see if the currency pair was either trending up or down. This is one of the simplest indicators to use and understand. The downfall is that it is an average indicator looking back at however many bars you determine. It does not predict what the next bar will do but it moderately gives you an idea of what the next bar is going to do because of the direction of the trend.

Once in the market, and hopefully making money, getting out of the market became the next major part. Once in, the big question becomes when to decide to get out. Exit points were particularly difficult to create and even more difficult to follow. The psychology behind human thinking is when in a winning trade it's hard to say, "Ok that's enough, time to get out with profit" and the exact opposite for a losing trade.

In some cases overcoming the psychological aspect is the hardest part for most traders. Instead of following their indicators, entries and exits traders sometimes start to "will" the market to do what they want. Another common one is that the trader will say to himself or herself that the market is going to come back.

Here is where the strategy started out with multiple indicators; two lines Moving Average and Bollinger Bands indicators. What I try to do is buy when the currency pair goes below the lower standard deviation line and when I see that the fast moving average line is about to cross or has crossed the slow line moving average line.

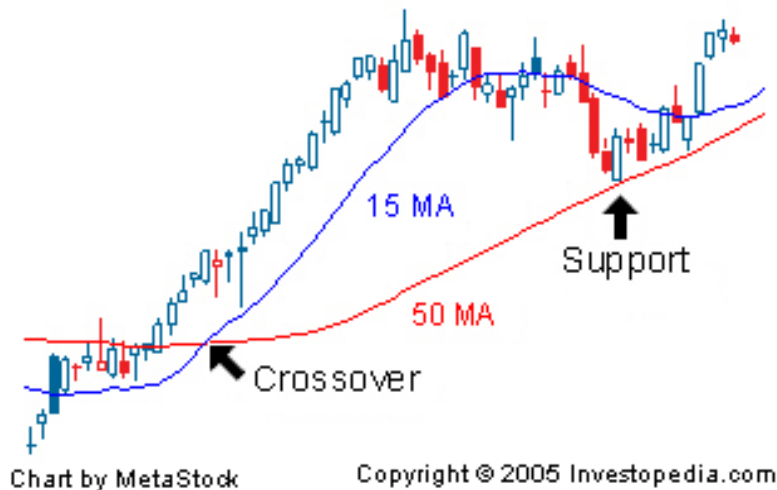


Figure 11 – Strategy II: Example of a 2-line Moving Average Crossover^j

The next step for me was I started to pair two indicators at a time. The idea behind this was when both indicators produce a buy signal then that was the time to get into the market. By having two buy or sell signals it has a more defined criteria, hopefully producing a better chance on a winning trade.

Here is where the strategy gets a little more complex. After doing more research on indicators, it was decided to pair Bollinger Bands with a One-line moving average. Eventually a two-line moving average was added to replace the one line to try and get a stronger buy signal.

The thought behind the pairing of these two indicators together to try and use both to trigger when to get in. I want good signals from both before I get in, Ideally I would like to see the actual price of the currency hit or break through the lower standard deviation line on my Bollinger Band indicator while seeing a cross over on my moving Average indicator. Visa Versa with a shorting technique, except, the actual price of the currency is on the upper standard deviation line.

^j <http://www.investopedia.com/terms/m/movingaverage.asp>



Figure 12 - Strategy II: Bollinger Bands Strategy

In this strategy what the thinking behind it was that you are going to need to see both indicators give you a buy signal. The first conditional buy signal that occurs will be if the price bars are greater than its moving average line and the Relative Strength Index is less than 30, Which we know is showing that the currency has been overbought.

Another conditional buy in signal that is a little more complex has four rules; 1) the price bar is less than its moving average line; 2) the close is less than the open; 3) the Relative Strength Index is less than 30; 4) the open - close is greater than $.70 * \text{the (high - low)}$. This buy sell strategy is more for trading over a few days not few hours. These signals would work best

The sell signal for this strategy states that the Relative Strength Index has to be greater than the 40 levels. The main idea behind this strategy is that we want to buy the market as it has pull back extremes. We also want our trades to be short term and exit our trades as the Relative Strength Index crosses above 40.



Figure 13 - Strategy II: RSI and 2-Line Moving Average

The last and final step was starting to fine-tune the RSI and Moving average system. The exit criteria is short term, so that you're not in the trade too long just in case the market continues reverting to the downside.

The exit criteria is short term, this should work well for trading on a currency so that you're not in the trade too. Currencies have the tendency to continue to fall or rise more often due to the ties to the economy, with a short term exit this should prevent the long rides down a long drop. In this strategy as exit criteria, and as a basic rule of thumb for exit criteria is to decide on a small percentage to lose. One percent or less is a good base line for exit criteria. Some traders set their exits by a pip lose. This was also the process used for the determining what would be the exit criteria on a winning trade.

Major habits that I found that I was going were different than other team members were doing. It became apparent very close to the start that trading around big news releases was a difficult time to trade on. This is where most, and greatest losses came out of the trading system. Also it was realized relatively early on that long-term trades were producing a lot of the losses.

The most success strangle came from when one of both of the currencies in the currencies pairs market happened to be closed. In other words, during lower volume trading periods.

Psychological habits that became hard to break were trying to wish the market to do something other than what it was showing. This was a major thing that was needed to overcome because it seemed to be one of the major factors that was cause for big loosing trades. Once this was figured out, listening to the exit criteria cut down on the large losing trades.

4.3 Strategy III Process

In accordance with the proposed scheme of the project, the first installment of involvement in the currency market was to be guided by rather experimental trading. This was done to ensure a level of comfort with the ideas and processes of trading currencies. The group was advised to experiment with each of the methodologies available to investors in the forex market. This includes investigating each aspect of currency trading, including the selection of assets, the different styles of trading, and the variety of timeframes during which one can trade. The adherence to these guidelines on behalf of group member Michael Guarino, and the resultant trading strategy, is outlined throughout the remainder of this section.

The fundamental step in delving into the atmosphere of currency trading is to establish some form of a trading strategy. This will form the premise, and control the interaction, of all involvement within the market. The foundational stage in implementing any successful trading strategy is to follow, at all times, each of the guidelines set forth by the strategy.

The goal of group was to devise a system of strategies that was comprised of several working methods of trading; each was to have the ability to be implemented in the event that a separate system was not producing desirable results. In order to accomplish this, each member was responsible for developing a handful of strategies that produced results with which they were pleased.

In accordance with the parameters established by the group, the foundational step involved the documentation of a basis for a personal trading strategy. Based upon the first installment, it was apparent that the most suitable timeframe would be intraday trading. The leniency of this rule, however, was to be fairly high in order to not prevent an occasional overnight investment position. Trading can be extremely stressful, as is, and this step was taken

to avoid the added anxiety associated with diminishing the ability to monitor a trade by sleeping. Week-to-week trading, on the other hand, was to be avoided at all costs; when the currency market closed on Friday evening, all positions were to be closed.

In cooperation with previous economic knowledge, it was determined that the currency pairs presenting the most opportunity for success would incorporate either the US Dollar or the Euro. For this reason, all ensuing transactions of the major currencies were of either the EUR/USD or the GBP/USD. The economic relations between Europe and Switzerland simplified the search for a minor currency to trade, the Swiss Franc. Due to the limited availability of activity, however, far fewer trades were conducted in the USD/CHF market.

The final aspect of the trading strategy was to delegate a specific time of day to manage the majority of these investments. Although some periods proved more active than others, the realization was that different strategies could be employed at different times of the trading day. This knowledge was gathered fairly quickly, allowing for efficiency with regard to planning efforts to enter positions in the currency market. Different strategies were developed to accommodate the level of activity characteristic of different stages of the typical trading day.

As mentioned throughout the previous sections of the report, a successful trading system complements technical analysis with a thorough fundamental approach to analyzing the forex market. This property of the trading system was held paramount during the course of the project. Fundamental data was responsible for identifying the majority of the trading opportunities exploited throughout the project; important information was gathered from relevant fiscal reports and news conferences but the market was typically avoided to circumvent the unpredictable nature of the events. Television programs, including Bloomberg and CNBC, were continuously

utilized in order to further develop an understanding of the health of the United States economy and how domestic economic events would shape the value of the currency.

The results of the efforts outlined above generated a system of three separate trading strategies that were ideally to be substituted over the course of the trading day; this ensured that each was to be used only during the most opportune periods. It is this detail that complicates any attempt to ascertain which of the strategies was most successful. Unfortunately, however, the each component of the trading system was developed during different periods within the project, providing minimal time in which each was allowed to properly function in conjunction with the others. Locating the benefits of each, while coincidentally testing other combinations of technical indicators, prevented the simultaneous discovery of each of the three finalized trading techniques that will be explained later. Despite this minor hiccup in the constructive process, each strategy was continuously developed throughout the remainder of the project, eventually producing a functional and refined arrangement of trading tactics that was utilized during the concluding two terms of the project.

The first of the strategies employed three separate exponential moving averages (EMA). Created during the first weeks of the project, this technique would establish a solid foundation for a technical understanding of the tendencies of price movement. The most basic of the three, connected with the simplistic nature of its sole dependence upon moving averages, this improved the understanding of the sensitivity of moving averages and characteristics of their reversals. It also allowed for the most short-term trading, given its ability to serve as a scalping strategy.

This strategy, as mentioned, utilizes three exponential moving averages – a fast, middle, and a slow. The representative periods of each, respectively, are twenty-five bars, fifty bars, and

one hundred bars. The simplicity of the construction of the strategy is supplemented by that of its execution; trading opportunities were identified by intersections of the fast and slow averages. When the fast average crossed below both the middle and slow averages, the market was assumed to be entering a downtrend and a sell signal was advised. Conversely, when the fast average crossed above both the middle and slow averages, the market was assumed to be entering an uptrend and a buy signal was advised.



Figure 14 – Strategy III: 3-Line SMA Strategy Chart

A diagram of the scalping strategy can be seen above. The image highlights several trading opportunities encountered through the use of this technique. Despite the visual clarity of trading opportunities highlighted through visual backtesting, as demonstrated above, trading with this strategy did not always prove easiest. As market volatility spiked, characteristic of the price data associated with the EUR/USD, the movement of the three averages, especially that of the fast, became increasingly unpredictable. This proved to significantly escalate the number of trader misinterpretations and false-positives generated by the strategy. Losses were often minimized, though, due to its employment as a scalping aide used on short time intervals. As a level of familiarity was established with both the strategy and the movement of the the two

currency pairs to which it was applied, fewer false signals were followed. It became clear, however, that any future strategy would need to establish a reliance upon two distinct sets of technical indicators in order to avoid such miscues.

The second strategy of this repertoire is reliant upon the use of two separate moving averages, one faster and one slower, as well as a Relative Strength Index (RSI). In contrast to the scalping technique explained earlier, this strategy was aimed at generating the availability of slightly lengthier intraday trades. With the knowledge acquired from experiences of difficulty with the scalping technique, it was necessary that this technique incorporated the use of a second indicator to assist the validity of signals generated by the moving averages.

This strategy utilizes two exponential moving averages, a fast and a slow. The representative periods of each, respectively, are nine bars and twenty-one bars, while that of the RSI is fourteen. The addition of the RSI Filter was to ensure that false-positives, or deceptively incorrect trading signals, were avoided. Similarly to the scalping technique, instances of intersection between the two moving averages were responsible for identifying trading opportunities. When the fast average crossed below the slow average, the market was assumed to be entering a downtrend and a sell signal was advised. Conversely, when the fast average crossed above the slow average, the market was assumed to be entering an uptrend and a buy signal was advised. These signals, however, were only obeyed if the RSI readings were in concurrence; the validity of a buy signal was confirmed by readings over fifty, while that of a sell signal were confirmed by readings below fifty.



Figure 15 – Strategy III: RSI Strategy Chart

A diagram of the RSI Filter strategy can be seen above. The image highlights several trading opportunities encountered through the use of this technique. This method was the result of several revisions whose goals centered about the identification of a tactic that successfully complemented that of the EMA. The incorporation of an indicator with the goal of evaluating the momentum associated with the observed trend seemed obvious, but the determination of which oscillator proved very difficult. The level of versatility promoted by the use of the RSI as an oscillator is ultimately secured permanent its permanent use within the strategy. This second finalized combination of analytical tools allowed for more educated attempts of longer-term intraday trading, generating a substantial population of successful trades. This strategy would also furnish a personal preference of utilizing both oscillating and trending indicators in the development of future technical strategies.

The final strategy utilized in this system uses a simple moving average and an Accumulative Swing Index (ASI), but is also complemented by the addition of a Parabolic Stop and Reverse (SAR). Similar to the strategy that employs the RSI and two moving averages, this method is heavily reliant upon the interaction between the ASI and moving average. The role of

the Parabolic SAR is very similar to that of the RSI Filter, in that its primary use is to prevent trading action generated by false-positives.

This strategy utilizes one exponential moving average of a fifty bar period, an ASI, and a Parabolic SAR function. Although it is typically placed on its own scale, the ASI was superimposed upon the price movement of the assets, using an entirely relative scale. The addition of the Parabolic SAR, initially absent from the strategy, was to ensure that false-positives, or deceptively incorrect trading signals, were avoided. Similarly to the RSI technique, instances of intersection between the moving average and the ASI were responsible for identifying trading opportunities. When the ASI crossed below the moving average, the market was assumed to be entering a downtrend and a sell signal was advised. Conversely, when the ASI crossed above the average, the market was assumed to be entering an uptrend and a buy signal was advised. These signals, however, were only obeyed if the Parabolic SAR readings were in concurrence; the validity of a buy signal was confirmed by positive readings, while that of a sell signal were confirmed by negative readings.

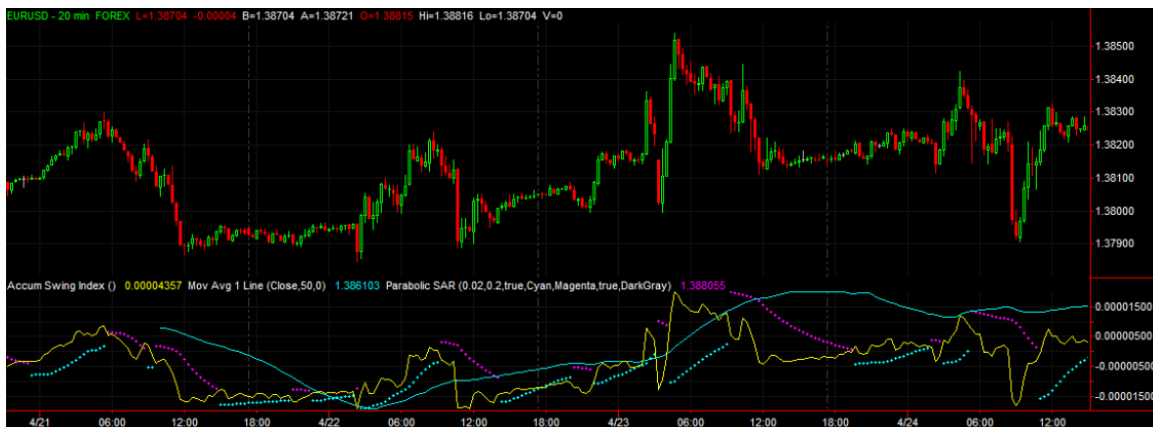


Figure 16 – Strategy III ASI + Parabolic SAR Strategy Chart

A diagram of the ASI and Parabolic SAR strategy can be seen above. The image highlights several trading opportunities encountered through the use of this technique. Similar to the second strategy outlined above, this technique is reliant upon both oscillating and trending indicators to predict trend reversals. Although still employed as an intraday trading strategy, this collection of indicators was also used to enact trades that would last for hours rather than minutes.

5 Results

At the conclusion of our trading period, the group consolidated our findings from developing individual trading systems. The goal of combining our individual trading experiences was to further investigate how to construct a trading system personalize to each individual trader while following a universal set of guidelines. Outlined below are the components of building a personal forex trading system.

5.1 Gain an Understanding of Forex

As the largest financial market in the world it is important to know how the market operates. This kind of information may not be used constantly when trading but it does help to clear up a lot of questions that can come up in the future. Our group found that an understanding of the market allowed for a better interpretation of fundamentals and normal market movement. While trading it is important to be able to process new information about the market and incorporate that into the trading system.

5.2 Define Trading Personality

The definition of a personal trading system is that it is unique to each individual trader's personality. During our trading process, each group member had a different approach to trading that matched with their personality. To help fit a trader to the appropriate trading style we start with the individual's trading goals. This can vary from a trader who is just looking to take advantage of a new investment opportunity, to a dedicated day trader who wants to make a profit as a source of income. These trading goals lend themselves to adopt trading styles along with your personality as a trader. A person who needs to watch the market constantly while having open trades will mostly likely be a range trader or a day trader, trading throughout the day but never holding a position outside a trading session. Conversely, a trader who is more comfortable holding positions for long periods of time without checking the market can be categorized as a

swing trader, or position trader, relying on market analysis to place long term trades. While developing a trading system, it is normal for a trader to jump between trading styles but in the end it is important to find the style each trader is comfortable with because that will in turn reflect in trading confidence.

5.3 Select Useful Indicators

The goal of any effective trading system is to quickly and easily identify trends and capitalizing on those trends to trade for a profit. Indicators play a big part in identifying trends by showing information that a trader wouldn't normally be able to recognize by simply staring at a chart. The idea of using indicators is to give the trader an edge, a leg-up on other investors as to when to enter and exit a trade. Given the groups experience using indicators it was apparent that there was not do-all, ideal indicator for picking up trends. There were many scenarios where an indicator did pick up on every trend but also picked up on twice as many false trends. Therefore, it is important to use multiple indicators to draw conclusions about future price movement. The aim of using multiple indicators to confirm the existence of a trend is to attempt to make the system more consistent, limiting the number of trades but more importantly the number of losing trades.

5.4 Define Entry and Exit Rules

One of the last elements of a complete trading system are the entry and exit conditions which dictate when a trader should enter a position and when to exit a position for either a profit or a loss. This is arguably the most important part of a trading system because it determines when trades are placed and defines the effectiveness of the system. This was the most difficult component of the system to define because there are so many different entry and exit rules to use. Entry conditions are determined by the setup and triggers shown by the trader's indicators.

Traders who are confident in their indicators may enter a position as soon as conditions are met while others may wait until the end of the bar or next bar to make a decision. While, exit conditions can vary either using exit triggers from indicators or simply exiting after the market moves certain amount. Exits can serve to both take profit and minimize losses. An important property of entry and exit rules is that they be clear and definitive with little room for interpretation. Concrete rules are the key to building a system that is consistent.

5.5 Manage Risk

Outside the rules of trading, money management is the backbone ensuring that trading is worth the investment. While building our individual systems the group experienced a shift from analyzing the potential profits after placing a trade and instead thought about the possibility of producing a losing trade. The two components of risk management are putting up what you are prepared to losing and knowing when to pull out when you know you've lost.

5.6 Trade the System

The last step in developing a trading system is in fact to trade the system itself. The foreign exchange market is like any other market, unpredictable. The goal of using a trading system to increase a trader's odds of beating the market; therefore when trading an unpredictable market there must be a constant in order to approach trading systematically. Our group's experience showed us that trading is difficult because it can be a psychological rollercoaster driving us to make impulsive decisions regardless of what we had defined in our system. This isn't to say that a system cannot change; logically as the market changes it is natural to iterate the trading system to fit the market.

Appendices

Appendix A. Exchange Rate Theories and Models

With the growing interest in foreign exchange trading, many economists have studied the connection between economic variables and changes in currency exchange rates. The result has been a number of accepted theories and models that attempt to explain the movement of exchange rates. However, these theories commonly simplify the price movement by comparing it against only a few economic variables; when in fact the truth being exchange rates are influenced by a multitude of different factors. Nevertheless, the research shown in these theories and models present a basic explanation of the kinds of economic changes that can affect exchange rates. Outlined in this section is a selection of generally accepted theories.

Purchasing Power Parity

The Purchasing Power Parity (PPP) is theory based on price levels of identical goods in two different currencies. The idea of the theory is that the exchange rate between two currencies should adjust to the relative price levels of these goods. For example, if popular product such as a cell phone was priced at \$300 in the U.S. and 150€ in the Eurozone it is assumed from the relative price that the exchange rate for EUR/USD is 2. However, an exchange rate other than 2 would allow opportunities for the cell phone to be resold for a profit. Of course it is not expected that a single good can significantly change the currency exchange rate, but by applying the PPP theory to a range of goods and services a more general picture can be drawn. This particular application ties relative price levels to a country's relative inflation rate; meaning when evaluating an exchange rate it is expected that the country with the comparatively higher inflation rate would experience depreciation in its currency in order to maintain equilibrium.

Interest Rate Theories

Interest rate theories are based on the concept that the difference in relative interests creates a condition for future exchange rate movement. One application of interest rates is the Interest Rate Parity (IRP) which is based on the law of one price, similarly to the PPP. In this case the purchase of an investment asset from one country should yield the same return when purchasing the same asset in another country; otherwise the exchange rate has to adjust to compensate for the difference. The concept can be simplified into a formula for predicting future exchange rates as shown:

$$i_1 - i_2 = \frac{F - S}{S} (1 - i_2)$$

Where i_1 and i_2 are the respective interest rates; S is the spot exchange rate; and F is the forward exchange rate.

Another known interest rate theory is the International Fisher Effect (IFE) which attempts to predict the change of an exchange rate based on the nominal difference between the two countries interest rates. This means that with when two countries have different nominal interest rates the country with the lower interest rate should appreciate proportionally against the higher rate country. This theory can be represented as formula showing the predicted change in exchange rates as shown:

$$e = \frac{i_1 - i_2}{1 + i_2}$$

Where e is the rate of change of the exchange rate; and i_1 and i_2 are the respective interest rates.

Monetary Theory

The monetary theory or model is based on relationship between currency value and currency supply. In this way currencies can be treated like other traded goods where changes in

supply and demand determine its value; in this case increased in a currencies supply would result in a depreciation of that country's currency. However, the currency supply is directly controlled by the central bank which adjusts currency supply to stabilize the national economy. With this in mind, it is clear that the backbone of the monetary theory is understanding how central banks operate and the factors that go into how decisions about monetary policy are made. This is the most complex of the exchange rate theories in that it encompasses all aspects of fundamental analysis including agendas not always known to the public.

Appendix B. Weekly Reports

Weekly Report - 2/6/14

Michael Poon

Forex News:

The Federal Reserve's decision from last week to continue the tapering of the asset buying program has influenced many of the major central banks, such as the European Central Bank (ECB), Bank of England (BoE), and the Reserve Bank of Australia (RBA) to hold their interest rates low. Australia held their interest rate at 2.5%, among the highest of the central banks, while the U.K. and ECB are anticipated to hold the interest rates at 0.5% and 0.25% respectively.^k The Euro this week hit an 11-week low possibly due to the drop in inflation announced at the end of last week on top of the decision to hold the interest rate at 0.25%. Meanwhile, the Australian dollar rallied back, hitting a three-week high, this week mainly due to the trade surplus after reporting record exports to China.^l

In Asian markets, the Japanese yen has started to climb back in the currency market especially against its nearby competing markets such as South Korea. The gain is said to have come as a result of investors pulling money out of emerging markets, however with Japan continuing its monetary easing as well as flooding the economy with money to stimulate the economy, and offset the recent tax increase; the yen is expected to weaken in the next week.^m Meanwhile, recent focus on economic dependence on China has sparked new concerns about China's economic reform on economic growth. A chart released by Bloomberg chief economist Michael McDonough shows that China consumes anywhere from 10-30% of exports from the major economies of the world. Australia in particular has taken a hit from China's slowed

^k Golle, Vince. "Europe Central Banks Seen Keeping Rates at Lows: Global Economy." *Bloomberg.com*. Bloomberg, 1 Feb. 2014. Web. 03 Feb. 2014.

^l Kondo, Masaki, and Candice Zachariahs. "Euro Near 11-Week Low Before ECB; Aussie Rises on Trade Surplus." *Bloomberg.com*. Bloomberg, 5 Feb. 2014. Web. 05 Feb. 2014.

^m Ishikawa, Mariko, and Hiroko Komiya. "Yen's Rise Versus Won Seen Unwinding on Trade: Market Reversal." *Bloomberg.com*. Bloomberg, 5 Feb. 2014. Web. 05 Feb. 2014

economic growth being responsible for 30% of the country's exports triggering a drop in Australia's export prices. With so many economies now dependent on China's economy for exports, expect a new focus on the impact of China's reform policy.ⁿ

Trading Analysis:

MACD:

This past week of trading the main strategy I have been testing is the MACD and Simple Moving Average strategy. This strategy is simple that it provides clear signals given the position of the pair in terms of the SMAs and MACD cross overs confirming bullish or bearish signals. I first began by trading using only MACD crossovers while using the MACD divergence histogram as an indicator of a trend's strength.



Figure 17 - Weekly Report: Simple MACD trading strategy

Here is a simple implementation of the MACD strategy, my first short trade I followed the signals from the crossover points marking my entry and exit point that covered a 20 pip change and closed the trade at an appropriate time. After the crossover of the MACD the divergence increased indicating a strong change in momentum, so I decided to enter a long

ⁿ Badkar, Mamta. "How China's Slowdown Is Having Ripple Effects All Over The World." *Business Insider*. Business Insider, Inc, 05 Feb. 2014. Web. 05 Feb. 2014.

position, however with a sharp increase from the pair the MACD pair lags behind and the signal becomes delayed. Also, this trade was place right before the opening of the London session where trading volume was anticipated to pick up; at the same time the Spanish unemployment numbers were release with an increase in unemployment again pulling the market sharply. I have been using technical charts with 10-minute bars as they provide direct signals with MACD without too much noise and false signals. To limit the positions to take a SMA can be added to filter only short or long positions based on the price in relation to the SMA. In the case that the price is below the SMA only bearish signal would be acted on as with the price indicates a bias to the downtrend and vice versa.

Simple Scalping:

The second trading strategy I have been testing is a simple scalping technique that utilizes the small oscillations in a in a pair to take profit over short periods of time. This particular scalping strategy uses a simple moving average to filter signals to either bearish or bullish the same way the MACD strategy does along with a stochastic oscillator to trigger entry into long and short positions.

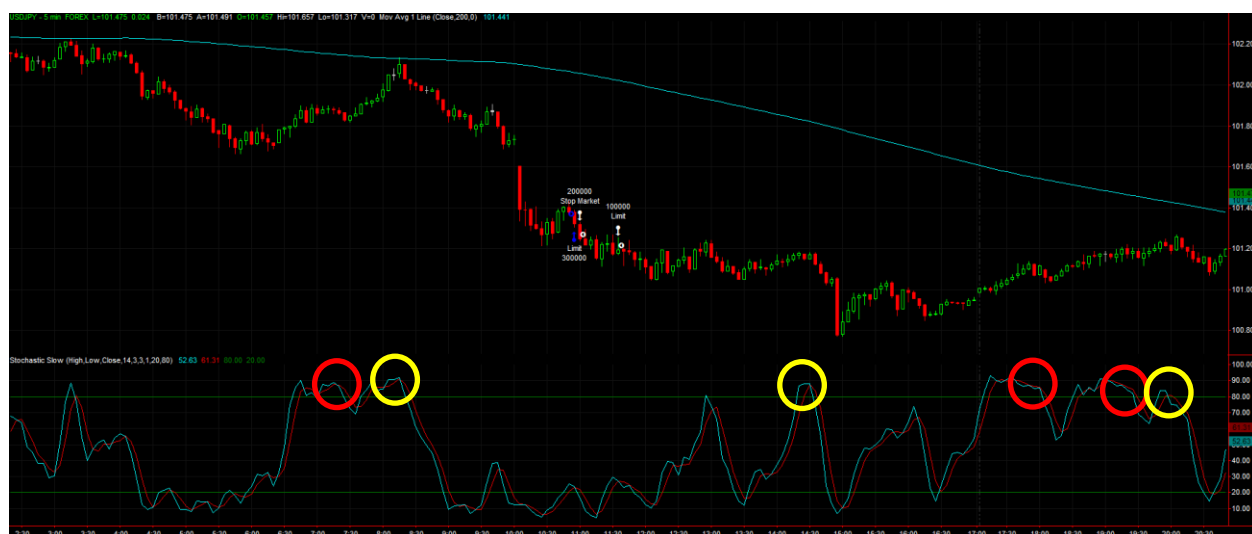


Figure 18 - Weekly Report: Simple stochastic scalping strategy

This shows figure shows a few entry positions triggered by the strategy for a short entry position. As shown above the short entry is triggered by a stochastic crossover when both lines are indicating an overbought signal or above the 80% line. This chart uses 5-minute bars as the trick behind scalping is make quick trade over a short period of time and take a small profit that can range from 3-10 pips on average depending on how you set your exit strategy. But with such small movements per trade to make a decent profit you must use more leverage. But as shown above not all triggers produce a winning trade so it is important to set stop losses with each trade to minimize losses. My current experience is that scalping works best if there is as little human input as possible; it is more effective to set stop losses and take profit orders to ensure you don't hold trade. The difficulty is determining where to place your stop loss and profit orders to make the trade worthwhile. I have been attempting to trade this strategy with more volatile currency pairs such as EURUSD and USDJPY during hours of steady volume to increase the number of opportunities to place a trade. This is usually during the London and New York session overlap and a majority of the New York session.

Austin Alibozek

Forex News:

The Australian dollars has taken an upturn from its earlier predicted steady down. Traders who were expecting the Australian dollar to start trading around 0.80 against the USD are now seeing it around 0.89. This has to do with the timing of the central bank releasing news that the interest-rate cuts are at an end. They are stepping back from their strategy of down talking the currency. The interest rate is remaining at the record low 2.5 %.

New Zealand the labor continues to grow and unemployment is down to 6.0 percent. We saw that the both of these currencies ended up doing fairly well this week, and usually these two move similarly because they are in the same region and generally follow what each other are doing.^o

Australia had another good announcement that might push them over the 0.90 mark. Recently released was a strong rise in exports. Australia's trade balance is now pushed into a surplus for the first time in two years. The retail sector was very strong during the Christmas season, new figures show, and had exports rose 4% in December and imports were up 2 %.

Simple moving average:

Back to the basics, looking at a single line moving average, the direction of the moving average line communicates important information about prices. It can be used as a technical analysis to help smooth out price action, and show a more steady movement instead of the fluctuation of the set time bars. The main concept behind the moving average line is to filter out the noise from the random up and down price fluctuations. A rising moving average shows that prices are generally increasing. A falling moving average indicates that prices, on average, are decreasing. A rising long-term moving average reflects a long-term uptrend. A falling long-term moving average reflects a long-term downtrend.

How a moving average line works is it takes the closing prices for the end of the day or the end of the last bar, and averages them together to create the line. It looks at the ending prices for however many bars that you wish to look back at to create the moving line. The fewer bars you look back on the more closely the moving average line will resemble the actual trend of the currency.

^o <http://www.forexfactory.com/index.php?day=feb4.2014>

Trading technics for a single moving line average can be as simple as when the moving average line is on uptrend buy, and sell when you see the trend starting to shift downward.

Another trading technic that can be used with a moving average indicator is a crossover trading strategy. This strategy is more effective when you have two moving average lines instead of one, but it can be done with either way. When only one moving average line is active, to use a crossover method, all that is needed for the buy and sell points is when the moving average line breaks over the actual.

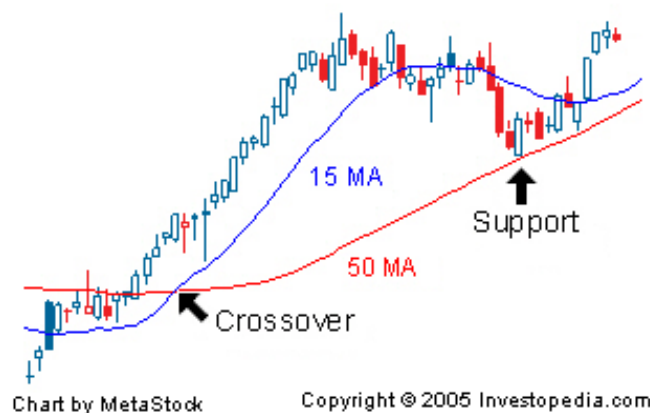


Figure 19 - Weekly Report: Example of 2-line moving average^P

An example with a two line moving average is shown above. When using a crossover method with a two line moving average strategy a buy point is when you have the fast line moving average cross over the slow line moving average and a sell point vice versa.

Bollinger Bands:

This is another basic and commonly used indicator that people use to put forth for their strategies. It uses two deviation lines over a simple moving average line. If the price of the currency is moving in between the two deviation lines this means that the market is more

^P <http://www.investopedia.com/terms/m/movingaverage.asp>

volatile. When the market is less volatile we will see it moving more along the simple moving average line.

The closer the price is moving to the upper band, this means the currency is being overbought in the market, and the closer the price is moving to the lower band means that it is oversold in the market.

Generally it can be used as a strategy when you see the current price hit the floor or the ceilings, the top or bottom deviation line, are the indicators to go long or short.

Trading Technique:

I have paired these two indicators together to try and use both to trigger when I get in. I want good signals from both before I get in; ideally I would like to see the actual price of the currency hit or break through the lower standard deviation line on my Bollinger Band indicator while seeing a cross over on my moving Average indicator. Visa Versa with a shorting technic, except, the actual price of the currency is on the upper standard deviation line.

This technic has not been working great with a non-volatile market. The ore movement between the two standard deviation lines the more pips there are to be made. Also, when the actual price seems to be sticking to the one of the standard deviation lines and not crossing the Bollinger bands moving average line. My mind set is to try and get the huge win all the time. Breaking this and determining when enough is enough is tricky. Depending on what the investment is on the currency pair will depend on the exit. One to two hundred dollar profits on a one standard lot trade should prevent me prolonging things waiting for the giant up movement for the big win.

Cutting my losses is similar. I have a fear of missing the comeback. When I'm in the negative I have trouble saying enough is enough. Setting the stop loss on all trades no matter what the size at 0.5% should prevent the impending huge loss.

Further Research:

Finding an indicator that shows volume or volatility is where my strategy is heading. This could help see more volatility to show more successful trades. I keep trades on for a short amount of time, just because the long term trades have burnt me, so the short term trades need to be successful, and seeing when the most movement is happening is important.

Michael Guarino

Market News (EUR/USD):

Despite a fairly congested week of economic data reported, the most significant event has yet to occur; in a meeting and subsequent press release on Thursday, the European Central Bank (ECB) will address the issue of altering the exchange rate of the Euro. This event, prompted by substantial losses against the United States Dollar, comes during a sideways week in which no significant ground has been recovered.^q The countries of the Eurozone have continued along respective economic trends while the overall fiscal health of the area has increased marginally.

German factory production continued to improve as the downturn experienced in France has yet to cease.^r On a more optimistic note, however, the Purchasing Managers' Indices of the entire Eurozone, as well as those of the countries comprising the area, were released at higher levels than expected.^s

Market News (USD/CHF):

The Swiss market, as usual, experienced a significantly quiet week regarding publication of news releases. The only notable economic documentation announced was the SVME Purchasing Managers' Index (PMI). The survey of business health, a leading indicator of economic strength, rose this month, exceeding anticipated levels.

Market Analysis:

Despite recent struggles, it is not believed that the European exchange rate will be forcibly altered in the meeting of the ECB. This is certainly not a definitive forecast, however, especially with the significantly low level of inflation experienced throughout Europe. Regardless of the resultant press release announcing such a decision, this announcement may

^q <http://www.forexcrunch.com/eurusd-forecast-february-3-7/>

^r <http://www.reuters.com/article/2014/02/03/us-eurozone-manufacturing-pmi-idUSBREA120CS20140203>

^s <http://www.markiteconomics.com/Survey/PressRelease.mvc/fa8005f424084e018d665383c341ef75>

serve as an opportunistic period to record substantially profitable trades. It is likely that the market will head in the direction of the news reported during this time.

Aside from a disappointing start to a potential week of recovery for the Euro, the fiscal data released collectively demonstrates hope for a gradual recovery against the United States Dollar, as it was seen to establish a sense of resistance against the previous week's substantial losses. If the exchange rate remains untouched, it is entirely possible that economic recovery could continue, slowly recording gains of the Euro against the United States Dollar.

Trading Strategy Review:

Despite briefly experimenting with a scalping system, the majority of my trading activity has involved the utilization of a technique culminating a two-line Moving Average and a RSI Filter. The success of the strategy is dependent upon anticipating intersections of the moving averages while the RSI indicator lies on the correct side, either above or below, of the desired mark. When the fast average crosses above the path of the slow and RSI indicator rises above the fiftieth level, the system advises entering the market. When the fast average crosses below the path of the slow and the RSI indicator falls below the fiftieth level, the system advises exiting the market. During the week, this approach provided its most successful returns throughout relatively short periods of time, specifically five through fifteen minute bars.



Figure 20 - Weekly Report: Moving Average/RSI Strategy

In order to properly evaluate the validity of the trend identified by one of my group of indicators, I have been utilizing the dollar index. Following my trend identifier and entry signal, this has simply served as a final assessment measure; because I have only been trading major pairs, the index essentially serves as an evaluation of market sentiment.

Weekly Report - 2/27/14

Michael Poon

Forex News:

This week Federal Reserve Chair Janet Yellen is scheduled to speak most likely to confirm the continued tapering of bond purchasing in coming months. This of course comes after an unexpected rise in home sales for the month of January as well as the release of the weekly unemployment claims, a large factor in the fed's dual mandate. As mentioned in last week's press release talks of interest rate increase have been in the mix so any queues of notable changes to the nation's economic state will be under the microscope.[†] Also on the topic of interest rates, in an article from the wall street journal, an interview with Fed Governor Daniel Tarullo explains the Fed's macroprudential tools to prevent financial bubbles. The concern over financial bubbles have been a focus since the beginning of the quantitative easing policy holding interest rates low and pushing money into the stock market. The idea behind macroprudential policy is adjusting interest rates to prevent bubbles from forming by shifting investors out of the stock market.[‡] Now this approach to controlling financial bubbles seems simple but adjusting interest rates is much more complex and most likely will be dependent on the rate of economic recovery rather than a financial bubble stabilizer.

[†] Kondo, Masaki, and Mariko Ishikawa. "Dollar Is Near Two-Week High Before Yellen Speaks; Aussie Drops." *Bloomberg.com*. Bloomberg, 26 Feb. 2014. Web. 26 Feb. 2014.

[‡] Hilsenrath, Jon. "The Wall Street Journal." *Real Time Economics RSS*. Wsj.com, 26 Feb. 2014. Web. 26 Feb. 2014.

In Asian markets, a lot of discussion surrounding the falling Chinese Yuan with continued signs of China's economic slowdown. On the currency side the People's Bank of China has been continuing to drive down the value of Yuan to discourage investors from taking advantage of China's high interest rates.^v Another contributor to China's economic slump is the increase borrowing by local governments and the role of shadow banking. The larger of the two being the rise of shadow banking due to China's strict regulation the financial system that allows direct lending between individuals and smaller businesses that have limited access to bank credit.^w China's economic downtrend has not only hurt its own position as the world's second largest economy but will most likely have negative effect on Australia's economy being a major consumer of Australian exports. However, China's recovery is expected to be slow as China will continue to get competition from neighboring Japan due to deprecation of the Japanese Yen.

Trading Analysis:

This week my focus has been look at placing longer term trades that I hold for a number of days to a week based on fundamental analysis. For example, as seen in the news lately and mentioned above the Chinese economy has slowed quite a bit in the recent months. Now since the Australian economy is reliant on China's consumption of Australian exports I entered a short position with the AUD/USD pair with the US economy stable or on a slow climb due to the continued tapering. However, with longer term trades I felt the need to set a stop loss at the highest high of the last week to ensure the pair does not breakout and run too far in the wrong direction.

^v "Should You Panic About The Falling Chinese Yuan?" *BabyPips*. BabyPips.com, 26 Feb. 2014. Web. 26 Feb. 2014.

^w Das, Satyajit. "'Shadow Banks' Pose Risk to China Investors." *MarketWatch*. MarketWatch, 26 Feb. 2014. Web. 26 Feb. 2014.

In contrast for short term trades I am continuing to use the MACD crossovers using two time intervals to confirm entry. If trading signals from a 30-min chart a 2-hour chart is used to confirm the trend entry while a 60-min chart signal will use a longer 4-hour chart to confirm for a longer term trade. This strategy so far has not worked very consistently as even with longer trades the news can pull a pair one way or another very quickly and if your trade is on the wrong side of the move it can either pull you negative or diminish any existing profit. During my longer trading sessions, I have been watching the charts to attempt to pick up on trading patterns such as double tops and bottoms, and head and shoulder pattern that indicators can pick up on. This will contribute to my progress on building a range trading strategy to take small profits here and there without putting up too much risk.

Austin Alibozek

News:

In January 2014 for New Zealand their exported goods were worth \$4.1 billion. Over a quarter of those exports, \$1.2 billion, were going to China and \$556 million to Australia. The exports to China rose up \$590 million and the exports to Australia was down \$80 million due to unwrought gold and silver, and crude oil.^x

The trade balance for January 2014 in New Zealand was a surplus of \$306 million. This is the highest-ever trade surplus January for New Zealand.

For the Euro Zone we have been seeing an economic recovery. This recovery can be noted to start in the middle of 2013. It is now expected to continue and start to affect more countries. As is typical for big financial crises the recovery for a countries economies recovery can be fragile. The Euro zones GDP saw a rise in 2013 of 0.1%, is now expected to rise 1.5% for

^xhttp://www.stats.govt.nz/browse_for_stats/industry_sectors/imports_and_exports/OverseasMerchandiseTrade_MRJan14.aspx

the year of 2014.^y

Up coming tomorrow the US is going to release is Jobless Claims again along with the Fed speakers. The Fed is going to cover banking reforms, along with interactions between monetary policy and financial stability. Durable goods, GDP and Home sales are up coming this week for the US as well. The predictions for housing sales are lower than January along with the 2013 4 quarter GDP numbers are being revised to a lower percentage than what had been previously released due to softer net exports and a lower consumer spending.^z

Note: Lost big again on Wednesday playing the AUD/USD around a news release along with trying to maximize gains by trying to jump my signals

RSI w/2 Line Moving Average:

I have finally figured out how to put multiple indicators onto the same chart. I have moved the Two Line Moving Average down onto the RSI cart below as talked about in our meetings. It was as simple as clicking and dragging the indicator down. Once done a window appears asking to keep the scale or have no axis scale. Having the two extremes for the axis I chose the no axis scale.

With the 2 Line Moving Average on the same axis now, seeing my indicators on when to take a position are much easier to determine. With a 2 Line SMA it allows you to see a longer term trend compared to a shorter term moving average because there are two different lines

^y <http://www.forexfactory.com/news.php?do=news&id=472630>

^z <http://www.efxnews.com/story/23013/us-week-ahead-fed-speakers-durable-goods-gdp-cons-conf-umich-sent-housing>

looking back at a different number of bars. Also it makes it an easier method to determine whether the trend is gaining strength or if it is about to reverse.^{aa}

The Indicator I mainly use as whether to take the position is the RSI. The SMA is mainly a secondary source to double check to minimize a false signal in the RSI or not as strong of a signal. For a Long position in this strategy a good Buy signal on the RSI, meaning the currency has been oversold, along with the “Fast” line average below the “Slow” average is where I feel more comfortable getting in the market. If the “Fast” line average is above the “slow”, or they are close together, or intersecting I look at that as not a solid buy position.

RSI:

Trading this week with the RSI strategy I have been having losing trades. I have come to the conclusion that the losing trades have been from the fact that I have not been holding the trades long enough. With trades that are 6+ hours I’m showing a better percentage of a winning trades.



Figure 21 - Weekly Report: RSI indicator application

^{aa} <http://www.investopedia.com/articles/technical/052201.asp>

In this figure you can see the RSI well below the 20-oversold line along with the fast moving average line under the slow. This is showing a Buy signal using my strategy with the RSI, as the position signal, and the SMA being the secondary. I ended up waiting until I got a solid sell signal from the RSI after holding the position for just around 10 hours and ending with a good chunk of profit.

Moving forward / more tweaks for the strategy:

1. Hold the trades for longer periods of time, produces more winning trades. Do not try to take a little here and there.
2. Trust my Long and Short signals. They work when I hit them right. When I am trying to jump the signals to try and maximize my gains, when actually it ends up losing me more.
3. Don't wait for both signals. Use the RSI as the main position taking signal and use the 2 Line Moving Average as a secondary that as long as it is showing.

Michael Guarino

Market News (EUR/USD)

Although the previous week reported roughly two-month highs reported against the United States Dollar (USD), the inability of the Euro to maintain such gains has prevailed during this past week. The previous week's resurgence against the USD was not completely depleted, but did see significant periods of deficit despite slightly unanticipated reports of economic success. Release of the German IFO Business Confidence level, for instance, highlighted a two-year high value while fourth quarter growth domestic product (GDP) data confirmed a successful close to a rather surprisingly prosperous year.^{bb}

Market News (USD/CHF)

The Swiss market experienced a fairly volatile week, despite a substantially week with regard to the publication of economic data. The only notable piece of economic documentation

^{bb} <http://www.bloomberg.com/news/2014-02-24/german-business-confidence-unexpectedly-gains-on-growth-outlook.html>

announced was the UBS Consumption Indicator, which generally serves as a significant component of the overall Swiss GDP. Although the value was reported slightly below that of the previous month, “indicating a weaker picture for private consumption,” most consumers remain confident regarding economic sentiment.^{cc}

Market Analysis

With each nation of the Eurozone steadily matching the instances of regrowth initially exhibited by a select group of countries, specifically Germany, the Euro appears to have entered a trend of success against its major competitors. Economic data representative of these nations suggests periods of continued growth throughout the next two years, establishing a sense of optimism among investors, despite the periods of instability seen to plague recent instances of theorized recovery.^{dd}

Trading Strategy Review

The focus of this past week was to further develop the profitability of the strategy developed during weeks previous. As proven during previous experimentation, the strategy selected to dictate most trading decisions does produce frequent indication of profitable trading opportunities during its utilization in viewing a range of roughly five to thirty minute bars. Because personal experience has displayed less volatility on behalf of the moving average during use with larger installments of time, preference to implementing the strategy along with such market analysis has been established. Due to the versatile application of the trading strategy, however, I have decided to consult the cumulative results produced by the indicators applied to shorter time intervals in order to further enhance my understanding of the trends at a given time.

^{cc} http://www.ubs.com/global/en/about_ubs/media/switzerland/releases/news-display-media-switzerland.html/en/2014/02/26/a.html

^{dd} http://ec.europa.eu/economy_finance/eu/forecasts/2014_winter/overview_en.pdf

As mentioned during previous reports, the search for a successfully complementary indicator has been conducted, in order to better identify the trend of a currency pair at any given time. In order to more correctly identify the strength and direction of the current market trend displayed by a currency pair, the Parabolic Stop and Reverse (SAR) indicator has been adopted to assist the previously successful strategy. This indicator simply enhances the comprehension and overall awareness of the trend exhibited by a specific currency pair during a specified time; it has been used to reinforce the signal produced by the moving average and ASI to enter a position within the market.



Figure 22 - Weekly Report: Updated Trading Strategy with Parabolic SAR

Despite aforementioned desires to back test the selected trading strategy, this approach has been temporarily suspended due to the recent addition of an indicator. This method of certifying the profitability generated by the founded trading strategy will be resumed following a consecutive week of successful trading with the adjustments that have been made.

Appendix C. Trading Logs

Strategy I Trading Log

Date/Time	Type	Symbol	Price	Units/Profit	%Profit
02/03/14 07:52	Sell	EURUSD	\$1.35	100000	(0.31%)
02/03/14 11:28	Buy	EURUSD	\$1.35	(\$415.00)	
02/03/14 10:51	Sell	EURUSD	\$1.35	100000	(0.04%)
02/04/14 00:16	Buy	EURUSD	\$1.35	(\$59.70)	
02/03/14 16:55	Sell	EURUSD	\$1.35	100000	0.12%
02/04/14 00:16	Buy	EURUSD	\$1.35	\$159.30	
02/04/14 00:40	Sell	USDCAD	\$1.11	100000	(0.03%)
02/04/14 01:57	Buy	USDCAD	\$1.11	(\$30.68)	
02/04/14 01:44	Sell	USDCAD	\$1.11	100000	(0.12%)
02/04/14 01:57	Buy	USDCAD	\$1.11	(\$119.12)	
02/04/14 02:04	Buy	USDCAD	\$1.11	100000	(0.01%)
02/04/14 02:54	Sell	USDCAD	\$1.11	(\$11.73)	
01/30/14 14:26	Buy	USDJPY	¥102.69	100000	(1.27%)
02/04/14 11:00	Sell	USDJPY	¥101.38	(\$1,282.50)	
01/30/14 16:32	Buy	USDJPY	¥102.73	100000	(1.06%)
02/04/14 16:47	Sell	USDJPY	¥101.64	(\$1,067.99)	
02/03/14 10:50	Buy	USDJPY	¥101.37	100000	0.03%
02/05/14 00:50	Sell	USDJPY	¥101.40	\$29.17	
02/04/14 03:01	Sell	EURUSD	\$1.35	100000	(0.06%)
02/05/14 04:41	Buy	EURUSD	\$1.35	(\$85.00)	
02/04/14 10:39	Buy	USDJPY	¥101.53	100000	(0.27%)
02/05/14 04:53	Sell	USDJPY	¥101.25	(\$270.08)	
02/05/14 05:00	Sell	EURUSD	\$1.35	100000	(0.01%)
02/05/14 05:13	Buy	EURUSD	\$1.35	(\$16.00)	
02/05/14 05:00	Sell	EURUSD	\$1.35	100000	(0.62%)
02/12/14 13:31	Buy	EURUSD	\$1.36	(\$841.30)	
02/13/14 01:14	Buy	EURUSD	\$1.36	100000	(0.07%)

02/13/14 02:57	Sell	EURUSD	\$1.36	(\$100.00)	
02/18/14 01:07	Buy	EURUSD	\$1.37	100000	0.33%
02/19/14 03:07	Sell	EURUSD	\$1.38	\$452.90	
02/19/14 16:15	Sell	USDCAD	\$1.11	100000	(0.02%)
02/19/14 16:15	Buy	USDCAD	\$1.11	(\$20.76)	
02/19/14 12:13	Buy	EURUSD	\$1.38	100000	(0.21%)
02/19/14 16:53	Sell	EURUSD	\$1.37	(\$291.00)	
02/24/14 03:13	Sell	EURUSD	\$1.37	100000	(0.07%)
02/25/14 09:56	Buy	EURUSD	\$1.38	(\$102.80)	
02/04/14 11:52	Buy	USDJPY	¥101.61	100000	0.41%
02/25/14 10:00	Sell	USDJPY	¥102.03	\$425.55	
02/05/14 03:41	Buy	USDJPY	¥101.31	100000	0.70%
02/25/14 10:00	Sell	USDJPY	¥102.03	\$718.00	
02/24/14 12:14	Sell	EURUSD	\$1.37	100000	0.45%
02/26/14 13:02	Buy	EURUSD	\$1.37	\$619.40	
02/20/14 02:00	Buy	AUDUSD	\$0.90	100000	0.01%
02/26/14 13:02	Sell	AUDUSD	\$0.90	\$43.10	
02/21/14 02:27	Buy	AUDUSD	\$0.90	100000	(0.41%)
02/26/14 13:02	Sell	AUDUSD	\$0.90	(\$341.00)	
02/26/14 01:50	Buy	AUDUSD	\$0.90	100000	(0.71%)
02/27/14 14:28	Sell	AUDUSD	\$0.90	(\$617.60)	
02/19/14 10:44	Buy	USDJPY	¥102.24	100000	(0.20%)
02/27/14 14:49	Sell	USDJPY	¥102.04	(\$189.99)	
03/02/14 17:25	Sell	EURUSD	\$1.38	100000	(0.02%)
03/03/14 00:39	Buy	EURUSD	\$1.38	(\$23.00)	
02/21/14 14:04	Buy	USDJPY	¥102.65	100000	(0.98%)
03/04/14 00:15	Sell	USDJPY	¥101.65	(\$970.50)	
02/19/14 16:52	Sell	GBPUSD	\$1.67	100000	0.14%
03/04/14 00:52	Buy	GBPUSD	\$1.67	\$181.30	
03/02/14 22:19	Buy	AUDUSD	\$0.89	100000	0.36%

03/04/14 01:07	Sell	AUDUSD	\$0.89	\$325.90	
03/04/14 01:23	Buy	GBPUSD	\$1.67	100000	(0.15%)
03/04/14 11:23	Sell	GBPUSD	\$1.67	(\$253.00)	
03/04/14 01:07	Sell	AUDUSD	\$0.89	100000	(0.05%)
03/04/14 16:00	Buy	AUDUSD	\$0.90	(\$47.00)	
03/05/14 11:42	Sell	AUDUSD	\$0.90	100000	(0.07%)
03/05/14 12:33	Buy	AUDUSD	\$0.90	(\$64.00)	
03/05/14 13:41	Buy	USDJPY	¥102.39	100000	(0.10%)
03/05/14 14:38	Sell	USDJPY	¥102.29	(\$96.78)	
03/17/14 13:49	Buy	USDJPY	¥101.63	100000	0.16%
03/18/14 01:21	Sell	USDJPY	¥101.80	\$164.52	
03/19/14 00:28	Buy	AUDUSD	\$0.91	100000	(1.17%)
03/19/14 21:48	Sell	AUDUSD	\$0.90	(\$1,046.20)	
03/18/14 16:04	Buy	EURUSD	\$1.39	100000	(0.75%)
03/19/14 21:48	Sell	EURUSD	\$1.38	(\$1,046.00)	
03/20/14 23:52	Buy	AUDUSD	\$0.91	100000	0.28%
03/21/14 12:18	Sell	AUDUSD	\$0.91	\$257.00	
03/20/14 20:09	Buy	USDCAD	\$1.12	100000	(0.18%)
03/21/14 16:48	Sell	USDCAD	\$1.12	(\$179.70)	
03/20/14 19:05	Buy	EURUSD	\$1.38	100000	0.10%
03/21/14 16:48	Sell	EURUSD	\$1.38	\$135.00	

Strategy II Trading Log

Time/Date	Type	Symbol	Price	Units/Profit	%Profit
12/6/2013 11:25	Buy	USDJPY	¥102.73	100000	0.01%
12/6/2013 11:38	Sell	USDJPY	¥102.72	\$900.00	
12/6/2013 13:39	Buy	USDSEK	kr6.51	200000	0.44%
12/9/2013 11:36	Sell	USDSEK	kr6.54	\$5,770.00	
12/6/2013 11:32	Sell	EURUSD	\$1.37	50000	-0.44%
12/12/2013 11:30	Buy	EURUSD	\$1.38	(\$301.00)	
12/13/2013 11:17	Buy	USDJPY	¥103.27	50000	-0.02%

12/13/2013 12:36	Sell	USDJPY	¥103.25	(\$1,000.00)	
12/18/2013 16:19	Buy	GBPUSD	\$1.64	25000	-0.32%
12/19/2013 9:52	Sell	GBPUSD	\$1.63	(\$130.75)	
12/27/2013 14:05	Sell	USDJPY	¥105.08	30000	0.14%
12/30/2013 20:05	Buy	USDJPY	¥104.94	\$4,290.00	
1/23/2014 13:24	Buy	AUDUSD	\$0.88	100000	0.03%
1/23/2014 14:39	Sell	AUDUSD	\$0.88	\$30.00	
1/23/2014 17:44	Buy	USDCAD	\$1.11	100000	-0.03%
1/23/2014 17:45	Sell	USDCAD	\$1.11	(\$31.00)	
1/27/2014 16:35	Sell	AUDUSD	\$0.87	100000	-0.04%
1/27/2014 16:40	Buy	AUDUSD	\$0.87	(\$33.00)	
1/27/2014 16:42	Buy	AUDUSD	\$0.87	90000	0.21%
1/27/2014 20:06	Sell	AUDUSD	\$0.88	\$178.38	
1/29/2014 14:00	Buy	AUDUSD	\$0.88	100000	-0.05%
1/29/2014 14:39	Sell	AUDUSD	\$0.88	(\$48.00)	
1/29/2014 14:41	Buy	EURUSD	\$1.37	140000	0.05%
1/29/2014 17:22	Sell	EURUSD	\$1.37	\$96.46	
1/30/2014 11:53	Buy	AUDUSD	\$0.88	90000	0.07%
1/30/2014 13:24	Sell	AUDUSD	\$0.88	\$57.60	
1/31/2014 8:34	Buy	AUDUSD	\$0.87	90000	-0.07%
1/31/2014 8:41	Sell	AUDUSD	\$0.87	(\$53.10)	
1/23/2014 20:17	Sell	USDCAD	\$1.11	100000	-0.95%
1/31/2014 8:42	Buy	USDCAD	\$1.12	(\$1,037.70)	
2/7/2014 9:41	Sell	EURUSD	\$1.36	100000	-0.03%
2/7/2014 9:46	Buy	EURUSD	\$1.36	(\$41.00)	
2/7/2014 9:55	Buy	AUDUSD	\$0.90	100000	-0.20%
2/7/2014 10:10	Sell	AUDUSD	\$0.89	(\$179.00)	
2/7/2014 10:19	Buy	USDCAD	\$1.10	100000	-0.06%
2/7/2014 10:20	Sell	USDCAD	\$1.10	(\$61.00)	
2/12/2014 10:22	Buy	AUDUSD	\$0.90	100000	-0.02%

2/12/2014	10:24	Sell	AUDUSD	\$0.90	(\$18.00)	
2/20/2014	14:36	Sell	AUDUSD	\$0.90	80000	-0.30%
2/20/2014	15:59	Buy	AUDUSD	\$0.90	(\$219.20)	
2/21/2014	9:40	Buy	USDCAD	\$1.12	\$90,000.00	-0.02%
2/21/2014	9:40	Sell	USDCAD	\$1.11	(\$22.50)	
2/20/2014	14:42	Sell	EURUSD	\$1.37	80000	-0.24%
2/21/2014	13:26	Buy	EURUSD	\$1.37	(\$263.04)	
2/21/2014	13:26	Buy	EURUSD	\$1.37	10000	-0.02%
2/21/2014	13:26	Sell	EURUSD	\$1.37	(\$2.20)	
2/21/2014	9:41	Buy	AUDUSD	\$0.90	90000	0.12%
2/21/2014	13:28	Sell	AUDUSD	\$0.90	\$96.30	
2/26/2014	10:33	Buy	EURUSD	\$1.37	100000	0.13%
2/26/2014	20:43	Sell	EURUSD	\$1.37	\$178.80	
2/26/2014	10:26	Buy	AUDUSD	\$0.90	100000	-0.29%
3/4/2014	15:56	Sell	AUDUSD	\$0.89	(\$213.50)	
3/5/2014	0:26	Sell	AUDUSD	\$0.90	100000	-0.01%
3/5/2014	0:51	Buy	AUDUSD	\$0.90	(\$9.00)	
3/5/2014	0:28	Buy	EURUSD	\$1.37	50000	-0.05%
3/5/2014	0:52	Sell	EURUSD	\$1.37	(\$37.00)	
3/5/2014	0:49	Buy	EURUSD	\$1.37	50000	-0.02%
3/5/2014	0:52	Sell	EURUSD	\$1.37	(\$16.50)	
3/5/2014	0:50	Buy	EURUSD	\$1.37	50000	-0.02%
3/5/2014	0:52	Sell	EURUSD	\$1.37	(\$17.00)	
3/5/2014	0:50	Buy	EURUSD	\$1.37	25000	-0.03%
3/5/2014	0:53	Sell	EURUSD	\$1.37	(\$9.00)	
3/5/2014	1:01	Buy	EURUSD	\$1.37	75000	-0.02%
3/5/2014	1:08	Sell	EURUSD	\$1.37	(\$25.50)	
3/4/2014	17:08	Buy	GBPUSD	\$1.67	170000	0.41%
3/5/2014	10:35	Sell	GBPUSD	\$1.67	\$1,150.90	
2/27/2014	16:45	Buy	USDCAD	\$1.11	200000	-0.89%

3/5/2014 17:42	Sell	USDCAD	\$1.10	(\$2,003.80)	
4/30/2014 22:21	Buy	AUDUSD	\$0.93	100000	-0.08%
4/30/2014 23:24	Sell	AUDUSD	\$0.93	(\$76.00)	
4/30/2014 22:23	Buy	USDCAD	\$1.10	100000	-0.07%
5/1/2014 15:13	Sell	USDCAD	\$1.10	(\$78.00)	

Strategy III Trading Log

Date/Time	Type	Symbol	Price	Units/Profit	% Profit
2/3/2014 9:08	Buy	EURUSD	\$1.36	100,000	0.65%
2/3/2014 11:32	Sell	EURUSD	\$1.35	\$879.00	
2/3/2014 12:41	Sell	EURUSD	\$1.35	100,000	0.06%
2/3/2014 15:56	Buy	EURUSD	\$1.35	\$83.00	
2/4/2014 1:14	Sell	EURUSD	\$1.35	100,000	0.10%
2/4/2014 1:17	Buy	EURUSD	\$1.35	\$134.00	
2/4/2014 8:35	Buy	EURUSD	\$1.35	100,000	0.01%
2/4/2014 9:18	Sell	EURUSD	\$1.35	\$9.00	
2/4/2014 9:59	Buy	EURUSD	\$1.35	100,000	0.02%
2/4/2014 10:31	Sell	EURUSD	\$1.35	\$28.00	
2/4/2014 13:09	Sell	EURUSD	\$1.35	400,000	0.02%
2/4/2014 13:13	Buy	EURUSD	\$1.35	\$124.00	
2/5/2014 16:50	Buy	EURUSD	\$1.35	100,000	0.01%
2/5/2014 16:51	Sell	EURUSD	\$1.35	\$7.00	
2/6/2014 9:15	Sell	USDCHF	sFr. 0.91	100,000	0.50%
2/6/2014 13:37	Buy	USDCHF	sFr. 0.90	\$454.00	
2/6/2014 15:17	Sell	USDCHF	sFr. 0.90	100,000	0.07%
2/6/2014 18:01	Buy	USDCHF	sFr. 0.90	\$60.00	
2/7/2014 10:33	Buy	EURUSD	\$1.36	100,000	0.08%
2/7/2014 11:32	Sell	EURUSD	\$1.36	\$107.00	
2/10/2014 8:27	Sell	USDCHF	sFr. 0.90	100,000	0.03%
2/10/2014 9:42	Buy	USDCHF	sFr. 0.90	\$27.00	

2/10/2014 12:48	Buy	EURUSD	\$1.36	100,000	0.39%
2/10/2014 20:13	Sell	EURUSD	\$1.37	\$532.00	
2/13/2014 7:55	Buy	EURUSD	\$1.37	100,000	0.05%
2/13/2014 13:51	Sell	EURUSD	\$1.37	\$72.00	
2/13/2014 15:28	Buy	USDCHF	sFr. 0.89	100,000	0.03%
2/13/2014 21:56	Sell	USDCHF	sFr. 0.89	\$29.00	
2/14/2014 9:14	Buy	EURUSD	\$1.37	100,000	0.02%
2/14/2014 10:39	Sell	EURUSD	\$1.37	\$31.00	
2/18/2014 8:33	Sell	USDCHF	sFr. 0.89	100,000	0.24%
2/18/2014 11:04	Buy	USDCHF	sFr. 0.89	\$217.00	
2/18/2014 9:03	Buy	EURUSD	\$1.37	100,000	0.10%
2/18/2014 11:02	Sell	EURUSD	\$1.37	\$142.00	
2/24/2014 8:21	Sell	EURUSD	\$1.37	400,000	0.03%
2/24/2014 9:07	Buy	EURUSD	\$1.37	\$160.00	
2/24/2014 8:54	Buy	USDCHF	sFr. 0.89	400,000	0.07%
2/24/2014 11:03	Sell	USDCHF	sFr. 0.89	\$264.00	
2/25/2014 8:11	Buy	EURUSD	\$1.38	100,000	0.01%
2/25/2014 9:37	Sell	EURUSD	\$1.38	\$11.00	
2/26/2014 10:56	Sell	USDCHF	sFr. 0.89	400,000	0.10%
2/26/2014 15:37	Buy	USDCHF	sFr. 0.89	\$356.00	
2/28/2014 9:27	Buy	EURUSD	\$1.38	100,000	0.08%
2/28/2014 10:10	Sell	EURUSD	\$1.38	\$113.00	
3/4/2014 10:19	Sell	EURUSD	\$1.38	100,000	0.13%
3/4/2014 0:34	Buy	EURUSD	\$1.37	\$173.00	
3/5/2014 8:21	Sell	EURUSD	\$1.37	100,000	0.05%
3/5/2014 10:32	Buy	EURUSD	\$1.37	\$67.00	
3/6/2014 15:24	Sell	EURUSD	\$1.39	100,000	1.10%
5/20/2014 22:09	Buy	EURUSD	\$1.37	\$1,518.00	

Appendix D. EasyLanguage Code

EL Strategy I – Strategy

```
inputs: FastLength( 12 ), SlowLength( 26 ), MACDLength( 9 ),
        Price( Close ), AvgFastLength( 50 ), AvgSlowLength( 200 ),
        StoLength( 14 ), MomentumMode (1) ;
variables: MyMACD( 0 ), MACDAvg( 0 ), MACDDiff( 0 ),
           FastAvg( 0 ), SlowAvg( 0 ), oFastK( 0 ),
           oFastD( 0 ), oSlowK( 0 ), oSlowD( 0 ),
           MomMode ( 0 );

//Calculate all values for indicator based rules
//MACD values using input parameters
MyMACD = MACD( Close, FastLength, SlowLength ) ;
MACDAvg = XAverage( MyMACD, MACDLength ) ;
MACDDiff = MyMACD - MACDAvg ;
//Single stochastic calculation with variable length
Value1 = Stochastic( H, L, C, StoLength, 3, 3, 1, oFastK, oFastD, oSlowK,
oSlowD );
//2-Line Moving Average values using input parameters
FastAvg = AverageFC( Price, AvgFastLength ) ;
SlowAvg = AverageFC( Price, AvgSlowLength ) ;

//Different momentum setup modes
switch ( MomentumMode ) begin

    //Case uses moving average bias to filter long or short positions and
    MACD crossovers as trigger
    //Best used for trending markets indicated from 2-line moving average
    case 1:
        //Bullish setup with fast moving average above the slow
        if FastAvg > SlowAvg then
            //Entry on crossover with a positive previous bar
            if MACDDiff crosses over 0 and Open[1] < Close[1] then
                Buy ( "Strat_LE_1" ) next bar at market ;
            if MACDDiff crosses under 0 then
                Sell ( "Strat_LX_1" ) next bar at market ;

        //Bearish setup with fast moving average below the slow
        if FastAvg < SlowAvg then
            //Entry on crossunder with negative previous bar
            if MACDDiff crosses under 0 and Open[1] > Close[1] then
                Sell Short ( "Strat_SE_1" ) next bar at market ;
            if MACDDiff crosses over 0 then
                BuytoCover ( "Strat_SX_1" ) next bar at market ;

    //Case confirms momentum direction and enters in the middle
    //Case for 4-hour and daily bars to catch long term trends
```

```

case 2:
//Bullish momentum demonstrated with two consecutive positive bars
  if Open[1] < Close[1] and Open[2] < Close[2] then
    if MACDDiff crosses over 0 then
      Buy ( "Strat_LE_2" ) next bar at market ;
    if MACDDiff crosses under 0 then
      Sell ( "Strat_LX_2" ) next bar at market ;

//Bearish momentum demonstrated with two consecutive positive bars
  if Open[1] > Close[1] and Open[2] > Close[2] then
    if MACDDiff crosses under 0 then
      Sell Short ( "Strat_SE_2" ) next bar at market ;
    if MACDDiff crosses over 0 then
      BuytoCover ( "Strat_SX_2" ) next bar at market ;
//Case uses MACD and Stochastic to enter trades before momentum picks
up
//Can be used at different time intervals but stochastic can produce
false signals
case 3:
  //Filter for long signals starting before momentum (MACD)
  completely shifts
  If MACDDiff < 0 then
    //Entry at the beginning of a trend reversal in a oversold
    state
    If oSlowK crosses over oSlowD and oSlowD < 20 then
      Buy ( "Strat_LE_3" ) next bar at market ;
  //Exit at the next trend reversal
  If oSlowK crosses under oSlowD then
    Sell ( "Strat_LX_3" ) next bar at market ;

  //Filter for short signals starting before momentum (MACD)
  completely shifts
  If MACDDiff > 0 then
    //Entry at the beginning of a trend reversal in an
    overbought state
    If oSlowK crosses under oSlowD and oSlowD > 80 then
      Sell Short ( "Strat_SE_3" ) next bar at market ;
  //Exit at the next trend reversal
  If oSlowK crosses over oSlowD then
    BuytoCover ( "Strat_SX_3" ) next bar at market ;
end;

```

EL Strategy II - Strategy

```
inputs:
ema83Price( Close ),
ema83Length( 83 ),
ema83Displace( 0 ) ;
variables:
ema83AvgExp( 0 ) ;
ema83AvgExp = XAverage( ema83Price, ema83Length ) ;
{if ema83Displace >= 0 or CurrentBar > AbsValue( ema83Displace ) then
    begin
        Plot2( ema83AvgExp, "ema83AvgExp" ) ;
    end;}
end;}
```

```
inputs:
    Price( Close ),
    RSI_Length( 10 ),
    RSI_Smoothing( 5 ),      -Edited from 9 3
    OverSold( 30 ),
    OverBought( 70 ),      -Tightened from 25 75
    TrailingAmt( 3 ) ;
```

```
variables:
    RSI_MA( 0 ) ;

RSI_MA = Average( RSI( Price, RSI_Length ),
RSI_Smoothing ) ;

if RSI_MA crosses over OverSold then
    Buy next bar market
else if RSI_MA crosses under OverBought then
    SellShort next bar at market ;

SetStopShare ;
SetDollarTrailing( TrailingAmt ) ;
```

EL Strategy III - Indicator

```
inputs:
    double AfStep( 0.02 ),
    double AfLimit( 0.2 ),
    bool UsePlotColoring( true ), { set to true if it is desired to use
different
    colors to plot the parabolic based on whether prices are currently
above the
    parabolic or below it }
    int PriceAbvParabColor( Cyan ), { if UsePlotColoring is true, this
input
    specifies the color that will be used to plot the parabolic when
prices are
```

```

    above it; if UsePlotColoring is false then this input has no effect }
    int PriceBlwParabColor( Magenta ), { if UsePlotColoring is true, this
input
    specifies the color that will be used to plot the parabolic when
prices are
    below it; if UsePlotColoring is false then this input has no effect }
    bool ColorCellBGOnAlert( true ), { if true, cell background color will
be
    changed when alert criteria are met; if false then cell background
color will
    not be changed when alert criteria are met }
    int BackgroundColorAlertCell( DarkGray ) , { if ColorCellBGOnAlert is
true, this input
    specifies the color to which the cell background will be changed when
the alert
    criteria are met; if ColorCellBGOnAlert is false then this input has
no
    effect }
    Price( Close ),
    Length( 55 ),
    Displace( 0 ) ;

```

variables:

```

    intrabarpersist bool PlotCrossBarsAgo( false ),
    double oParCl( 0 ),
    double oParOp( 0 ),
    double oPosition( 0 ),
    double oTransition( 0 ),
    int CrossBarsAgo( 0 ),
    intrabarpersist bool Alerting( false ),
    AlertStr( "" ),
    AvgExp( 0 ) ;

```

once

```

    begin
    { if the application is something other than Charting, like
RadarScreen, then
        set PlotCrossBarsAgo to true to indicate that the number of bars ago
that the
        last cross of the parabolic occurred is to be plotted; this value is
not
        plotted in Charting since it is on a different scale than the
parabolic
        itself }
    PlotCrossBarsAgo = GetAppInfo( aiApplicationType ) <> cChart ;
    end ;

```

```

Value1 = ParabolicSAR( AfStep, AfLimit, oParCl, oParOp, oPosition,
oTransition ) ;
AvgExp = XAverage( Price, Length ) ;

```

```

{ track the number of bars since the last crossover; if oTransition is non-
zero
then there is a crossover on the current bar, so set CrossBarsAgo to 0 when
this
occurs, otherwise, increment CrossBarsAgo by 1 on every bar }
if oTransition <> 0 then
    CrossBarsAgo = 0
else
    CrossBarsAgo += 1 ;

Plot1( oParCl, "ParCl" ) ;

if PlotCrossBarsAgo then
    Plot2( CrossBarsAgo, "CrossBarsAgo" ) ;

if UsePlotColoring then
    if oPosition = 1 then
        begin
            SetPlotColor( 1, PriceAbvParabColor ) ;
            SetPlotColor( 2, PriceAbvParabColor ) ;
        end
    else
        begin
            SetPlotColor( 1, PriceBlwParabColor ) ;
            SetPlotColor( 2, PriceBlwParabColor ) ;
        end ;

{ Alert criteria }
if oTransition = 1 then
    begin
        Alerting = true ;
        Alert( "Bullish reversal" ) ;
    end
else if oTransition = -1 then
    begin
        Alerting = true ;
        Alert( "Bearish reversal" ) ;
    end
else
    Alerting = false ;

{ Alternate alert criteria to write next reversal level to alert dialog box }
{
AlertStr = NumToStr( oParOp, 2 ) ;
if oPosition = 1 then
    begin
        Alerting = true ;
        Alert( "At next bar, stop and reverse current long position at " +
AlertStr ) ;

```

```

        end
    else if oPosition = -1 then
        begin
            Alerting = true ;
            Alert( "At next bar, stop and reverse current short position at " +
AlertStr ) ;
            end ;
        }

{ cell background coloring, see input ColorCellBGOnAlert, above }
if ColorCellBGOnAlert and Alerting then
    SetPlotBGColor( 2, BackgroundColorAlertCell ) ;
    if Displace >= 0 or CurrentBar > AbsValue( Displace ) then
        begin
            Plot3[Displace]( AvgExp, "AvgExp" ) ;

            { Alert criteria }
            if Displace <= 0 then
                begin
                    if Price > AvgExp and AvgExp > AvgExp[1] and AvgExp[1] <=
AvgExp[2] then
                        Alert( "Indicator turning up" )
                    else if Price < AvgExp and AvgExp < AvgExp[1] and AvgExp[1] >=
AvgExp[2] then
                        Alert( "Indicator turning down" ) ;
                    end ;
                end ;
            end ;
        end ;
    end ;
end ;

```

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