

# Expanding on the 10 O’Clock Bulls

An Interactive Qualifying Project Report  
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Submitted to

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This report represents the work of one or more WPI undergraduate students submitted to the faculty as evidence of completion of a degree requirement. WPI routinely publishes these reports on its web site without editorial or peer review.

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- Michael Radzicki, regarding his professor.

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## **Chapter 1: Overview and Introduction**

The purpose of this interactive qualifying project (IQP) was to develop changes to, test and analyze stock trading strategies that utilize daily opening ranges.

In today's world, it is important to be able to ensure one's proximate and ultimate financial situation. It has become common that people are forced to make decisions on how to manage their financial assets, especially their retirement plans. Out of the many options available, stocks are very common choice. Unlike past times when only the wealthy elite had access to the market, online brokers have made retail stock trading more accessible to the general population. This increase in accessibility has also created a wave of misinformation of all sorts, including a portrayal of trading as an easy task. Unfortunately, trading can go horribly wrong if not approached in a disciplined and scientific fashion. This is easier said than done. In this IQP, trading system development is approached scientifically to demonstrate that it is possible to manage assets in the stock market efficiently, and to create systems that others can use or improve upon for their own personal use.

This document introduces the reader to the basics of macroeconomics, investing and trading. Mostly focusing on trading, it explores the Charlie Wright's method to create a functional trading strategy to modify Geoff Bysshe's 10 O'Clock Bulls which consists of intraday opening range trading. It also confirms that trading is common practice, including opening ranges, the use of average true range and linear regression as exits and entries.

Opening range trading has been previously explored by others with positive results in trending markets. This project builds on the previous IQP groups focusing on the 10 O'Clock Bulls by the creation of three new trading strategies that add a myriad of new entries, exits and the use of a scanner. Using Portfolio Maestro, the systems were optimized to find what combination of entries, exits and parameters for these was the most effective. The optimization resulted in doubtful parameters that proved to be not profitable in the time sample which consisted of a directionless market.

## **Chapter 2: Trading & Investing**

Among the topics explored, are the differences between trading and investing, the main asset classes and their derivatives and also the breath of the market. The objective is to familiarize anyone who is interested in trading opening ranges who does not have adequate background knowledge in this area or needs a refresher. Ultimately, this background will aid in better understanding valuable concepts about general trading and investing.

### **Retail Trading Versus Investing**

Involvement in the market on a lower-level can consist of either taking the role of an investor or a trader. An investor and trader differ in their level of involvement with the company whose stock they purchase and their market action reflects this. Investors buy many shares of a company of their choice which gives them “ownership” of the company. Their mindset is that the company will flourish and they will with it. There are two types of investing - passive and active. Typically, passive investors go long and hold on to their shares for long periods of time, while the less common active investors get in and out of the market frequently. In contrast to investors, traders profit simply from making transactions and usually think short-term. They are not particularly loyal to or invested in the overall success of any company but just want to profit from changing market prices (Williams).

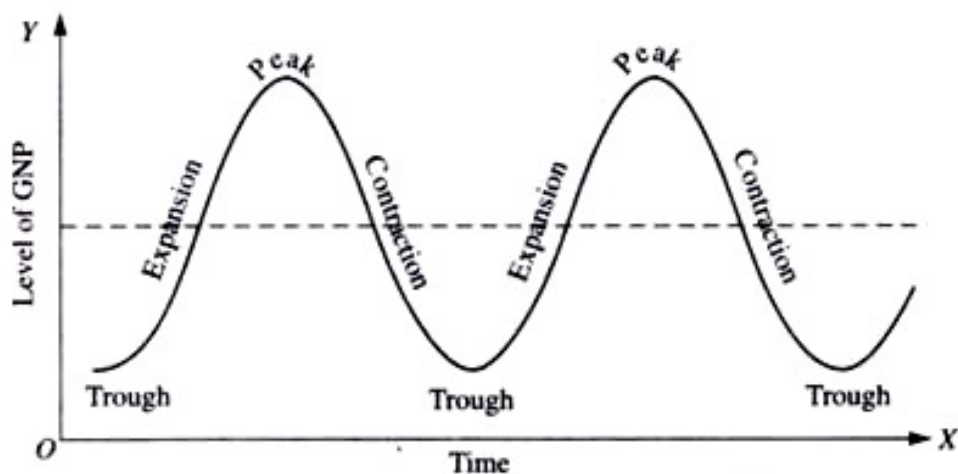
### **Behavioral Finance or Efficient Market Hypothesis**

In 2013 both Eugene Fama and Robert Shiller received the Nobel Prize for economics, even though their contributions to economics are contradictory. Eugene Fama is known to have developed the Efficient Market Hypothesis (EMH). This theory states that the price of assets in the market is reflective of all available relevant information implying that it is impossible to “beat” the market. The idea of a “random walk,” which also is used, suggests that the price is detached from previous prices and is a reflection of only the current information and news. Since the news are unpredictable by definition then the price will also be unpredictable, which makes it impossible to foresee price movements and “beat” the market. The only way that someone could really “beat” the market would be by taking higher risks.

The issue with the EHM comes from the implication that for it to be true all people must interpret and be affected by information in the same way, effectively removing all subjectivity from the matter, which in the view of Robert Schiller is impossible. Schiller is known for his work in behavioral finance that effectively combines aspects of economics and psychology to explain market behavior. In behavioral finance, subjectivity plays a big role. People tend to make decisions holistically and follow herd behavior. This means that prices are not reflective of all information making it possible to “beat” the market (Alonso Niera, 2013, pp. 547 -548). Traders tend to agree with the latter of the two disciplines since it allows for someone to accomplish exactly what they are trying to do: beat the market.

### **Cycles and Trends**

The Business or Economic Cycle is defined as the recurrent fluctuations in levels of national production, measured in Gross Domestic Product (GDP). There two periods in this cycle, contraction (recession) and expansion (recovery). During recessions, the GDP downtrends (decreases), unemployment rises, and inflation falls. During recoveries, the GDP uptrends (rises), unemployment falls and inflation increases. In a contraction, the GDP falls until it reaches a trough or a low point and then starts to increase. In an expansion, the GDP rises until it reaches a peak or a high point and then it starts to falls. The beginning and ending of recessions is defined by the National Bureau of Economic Research (NBER) (Goodwin, 2014, p. 202 - 205).



**Figure 2.1: The Business Cycle with its four stages without growth trend** (Source: Guru)

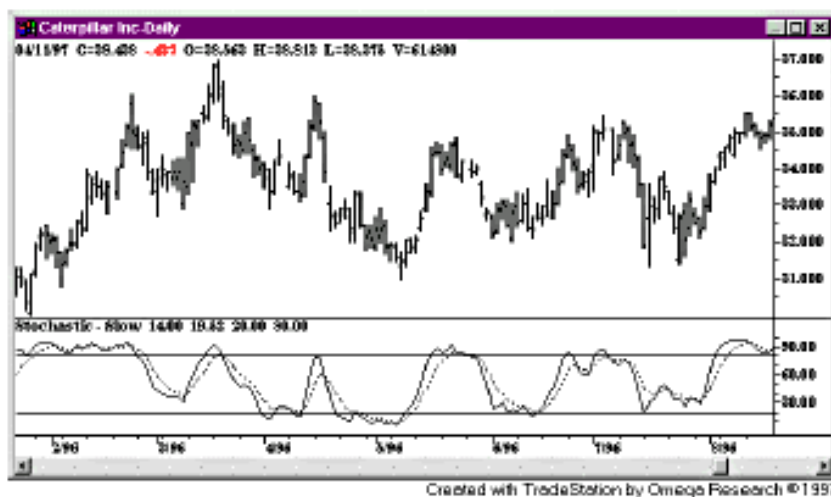
The market oftentimes does not move in a cyclic pattern. Wright states that there are three broad categories in which market behavior falls in: trending, directionless, and volatile.

- Trending: Sustained large increases or decreases in price characterize a trending market. It can either be up trending or down trending. The general direction of the price over a longer period of time is exemplary of a trending market.



**Figure 2.2: Upward Trending Market** (Adapted from Wright, 1998, p. 21)

- Trendless Market: A directionless market is characterized by smaller, insignificant up and down movements in price, with the general movement sideways. Although there is a lot of up and down movement, the price just continues to move around one general price range.



**Figure 2.3: Trendless (Directionless) Market** (Adapted from Wright, 2009, p. 22)

- Volatile Market: Characterized by sharp jumps in price. The sharp jumps in price tend to be unexpected and unpredictable.



**Figure 2.4: Volatile Market** (Adapted from: Wright, 2009, p. 23)

### Behavior of Financial Institutions over the Business Cycle

Depending on the stage of the business cycle, the government will implement different fiscal policies (spending and taxation policies) to alleviate the severity of the cycle's fluctuations. It is accepted that government spending on goods and services on all levels (federal, state and

local) affects aggregate demand and GDP in a similar way to private fixed investment. This means that when the economy is doing poorly or is a recession, governments increase their spending with the intention of stimulating economic growth. This is known as expansionary fiscal policy. The contrary, contractionary fiscal policy is when the government will spend less to slow down economic growth (Goodwin, 2014, pp. 229 - 235).

Monetary Policy also plays a role in alleviating the severity of the fluctuations. It is best defined as the use of tools controlled by the government and federal reserves or central banks on banking regulations and the issuance of currency to affect the levels of money supply, interest rates and credit (p. 250). Monetary policy can either be expansionary, used to increase money supply, lower interest rates and stimulate a higher level of economic activity during recessions, or it can be contractionary, used to limit money supply, raise interest rates and reduce economic activity (p. 278). The biggest tool in monetary policy is the manipulation of interest rates. In the United States, the interest rates are set by the Federal Reserve, nicknamed *the Fed*. When *the Fed* lowers interest rates, people are more incentivized to invest, which helps stimulate the economy. Alternatively, when the Fed increases interest rates people are less incentivized to invest which slows the economy down. Another monetary tool used is quantitative easing, or the purchase of financial assets including long-term bonds by *the Fed*, which creates more monetary reserves and expands the money supply (p. 280).

## **The Four Asset Classes**

### Equities

An equity, otherwise known as a stock, is a type of security that represents a stake in a corporation and a claim on its assets and earnings. There are two types of equities: common and preferred. Common equity gives the owner the right to vote at shareholder meetings and the right to dividends. Preferred equity, which is actually favored over common equity, does not endow voting rights in the company but a higher claim to assets and dividends than common equity. Since an equity represents a stake in a corporation and a claim on its assets and earnings, if a company reaches bankruptcy, preferred stock holders will get compensated before common stockholders (Investopedia, 2003).

### Currencies

A currency is defined as something in circulation that is used as a medium of exchange, and generally refers to money. Currency trading is necessary between nations as it allows the trade for domestic and universal goods to occur (Gove, 1961). The foreign exchange market that trades currency, otherwise known as Forex, is the largest stock market for with daily trade volume of \$5.3 trillion. Some of the most commonly traded currencies are the Dollar, Euro, Yen, Pound, and Franc. Trading currency differs from stock trading in that currencies are bought in pairs. The three categories that currency combinations fall into are Major Currency Pairs,



Minor Currency Pairs and Exotic Pairs. Some examples of the major pairs include but are not limited to: EUR/USD, USD/JPY, and GBP/USD (What is Forex).

Currency Pair	Countries	FX Geek Speak
EUR/USD	Euro zone / United States	"euro dollar"
USD/JPY	United States / Japan	"dollar yen"
GBP/USD	United Kingdom / United States	"pound dollar"
USD/CHF	United States/ Switzerland	"dollar swissy"
USD/CAD	United States / Canada	"dollar loonie"
AUD/USD	Australia / United States	"aussie dollar"
NZD/USD	New Zealand / United States	"kiwi dollar"

**Table 2.1: Major-Pairs making up the Currency Market** (Adapted from What is Forex)

### Bonds

A bond is a loan offered by investors (issuer) to a company, government or any other organization (creditor) which will be paid back with interest. Bonds are often traded in exchanges or over-the counter. One can buy bonds in various quantities. Once purchased, bonds exist for a number of years and the loan has to be paid back to the bond owner once the time expires (maturity date) with set interest rate (coupon) that cannot be changed after it is established. The investors alter the price (market price) depending on the market interest-rate and other factors, such as credit of issuer, to make the investment competitive with the current interest rates. With that, they are able to generate higher or lower percent gain on a set interest bond just by increasing or decreasing the price, which creates an inverse relationship between bond prices and interest rates (Sheimo, 2000, p.1-3). Bonds are mainly issued by companies, municipalities and the US Treasury. The credit quality and duration determine the interest rate of the bond. The worse the credit and longer the bond's maturity, the higher the interest rates will be. Some of the different types of bonds are the zero-coupon bond, convertible bonds, bullet bonds and callable bonds (Guinan, 2009).

### Commodities

Commodities are defined as resources that are used in commerce and are interchangeable for other goods of the same type. Commodities are usually traded through future contracts which allow the trader to buy or sell the commodity at a predetermined price for a later date. These goods are held to minimum standards called a 'basis grade' when traded on an exchange, and the quality of these goods do not vary much with producer (Guinan, 2009). Each country has different environmental advantages that allow specialization in some commodities, while the remaining goods have to be acquired through trade. Commodities can be divided into five categories: energy, precious metals, livestock, grains and softs. Energy commodities include

renewable sources such as green energy. Metals include gold or copper and depend on the valued price of the metal in the market. Investors can directly or indirectly provide capital for raising livestock such as pork or beef. Another commodity, grains, pose greater risk to the trader and market because of its dependence on weather. Lastly, softs are miscellaneous commodities like cotton or wood and are more rarely traded (Financial Web).

## Derivatives

Aside from the four main asset classes, two commonly discussed derivatives exist which are future and option contracts. The main similarity between the two are that they represent events that will occur in the future. Futures are contracts for delivering or accepting a commodity in its actual state with a requirement to buy or sell on a designated date. Options are contracts on these underlying future contracts which make buying and selling the commodity a choice not an obligation (Lutgen, 1986). Some of the important advantages and disadvantages between options and future contract are summarized below, thanks to the description provided by Lutgen.

<b>Futures</b>		<b>Options</b>	
<u>Advantages</u>	<u>Disadvantages</u>	<u>Advantages</u>	<u>Disadvantages</u>
No Premium	Has margin calls	No margin calls	Premium
With favorable price moves-return is greatest	Net price subject to Basis change- Less predictable	Risk is known when option is purchased	May yield negative return in some market situations
	Cannot take advantage of favorable price moves	Can take advantage of favorable price moves	Delta effect-premiums don't move exactly with future contracts

**Table 2.2: Evaluating Differences between Futures and Options** (Adapted from: Lutgen, 1986)

From looking at various case studies presented by Lutgen, it can be deduced that a future contract is typically more profitable in a down trending market, whereas the option contract will be more profitable in an up trending market.

## Intermarket Analysis

Intermarket analysis consists of considering the relationships and correlations between asset classes to make better decisions in investing and trading. Some basic relationships include but are not limited to:

- Stock and bond prices are directly correlated
- Commodity and bond prices are inversely correlated
- USD and commodity prices are inversely correlated

For example, when the value of the USD increases, it is a good sign that commodity prices will start to fall and investors see this sign and pull their money out of commodities (Radzicki, 2015).

### **Advantages and Disadvantages between Investing and Trading Stocks**

When one decides to try making money in the market they first must decide between being a trader or an investor. Focusing on equity, there are differences between the two options in terms of liquidity, margin requirements, tax advantages, regulatory and legal issues, account and position sizing. It is important for individuals to understand the distinctions and know what the advantages and disadvantages are between being a trader and investor.

#### Liquidity

Market liquidity is important because it allows for people to buy sell quickly without affecting the price of the asset. It is traders, who as the market makers, provide the investors with a liquid market by taking the end of their trades. Without traders, the investors would not have a liquid market to buy and sell shares in. Similarly, without investors, there would be no basis from which to buy and sell (Harvey, 2013). Ultimately, both investors and traders are dependent on one another to create a functional market.

#### Margin Requirements

An investor is faced with marginal requirements which is a form of protected leverage. A margin requirement is defined as the percentage of marginable, or borrowed securities that has to be paid for by the individual. This can be split into an initial (IMR) and maintenance margin requirement (MMR). For a non-concentrated account, the IMR refers to the percentage of equity required to open a position and the MMR occurs when the price of the equity drops below a minimum margin level. A concentrated account has the same MMR as the IMR.

	Initial Margin Requirements	Maintenance Margin Requirements
Concentrated Amount	50%	50%
Non-Concentrated Account	50%	30%

Higher Margin Requirement Securities	(Range from 45%, 60%, 75%, and 90% to 100%)	Stay the same as the Initial Requirement
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**Table 2.2: Common Specifications for Margin Requirements, might differ depending on the broker.** (Adapted from: Firstrade)

### Tax Advantages

There are various tax advantages for equity investors as opposed to equity traders. According to the Internal Revenue Service anything used for personal or investment purposes including stocks are considered capital assets and are taxable. Equity traders are treated as business owners and have special guidelines. For instance those who hold their stock for more than a year have long-term capital gains and are taxed between 0-15% depending on their profit. Meanwhile, equity traders that belong to short-term category and are subject to taxation as ordinary income at graduated tax rates. It is required by the IRS to maintain a record of all the trades made throughout the year, which can be very time-consuming and frustrating. Investors on the other hand are not considered business owners and may benefit from various deductions (Internal Revenue Service), Passive investors will benefit from not having many trades that they have to be accountable for since they trade infrequently. Active investors will benefit from deductions, but reporting to the IRS is more burdensome due to more frequent trading.

### Regulatory and Legal Issues

There are various regulations that have been created by the Financial Industry Regulatory Authority (FINRA) and overseen by the Securities and Exchange Commission. One of the regulations that can be an issue is the account size requirement.

### Minimum Account Size

Minimum account size requirements are different depending on the asset class and on the time frame that is being traded. According to FINRA, a day trader must have a minimum amount of \$25,000 in the account to be able to trade. If the trader loses on a trade and has below this threshold they are required to replenish the account before they can take the next trade. This can be a limiting factor to those who want to trade but do not have sufficient money coming in. In such a case the trader may choose to trade alternative asset classes like currencies which have no minimum account size requirement and can be bought in various lot sizes (MacEachern, 2008).

### Account and Position Sizes

The account sizes of investors increases through compounding, as the investor puts the money made into buying more shares with the intention to hold the stock for multiple years. Investors try to wait out a falling position and typically are satisfied with a 10-15 percent annual return. Traders, unlike investors look for higher short term returns and their accounts are smaller

and emphasize procuring frequent profits. Position sizing is most useful for traders since they have more stocks and want a high rate of return, as it allows for maximum profits however, even investors that have multiple strategies can utilize position sizing (Folger,2012).

### Other aspects to consider

There are inconveniences that can make trading cumbersome. One that comes to mind is with future contracts. Future contracts have a rollover date eight days before the expiration date during which the lead month becomes the second nearest expiration month. This brings about confusion (Equity Index Roll Dates). For currencies a big headache could be the inconsistency in prices due to the decentralization in the FOREX market. One bank for instance could have one ask price while another could have a lower price, so a broker is needed to filter the best ask and bid prices (Decentralized Market Definition, 2006). Thus, the trader has to be more flexible and more dependent on brokers. In regards to equities, headaches can arise due to the commission costs, the IRS tracking requirements as aforementioned. Also, another headache that was not previously discussed is the extra unexpected cost that may be incurred due to the delay between submitting a buy order and its execution especially for day traders who work in a fast changing time frame. In matter of minutes the stock can change from up trending to down trending and someone who uses five minutes bars or minute bars gets out at, let's say \$160.05 per share but due to delay caused by data transfer the actual exit might occur at the subsequent tick and the price might have dropped to \$158.8 per share (U.S. Securities and Exchange Commission, 2013).

### Some Differences between Equity and Forex

The structure of the Forex market is quite different than that of an equity market. Main participants in the Forex market consist of the hierarchy displayed in the image below, where the major bank including the US Federal Reserve Bank are at the top and at the very bottom are retail traders, hedge funds, corporations and retail ECNs. This is the smallest group of traders and investors who use brokers to complete the transaction. The diagram below demonstrates this top to bottom structure of the currency market.



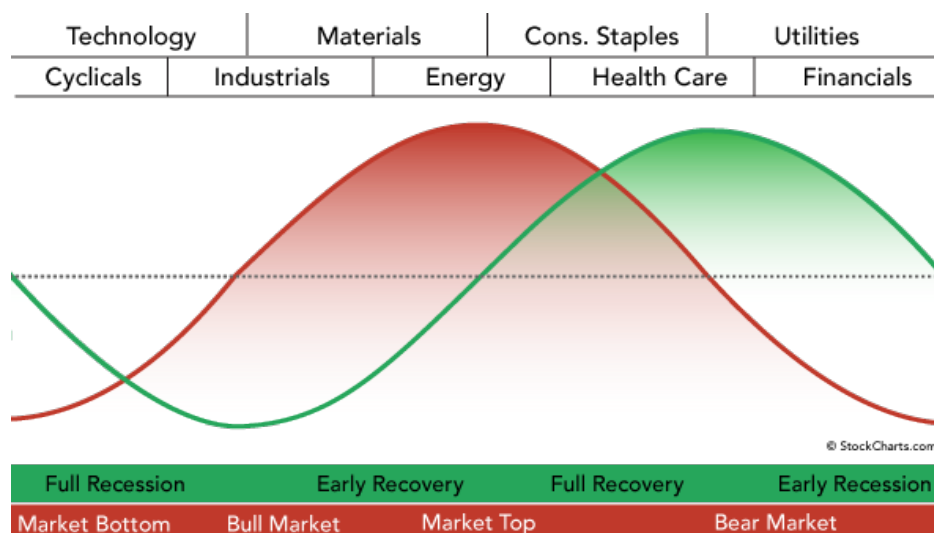
**Figure 2.5: The Hierarchy of the Forex Market** (Source: Mao)



Sector rotation is defined as an investing strategy involving moving money from equities from one sector to another depending on the stage of the business cycle. This strategy was developed by analyzing data from historical business cycles. While using this strategy, the business cycle is divided in four stages: market bottom, bull market, market top and bear market. An investor would place his money in the following sectors depending on the stage (Stone):

Full Recession	Early Recovery	Late Recovery	Early Recession
<ul style="list-style-type: none"> <li>● Cyclical and Transports</li> <li>● Technology</li> <li>● Industrial</li> </ul>	<ul style="list-style-type: none"> <li>● Cyclical and Transports</li> <li>● Technology</li> <li>● Industrial</li> </ul>	<ul style="list-style-type: none"> <li>● Industrials</li> <li>● Technology</li> <li>● Energy</li> </ul>	<ul style="list-style-type: none"> <li>● Services</li> <li>● Utilities</li> <li>● Cyclical</li> </ul>

**Table 2.3: Investing Trend in Sector Rotation** (Adapted from: Stone)



**Figure 2.7: Representation of Sector Rotation** (Stockcharts)

### Breadth of the Market

The breadth of the market is defined by google as a tool to gauge the general direction of the market. It is defined by dividing the number of stocks that experienced gains that day by the number that experienced losses.

### Stock Exchanges

A stock exchange is an organized and regulated platform on which stocks, bonds, and securities can be bought and sold by companies, corporations, or individuals (Business Dictionary).

An example of a stock exchange would be the New York Stock Exchange (NYSE). The NYSE was founded in May 1792 when 24 stockbrokers signed the Buttonwood Agreement on Wall Street. The 24 men became the first members of the NYSE. Throughout the 1800s various changes and regulations were made, then in the 1900s and early 2000s, it made its way to be the most traded exchange in the world, and has a bigger market capitalization than Tokyo, London, and the NASDAQ combined (Beattie, 2007).

### Indices

Nasdaq.com defines stock market indices as tools that help measure the performance of major groupings of stocks, classified by the exchange on which they trade, by region, or any number of classifications that allow investors to benchmark the overall performance of major groupings of stocks. The various indices help traders identify trends and new potential trading opportunities in the different segments of the markets.

### How to Tell How “The Market” is Trending

A trader can tell how the market is trending by looking at various indices and determining the direction the market is heading in. Determining the direction of the market is key in figuring out how the market is doing. The market can only have three states, they are: up trending, down trending and sideways trending. When the market is trending upwards, which indicates the market is doing well. If the market is down trending that indicates that the market is doing poorly. Lastly, if the market is trading sideways, which means the market is not doing much of anything, and the state of the market cannot be well determined.

A trader can also make assumptions on how the market is doing through research and interpretation. Research includes reading newspapers and websites such as CNBC, The Wall Street Journal, and Bloomberg BusinessWeek. Being able to interpret current events and their effects on the market is another way of telling how the market is doing. Oftentimes, articles in news and websites have to be further interpreted because they will not straight out say how the market will respond. Even certain predictions are made by a source, it is up to the individual to verify.



## **Chapter 3: Trading Systems**

Traders can construct a very bare-bone trading system with only necessary rules, one time frame and one strategy, or a very complicated one with multiple strategies, rules and other features. There are many variables that can be controlled and it is really up to the trader to create a successful system. The group will in this section explore trading systems in general and some of the requirements and options that a trader must consider when creating their trading system. Ultimately, the reader should have an idea of the thought process that went into the trading system formed to trade opening ranges.

### **Trading Platforms and Brokerage Account**

Trading platforms and brokerage accounts are both vehicles that provide a service on which a trader can make a trade (Radzicki, *Topic #4: Trading Platforms and Other Tools*, 2015).

#### **Trade Platforms**

Trade Platforms are defined by Investopedia as the software that allows traders and investors to place trades and monitor accounts (2010). Examples of trading platforms include fidelity investments, Scottrade, and TradeStation. TradeStation was the platform used for this project. TradeStation is a trading platform provided by TradeStation Group Inc., that allows users to design, test, optimize, monitor and automate their own strategies for equities, options, futures and foreign exchange markets (Folger, 2012).

#### **Brokerage accounts**

Brokerage accounts are run by stock brokers. Stock brokers are licensed professionals who are able to buy and sell stocks/securities for someone else. Brokers either charge a flat rate, or commission on every trade for their services (Perry, 2013).

#### **Types of brokerage accounts**

There are two different types of brokerage accounts. They are cash accounts, and margin accounts. Cash accounts are account where the investor must pay the full amount for securities, the investor cannot borrow money from the brokerage firm. Margin accounts are a type of account where the investor can borrow money from the brokerage firm to purchase securities, with the securities serving as collateral for the loan. Margin accounts must stay within a margin ratio at all times. Otherwise the broker makes a margin call to the investor, which is the demand for a deposit of money or sold security to settle the margin. The borrowed money also has added interest (Types of Brokerage Accounts, 2016).

Commissions and additional fees are important when deciding which brokerage firm is right for the investor. Commission is a fee charged per trade for the services of the broker. Commission fees can be anywhere as high as \$30 to as low as \$8. The higher the commission

usually means better services provided, however this is not always the case and careful research should be done by the inquiring investor.

Additional fees may include maintenance fees and minimum opening balance fees. Minimum opening balance fees are the amount of money the investor must at least have in order to open an account with the firm. Some firms do not have this fee, but it can range anywhere from \$500 to \$50,000. Maintenance fees are fees that are charged by firms with low opening balances. The fee needs to be paid when the investor's account drops below the minimum balance (Kennon, 2016).

## **Data Sources**

### Financial Assets Traded

Financial assets are assets that derive value because of a contractual claim. Examples of assets are stocks, bonds, currencies, and commodities (Financial Assets Definition, 2006). This paper will only go into detail about stocks and currencies. Stock transactions take place on exchanges. There are multiple exchanges around the world. The more popular exchanges are the New York Stock Exchange, NASDAQ, Tokyo Stock Exchange, and the London Stock Exchange (The World's Biggest Stock Exchanges, 2016). The US stock exchanges are regulated by the Securities Exchange Commission (SEC) and the National Association of Securities Dealers (NASD) which is a non-governmental agency that oversees licenses for brokers and regulates the sales of securities (How the U.S. Markets Are Regulated, 2016). Currencies are traded on the largest market in the world which is the foreign exchange market, otherwise known as the Forex. The Forex is not regulated at all, due to the competition of the world wanting the value of their currency to be high, it regulates itself. (Top 7 Questions About Currency Trading Answered, 2006).

### Methods of Trading

Assets can be bought in many places, and there are various methods of how they can be bought and sold.

#### *Specialists and Market Makers*

The main difference between specialists and market makers is that specialists represent NYSE specialist firms and are the main facilitators of trade on an exchange. Market makers represent broker dealers who facilitate trades by holding shares and posting bid and ask prices for those shares. Both are responsible for the liquidity of the market (What's the Difference Between a Nasdaq Specialists and an NYSE Market Maker, 2005).

#### *Open Outcry Pits*

An open outcry pit is defined by Investopedia as A vanishing method of communicating on a stock, commodity or futures exchange that involves verbal bids and offers as well as hand signals to convey trading information in the trading pits. Trading pits are the parts of the trading floor, such as at the New York Stock Exchange, where trading takes place. A contract is bought and sold when a trader yells out that they want to sell the contract and for what price. The buyer then calls out what price they are willing to pay for the contract (2003).

### *Electronic Trading*

Electronic trading is the use of online websites for the act of placing buy and sell orders for financial securities and/or currencies with the use of a brokerage's internet-based proprietary trading platforms (Online Trading Definition, 2004). This is the method that was investigated throughout this IQP. The trading platform used for this specific project, which was previously mentioned before, was the TradeStation trading platform that is provided by TradeStation Group Inc. Although the team only used the simulation platform, the trading systems developed using the software can be traded in real time through TradeStation. Other examples of online websites that act as brokers are Scottrade, TD Ameritrade, and Etrade (O'Shea 2016).

## **Stock Investing Styles**

### Value Investing

This investment strategy consists of acquiring stocks of companies that are currently undervalued or are trading below their intrinsic value. By buying the stock at a deflated value, the investor benefits when the price returns to the fundamental worth. The biggest issue with value investing is estimating the intrinsic value of a stock. Many investors will use the same information to reach different conclusions depending on their criteria for defining intrinsic value. This insecurity translates to higher investment risks (Value Investing Definition). Other disadvantages include stocks continuously underperforming, missing out on profitable investments due to high margins of safety and a lack of liquidity for a poor performing stock (Pros and Cons of Growth Versus Value Investing).

### Growth Investing

This investment strategy consists of acquiring stocks of companies that will grow faster than the general market, normally the S&P 500. Investors look into many aspects of a company to decide which they believe will grow. A common criteria is known as CANSLIM.

Some disadvantages of growth investing are: higher risk and volatility, dividends are uncommon since companies reinvest earnings, and expectations may never be fulfilled (Pros and Cons of Growth Versus Value Investing).

### Hybrid Systems

Hybrid Systems not only combine the aforementioned techniques but might also include aspects from various other strategies.

## Trading Styles

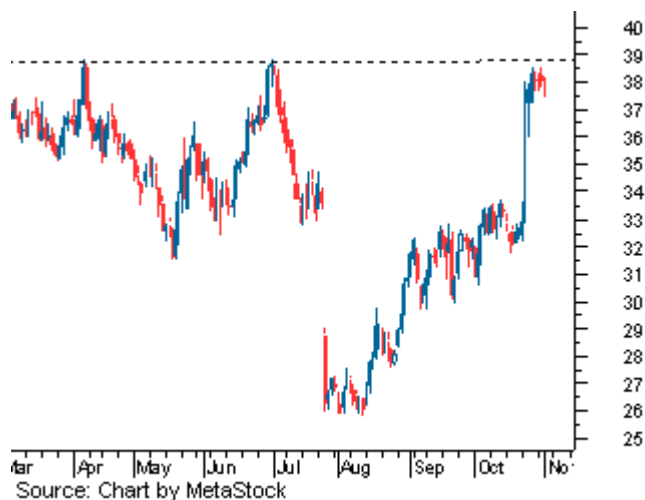
The three basic market types are explained in chapter 2. Charlie Wright sets three broad strategy categories, each corresponding to a market type: Trend Following, Support and Resistance (S/R), and Volatility Expansion.

### Trend Following Strategies

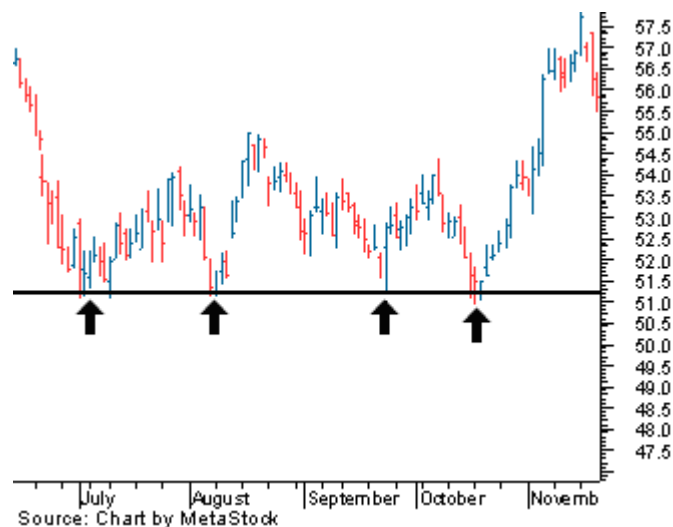
As their name implies, trend following strategies are used when the market is trending. Investopedia defines trend trading as “Trend trading is a trading strategy that attempts to capture gains through the analysis of an asset's momentum in a particular direction. The trend trader enters into a long position when a stock is trending upward (successively higher highs). Conversely, a short position is taken when the stock is in a downtrend (successively lower highs).” This strategy focuses on exploiting big moves and traders continue to hold a position until they believe that a trend has stopped or reversed.

### Support and Resistance

A support and resistance is a set of price levels that a stock or currency has trouble passing through. The support acts as a floor and the resistance acts as a ceiling. The resistance barrier occurs at a level where an increase in supply halts due to trades getting filled, whereas, an increase in demand for a decreasing stock creates the support barrier. The best way to spot support and resistance levels is to look at reversals from the past and interconnect the peaks with a horizontal or sloping line. This strategies are normally intended to be used in trendless markets (Wright, 1998).

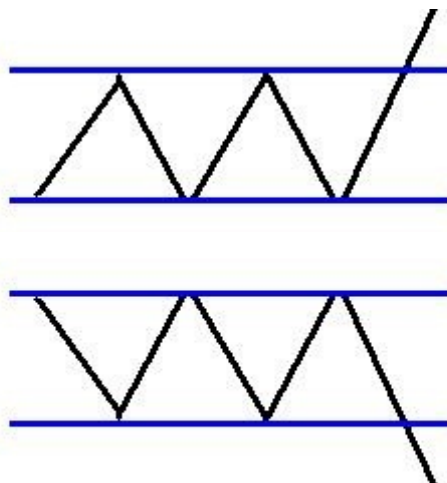


**Figure 3.1: Resistance:** Approximately 39 USD acts as a resistance on this chart.



**Figure 3.2: Support:** The black line acts a support on this chart.

The support and resistance levels, sometimes are prone to breaking, and can be tested by waiting for the bounce off to see if the barriers hold. There are numerous resistance and support systems that vary in their entry properties and they are significant for technical trading as they provide vital information about market behavior. Most traders using this strategy assume the support and resistance is going stay intact entering at the support and exiting at the resistance. Other traders will interpret breakouts and breakdowns as a good indicator of a start of a trend or big move and will act on it.



**Figure 3.3: Breakout (Top) and Breakdown (Bottom)** (Source: TradeQuest.com)

Figure 3.3 show a stylized representation of a breakout and breakdown. The blue lines represent the support and resistance levels. Traders will act on a breakout by either going long in a breakout or going short in a breakdown.

## Volatility Expansion

Volatility expansion strategies are typically designed to be used on volatile markets. Sharp movements in the market are exploited by these types of strategies. There are many methods to do achieve this, for example gap trading.

### **Trading Styles: Main Differences**

Each strategy category has various advantages and disadvantages that make them suitable for traders with various trading styles.

	<b>Trend</b>	<b>S / R</b>	<b>Volatility</b>
Time in the market	Always in the market	Not always in the market	A substantial amount of time out of the market
Winning trades	Small percentage of winning trades	Higher percentage of winning trades	High percentage of winning trades
Where is money made	Money is made on big moves	Money is made in sideways markets	Money is made in market explosions
Where is money not made	Money is lost in choppy periods	Money lost in trending periods	Money is not made in quiet markets
Biggest con	Many false signals, long drawdown periods	Difficult to sustain profit over the long term	Never get the big move
Biggest pro	Possibility of high profits	Higher percentage of profitable trades	High percentage of profitable trades
Profit	Average profit per trade high over long term, unlimited	Limited average profit per trade	Small profit per trade, limited
Philosophy	Buy high and exit higher, sell low and exit lower	Buy low and sell high	Very quick and short term trades
Emotional	Long sustained drawdown periods can be difficult	Easier to trade because you are buying low and selling high	Exciting to trade - trades are short-term
Type of Indicators used	Moving Average, ADX, price bands and channels	RSI, %R, Stochastics, Support/Resistance lines	Purely based on price

**Table 3.1: Main Differences between Three Trading Styles** (Source: Wright, 2009)

### **Example Trading Strategies**

#### *Turtle Systems*

Turtle systems are a result of an experiment conducted by Richard Dennis and William Eckhardt. The experiment consisted was meant to test if it is possible to teach someone to trade. The previous belief was that traders had an innate talent that could not be taught. The experiment

supported the claim that people can be taught to trade. The strategies they taught consisted of trend following strategies, the simplest being a cross moving average strategy.

Cross moving average strategies consist of two moving averages of different lengths. When the slower moving average crosses over or under the fast moving average, it indicates a change in the trend pattern. The traders then change their position accordingly (Carr).

### *10 O'Clock Bulls*

The 10 O'Clock Bulls was developed by Geoff Bysshe and assumes that the first thirty minutes of the daily session is the most volatile and provides support and resistance barriers for the rest of the day. The highest high and lowest low of the first thirty minutes, sometimes called the “amateur hour”, is used to define the opening range. If a stock's price breaks out of this range with above average volume, it's expected to continue to trend in the direction of the breakout, and traders take a position accordingly. To choose which stocks to trade every day, Bysshe uses his HotScans scanner to search the pre-market for stocks with more movement and higher than average volume (2009).

### *Regression Channels*

Regression channels, also called Raff Regression Channels, is a very commonly but effective instrument used in trading. The basic idea consists of calculating from previous data and superimposing a linear regression on a chart. The channel is then formed by setting two parallel lines translated up and down by a magnitude defined by the point of data farthest to the linear regression.



**Figure 3.4: A Closer Look to Defining Regression Channels** (Source: StockCharts.com)

Traders can use regression channels to trade in many different ways. Two basic examples is trading the trend imposed by the channel. A trader would take a position with the trend and would get out if the price broke out of the channel. Another way to trade would be support and resistance. The trader would get take a position when the price gets close to one of the channel limits and reverse or get out when it hits the other limit (Yell, 2014).

### *Precision Trading Systems*

Precision Trading Systems (PTS) were made famous by Mel Raiman. PTS consists of combining many technical indicators to make the best decisions. PTS fully relies on the information given by or derived from the Figure data and applies probability analysis to foresee price movements. The stocks traded also are selected by scanning the market for desired characteristics such as low volatility (Precision Trading System).

### *Gap Strategies*

Gaps are defined as the price difference between the close and opening of two continuous sessions when the price opens outside the range of the previous bar. Traders can try to exploit these by betting that the price will run (will continue to trend in the direction of the gap) or will fill (return to the general price range of the previous day) the gap (Gap Trading Strategies).

### *Neural Networks*

Artificial neural networks are used to mathematically analyze and predict patterns that human beings cannot recognized. It is believed that these may hold special significance in the future of trading and studies, such as Hadavandi, Shavandi and Ghanbari have shown.

### **Time Frames (Advantages and Disadvantages)**

There are six general trading time frames which are scalping, day trading, swing trading, intermediate term position trading, long-term position trading and active investing. These trading time frames refer to how long the trader holds his trade. Multiple time frames can be traded by a user, however, each has advantages and disadvantages that need to be considered.

#### Scalping

Scalping is the act of buying and selling a large position very quickly. The objective is to take profits from small price changes. This is usually done by professionals or companies with very fast operating systems that can do quick and accurate time calculations. The fast speed is advantageous because traders can omit market instability. The main disadvantages that make this time frame less tradable is the fast pace required and the insane commissions that rack up, eating up gains, due to frequently getting in and out of the market (Guinan, 2009).

#### Day Trading



Day-trading occurs in a span of minutes or occasionally hours. Intraday traders can utilize minute bars. The biggest advantage to day-trading is that there are many opportunities without the overnight risk. Some disadvantages for day trading are the transaction costs and the need for the traders to quickly respond in this fast-moving market (Elder, 2014).

### Swing Trading

Swing trading is typically measured in days and sometimes in weeks. Some of the advantages in swing trading are that there can be good risk management and good opportunities without excessive commission baggage. Common disadvantage in swing trading is frequently missing the big moves (Elder, 2014).

### Intermediate-Term Position Trading

Intermediate Term Position Trading, as suggested by the word “intermediate,” lies between long and short time frames, short being considered swing trading and lower. This trading time frame is measured in weeks and maybe on occasion in months. This frame has some qualities of both short and long term trading. For instance there are few trades which means a small commission buildup. However, similarly to a short term trading system, there needs to be more supervision over the stock (McClellan).

### Long-Term Position Trading

Long-term position trading is buying and holding the stock for months and sometimes years. There are various pros and cons in trading this time frame. Among the advantages are the negligible commission, large gains and the little time it consumes daily. The major disadvantage that arises from trading at this time frame are the drawdowns which can be severe (Elder, 2014).

### Active Investing

The difference between trading and investing has already been discussed which makes understanding what active investing is in terms of the trading time frame easier. Active investing is different from regular (passive) investing as it is more highly involved and focuses on shorter term profits. This investing type entails buying and regularly checking the stock, not just holding it, which make it much more involved. Active investors use methods like technical analysis and stock chart analysis more than fundamental analysis so they can determine when to buy and sell, with a belief that they will be more profitable. As an objective, active investors look to get in on upturns and get out on downturns which can be difficult to spot. Conclusively, this type of investing can be more risky, requires more time and attention, but can be much more rewarding (Investing Answers).

### **Manual Trading versus Algorithmic (Automated) Trading**

Manual trading is when a trader makes all transactions by themselves, without the help of an automated system. There are many pros to manual trading. The first is the control the trader has over their transactions. A manual trader controls where and when their money goes. Some cons to this method are the emotional ties those traders have to their trades and the trust they must possess in their personal entries and exits through profitable and losing trades. Alternatively, automated trading is when a trader codes a system which includes the set-ups, entries, money management stops, and exits and incorporates them into a tradable system. The pros of an automated system are that once the coding is done and the system is implemented through a trade platform, the traders no longer have to be constantly in front of the computer. They can wake up, turn the system on, and go play golf all day and check on their progress via a mobile device. A big con of automated trading is that the trader might put too much faith in the system and leave a weak or incorrect strategy running. Fortunately, this can be avoided through back testing and frequent code verification. Thus, traders that do not have the stomach for manual trading or do not want to continuously track their trading progress typically do automated trading (Folger, 2011).

### **Fundamental versus Sentiment versus Technical**

There are three market analysis techniques widely used to analyze future market action. Fundamental analysis is one technique used which analyzes the economic, social and political situation to predict price movements. For instance, in fundamental trading, the individual may look at a company's monthly, quarterly and annual report to gain information regarding company's income statement to decide whether their stock is worth trading (Bysshe, 7). Sentiment analysis is the second method of gauging the market. In it, the general opinion that people have for the market is used for predicting price, specifically whether the market is bullish or bearish (Bysshe, 5). The last market analysis technique is technical analysis. Technical analysis relies on historical price movements to predict where the price will go. This is a feasible method because past market information can be obtained by analyzing past prices, and scientifically backed up predictions can be made by looking for patterns and developing ideas based on the patterns observed (Bysshe, 8). With TradeStation account accessible, technical analysis is useful due to the ability to back test and draw conclusions that can improve existing strategies.

### **Personalized Objectives**

Trading Strategies tend to be personalized by the traders' preferences. Traders due this to feel psychologically and practically comfortable. Many of these personalization options come in form of objectives. Examples include:

- Time frame: Some traders also hold other professions not allowing them to trade at all times meaning that they must design their strategies according to their schedule. Also some traders prefer to be in the market as little as possible since increasing the time inside the market increases the risk taken.

- No overnight trading: Some traders prefer not to trade overnight since these cannot sleep comfortably due to the anxiety of risking money.
- Cross-Market Robustness: this means that the strategy is versatile and can perform in many types of markets.
- Profit Objectives: traders will decide what constitutes a “Profitable” Strategy by their own parameters. Traders will then set their objectives depending on their criteria such as high annual rate of return, high trade winning percentage and/or profit factors above a certain value (typically 2).
- Account Size: Strategies tend not to be perfect meaning that some trades will lose money on occasions. The maximum amount of money lost during a session is called the maximum drawdown (maximum adverse excursion). If this value presents large losses compared to the account size, the trader might lose all his money. It is important to set money management objectives to evade wiping out accounts,

### Tradeoffs between Trading Objectives

Traders have several objectives they want to meet. Some of these include the obvious, such as positive efficiency and high profit to loss ratio while other objectives are more personalized such as a small number of losing trades and not leaving trades in the market overnight. There will be conflicts between some trading objectives and the trader will have to weigh the tradeoffs. Ultimately, the trader has to sacrifice some objectives for others. Prioritizing objectives based on importance can help the trader decide what time-frame to trade in.

One example of a trade-off is when deciding between long-term trading and day-trading. The trader may make a list of benefits that each timeframe guarantees.

<u>Long-Term Trading</u>	<u>Day Trading</u>
1) Greater price fluctuations = greater possible returns due to bigger price changes	1) Smaller price fluctuations = smaller possible returns
2) Guarantees lower commission due to less frequent buying and selling	2) Wracks up more commission because of frequent trading
3) Trades held overnight can cause stress and insomnia	3) Trades not held overnight
4) Account wipeout more likely-greater possible losses	4) Smaller losses

**Table 3.2: Some Trade-offs Between Long-Term and Short-Term Trading** (Adapted from Radzicki)

If this trader has high anxiety, cannot fall asleep for hours knowing his money was on the line and decided sound sleep was most important it would be in his best interest to choose day trading. Ultimately, as there are many trade-offs the trader has to accept what all the implications will be of each.

### Fundamental Law of Trading System

There are five fundamental laws of trading. These are 1) Trading is an acquired skill, not an innate talent 2) There are no winning systems, only winning traders 3) Successful traders who stop learning stop winning 4) Goals are your compass and 5) 90% of all traders fail (Winvesting). With regards to trading systems, second law is directly relevant. This law conveys that it is the trader that profits, and that although a system exists it is how the system set up by the trader that really matters. A trading system is a tool that helps the user do a better job, however, it is not any better than the user behind it. Ultimately, the trader has to develop the skill and confidence to develop working strategies.

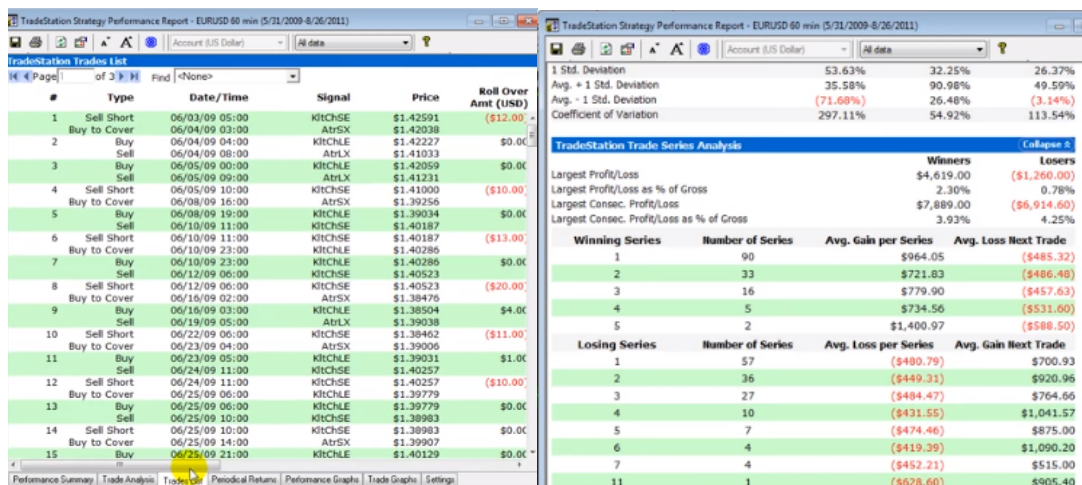
### Metrics from Strategy Performance Report

Depending on the trading platform used, the trader should be familiar with the method that the trading logs are recorded and displayed. This is vital as the trader will have to understand the performance of their strategies so they can assure their profitability. Since TradeStation is being used in this project to simulate OR strategies, the focus will be specifically on the TradeStation Strategy Performance Report. The TradeStation Performance Report displays the historical performance of a trading strategy applied to a chart, evaluating the strategy for its trading characteristics and its potential reward and risk. This report contains a Performance Summary, Trader Log, Trade Analysis and a Performance Figure.

All Trades			
Total Net Profit	\$38,033.60	Profit Factor	1.23
Gross Profit	\$200,541.80	Gross Loss	(\$162,508.20)
Total Number of Trades	583	Percent Profitable	40.14%
Winning Trades	234	Losing Trades	348
Even Trades	1		
Avg. Trade Net Profit	\$65.24	Ratio Avg. Win:Avg. Loss	1.84
Avg. Winning Trade	\$857.02	Avg. Losing Trade	(\$466.98)
Largest Winning Trade	\$4,619.00	Largest Losing Trade	(\$1,260.00)
Max. Consecutive Winning Trades	5	Max. Consecutive Losing Trades	11
Avg. Bars in Winning Trades	37.03	Avg. Bars in Losing Trades	13.20
Avg. Bars in Total Trades	22.78		
Max. Shares/Contracts Held	100000	Account Size Required	\$9,993.00
Return on Initial Capital	38.03%	Annual Rate of Return	14.45%
Return Retracement Ratio	0.53	RMA Index	74.69
Trading Period	2 Yrs, 2 Mths, 22 Dys, 20 Hrs, 59 Mins	Percent of Time in the Market	90.85%
Max. Equity Run-up	\$51,543.40		
<b>Max. Drawdown (Intra-day Peak to Valley)</b>		<b>Max. Drawdown (Trade Close to Trade Close)</b>	
Value	(\$11,361.10)	Value	(\$9,993.00)
Net Profit as % of Drawdown	334.77%	Net Profit as % of Drawdown	380.60%
Max. Trade Drawdown	(\$1,260.00)		

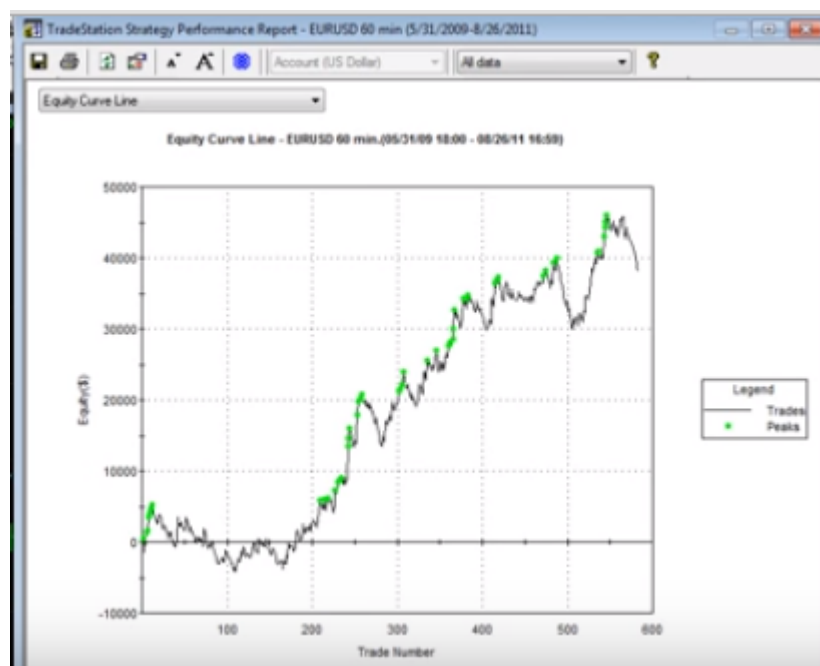
**Figure 3.5: Performance Summary** (Source: TradeStation, 2012)

The performance summary contains some valuable information about how a strategy behaves during a specified historic time frame. While it may not correspond to the future market, it may give input (especially when tested on multiple time frames) into the overall probability of success of the strategy. The Performance report contains useful statistics such as Total Net Profit, Number of Winning/Losing Trades, Profit ratio and Maximum Drawdown. Settings such as commission and slippage when enabled are accounted for in the performance summary.



**Figure 3.6: Trader Log (Left), Trade Analysis (Right)** (Source: TradeStation, 2012)

The trader log (trade by trade) tab shows the log of all each trade chronologically, with criteria such as entry, exit, efficiency, and commission. It is useful for closer examination of each trade. Trade Analysis displayed on the right provides more advanced statistical and risk calculations, also, it contains analysis of consecutive winning and losing trades.



**Figure 3.7: Performance Figure** (Source: TradeStation, 2012)

Lastly, another option available is the performance Figure tab which allows the trader to visually see the performance of the strategy. There are various performance Figures that can be selected which show the equity curve in different light, for example, bar to bar, area curve and net profit. Ultimately, the trader can utilize these tools to better understand the quality of the strategy and get a sense of how it will perform in the market real-time (TradeStation, 2012).

### Trading System Rules

The market can be traded technically thanks to advanced trading platforms in which the trader can create strategies and develop a successful trading system. Technical trading on a trading platform requires familiarity with trading system rules, since it is one thing to make a working strategy but another to make a winning strategy. Entry and exit rules can significantly affect the quality of the trading system.

Entry rules are decisions that get a trader in or out of the market. In an automated signal, the entry signals define the exact price and market conditions to enter the market. This is important to set so that the stocks are bought or sold at optimal positions. For instance in a trending market the trader would want to get in as soon as there is a reversion from bearish to bullish market behavior so you don't miss the 'big move', thus, they could place an entry when there is a specific increase in stock price (Sands, 2008, p.8). When making entry rules there are several options such as filters, set-ups, or triggers. Price patterns and indicators can also be used as entries.

Exit rules are created to get out of a winning position. When to get out of a winning position is an important decision to address since it determines how profitable the system is. In fact, it is essential for a complete trading system to have an exit strategy. It is possible to automate an exit at specified point which gives more control to the trader (Sands, 2008, p.9). There are various exit rules that can be used to get out of a market when profiting. Some of the options for exit rules include but are not limited to (1) exit after a set number of bars (time) (2) exit at the end of day (time) (3) create a trailing stop (4) set a profit target (price) and (5) use an indicator.

The only exits that might not be intuitive are the trailing stop and the indicator stop, thus, a brief example will be given for each. A trailing stop is a stop that uses an algorithm to periodically adjust itself in your favor. For instance, a common trailing stop is a moving average trailing stop which looks at the price of the subsequent bar and if the price was below the average price then the stock would be sold at that price. Other potential trailing stops use price, channel breakouts, and volatility algorithms to exit the market (Tharp, 2007, pp. 256-259). While an indicator is designed to reveal information and the state of the stock, it can be used in both exits and entries. There are hundreds of indicators including stochastics, relative strength index and moving average (Yell, 2013).

Another set of rules when developing a trading system are exits that get you out when the position is losing, which are called stops. Stops help cut losses so the trader is not wiped out by major downturns. Loss can be minimized once a point is determined and set by the trader that indicates this change in market direction. Ultimately, the stop has to be set before entering a position, which can at times be difficult to predict (Sands, 2008, p.9). Two major types of stop losses that exit you out of the market are 1) money management stop and 2) end of day stop. Other possible exits exist, for example the inactivity exit which occurs when there is no profit and no loss for a predetermined number of bars.

Ultimately there are entries and exits that need to be utilized depending on the circumstances. Many people ignore exits and put most of their focus on how to get in the market. Van Tharp in his book, "Trade Your Way Into Financial Freedom," refers to this as 'Lotts bias.' Tharp explains that the golden rule, "Cut your losses short and let your profits run" has nothing to do with entry but everything to do with exit. In conclusion in a trading system must contain both and traders cannot emphasize only one if they want to have a successful system.

### **Position Sizing**

Whenever a large amount of money is traded, it becomes an important to allocate different amounts of money depending on the stocks you decide to trade or on the strategies you trade with. This is called position sizing. Position sizing is important because it allows the trader to maximize his profits while minimizing losses. When taking position sizes traders ought to take into account advice given by experienced traders. Some useful tips provided in 'What You Need To Know About Your Trade Position Size Strategy' that may be helpful. First, when taking

positions, traders should adjust the amount spent on each trade depending on market conditions. For instance in a bear market, the more the price drops the better it is to decrease the position sizing. This can be seen in the following table:

Market Drop	Amount per Trade	Discussion
0% to 19%	\$20,000	Do nothing. Drops of this magnitude are routine.
20% to 29%	\$10,000	Bear market begins. Position size cut in half.
30% to 39%	\$5,000	Position size cut in half.
40% to 99%	\$2,500	Position size cut in half.

**Table 3.3: Example Position Sizing According to Market Index** (Source: Bulkowski, 2012)

Second, the trader should adjust the position size depending on the market and stock volatility. Next, a good rule of thumb is to hold as many positions as are manageable while diversifying, this number varies depending on the trading style. Day traders for instance will have fewer positions than a buy and hold trader due to the quickly changing nature (Bulkowski, 2012). Those are some points to consider for someone who is only starting to incorporate position sizing into their trading strategy. Also, most important are the two position sizing techniques. Martingale Technique is the more popular of the two and it works by adding to a losing trade in the hope of lowering the average entry price which requires a smaller move to breakeven. Anti-Martingale Technique works by adding only to the winning trades and assumes adding to losing trades will drain your account (Yell, 2014). Ultimately, both techniques have been successful in the past, thus, it is to the preference of the trader to choose.

### Order Types

Traders utilize several types of orders depending on how they want to enter and exit the market. Most commonly used order types are the market orders, stop orders and limit orders. Market orders are used to enter the market without a price restriction. They are usually placed at the open or close and simply serve the purpose of getting you in at the beginning of the trading day. Stop orders are orders that get you into or out of the market at the market price once you pass a predetermined price. Buying at market price guarantees that you get a fill (order getting fulfilled) regardless of the time. Lastly, limit orders are used to buy into the market below the market price or sell out at higher price than the market. Limit orders are for buyers who want to save or make more money than the market, however, they are often not as effective since the fill is not guaranteed by the broker (Wright, 47).

Less commonly used orders include day orders, market on close (MOC) orders and conditional orders which are modifications of the commonly used order types. Day orders last one trading session, an MOC orders exit the trades at the closing price but with a time limit. The conditional order is used to trigger or cancel another order (Bulkowski, Order Types).

### Stock Selecting Rules

Stocks are selected to fit the strategy that is being traded. Whether you are a long or short



term trader the objective is to deliberately choose a stock that will make you money. These stocks can be determined in various ways some more accessible than others. For instance, there are automatic stock scanners such as the one advertised by Bysshe in “Trading the 10 O’Clock Bulls” and websites such as MarketWatch that filter stocks daily depending on selected categories. The main benefit of a stock scanner is that it is specialized for a particular strategy and the trader does not have to determine the criteria, however, this method is not free. In contrast, the free web scanners are easily accessible, however, using a free service means that the trader is responsible for determining the criteria for the stocks based on his strategies. An example of stock selecting criterion include: price, volume, P/E ratio, performance, exchange, and type of industry. Typically, the more filters are selected, the fewer choices appear, which means the more specialized the filters are the more tailored the results can be to your strategy. Ultimately, choosing a stock arbitrarily is more risky as the entry may not be activated, and if a stock is selected it may not be the optimal stock for trading a specific strategy. Choosing the right stock using a scanner lowers such risks and guarantees more success.

### **Average True Range (ATR)**

The Average True Range (ATR) is an indicator that measures volatility developed by J. Welles Wilder. It is calculated by first calculating the True Range of a set of bars. The True range can be calculated by the choosing the highest of the following for a bar:

- Current High less the current Low
- Current High less the previous Close (absolute value)
- Current Low less the previous Close (absolute value)

By computing the average for the highest True Range values for a set of bars one can find the Average True Range of the current bar.

## Chapter 4: Analyzing Trading Systems

Creating a metric for evaluating the profitability of a trading system, and comparing two different trading systems, is a vital part of approaching trading in a scientific way. Expectancy, or the expected value of the trading system, is a way to measure the average historical performance of a system. Expectunity is annualized expectancy, and can be used to compare two systems that traded over different time periods. System Quality is the normalized expectancy, and is a dimensionless figure that is also useful for comparing different trading systems. A detailed description of each of these metrics is given below.

### **Risk Multiples**

Several of these concepts rely on the concept of R-multiples. The R-multiple  $c$  of a trade is given by

$$|P| = cR$$

where  $P$  is the profit (if the trade was a loss, it is a negative number) on the trade and  $R$  is the money risked on the trade. An indication of good system performance is to have high R-multiples on winning trades and low R-multiples on losing trades (Tharp, “Risk and R-Multiples”).

### **Expectancy (System Expected Value)**

Given historical trade information, the expectancy  $E$  of a system is given by

$$E = \frac{\sum_{i=1}^n R_i}{n}$$

where  $R_i$  is the risk multiple of trade  $i$ , and  $n$  is the number of trades that the system took (Radzicki, 2015).

Expectancy can be understood as the average profit per trade. This means that a system that has a positive expectancy will be profitable, even if it has a small winning percentage.

### **Expectunity**

Expectunity is the average net profit after costs per year. Given the expectancy  $E$ , the expectancy  $E'$  is given by

$$E' = (E - C)T$$

where  $C$  is the total costs (i.e., commission, data feed subscription, etc.) incurred while trading, and  $T$  is the estimated number of trades per year (Radzicki, 2015).

The expectunity can easily be converted to other time periods, by simply choosing the appropriate  $T$ . For example, by making  $T$  the number of trades per month rather than per year, the expectunity is now the after-costs net profit per month.

Since expectancy normalizes for the frequency of trading, systems that trade differently can be more easily compared. Comparing a day trading system to a system that trades on week bars is much easier using expectancy than using expectancy alone.

### System Quality

Given the expectancy  $E'$ , the system quality  $Q$  is given by

$$Q = \frac{E'}{\sigma(c)}$$

where  $(c)$  is the standard deviation of the R-multiples of all the system's trades, both winners and losers. Systems which are more consistent are given higher quality ratings than equally profitable systems with higher variation in their R-multiples (Radzicki, 2015). **Monte Carlo Analysis**

It is important to see how a system behaves in many different circumstances. The simplest way to do this is to acquire a vast amount of historical data about the system's performance. However, there are situations in which this is not practical. For example, if the asset on which a system is being traded has not existed for very long relative to the size of each bar or market conditions have changed recently, accurate historical data is simply not available in large quantity.

A way to evaluate the robustness and behavior of the system more generally and without using huge amounts of data is Monte Carlo Analysis. Applied to trading, Monte Carlo analysis takes a list of trades (i.e., generated from historical data), randomly samples from the list with replacement many times to generate many new lists of trades, and then evaluates what the system's performance would have been in each of those alternative histories.

Computing the usual relevant metrics like net profit, maximum drawdown (maximum adverse excursion), and winning percentage over these many alternative histories replaces the single values of each of the metrics with distributions, which give robust averages rather than single values and estimates of the average variation in the metric as the system trades.

These estimates can then be used for inform decision making during system development and after the system is deployed far better than getting single estimates from the original history would. For example, if a Monte Carlo simulation reports that a system's average maximum number of losing trades in a row is 3 with a standard deviation of 0.7, and the system takes 5 losing trades in a row, one can be very confident that something has changed and the system needs to be retired or reworked.

It is important to note that the values of some metrics are tied to the number of trades in each simulation that the Monte Carlo Analysis generates: it is very different to say that the average maximum number of losing trades in a row is 2 when each simulation contained five trades than when each simulation contained 50 trades.

## Applying these Methods to a System of Systems

Instead of trading a single system, it is often better to divide one's capital among multiple different systems, and trade each of them simultaneously. There are two main reasons that this is usually more profitable (Radzicki, 2015):

1. **Diversification:** multiple, decorrelated systems are less likely to lose simultaneously. Combining two decorrelated systems with the same expected value will not change the expected value of the overall portfolio but will reduce the variability of the equity curve.
2. **Flexibility:** different systems perform better in different market conditions. One can rotate their systems based on the market and their recent performance history on real or simulated accounts. By activating some systems and deactivating others in response to changing market conditions, one can greatly increase the expected value of a portfolio.

Much like the development of individual systems, the development of a system of systems must be approached scientifically to be consistently effective. The most natural way to create, maintain, and back test a system of systems is by defining system monitoring rules which govern the selection of individual systems to use at any given time, and a method of allocating portions of the overall portfolio to each actively trading system.

System monitoring rules can be broadly separated into three categories: system suspension rules, system reactivation rules, and system retirement rules. System suspension rules determine whether a system should be temporarily suspended, perhaps because market conditions are no longer suitable for that system. These rules are usually based on number of losing trades in a row or drawdown. System reactivation rules determine when deactivated systems are reactivated. They are usually based on profit measures of the system based on its simulated performance on price data from the recent past. System retirement rules are similar to system suspension rules, but they are permanent: retired systems do not reenter the system of systems without manual intervention. They are usually based on number of losing trades or expectancy calculations; i.e., if expectancy becomes negative and stays negative for a long time, the system may need to be reworked (Radzicki).

In the simplest case, each system in a system of systems is given an equal share of the portfolio. For example, if the portfolio is worth \$100,000 and there are two active systems, each would trade with a \$50,000 account. Another, arguably better option, is to allocate money to each system based on some performance metric, commonly system quality. This is done by normalizing the value of the metric for each system (i.e., dividing the value by the sum of the values for all the active systems), and then multiplying that fraction by the total value of the portfolio (Radzicki, 2015). For example, if the portfolio is worth \$100,000, and two systems are active, system A and system B, with system qualities 7 and 3, the total of the metric values would be 10, so the normalized system quality of system A would be  $7/10 = 0.7$  and the

normalized quality of system B would be  $3/10 = 0.3$ , so \$70,000 would be allocated to system A and \$30,000 would be allocated to system B.

## Chapter 5: Optimizing Trading Systems

Trading systems which have modifiable inputs like the period of an average true range calculation or the target slope of a linear regression will perform slightly differently with different values of those inputs. It is helpful to pick values for the inputs which help maximize profit and are robust. However, with even a few inputs, there can be several hundred different combinations, far too many to be tried manually.

The process of optimization is designed to resolve this issue. In the simplest case, optimization routine simply executes the system on a single set of data with every possible combination of inputs and then compares the results.

The results of all the executions are compared using an objective function, and the combination of inputs for which the objective function is highest is chosen. An objective function is a function that takes all the information about a system run and rates the overall performance of the system. A natural choice for objective function is the net profit of the system; other common choices include the Sharpe ratio or winning percentage. Objective functions can also be linear combinations of several different factors; this allows for the inclusion of factors that are necessary for a system's performance to be acceptable for whatever application it is being built for but not sufficient, such as minimizing maximum drawdown or minimizing the number of consecutive losses.

Optimization is a way to pick the best parameters for a system which is already profitable and robust. It is possible that a system which is unprofitable can become profitable on certain data sets through optimization, but the performance of such systems is generally not robust; it is unlikely that such a system will continue to be profitable in even slightly different market conditions or when traded on a different equity. Instead, optimization should generally only be used to make a profitable system more profitable. A convenient way to ensure that optimization is used correctly is to optimize systems very near the end of their development, after they have already been seen to trade well over a long time period or over multiple equities (Wright).

### Overfitting and How to avoid it

When the number of combinations of parameter values is large relative to the amount of data being used, optimization can cause overfitting. Overfitting is when the system is fit so closely to the data that it does not generalize to data it wasn't exposed to during the optimization; i.e., it fits the historical data so well that it will only be able to perform well if history repeats itself exactly.

It is never easy to directly determine whether there are too many parameters and too little data. The most reliable simple method for checking if a model has been overfit is to split the data into two parts: a *training set*, which will be used in the optimization, and a *validation set*, which is not used in the optimization, which can be used to test the system's performance on data it was not optimized to. For example, if the past four years have seen market conditions similar

to current conditions for a certain symbol, then a natural choice for the training set would be the data from four years ago up until one year ago, and the validation set would be the data from one year ago until the present day. If the system performs significantly worse on the validation set than it does on the training set, even if it is still profitable, it has probably been over fit, and needs to be re-optimized with fewer options for its parameters or, ideally, more data (James, Witten, Hastie, & Tibshirani, 2013).

This method is sufficient for most situations. However, when accuracy is critical or data is scarce, k-fold cross validation is an effective approach. This document will not describe k-fold cross validation in detail, but interested readers can learn more in from James, Witten, Hastie, & Tibshirani's book, *An introduction to statistical learning: With applications in R*.

### Choosing Data for Optimization

When optimizing, it is very important to choose the data to optimize over wisely. It is important to choose data that is similar to the data that it will eventually be traded on; i.e., similar market conditions from the recent past. It is also important to make sure that the optimization is given enough data: if the amount of data is small enough relative to the number of parameters the system has, the optimization may over fit the data.

A natural choice is the past price data of the equity that the symbol will eventually be traded on. While the price data will never be exactly repeated, future price data for an equity will probably behave similarly to that equity's price data from the recent past.

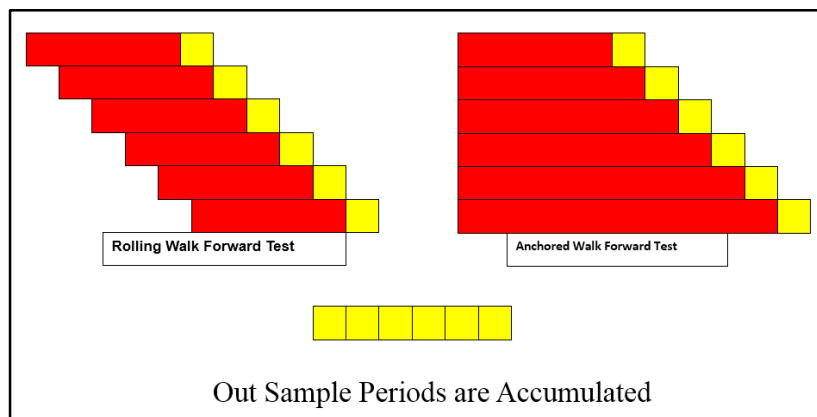
When past price data for a single equity is insufficient, a system can instead be optimized over recent price data from many different equities simultaneously. In TradeStation, this is done using Portfolio Maestro. This is the process that was used to optimize the systems described in this report.

### Walk-Forward Analysis

While a single system can perform successfully for many years, the optimal parameter values may change over time, so it is important to periodically re-optimize based on price data that was created after the previous optimization. This method is called walk-forward optimization. The final result of a back test on a system that uses this method is the accumulated performance of the system on the bars between each individual optimization (called out sample periods), with the system using the optimal parameters found by the most recent optimization. The period of this reoptimization is itself a parameter that can be optimized (Kirkpatrick and Dahlquist, 2011, p. 548). TradeStation Portfolio Maestro is capable of conducting walk-forward optimization back tests.

In walk-forward optimization, the range from which data is taken for each individual back test can be assigned in two different ways. In rolling walk-forward optimization, the number of bars included in each optimization is fixed, starting with the most recent available bar

and moving backwards until enough bars have been collected. In anchored walk-forward optimization, each optimization back test starts from the same initial date and goes until the present day, meaning that each optimization has progressively more data to work with, but also that the data is older. Below is a diagram illustrating the two different methods:



**Figure 5.1: Illustration of Anchored and Rolling Walk-Forward Optimization** (Adapted from Radzicki, 2015)



## Chapter 6: Literature Review

In 1998, Charlie Wright explained how to create a trading system in his book, *trading as a Business*. Wright emphasized how valuable discipline is when trading a strategy and explained that it is proper discipline, and not correct market predictions that makes the experts profitable. This involves having a sound trading strategy, which contains of entries, exits, and stops as well as sound cash management strategies. Accordingly, it is the design and execution of a trading strategy that is the key to profits.

Wright encouraged the use of the set-up followed by an entry. A set-up, not previously discussed, was defined by Wright as the condition(s) necessary prior to considering taking a position in the market- typically as an indicator that tells the trader to prepare to get in or out of the market. He also suggested that the set-up should be specifically geared towards the strategy and warned about the tendency for new traders to often feel discouraged when first making set-ups and entries due to not understanding the role of each in a trading strategy.

Wright defined an entry as the signal by which the strategy purchases the contract in the market. Two main rules that Wright introduced when creating entries were that prices should confirm the direction indicated by the set-up before the position is taken and that the entry should guarantee that the strategy captures every price move it is designed to. These rules, when followed, ensure that certain desired market conditions are satisfied (thanks to set-up placement) and that it is “safe” to get into the market. Also, they give the trader a sense of what will occur once the entry is prompted, so once in the market the trader can track the price movements and mitigate some risks.

Wright believed that the success of a strategy is directly tied to the exits, money management stops and cash flow management. Exits are designed to close a position as soon as possible to protect profits thus requiring of a market order to be filled immediately. Wright claimed that the most common mistake done by traders is using criteria for an entry as an exit and suggested that instead of trying to reverse a position in trend following strategies. There are three reasons, he argued, to simply exiting instead of reversing the position. The first is to take the profit at a predetermined price level or indicator. The second is that they are certain conditions that it is more profitable to flat instead of long or short. And the third is that when an indicator being used to determine entry turns against the trader then he or she can get out of the market and wait until all conditions are met again.

Stop losses differ from exits in that they are used to protect capital and are not based on market activity. Wright utilized money managements as they help protect trading capital. These stops, Wright explained could not to interfere with market action and had to be revised with time to suit current market conditions. Another stop he suggested was the profit protection stop, also known as a trailing stop. These stops and exits are primarily used to limit risk taken on trades.

Wright suggested that the best way to design a strategy is to modify only one element on the strategy at a time starting with the set-up. He suggested to keep all other elements consistent for the sake of comparison. Just after one has ended designing the rules for the set-up, entry and exit, one can optimize the parameters of a strategy that in its prior state, proved to be profitable.

Wright is not the only one to have used mechanical trading rules to turn a profit. In 1998, Gençay demonstrated that having mechanical systems for trading brought success and that more research should be done to integrate the costs of commissions into automated strategies. Prior to that, in 1993, Jegadeesh and Titman showed that a simple automated trading can turn a profit. Thier system longed stocks for a period of six months if they had already been up trending for a prior period of six months. Even though these rules were simple and applied to long term trading, they showed that systems can in fact trade effectively when approached in a disciplined fashion.

The use technical automated trading has become common use in the financial markets and surveys such as the one conducted by Menkhoff and Taylor in 2007. Not only has automatic trading become common, but the timeframe in which the technique is applied has been reduced. This was argued by Schulmeister in 2009, who showed that the speed provided by automated trading creates more trading opportunities in a smaller time frame, which in turn results in the design of even faster trading systems which again create more trading opportunities.

A system that uses the intraday trading timeline is opening range trading. Even though Geoff Bysshe claimed not to have invented the opening range trading method, he popularized it through his book *Trading the 10 O'Clock Bulls*. In his book he claims that sentiment is a major factor driving the market on the daily time frame. Such claim can be supported by the work of Nobel laureate Robert J. Shiller regarding behavioral finance. Even though not everyone agrees with Shiller, he demonstrated that movement in the market can only be effectively predicted on the long run. Short term predictability is rendered useless by the sentiment of asset holders. This sentiment refers to the psychological state of holders and its effects on how they behave. Shiller's work has actively affected how professionals approach asset management since the 1980s (Campbell).

Bysshe used an opening range of the first 30 minutes of the daily session to better understand the sentiment of the day. The opening range consisted of the highest and lowest price value of the first thirty minutes. The movement inside that range provides a lot of insight regarding the possible trend of the day. Bysshe claimed that the first thirty minutes are emotionally charged and information packed. Information packed since this is the time when traders are able to input traders that are reactions to their interpretation of the overnight data regarding companies and international markets. Emotionally charged because it is the first time for traders to put in action their overnight conclusions. From his trading experience, he concluded that the high and lows of the day happen inside the first thirty minutes 35% of the time.

Bysshe argued that there are three dimensions to a Figure: price, volume and time. Volume is an important player in trading the opening range. Important movements in the market tend to be accompanied by abnormalities in volume. These tend to be expressed as spikes in volume data above the average trend. When movements in price are accompanied with high volume it is a sign of the trend imposed by the movement to continue. High volume confirms price because it is reflective of not only the activity of traders but also of large financial institutions (2009, pp. 11-12).

Bysshe recognized the opening range as important support and resistance boundaries and identifies four factors that reinforce the strength of the boundaries: time, number of occurrences, volume, and how recently it was formed. The more time a stock trades at a price level the more significant that level becomes. The higher number of occurrences when the price swings at a level the stronger that boundary becomes. The higher the relative volume is at a particular price level, the more likely it is that the price level will become significant support or resistance. Support and resistance levels that have been created recently are likely to be more significant than those that were formed weeks or months ago.

There are cases where the price breaks above a resistance level and that level starts behaving as a support. Bysshe claimed that are various things causing this type of price behavior. When the market is bullish enough for the price to reach the resistance then traders interpret this as a sign of an uptrend. More traders will now long making the price go even higher. If the price dips and touches the resistance but does not show clear signs of going under the boundary then that boundary has become a support. Bysshe claimed that traders who did not get a chance to buy the stock when it initially went over the boundary now have a second chance to acquire it with hopes of the movement repeating itself. This behavior only pushes the price upward again. He also argued that the longer a price lingers over the boundary, the stronger the support becomes since more traders will go long betting that the boundary is indeed a support. Bysshe defined a movement over a resistance as a breakout and below a support as a breakdown (pp. 16-21).

Bysshe defined his opening range (OR) as the highest high and the lowest low of the first 30 minutes of the daily session. He proceeded to ask three questions about the OR: Does the OR have a well-defined area of support or resistance at its low or high? Is there a distinctly bullish or bearish bias to the OR? Is the volume for the entire OR unusually high? The first question addresses how “tradable” a stock is. The more volatile the opening range is the less effective trading a stock will be since it does not present a clear trend. Stocks that behave this way should not be traded for the day’s session. The second question addresses the possible direction of the day. If there is a bias, that is a good sign of a possible breakout and trade opportunity in the bias’s direction. And the third question addresses the legitimacy of the OR. If there was high volume it means that the OR is more reliable since there is high sentiment involved. Apart from these three questions, Bysshe also addresses the general long term trend as an important factor to consider when trading a specific stock since it provides insight of how is normally behaves that could be extrapolated into the future.

For the 10 O'Clock Bulls, Bysshe defined three types of trading methods or entries: buy the initial breakout when the conditions are right, buy the retracement to the breakout when you need confirmation and buy the second breakout when you need more confirmation. For more volatile markets, confirmation makes trades less risky.

To be able to confirm a trade, he suggested four other factors to conclude that a breakout is "healthy." The first is good consolidation before the breakout. Consolidation is when the dominance of either supply or demand is unclear. Bysshe claimed that consolidation behavior is a sign of change in trend. One of the overwhelming themes emphasized by Bysshe is thinking of the limits of the OR as ranges and not as static values. This allows for noise in the consolidation periods to not be confused with a real breakout. The second factor is high relative volume since it signifies that the trend is strong. The third is a clean breakout followed by bullish price action since it shows that the breakout is healthy and the movement is strong. The fourth is a bullish big picture meaning that the stock is likely to continue to uptrend (pp. 34-40).

Apart from trading the breakouts, Bysshe also introduced the practice of "fading." This consists of entering the market after confirming that a boundary does act as a support or resistance. To trade the OR low boundary he imposed three rules: first, a second demonstration of support at the low of the day. Second, evidence from the big picture that the OR low should be support and third, good intraday relative strength as compared to the market index. For the first rule, a trader must be looking for either a quick rejection of the low or a failed breakdown. He emphasized it is important to wait for a stock to finish consolidating since it only reinforces the movement and if traded before then it might actually breakout through resulting in losses for the trader. Bysshe claims that the principles applied for fading the OR Low can be used to fade failed breakouts (pp. 42-47).

Bysshe concluded his book by explaining the importance of using a market scanner to identify possible trading opportunities across a wide range of equities. He promoted the use of his HotScans program to facilitate the task and also set some things to aim for in scans. For trading breakouts he suggested to look for stocks with: a defined resistance near the OR high, bullish pattern near the OR high, and unusually high volume over the OR period, an OR high greater than or equal to the previous day's high, an OR above all previous resistance levels, a daily uptrend, upward daily gap, big volume on the breakout, a logical stop based on an intraday swing and bullish behavior after the breakout (p. 55). For fading the OR Low he suggested looking for stocks with: a well-defined support near the OR low, an OR low formed with big volume, a bullish reversal pattern at the OR low, an OR low that is equal or above the previous day's OR low, a daily uptrend, an upward daily gap, a second test of the OR low as a resistance, clear rejection of the OR low area, a strong consolidation and rejection of the OR low, and a positive intraday relative strength pattern (p. 65).

The profitability of intraday opening range breakout strategies was assessed by Holmberg, Lönnbark, and Lundström in 2009. Through testing various strategies involving the

opening ranges they realized that mechanized trading rules tend to result in higher profits when the market trends or in times of high volatility.

Momentum in intraday trading is the perceived idea that rising stocks keep rising and falling stocks keep falling. This idea was legitimized by the work of Barberis, Shleifer and Vishny in 1998 when they statistically showed that investors do over react, under react and take part of herd behavior in their daily activities over a wide range of empirical parameters. This is in line with Bysshe's description of price consolidation behavior.

Even though Bysshe made a claim that opening ranges have statistical significance he only used empirical assumptions to make such claim. The statistical significance of opening ranges was effectively demonstrated in 2013 by Holmberg, Lönnbark and Lundström.

Holmberg, Lönnbark and Lundström also showed that strategies similar to Bysshe's 10 O'Clock Bulls strategy are effective. Their version of the strategy traded equities, they traded US crude oil futures and only used data from the open, high and low of the session. They did not include any sort of exits or stops meaning that any position dependent on a previous behavioral moment would not be closed until the end of the trading session. The losses assumed by these open positions would be reduced in real trading with the use of trailing stops and stop losses. They also did not include commission costs. Regardless, they effectively showed that opening ranges can effectively be traded even if commission costs are included afterwards.

The 10 O'Clock Bulls strategy was expanded in 2010 by Cekirdekci and Iliev. Their major contributions were adding profit making exits, money management stops at the OR High and Low, V-Box money management stops and the use of an exponential average indicator. The profit making exits consisted of trailing stops to ensure that profit would not be lost and Average True Range (ATR) Ratchet, which effectively closes a position when the summation of ATR values for the bars after the entry has become higher than the price of the stock. This is an effective stop since the ATR will continue to rise regardless of the direction of price movement. If the price decreases then the ATR summation will overcome the price sooner closing the position before more profit is lost. Another exit with profit used was based on relative strength index indicator. When the value of the RSI indicates that the stock is overbought, a position was closed effectively securing profits for the traders. The use of volume based money management stops (V-Box) was also used. This stop consists of finding new support and resistance levels at prices where consolidation and volume was higher than average. The strategy proved to be profitable after optimization, but it is important to point out that the tested period consists of times before the great recession when the market was up trending strongly. Position sizing and scanners were not used.

In 2013, Gehrken, Hu, Mallattee, and Paprota improved on their predecessors by adding position sizing and using a scanner like Bysshe suggested. The scanner used in this strategy searched for the following criteria: current price greater than previous day's closing, daily volume is at least 50% greater than that of its 10 day average, and volume is greater than

1,000,000. The stocks selected by the scanner resulted with major profits. Not only Bysshe suggested the use of a scanner or screener but also other known traders such as Kevin Matras did in his book, *Finding #1 Stocks: Screening, Backtesting and Time-Proven Strategies*, released in 2009. Matras suggested back testing screeners if possible to assess its effectiveness at choosing stocks depending on the required criteria. An example of effective screening was provided by Nguyen in 2015 when he beat the simple buy and hold return value by investing in stocks with high Price-to-Free Cash Flow Ratio that his screener selected.

The ATR Ratchet exit was also used by Gehrken, Hu, Mallattee, and Paprota to successfully secure profits. ATR has been used by many traders since it serves as a measure of market volatility. It is directionless; it only contains information about volatility, not any information about price trend. It is useful primarily for differentiating between price movements that are simply due to volatility and price movements that are due to an actual change in the trend (Wilder, 1978, pp. 21-25).

Like other dynamic measures of market volatility, it is especially useful for stops, entries, exits and money management stops; adding or subtracting a fraction of the ATR from the current price is a way to find a price beyond which it is more likely that the market trend has changed than it is that the price is simply fluctuating due to volatility, and so usually gives a good location for a stop order (LeBeau).

Using the average true range to create money management exits also gives a specific value for the risk of a trade: the risk per share is simply the fraction of the average true range that is used to set the stop exit. This more accurate estimate of risk makes position sizing methods that take the risk of each trade into account more accurate, which is a major advantage of systems that use these stop exits.

Position was maximized to allow the amount of assets allocated to trading and risk was limited by using money management stops. Money Management Stops are not the only way to reduce risks, but also good position sizing is effective at maintaining the amount of money being risked under control. Ryan Jones explained the principle of fixed fractional position sizing in his book, *The Trading Game*. Fixed fractional position sizing consists of always risking the same fraction of value from the total account value. This way regardless of the size of the trade, the trade is always kept the same. Compared to other position sizing techniques, fixed fractional assumes that all trades are independent from each, a sound assumption. Other position sizing techniques risk more after losses with hopes of a winning trade recovering the previous losses. This many times is not effective and the growing risk results with accounts being wiped out. These are known as martingale methods.

A commonly used tool for prediction of stock market prices in the near future is the linear regression. The nonlinearity of stock prices in general means that long-term predictions made by linear regressions are not always reliable (Erdinç, A., & Satman, H. M., 2005). However, linear

regressions are usually effective in predicting events in the near future, i.e., in the next few bars (Campbell, R., 2016), and are commonly used to supplement other entry and exit indicators.

## Chapter 7: Developed Trading Systems

Refer to Appendix B for full EasyLanguage scripts.

### **Basic Breakout Strategy**

#### Basic Intuition

If the close goes above the defined entry price (upper opening range value) then the stock is bought with expectations of the price continuing to rise.

#### Opening Range (OR) Definition

In this strategy, the Opening Range (OR) is defined as the highest high and lowest low of the first thirty minutes of the trading session (9:00 - 9:30). These values are used as pivot numbers, also known as support and resistance values. These values as defined as opening range high (OR High) and opening range low (OR Low).

#### Entry

Entry price is defined as OR High. If close crosses over the entry price then buy. Triggered by using stop order set at the entry price. The opening range must be defined meaning that entries only happen after 10:00 am.

The following options add other requirements for entry:

#### *Average True Range (ATR) Option*

If on, then the entry price is defined as OR High plus a fraction of the ATR of the specified period. Trigger becomes a stop order set at the entry price. The fraction and the period are optimizable user defined inputs.

Useful to confirm that breakout is healthy by ensuring that the cross is not the result of the close behaving in a volatile fashion.

Turned on by setting the input *useatrentry* to true,

#### *Double Touch Entry Option*

If on, then the strategy does not buy on the first time that the close crosses over the entry price but waits for it to cross over for a second time. If the close crosses the OR High for a second time then it buys. Triggered by a stop order set at the entry price.

Useful for confirmation on whether it is a healthy breakout and the entry price is now behaving as a floor.

Turned on by setting the input *usedoubletouchentry* to true,

#### *Multiple Trade per Day Entry Ratio Option*



If on, then the entry price will become more difficult to reach after the first and second trade of the day. This is achieved by adding an initial optimizable user-defined fraction of the opening range to the entry price for the second trade of the day and another optimizable user-defined fraction for any trade after the second.

Useful to reduce the amount of trades during a day if the close of a stock is oscillating around the initially defined entry price.

Turned on by setting the input *useeratio* true,

## Exits

A position must be open for an exit to activate.

### *End of Day Exit*

All positions are closed a half hour before the close of the trading session (3:30 pm) and no new positions are opened.

This exit is always on.

### *Trailing Stop Exit*

If a position is making a profit and an optimizable user-defined fraction of the total profit made by such position is lost then it is closed.

This is a conservative method of ensuring that the larger parts of the profit is not lost.

Turned on by setting the input *usetrailingstop* to true.

### *Moving Average Cross under Exit*

If a moving average defined by a shorter period crosses under a moving average defined by a longer period then the position is closed. The periods are optimizable user-defined inputs.

This exit hopes to foresee the end of an uptrend before a major part of the profit is lost.

Turned on by setting the input *MAexit* to true.

### *Moving Average ATR Exit*

If the close crosses under a moving average defined by a longer period then the position is closed. The periods are optimizable user-defined inputs.

This exit hopes to foresee the end of an uptrend before a major part of the profit is lost.

Turned on by setting the input *MAexit* to true.

### *Under Entry Price and ATR Exit*

If the close crosses under the entry price and an optimizable user-defined fraction of the ATR then the position is closed. This is a management stop to control the amount of risk taken.

Turned on by setting the input *useatexit* to true.

## Support and Breakout Strategy

### Basic Intuition

This strategy has two different major ways to enter the market. (1) If the close is above the upper opening range value (OR High) and there is signs of a healthy uptrend then the strategy buys with expectations of the price to continue rise. (2) If the price crosses under and then over the lower opening range value (OR Low) then the OR Low has behaved as a support and the strategy buys with the hopes that the price will continue to rise.

### Perceived Advantage over Basic Strategy

When designing the previous strategy, it was noted that stocks tend to start an uptrend before the price touches the OR High and that this happens when the OR Low behaves as a support. The entry logic was designed with the hopes that the strategy will not only exploit the uptrend that happens after the stock rises over the OR High but more it by opening the position on an earlier stage of that trend.

### Opening Range Definition

In this strategy, the Opening Range (OR) is defined as the highest high and lowest low of the first thirty minutes of the trading session (9:00 - 9:30). These values are used as pivot numbers, also known as support and resistance values. These values as defined as opening range high (OR High) and opening range low (OR Low).

### Entry

There are two distinct entries in this system:

- (1) If the close is above the OR High and the slope of a linear regression is above an optimizable user-defined value then the strategy buys with the hope that the uptrend is healthy and the price will continue to rise. This is triggered by a stop order set at the OR High plus an optimizable user-defined fraction of the ATR. The length of the ATR and the linear regression periods are also optimizable user-defined inputs.
- (2) If the close crosses over the OR Low plus an optimizable user-defined fraction of the ATR and OR is large enough for a trade to cover commission costs before the price crosses over the OR High then the stock is bought with the hopes that it will uptrend. This entry is triggered by a stop order at the OR Low plus the same optimizable user-defined fraction of the ATR.

### Exits

A position must be open for an exit to activate.

*End of Day Exit*

All positions are closed a half hour before the close of the trading session (3:30 pm) and no new positions are opened.

This exit is always on.

#### *Under Entry Price and ATR Exit*

If the close crosses under the OR High or OR Low and an optimizable user-defined fraction of the ATR then the position is closed. This is a money management stop to control the amount of risk taken.

Turned on by setting the input *useatrexit* to true.

#### *Trailing Stop Exit*

If a position is making a profit and an optimizable user-defined fraction of the total profit made by such position is lost then it is closed.

This is a conservative method of ensuring that the larger parts of the profit is not lost.

Turned on by setting the input *usetrailingstop* to true.

#### *Linear Regression Exit*

If the slope of a linear regression is below a certain value then the position is closed. The period for the linear regression and the value of the slope are optimizable user-defined inputs.

This exit hopes to use a linear regression to predict when the price of a stock will stop to uptrend and start to downtrend.

Turned on by setting the input *uselinexit* to true.

#### *Relative Strength Index (RSI) Exit*

If the close is above the OR High and the RSI crosses under 70 then the position is closed. The period of the RSI is an optimizable user-defined input.

This exit hopes to use the RSI to predict when the price of a stock will stop to uptrend and start to downtrend.

Turned on by setting the input *useRSIexit* to true.

## Support and Breakout Symmetric Strategy

### Basic Intuition

This strategy has four different major ways to enter the market. (1) If the price crosses above the upper opening range value (OR High) then the strategy buys with expectations of the price to continue rise. (2) If the price crosses below the lower opening range value (OR Low) then the strategy shorts with expectations of the price to continue to fall. (3) If the price crosses over and then under the higher opening range value (OR High) then the value has behaved as a support and the strategy shorts with the hope that the price will continue to fall. (4) If the price crosses under and then over the lower opening range value (OR Low) then the value has behaved as a support and the stock is bought with the hope that it will continue to rise.

### Perceived Advantage over Basic Support and Breakout Strategy

When designing the previous strategy it was noted that in most occasions the price of the stock either breaks through the OR High or OR Low and continues to trend up or down respectively, or the OR High and OR Low behave as a support and the price reverses movement. Since the previous strategy can only profit when the price uptrends, all the down trending movement is wasted. This strategy can both long and short meaning it can profit in both, uptrends and downtrends.

### Opening Range Definition

In this strategy, the Opening Range (OR) is defined as the highest high and lowest low of the first thirty minutes of the trading session (9:00 - 9:30). These values are used as pivot numbers, also known as support and resistance values. These values are defined as opening range high (OR High) and opening range low (OR Low).

### Entry

There are four distinct entries in this system and all are activated between 10:00 am and 3:30 pm.

- (1) If the open crosses over the OR High and the current market position is not long then the strategy buys with the hope that the uptrend is healthy and the price will continue to rise. This is triggered by a stop order set at the OR High plus an optimizable user-defined fraction of the ATR. The length of the ATR period is also optimizable user-defined input.
- (2) If the open crosses under the OR Low and the current market position is not short then the strategy shorts with the hope that the downtrend is strong and the price will continue to fall. This is triggered by a stop order set at the OR Low minus an optimizable user-defined fraction of the ATR. The length of the ATR period is also optimizable user-defined input.

- (3) If the open crosses under the OR High and the market position is not short then the strategy buys with the hope that the OR High acted as a support and the price will fall. This is triggered by a stop order set at the OR High minus an optimizable user-defined fraction of the ATR. The length of the ATR period is also optimizable user-defined input
- (4) If the open crosses over the OR Low and the market position is not long then the strategy buys with the hope that the OR Low acted as a support and the price will rise. This is triggered by a stop order set at the OR Low plus an optimizable user-defined fraction of the ATR. The length of the ATR period is also optimizable user-defined input.

The addition or subtraction of the fraction of the ATR allows for a degree of noise to be removed from the strategy, especially if the price oscillates on either the OR Low or OR High, a situation that could result in rapid changes in position accumulating overwhelming commission costs.

## Exit

### *End of Day Exit*

All positions are closed a half hour before the close of the trading session (3:30 pm) and no new positions are opened.

This exit is always on.

### *Trailing Stop Exit*

If a position is making a profit and an optimizable user-defined fraction of the total profit made by such position is lost then it is closed.

This is a conservative method of ensuring that the larger parts of the profit is not lost.

Turned on by setting the input *usetrailingstop* to true.

### *Linear Regression Exit*

If the price is above or below the OR High or OR Low respectively and slope of a linear regression is below a certain value when long and above a certain value when short then the position is closed. The period for the linear regression and the values of the slope are optimizable user-defined inputs.

This exit hopes to use a linear regression to predict when the price of a stock will stop to trend and even maybe reverse the trend. .

Turned on by setting the input *uselinexit* to true.

### *Relative Strength Index (RSI) Exit*

If the close is above the OR High, the market position is long and the RSI crosses under 70 then the position is closed. Also, if the close is below the OR Low and the RSI crosses above 30 then the position is closed. The period of the RSI is an optimizable user-defined input.

This exit hopes to use the RSI to predict when the price of a stock will stop to trend and reverse.

Turned on by setting the input *useRSIexit* to true.

## **Double Opening Range Symmetric Strategy**

### Basic Intuition

This strategy defines the OR with an upper range and lower range instead of fixed values. This is done by defining the OR in two ways and then using the difference between the upper limits as the higher range and the difference of the lower limits as the lower range. The movement of the price from the inside to the outside of the ranges is used to define when and which position to have.

### Perceived Advantage over Previous Symmetric Strategy

When observing the previous strategy's upper and lower values of the OR, it was noted that the price oscillates around the value when testing if these are supports, the strategy changing position with each oscillation, accumulating commission costs on trades that were never likely to be profitable. To filter out the noise, the idea of defining the OR High and Low as ranges instead of single values was introduced. It was empirically observed that the price often oscillates inside the subranges instead of under and over the single value and since a position is only taken if the price leaves a subrange, signs of false trends were removed and the strategy takes trades only when more confident signs of movement are observed.

### Opening Range (OR) Definition

The OR is defined using any two out of three methods. (1) Using the highest high and the lowest low of the first thirty minutes of the session. (2) Using the high and low of the bar with the most volume of the first thirty minutes. (3) Using the highest high and the lowest low of the range of bars from the open of the day until three bars which have a volume lower than the volume moving average of the previous 390 bars. From the two selected the higher of the two highs is defined as the Outer High (ORHout) and the lower is defined as the Inner High (ORHin). The lower of the lows is defined as the Outer Low (ORLout) and the higher is defined as Inner Low (ORLin).

### Entry

There are four ways that the strategy takes a position.

- (1) If the close crosses over the ORHout plus an optimizable user-defined fraction of the ATR then the strategy buys with expectations of the price to continue to rise.
- (2) If the close crosses under the ORHin minus an optimizable user-defined fraction of the ATR then the upper range has acted as a support and the strategy shorts with expectations of the price to continue to fall.



- (3) If the close crosses under the ORLout minus an optimizable user-defined fraction of the ATR then the strategy shorts with expectations of the price to continue to fall.
- (4) If the close crosses over the ORLin plus an optimizable user-defined fraction of the ATR then the lower range has acted as a support and the strategy longed with expectations of the price to continue to fall.

The fraction of the ATR is an optimizable user-defined input.

## Exits

### *End of Day Exit*

All positions are closed a half hour before the close of the trading session (3:30 pm) and no new positions are opened.

This exit is always on.

### *Trailing Stop Exit*

If a position is making a profit and an optimizable user-defined fraction of the total profit made by such position is lost then it is closed.

This is a conservative method of ensuring that the larger parts of the profit is not lost.

Turned on by setting the input *usetrailingstop* to true.

### *Linear Regression Exit*

If the price is above or below the OR High or OR Low respectively and slope of a linear regression is below a certain value when long and above a certain value when short then the position is closed. The period for the linear regression and the values of the slope are optimizable user-defined inputs.

This exit hopes to use a linear regression to predict when the price of a stock will stop to trend and even maybe reverse the trend.

Turned on by setting the input *uselinexit* to true.

### *Relative Strength Index (RSI) Exit*

If the close is above the OR High, the market position is long and the RSI crosses under 70 then the position is closed. Also, if the close is below the OR Low and the RSI crosses above 30 then the position is closed. The period of the RSI is an optimizable user-defined input.

This exit hopes to use the RSI to predict when the price of a stock will stop to trend and reverse.

Turned on by setting the input *useRSIexit* to true.

## **Stock Scanner Selection Criteria**

The scanner was run daily at exactly 9:30 am when the market opened.

### 4 Week Change

A change of +5% was expected in the last 4 weeks. This criteria was chosen to ensure that the general picture of the stock is up trending.

### Minimum Volume

A minimum volume of 500000 was expected. This criteria was chosen to ensure that the stock was liquid enough to trade.

### Daily Change

A change of -4% was expected compared to the previous day. This criteria was chosen in the hopes that up trending stocks would fill in the gap.

## **Chapter 8: Data**

### *Optimization*

Before any data was collected, the systems were optimized. The optimization was done using TradeStation Portfolio Maestro. The portfolio each system was optimized on consisted of all the stocks in the Dow Jones composite, because it offered a good overall view of the economy without having so many different symbols that the runtime of each optimization was unreasonably long with time being a constraint. Each system was optimized over four years of data, up to April 5, 2016.

During the optimizations, each system used fixed fractional position sizing, betting 20% of the total cash available in each trade, and assuming each trade had a risk of 10 cents per share (a conservative estimate of the size of the average losing trade) when stops were not set.

Unfortunately, Portfolio Maestro's genetic optimization routine did not function when analysis was done, and the number of combinations of all the different parameters was overwhelmingly large, so optimization was done piecewise: parameters were optimized a few at a time, in groups such that each group had somewhere between 10 and 50 parameter combinations. This means that some combinations of different parameters were not tried, though it was thought that this did not have an enormous impact on each system's final performance.

### *Choosing Stocks for Final Test*

Stocks traded during testing were chosen using a scanner. The scanner intended to stocks that are more likely than average to have a trending day. The scanner was run every business day from March 29 2016 to April 29 2016. In order to lessen the danger of overfitting, the scanner scanned from all stocks, not just those in the Dow Jones composite. Each day, each of the four systems was traded on each of the stocks found by the scanner. The full list of trades, analyzed in the following sections, is available in appendix C.

The scanning criteria was implemented through TradeStation's scanner and the systems were traded using TradeStation.

During the tests, each system started with \$100,000 and used fixed fractional position sizing. Below are the equity curves for each of our four systems over the month. They were generated using the software package Market System Analyzer, version 3.5.0.

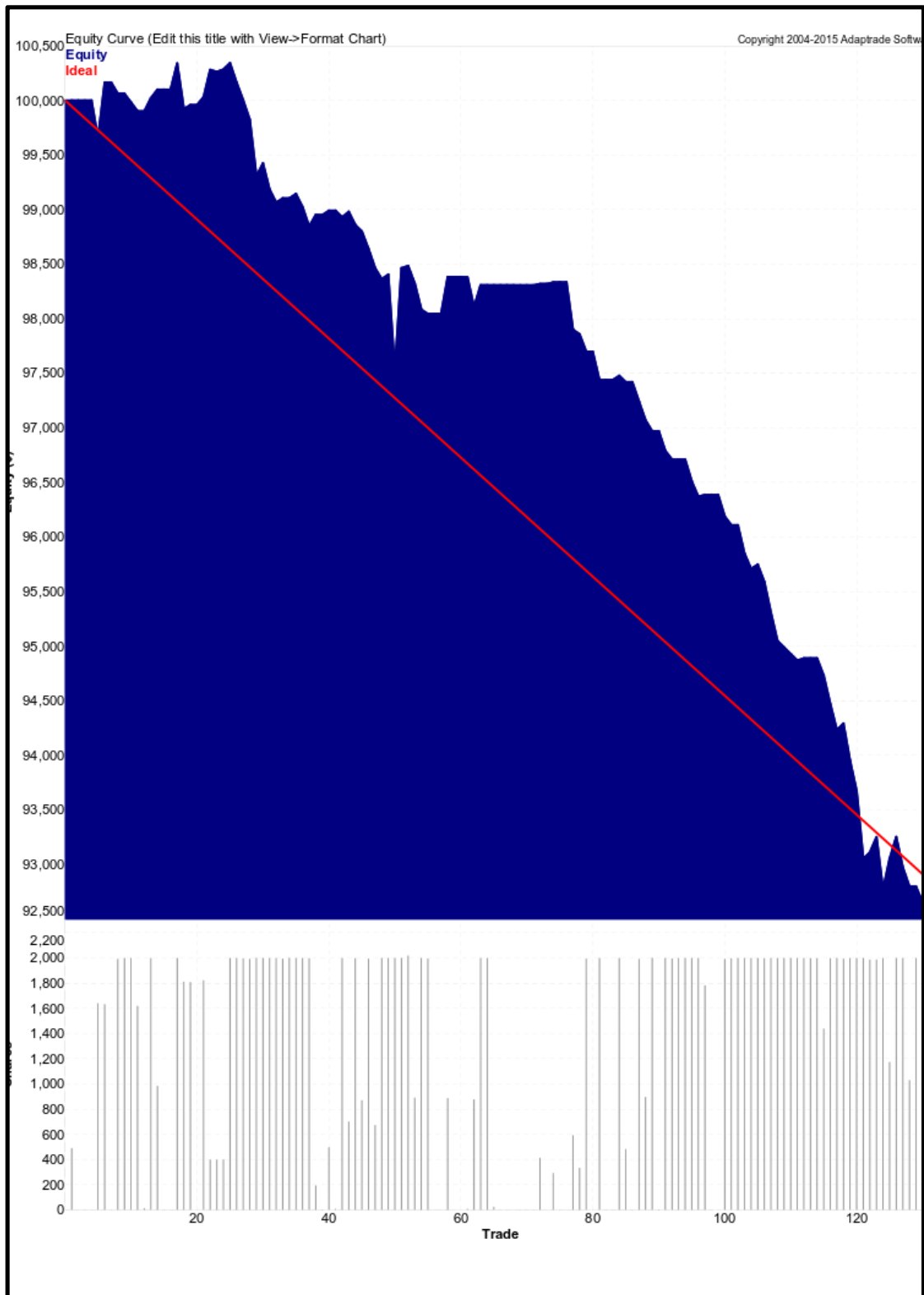
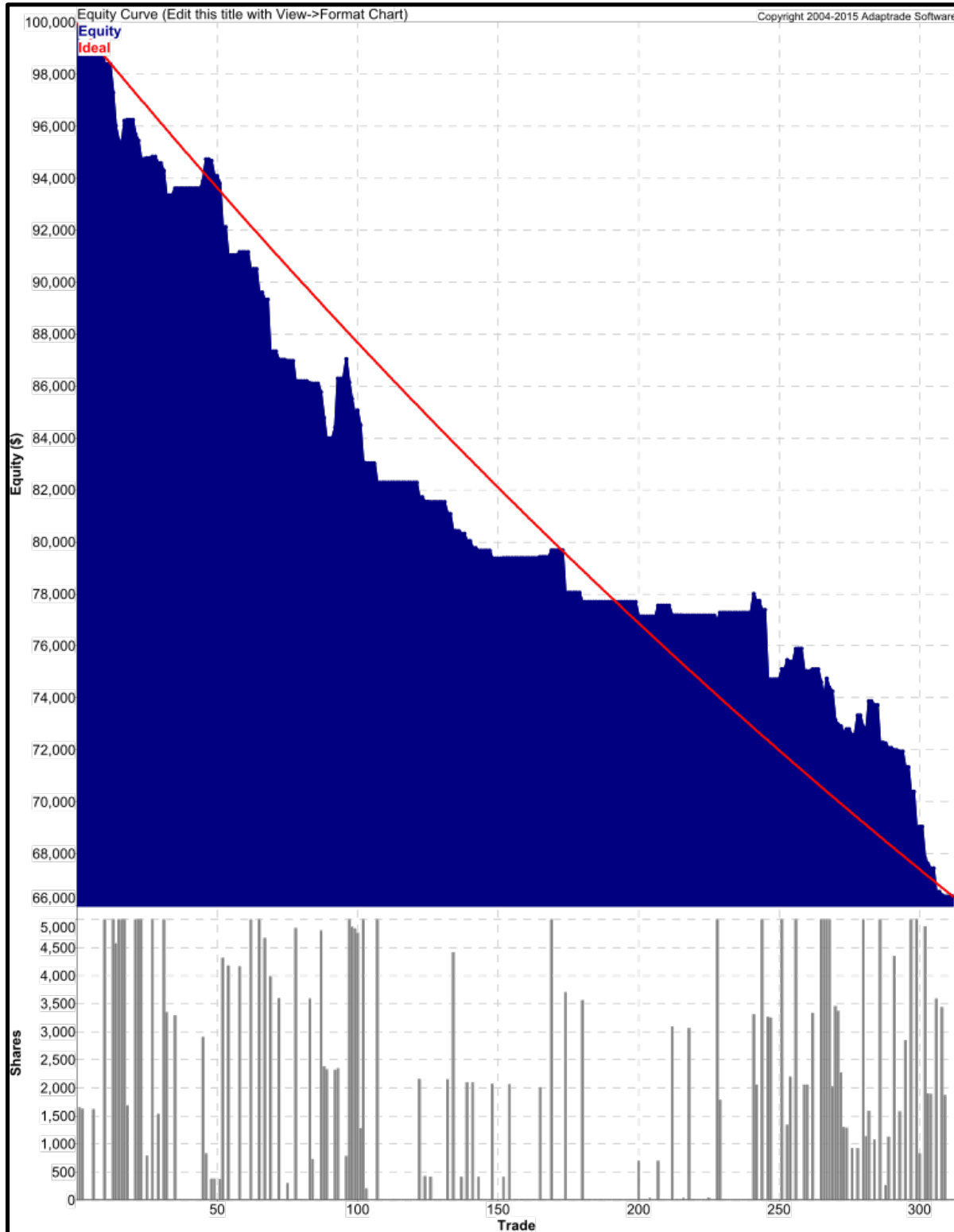


Figure 8.1: Equity Curve for Basic Breakout Strategy



**Figure 8.2: Equity Curve for Support and Breakout Strategy**

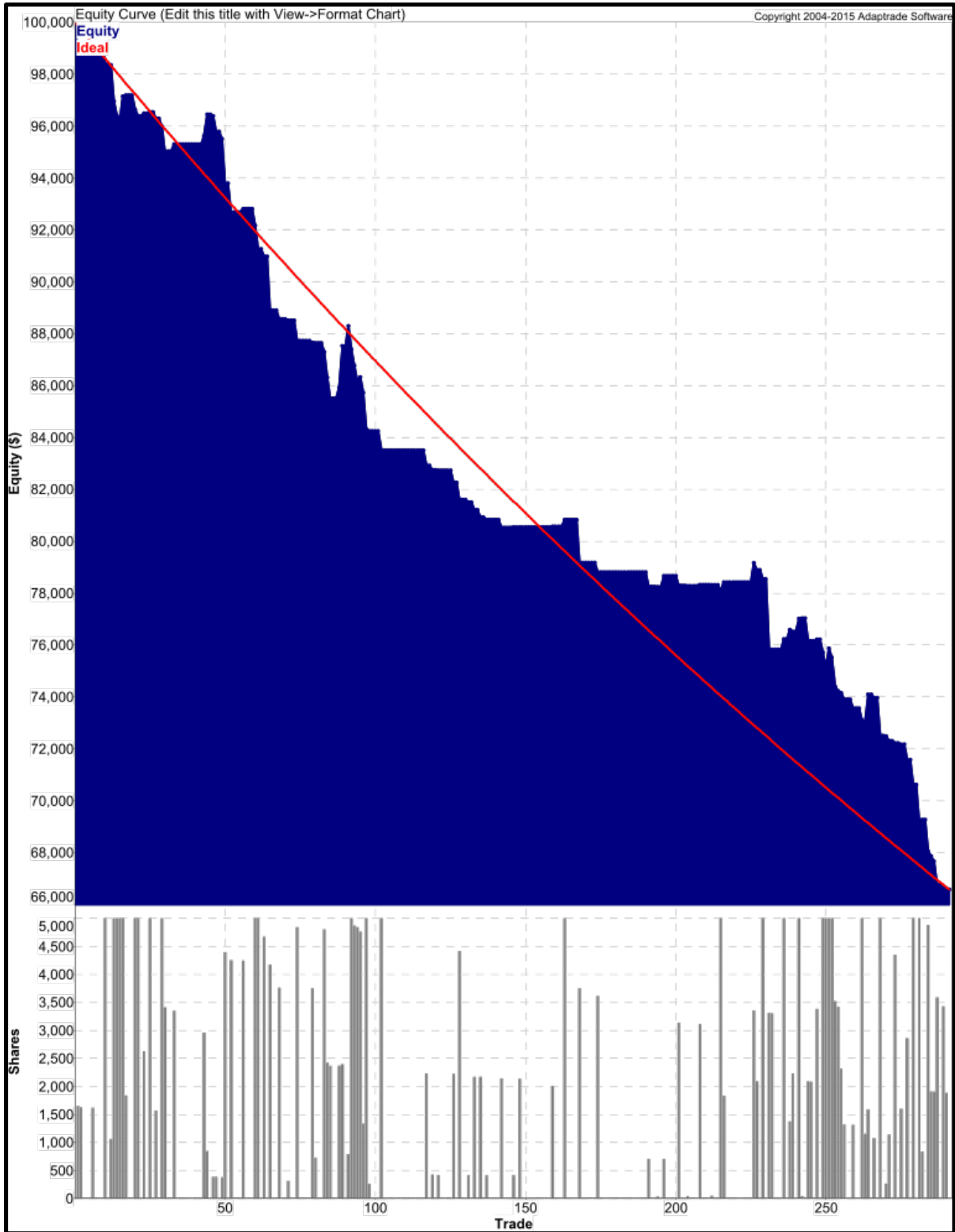


Figure 8.3: Equity Curve for Symmetric Support and Breakout Strategy

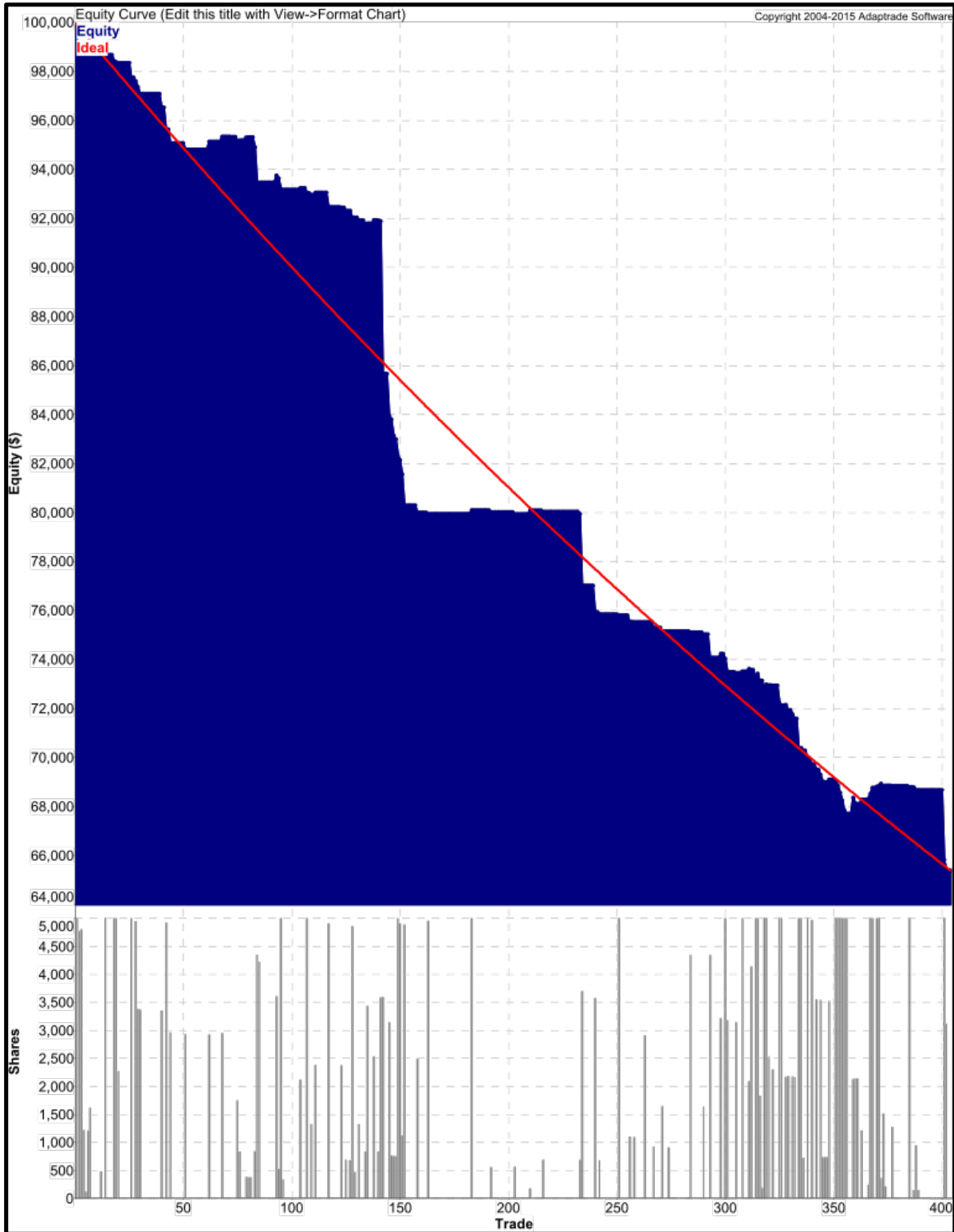


Figure 8.4: Equity Curve for Symmetric Double Opening Range Strategy

Unfortunately, it is clear that none of the systems were profitable with the current inputs and data sample. Some of the systems, most dramatically the double opening range strategy, had a few large losing trades, which is generally something that should be prevented (and something that can easily be prevented using money management stops).



## **Chapter 9: Analysis**

The two main parts of the analysis are computation of expectancy, expectunity, and system quality for each system and Monte Carlo simulation of permutations of the trades.

### *System Quality Analysis*

Using the equations given in chapter four, expectancy, (yearly) expectunity, standard deviation of the R-multiples, and system quality are computed for each system.

In the computation of expectunity, it was assumed that each year has 252 trading days. Each of the systems traded for 24 days.

Since several systems lost money overall, a usually unimportant feature of system quality becomes important here. A high standard deviation of the R-multiples reduces the absolute value of the system quality; when the expectunity is positive, this means that the system quality decreases. However, when the expectunity is negative, as is the case here, a higher standard deviation causing the system quality to move closer to zero actually *increases* its value. This makes sense, since a losing system, while unprofitable in the long run, is more likely to sometimes be profitable by chance if it is more inconsistent.

While this is natural, readers of this paper are probably more interested in modifying one of the systems presented here so that they are profitable. In this case, it is once again usually best to have a lower standard deviation of the R-multiples. For this reason, we report the standard deviation of the R-multiples of each system directly, so that readers can examine them easily.

The ‘max likely losing streak’ is also given. This is the 95% confidence longest losing streak a system will experience: if a system has a losing streak (series of consecutive losing trades) longer than this number, it is likely that market conditions have changed and the system is no longer functioning as intended.

### *Monte Carlo Analysis*

Monte Carlo analysis was done using Market System Analyzer. With position sizing in use, if a list of trades happens in a different order the trades’ effect on the total equity available to the system will be different, since the equity available at the start of the trade will be different. Market System Analyzer used a sample size of 500 permutations.

By this method, plots showing the actual equity curve, the 95% confidence equity curve the 50% confidence curve and the 5% confidence curve are generated. In this context, a confidence value simply means there is a 95% chance that the system’s average performance is at this line or above it, on market conditions like the ones the list of trades came from.

### Chapter 10: Results

<b>System</b>	<b>Breakout</b>	<b>SBB</b>	<b>SBB Symmetric</b>	<b>Double OR</b>
<b>Average Loss (USD)</b>	-18.86	-53.58	-57.03	-3.35
<b>Expectancy (risk-adjusted USD)</b>	-4.34	-3.40	-3.205	-7.30
<b>Expectunity (risk-adjusted USD)</b>	-54.17	-100.65	-88.811\	-280.88
<b>System Quality (dimensionless)</b>	-35.36	-23.35	-20.16	-136.07
<b>Standard Deviation of R-multiples (risk-adjusted USD)</b>	1.53	4.31	4.41	2.06
<b>Max Likely Losing Streak (number of trades)</b>	12	17	18	20

**Table 10.1: Table of Summary Statistics for Each Trading System**

Since each system was betting 20% of its available equity (which initially amounted to \$20,000) on each trade, the average losses seen above are relatively minor. However, each system did have a negative expectancy, which ultimately means that they are all unprofitable in their current state.

All the systems had similar (and poor) values for max likely losing streak, except the basic breakout system, whose value was also poor but which was much better than those of the other three systems.

The double opening range strategy was more consistent, as expected, though it also performed more poorly than the other systems.

Here are the results of Monte Carlo simulations of permutations of the trades:

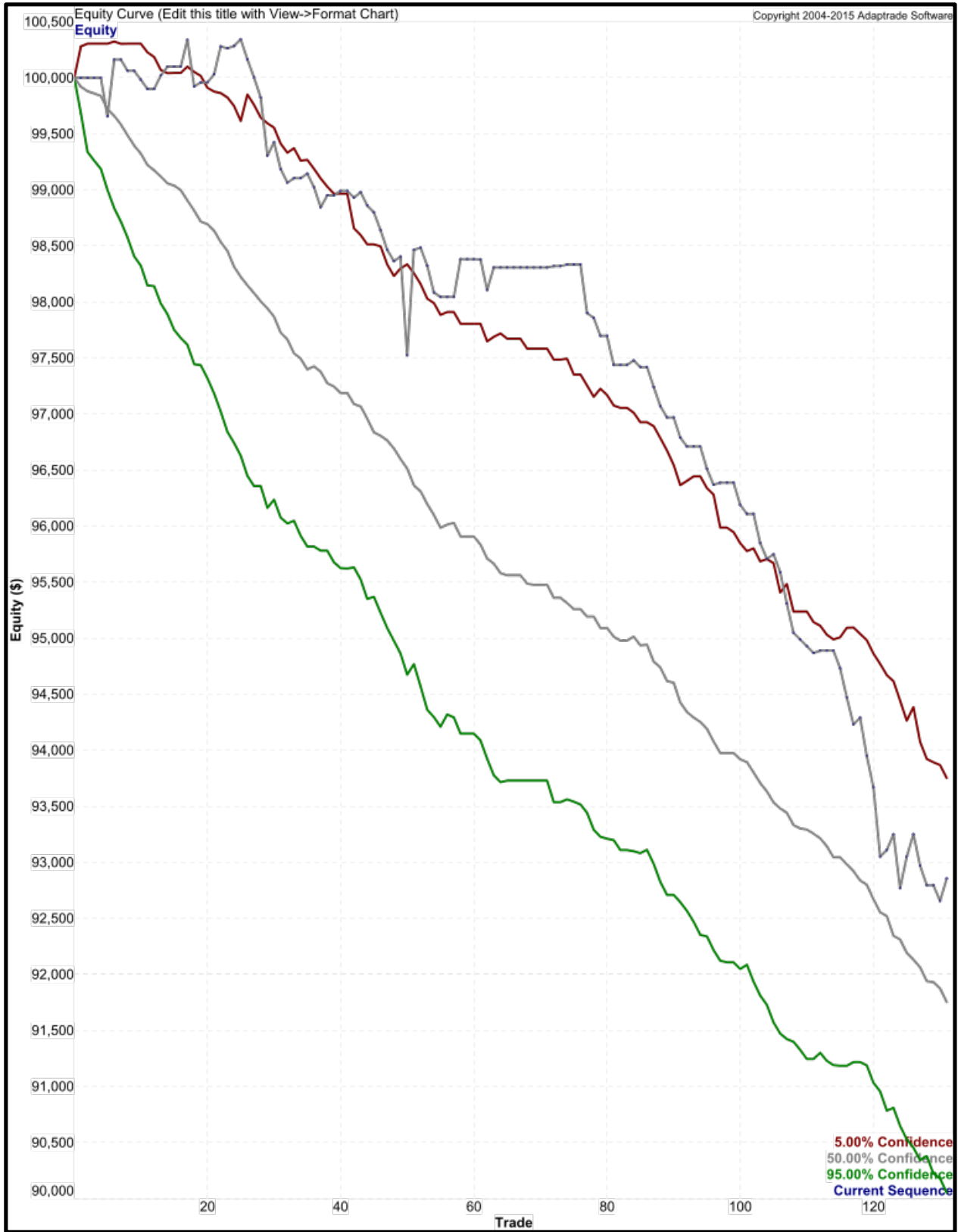


Figure 10.1: Monte Carlo Plot for Basic Breakout Strategy

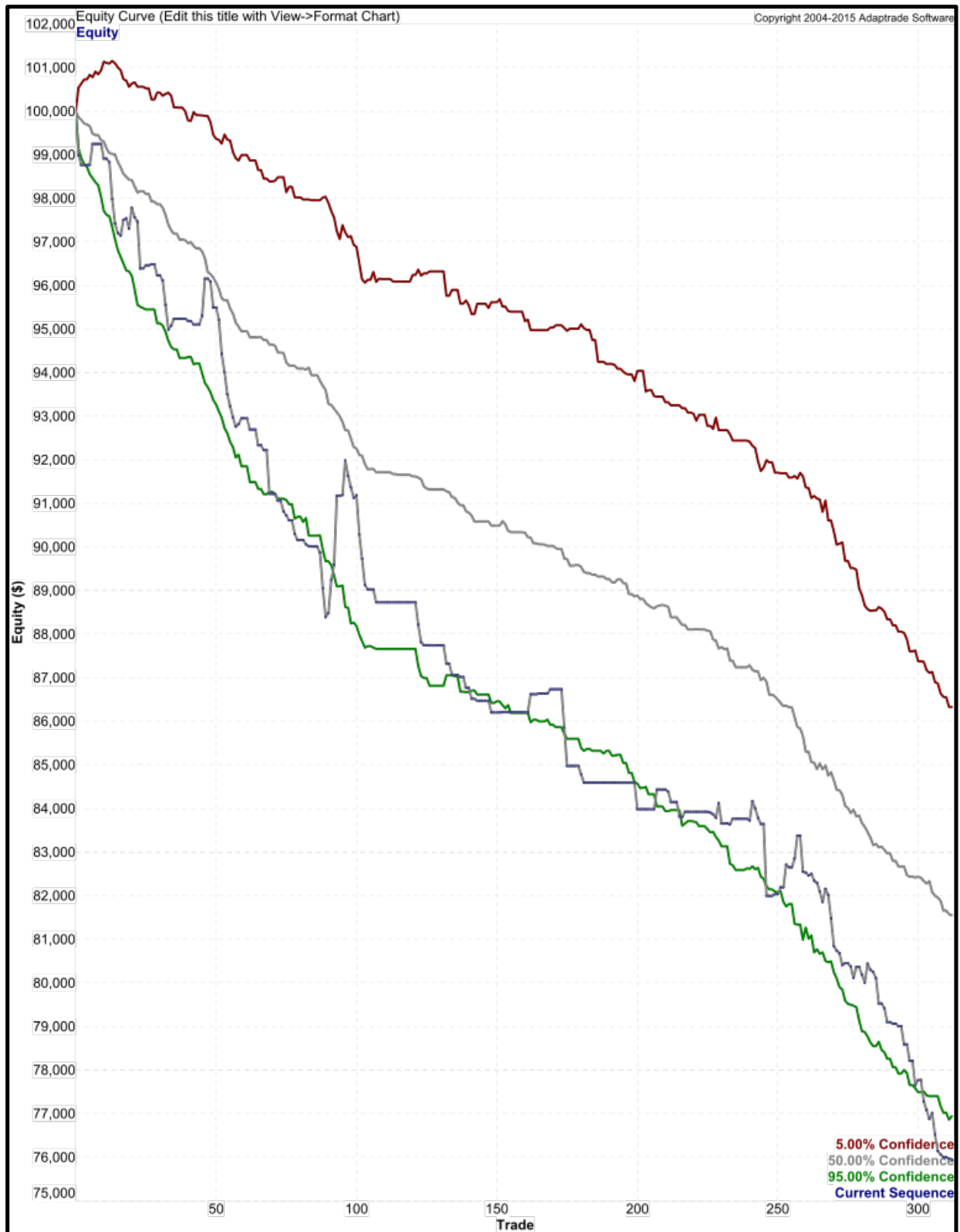


Figure 10.2: Monte Carlo Plot for Support and Breakout Strategy

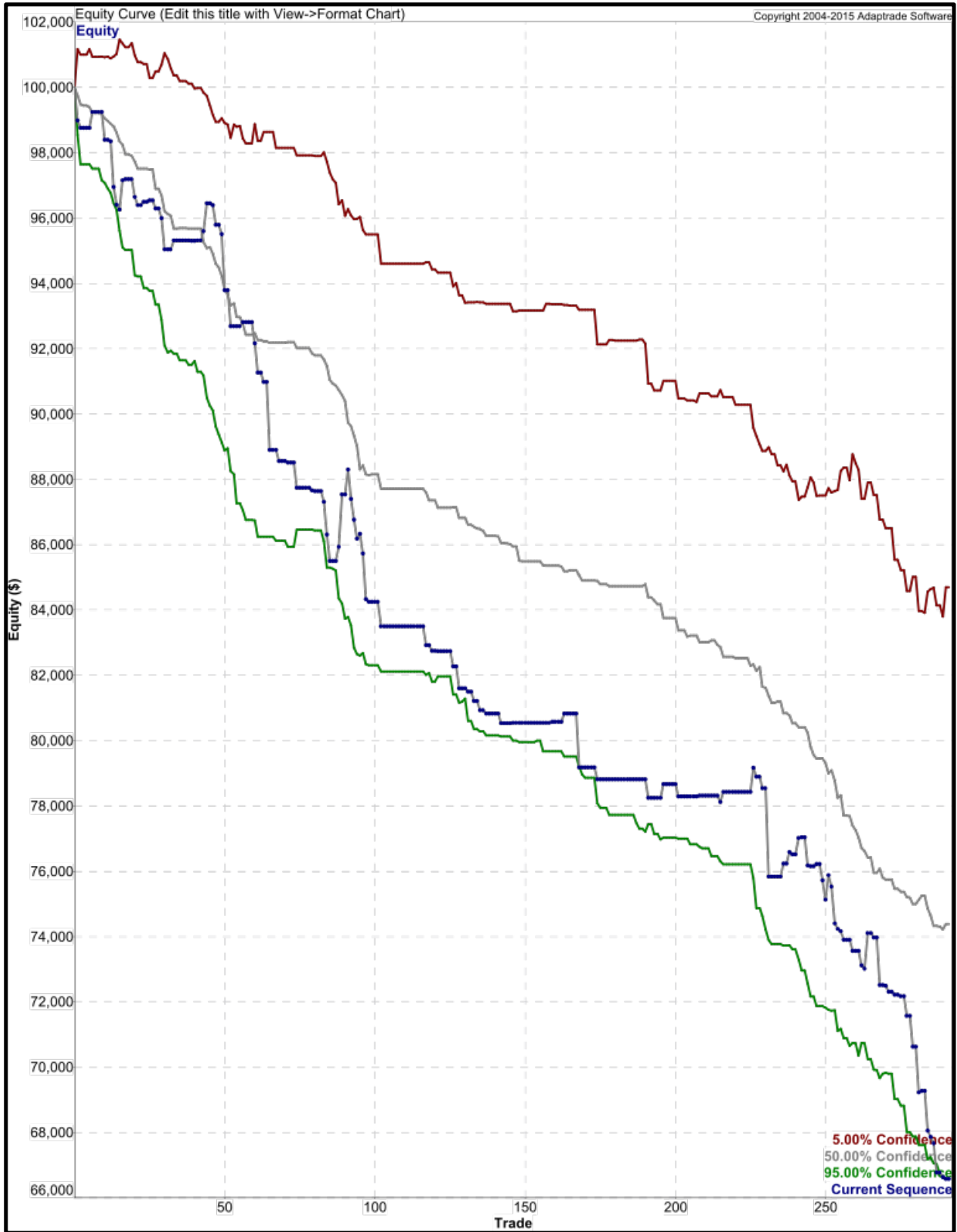


Figure 10.3: Monte Carlo Plot for Symmetric Support and Breakout Strategy

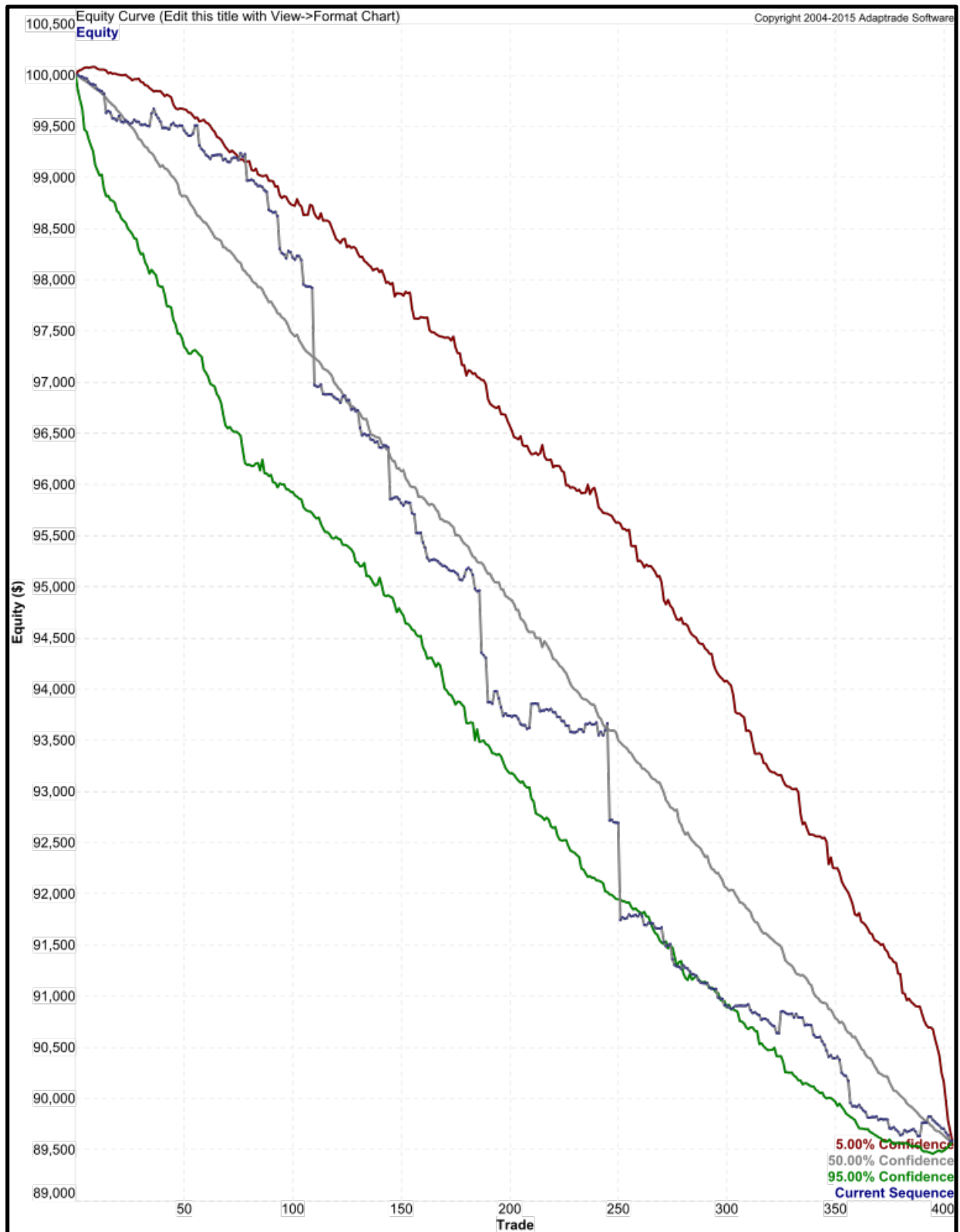


Figure 10.4: Monte Carlo Plot for Symmetric Double Opening Range Strategy

It is clear that, using the parameters chosen, none of the systems are even remotely likely to be profitable.

In the initial optimizations, none of the systems did better when using linear regression entries or when using linear regression exits, and only one system was improved by enabling RSI exits. This is to be expected, since these indicators are relatively common and so often don't offer a huge advantage over the market.

On the other hand, three of the four systems did choose to use trailing stops, which are widely considered to be one of the best way to protect profits.

The initial optimizations chose to not use money management (ATR) stops three of the four systems. This is the only choice where conventional trading wisdom seriously disagrees with the optimizer. In the analysis above, the optimizer was chosen over the conventional wisdom and ATR exits were not used. It may be that the optimizer's choice here was more a result of overfitting than true pattern finding in the data, and that enabling ATR stops would improve the performance of the systems.

## **Chapter 11: Conclusions**

The purpose of this IQP was to create a document to inform readers about trading stocks using opening range strategies, and give several robust, modular sample systems that interested readers could modify and expand upon.

The systems created are highly modular and thus also easy to modify. Each piece of extra functionality is cleanly isolated into its own section, and can be turned on or off easily. This makes it very easy for others to add their own modifications to the core body of each system or additional features easily. Comprehensive documentation also makes it clear what each portion of the code does.

However, the systems with the chosen parameters were not profitable. The systems were relatively consistent, but will probably need to be reworked to be effective in practice. Due to time constraints the team was not able to retest the time sample using money management stops that could improve these systems but would likely not be enough to make the systems robustly profitable.

The current results support previous research showing that breakout strategies tend to be very effective in trending markets and extremely poor in volatile or directionless markets. Previous IQP groups testing time samples consisted of up trending markets. When these strategies were designed, the team used time samples prior to the great recession with strong trends to empirically test the strategies. In such empirical analysis, the strategies seemed to be profitable.

Some things to consider in future research include but are not limited to the following.

Optimization can be done better. Portfolio Maestro's proved to be very buggy resulting in limited optimization ability and doubtful results.

A different scanner could be used that screens the market at 10 am and includes analysis of the opening range as an input of volatility and true range. Also the scanning criteria should be modified to include relative volume values since "higher than average" volume for a less traded equity is not the same as one for a more traded equity. Our scanner looked for gaps down with the hopes of the gap filling up. After looking at some of the trades, the gap down seemed to predict a bearish movement that day. Even if in fact the gap was filled it be filled before 10 am meaning that it would be too late to get in the market with the strategies rules. Modifying the scanner to look for gaps up could prove to be advantageous.

Another thing to consider in future research would be to not use fully automatization since the EasyLanguage code would assume positions too hastily. The alternative would be to have the user confirm each trade before assuming a position. Traders could take a more holistic decision by using their understanding of supports and resistances to ensure having a few winning



trades instead of many losing. This would mean that the user would have to be attentive to the strategy all day and would not allow for the multitasking benefits of day reading and working.

The aforementioned and other vital work that is need for meeting the appropriate conditions for this system to work.

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## Appendix A: Market System Analyzer Full Performance Reports

### Basic Breakout System Performance Report

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#### Market System: MarketSystem1

##### Account Settings

Starting Equity: \$100,000.00  
 Trading Vehicle: Stocks  
 Minimum Margin Requirement: 100.00%  
 Slippage per side: \$0.00 per trade  
 Commissions and fees per side: \$0.00 per trade

##### Input Data Settings

Profit/loss and risk calculated from P/L and risk inputs.  
 Profit/loss input data include slippage/commissions/fees.  
 Entry and exit prices include slippage.  
 Trades File: Undef

##### Position Sizing Settings & Rules

Position Sizing Method: None  
 No. Shares: From input data

	All Trades	Long
Total Net Profit	(\$7,145.06)	(\$7,145.06)
Gross Profit	4,400.71\$	4,400.71
Gross Loss	\$11,545.77)	\$11,545.77)
Profit Factor	0.3812	0.3812
Pessimistic Return Ratio	0.2835	0.2835
Trading Period	3/29/2016 10:10:00 AM to 4/29/2016 2:25:00 PM (31 days 4 hours)	
Starting Account Equity	\$100,000.00	
Highest Closed Trade Equity	\$100,343.34	
Lowest Closed Trade Equity	\$92,655.24	
Additions to Equity	\$0.00	
Withdrawals From Equity	\$0.00	
Final Account Equity	\$92,854.94	
Return on Starting Equity	-7.145%	
Total Number of Trades	131	131
Number of Winning Trades	33	3
Number of Losing Trades	28	2
Trades Not Taken	61	6
Percent Profitable	28.70%	28.70%
Max Number of Shares	2,019	2,019
Minimum Number of Shares	1	1
Average Number of Shares	1,452	1,452
Largest Winning Trade	\$940.00	\$940.00
Percent of Equity	.939%	.939%
Largest Winning Trade (%)	0.9639%	0.9639%
Trade Value	940.00\$	940.00
Average Winning Trade	\$133.35	\$133.35
Average Winning Trade (%)	0.1369%	0.1369%

Average R-Multiple, Wins	1334.	
Average Length of Wins	23 min 56 sec	23 min 56 sec
Max Number Consecutive Wins	3	3
Largest Losing Trade	(\$880.00)	(\$880.00)
/ Percent of Equity	0.8943%	0.8943%
Largest Losing Trade (%)	-0.8943%	-0.8943%
/ Trade Value	\$880.00	\$880.00
Average Losing Trade	(\$140.80)	(\$140.80)
Average Losing Trade (%)	-0.1452%	-0.1452%
Average R-Multiple, Losses	1408.	
Average Length of Losses	29 min 27 sec	29 min 27 sec
Max Number Consecutive Losses	8	8
Average Trade (Expectation)	(\$62.13)	(\$62.13)
Average Trade (%)	-0.06422%	-0.06422%
Trade Standard Deviation	\$207.33	\$207.33
Trade Standard Deviation (%)	0.2133%	0.2133%
Win/Loss Ratio	0.9471	0.9471
Win/Loss Ratio (%/%)	0.9431	0.9431
Return/Drawdown Ratio	0.000	0.000
Modified Sharpe Ratio	-0.3010	-0.3010
Sharpe Ratio	-0.7274	
Average Risk	\$0.10	
Average Risk (%)	0.000103%	
Average R-Multiple (Expectancy)	-621.3	
R-Multiple Standard Deviation	2073.	
Average Margin	\$70,964.98	
Average Margin (%)	72.61%	
Max Margin (%)	100.6%	
/ Margin Value	98,311.47	
Date of Max Margin	4/13/2016 12:30:00 PM	
Average Leverage	0.4118	
Risk of Ruin	-1.#1%	
Average Annual Profit/Loss	(\$83,734.75)	
Ave Annual Compounded Return	0.000%	
Average Monthly Profit/Loss	(\$6,977.90)	
Ave Monthly Compounded Return	0.000%	
Average Weekly Profit/Loss	(\$1,310.45)	
Ave Weekly Compounded Return	0.000%	
Average Daily Profit/Loss	(\$229.25)	
Ave Daily Compounded Return	0.000%	

Closed Trade Drawdowns	All Trades	Long
Number of Drawdowns	4	4
Average Drawdown	(\$2,177.78)	(\$2,177.78)
Average Drawdown (%)	2.171%	2.171%
Average Length of Drawdowns	7 days 19 hours	7 days 19 hours

Average Trades in Drawdowns	27	27
Worst Case Drawdown	(\$7,688.10)	(\$7,688.10)
Percent of Equity	.662%	.662%
Date at Trough	4/29/2016 1:05:00 PM	4/29/2016 1:05:00 PM
Trade Number at Trough	130	130
Length of Drawdown	24 days 4 hours	24 days 4 hours
Trades in Drawdown	94	94
Worst Case Drawdown (%)	7.662%	7.662%
Equity Value	\$7,688.10	\$7,688.10
Date at Trough	4/29/2016 1:05:00 PM	4/29/2016 1:05:00 PM
Trade Number at Trough	130	130
Length of Drawdown	24 days 4 hours	24 days 4 hours
Trades in Drawdown	94	94
Longest Drawdown	24 days 4 hours	24 days 4 hours
Start of Drawdown	5/2016 10:00 AM	5/2016 10:00 AM
End of Drawdown	2/2016 2:00 PM	2/2016 2:00 PM
Percent of Equity	.662%	.662%

**Annual Returns**

Year	Net Profit	Add/With	End Equity	Return(%)	Drawdown(%)	Trades	Wins(%)	P Fac	Sharpe
2016	(\$7,145.06)	\$0.00	\$92,854.94	-7.145	7.662	115	28.70	0.3812	-0.2887
<b>Ave</b>	<b>(\$7,145.06)</b>	<b>\$0.00</b>	<b>\$92,854.94</b>	<b>-7.145</b>	<b>7.662</b>	<b>115.0</b>	<b>28.70</b>	<b>0.3812</b>	<b>-0.2887</b>
<b>SD</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>

**Monthly Returns**

Month	Net Profit	Add/With	End Equity	Return(%)	Drawdown(%)	Trades	Wins(%)	P Fac
4-2016	(\$7,045.34)	\$0.00	\$92,854.94	-7.052	7.662	105	30.48	0.3560
3-2016	(\$99.72)	\$0.00	\$99,900.28	-0.09972	0.3448	10	10.00	0.8355
<b>Ave</b>	<b>(\$3,572.53)</b>	<b>\$0.00</b>	<b>\$96,377.61</b>	<b>-3.576</b>	<b>4.003</b>	<b>57.50</b>	<b>20.24</b>	<b>0.5957</b>
<b>SD</b>	<b>\$4,911.30</b>	<b>\$0.00</b>	<b>\$4,981.81</b>	<b>4.916</b>	<b>5.174</b>	<b>67.18</b>	<b>14.48</b>	<b>0.3391</b>

**Weekly Returns**

Week	Net Profit	Add/With	End Equity	Return(%)	Drawdown(%)	Trades	Wins(%)	P Fac
4/24/2016	(\$1,094.87)	\$0.00	\$92,854.94	-1.165	1.378	12	41.67	0.4457
4/17/2016	(\$1,898.08)	\$0.00	\$93,949.81	-1.980	1.980	16	18.75	0.05938
4/10/2016	(\$2,636.28)	\$0.00	\$95,847.89	-2.677	2.677	39	15.38	0.1910
4/3/2016	(\$1,474.24)	\$0.00	\$98,484.17	-1.475	2.810	32	43.75	0.5493
3/27/2016	(\$41.59)	\$0.00	\$99,958.41	-0.04159	0.4154	16	31.25	0.9593
<b>Ave</b>	<b>(\$1,429.01)</b>	<b>\$0.00</b>	<b>\$96,219.04</b>	<b>-1.468</b>	<b>1.852</b>	<b>23.00</b>	<b>30.16</b>	<b>0.4409</b>
<b>SD</b>	<b>\$963.87</b>	<b>\$0.00</b>	<b>\$2,988.23</b>	<b>0.9811</b>	<b>0.9878</b>	<b>11.79</b>	<b>12.91</b>	<b>0.3495</b>

**Daily Returns**

Day	Net Profit	Add/With	End Equity	Return(%)	Drawdown(%)	Trades	Wins(%)	P Fac
4/29/2016	\$59.70	\$0.00	\$92,854.94	0.06434	0.1509	3	33.33	1.426
4/28/2016	\$26.66	\$0.00	\$92,795.24	0.02874	0.4880	4	50.00	1.059
4/27/2016	(\$901.23)	\$0.00	\$92,768.58	-0.9621	0.9621	4	50.00	0.1807
4/25/2016	(\$280.00)	\$0.00	\$93,669.81	-0.2980	0.2980	1	0.000	0.000

4/22/2016	(\$340.00)	\$0.00	\$93,949.81	-0.3606	0.3606	1	0.000	0.000
4/20/2016	(\$1,558.08)	\$0.00	\$94,289.81	-1.626	1.688	15	20.00	0.07141
4/15/2016	(\$861.35)	\$0.00	\$95,847.89	-0.8907	0.8907	10	10.00	0.02027
4/13/2016	(\$1,334.65)	\$0.00	\$96,709.24	-1.361	1.700	26	19.23	0.3117
4/12/2016	(\$279.90)	\$0.00	\$98,043.89	-0.2847	0.2847	2	0.000	0.000
4/11/2016	(\$160.38)	\$0.00	\$98,323.79	-0.1628	0.1628	1	0.000	0.000
4/7/2016	\$120.19	\$0.00	\$98,484.17	0.1222	0.8943	4	75.00	1.137
4/6/2016	(\$940.05)	\$0.00	\$98,363.98	-0.9466	1.066	19	36.84	0.2963
4/5/2016	(\$979.31)	\$0.00	\$99,304.03	-0.9765	1.036	5	20.00	0.05773
4/4/2016	\$324.93	\$0.00	\$100,283.34	0.3251	0.01596	4	75.00	21.31
4/1/2016	\$58.13	\$0.00	\$99,958.41	0.05819	0.4154	6	66.67	1.139
3/31/2016	(\$161.78)	\$0.00	\$99,900.28	-0.1617	0.1617	3	0.000	0.000
3/29/2016	\$62.06	\$0.00	\$100,062.06	0.06206	0.3448	7	14.29	1.140
<b>Ave</b>	<b>(\$420.30)</b>	<b>\$0.00</b>	<b>\$96,800.55</b>	<b>-0.4335</b>	<b>0.6423</b>	<b>6.765</b>	<b>27.67</b>	<b>1.656</b>
<b>SD</b>	<b>\$562.28</b>	<b>\$0.00</b>	<b>\$2,858.92</b>	<b>0.5785</b>	<b>0.5219</b>	<b>6.996</b>	<b>26.95</b>	<b>5.091</b>

### Dependency Analysis Results for All Trades

#### Dependency: Negative

Confidence Level: 29.56%

Total Number of Runs: 52

Number of Runs of Wins: 26

Number of Runs of Losses: 26

Average Length of Winning Runs: 1.3

Average Length of Losing Runs: 3.8

### Significance Test Settings

Number of rules and/or restrictions in trading system or method: 0

Confidence level for confidence intervals around average trade: 95.00%

### Significance Test Results

Number of Trades: 115

Number of Degrees of Freedom: 115

Average trade at 95.00% confidence: \$-62.13 +/- 32.08

Worst-case average trade at 95.00% confidence: \$-94.21

Probability that average trade is greater than zero: 0.15%

<System/method may not be profitable at specified confidence level>

Basic Breakout System Monte Carlo Report

**Market System: MarketSystem1****Trading Parameters**

Initial Account Equity: \$11,456.00  
 Trading Vehicle: Futures  
 Initial Margin: \$0.00  
 Round-turn slippage per contract: \$0.00  
 Round-turn commissions and fees per contract: \$0.00  
 Position Sizing Method: None  
 No. Contracts: From input data  
 Number of Monte Carlo Samples: 500

**Key Results at Select Confidence Levels**

Confidence (%)	Rate of Return (%)	Max Drawdown (%)	Return-DD Ratio	Mod. Sharpe Ratio
50	-93.64	94.54	0.000	-0.1800
60	-93.64	95.51	0.000	-0.2068
70	-93.64	97.47	0.000	-0.2322
80	-93.64	99.20	0.000	-0.2650
85	-100.1	100.1	0.000	-0.2766
90	-100.6	100.6	0.000	-0.2892
91	-100.6	100.6	0.000	-0.2936
92	-100.8	100.8	0.000	-0.2958
93	-101.1	101.1	0.000	-0.2985
94	-101.2	101.2	0.000	-0.3026
95	-101.5	101.5	0.000	-0.3063
96	-101.8	101.8	0.000	-0.3154
97	-102.4	102.4	0.000	-0.3204
98	-102.9	102.7	0.000	-0.3319
99	-103.4	103.4	0.000	-0.3562
100	-104.1	104.1	0.000	-0.3769

**Monte Carlo Results at 95.00% Confidence**

Total Net Profit: (\$11,629.42)	Max Number of Contracts: 2,024
Final Account Equity: (\$173.42)	Minimum Number of Contracts: 1,987
Return on Starting Equity: -101.5%	Average Number of Contracts: 1,999
Profit Factor: 0.3217	
Largest Winning Trade: \$1,100.00	Largest Losing Trade: (\$1,470.95)
Largest Winning Trade (%): 16.45%	Largest Losing Trade (%): -180.2%
Average Winning Trade: \$170.25	Average Losing Trade: (\$218.18)
Average Winning Trade (%): 2.886%	Average Losing Trade (%): -9.240%
Average Trade: (\$106.55)	Win/Loss Ratio: 0.8076
Average Trade (%): -4.791%	Win/Loss Ratio (%/%) : 0.5110
Trade Standard Deviation: \$306.73	Max Consecutive Wins: 3
Trade Standard Deviation (%): 68.37%	Max Consecutive Losses: 12
Worst Case Drawdown: (\$12,483.99)	Return/Drawdown Ratio: 0.000

Worst Case Drawdown (%): 101.5%      Modified Sharpe Ratio: -0.3063

Average Drawdown: (\$11,706.65)

Average Drawdown (%): 101.1%

### Support and Breakout System Performance Report

**Market System: MarketSystem1****Account Settings**

Starting Equity: \$100,000.00  
 Trading Vehicle: Stocks  
 Minimum Margin Requirement: 100.00%  
 Slippage per side: \$0.00 per trade  
 Commissions and fees per side: \$0.00 per trade

**Input Data Settings**

Profit/loss and risk calculated from P/L and risk inputs.  
 Profit/loss input data include slippage/commissions/fees.  
 Entry and exit prices include slippage.  
 Trades File: Undef

**Position Sizing Settings & Rules**

Position Sizing Method: None  
 No. Shares: From input data

	All Trades	Long	Short
Total Net Profit	(\$24,058.52)	(\$12,922.05)	(\$11,136.47)
Gross Profit	11,301.14\$	4,308.21\$	7,011.93
Gross Loss	\$35,448.66)	\$17,230.26)	\$18,218.40)
Profit Factor	0.3213	0.2500	0.3887
Pessimistic Return Ratio	0.2546	0.1660	0.2889
Trading Period	3/29/2016 10:05:00 AM to 4/29/2016 3:40:00 PM (31 days 5 hours)		
Starting Account Equity	\$100,000.00		
Highest Closed Trade Equity	\$100,000.00		
Lowest Closed Trade Equity	\$75,941.48		
Additions to Equity	\$0.00		
Withdrawals From Equity	\$0.00		
Final Account Equity	\$75,941.48		
Return on Starting Equity	-24.06%		
Total Number of Trades	312	141	171
Number of Winning Trades	91	53	4
Number of Losing Trades	497	37	6
Trades Not Taken	145	36	1
Percent Profitable	24.75%	17.05%	30.91%
Max Number of Shares	7,692	7,692	2,010
Minimum Number of Shares	1	1	1
Average Number of Shares	1,372	1,584	1,203
Largest Winning Trade	\$1,580.00	\$1,580.00	\$850.42
/ Percent of Equity	.764%	.764%	.823%
Largest Winning Trade (%)	1.764%	1.764%	0.8923%
/ Trade Value	1,300.00\$	1,300.00\$	850.42
Average Winning Trade	\$232.45	\$287.21	\$208.29
Average Winning Trade (%)	0.2640%	0.3229%	0.2380%



Average R-Multiple, Wins	2069.		
Average Length of Wins	1 hours 52 min	1 hours 16 min	2 hours 8 min
Max Number Consecutive Wins	6	2	4
Largest Losing Trade	(\$1,648.20)	(\$1,648.20)	(\$1,009.55)
/ Percent of Equity	1.970%	1.970%	1.010%
Largest Losing Trade (%)	-1.970%	-1.970%	-1.084%
/ Trade Value	\$1,648.20	\$1,648.20	\$1,000.00
Average Losing Trade	(\$237.91)	(\$236.03)	(\$239.72)
Average Losing Trade (%)	-0.2704%	-0.2706%	-0.2701%
Average R-Multiple, Losses	2895.		
Average Length of Losses	1 hours 1 min	50 min 58 sec	1 hours 10 min
Max Number Consecutive Losses	19	12	13
Average Trade (Expectation)	(\$121.51)	(\$146.84)	(\$101.24)
Average Trade (%)	-0.1381%	-0.1694%	-0.1131%
Trade Standard Deviation	\$349.61	\$364.06	\$337.91
Trade Standard Deviation (%)	0.3947%	0.4144%	0.3781%
Win/Loss Ratio	0.9771	1.217	0.8689
Win/Loss Ratio (%/%)	0.9764	1.193	0.8811
Return/Drawdown Ratio	0.000	0.000	0.000
Modified Sharpe Ratio	-0.3500	-0.4089	-0.2990
Sharpe Ratio	-1.028		
Average Risk	\$87.35		
Average Risk (%)	0.1038%		
Average R-Multiple (Expectancy)	-1667.		
R-Multiple Standard Deviation	5530.		
Average Margin	\$73,214.05		
Average Margin (%)	84.07%		
Max Margin (%)	104.2%		
/ Margin Value	90,286.39		
Date of Max Margin	4/13/2016 3:40:00 PM		
Average Leverage	0.3233		
Risk of Ruin	-1.#1%		
Average Annual Profit/Loss	(\$281,571.41)		
Ave Annual Compounded Return	0.000%		
Average Monthly Profit/Loss	(\$23,464.28)		
Ave Monthly Compounded Return	0.000%		
Average Weekly Profit/Loss	(\$4,407.67)		
Ave Weekly Compounded Return	0.000%		
Average Daily Profit/Loss	(\$770.90)		
Ave Daily Compounded Return	0.000%		

Closed Trade Drawdowns	All Trades	Long	Short
Number of Drawdowns	1	2	1
Average Drawdown	(\$24,058.52)	(\$6,703.88)	(\$11,136.47)
Average Drawdown (%)	24.06%	6.687%	11.14%
Average Length of Drawdowns	31 days 5 hours	15 days 13 hours	31 days 5 hours

Average Trades in Drawdowns	198	43	110
Worst Case Drawdown	(\$24,058.52)	(\$13,180.25)	(\$11,136.47)
/ Percent of Equity	4.6%	3.5%	1.4%
Date at Trough	4/29/2016 3:40:00 PM	4/29/2016 3:40:00 PM	4/29/2016 3:20:00 PM
Trade Number at Trough	312	312	306
Length of Drawdown	31 days 5 hours	31 days 1 hours	31 days 5 hours
Trades in Drawdown	198	85	110
Worst Case Drawdown (%)	24.06%	13.15%	11.14%
/ Equity Value	\$24,058.52	\$13,180.25	\$11,136.47
Date at Trough	4/29/2016 3:40:00 PM	4/29/2016 3:40:00 PM	4/29/2016 3:20:00 PM
Trade Number at Trough	312	312	306
Length of Drawdown	31 days 5 hours	31 days 1 hours	31 days 5 hours
Trades in Drawdown	198	85	110
Longest Drawdown	31 days 5 hours	31 days 1 hours	31 days 5 hours
Start of Drawdown 3	/ 29/ 2016 10:05:00 AM	/ 29/ 2016 2:40:00 PM	/ 29/ 2016 10:05:00 AM
End of Drawdown 4	/ 29/ 2016 3:40:00 PM	/ 29/ 2016 3:40:00 PM	/ 29/ 2016 3:40:00 PM
Percent of Equity	4.6%	3.5%	1.4%

**Annual Returns**

Year	Net Profit	Add/With	End Equity	Return(%)	Drawdown(%)	Trades	Wins(%)	P Fac	Sharpe
2016	(\$24,058.52)	\$0.00	\$75,941.48	-24.06	24.06	198	24.75	0.3213	-0.2887
<b>Ave</b>	<b>(\$24,058.52)</b>	<b>\$0.00</b>	<b>\$75,941.48</b>	<b>-24.06</b>	<b>24.06</b>	<b>198.0</b>	<b>24.75</b>	<b>0.3213</b>	<b>-0.2887</b>
<b>SD</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>

**Monthly Returns**

Month	Net Profit	Add/With	End Equity	Return(%)	Drawdown(%)	Trades	Wins(%)	P Fac
4-2016	(\$20,172.35)	\$0.00	\$75,941.48	-20.99	21.02	174	23.56	0.3298
3-2016	(\$3,886.17)	\$0.00	\$96,113.83	-3.886	3.886	24	33.33	0.2736
<b>Ave</b>	<b>(\$12,029.26)</b>	<b>\$0.00</b>	<b>\$86,027.66</b>	<b>-12.44</b>	<b>12.45</b>	<b>99.00</b>	<b>28.45</b>	<b>0.3017</b>
<b>SD</b>	<b>\$11,516.07</b>	<b>\$0.00</b>	<b>\$14,264.01</b>	<b>12.09</b>	<b>12.12</b>	<b>106.1</b>	<b>6.909</b>	<b>0.03975</b>

**Weekly Returns**

Week	Net Profit	Add/With	End Equity	Return(%)	Drawdown(%)	Trades	Wins(%)	P Fac
4/24/2016	(\$6,708.58)	\$0.00	\$75,941.48	-8.117	8.916	51	25.49	0.2338
4/17/2016	(\$1,214.64)	\$0.00	\$82,650.06	-1.448	2.578	18	33.33	0.5722
4/10/2016	(\$7,327.47)	\$0.00	\$83,864.70	-8.035	8.893	61	16.39	0.2110
4/3/2016	(\$4,113.13)	\$0.00	\$91,192.17	-4.316	8.077	35	22.86	0.4833
3/27/2016	(\$4,694.70)	\$0.00	\$95,305.30	-4.695	5.012	33	36.36	0.2892
<b>Ave</b>	<b>(\$4,811.70)</b>	<b>\$0.00</b>	<b>\$85,790.74</b>	<b>-5.322</b>	<b>6.695</b>	<b>39.60</b>	<b>26.89</b>	<b>0.3579</b>
<b>SD</b>	<b>\$2,417.01</b>	<b>\$0.00</b>	<b>\$7,587.55</b>	<b>2.810</b>	<b>2.804</b>	<b>16.73</b>	<b>8.057</b>	<b>0.1607</b>

**Daily Returns**

Day	Net Profit	Add/With	End Equity	Return(%)	Drawdown(%)	Trades	Wins(%)	P Fac
4/29/2016	(\$4,422.55)	\$0.00	\$75,941.48	-5.503	5.594	27	14.81	0.1350
4/28/2016	(\$314.72)	\$0.00	\$80,364.03	-0.3901	0.6996	6	50.00	0.4815
4/27/2016	(\$799.45)	\$0.00	\$80,678.75	-0.9812	0.9812	3	0.000	0.000
4/26/2016	(\$817.52)	\$0.00	\$81,478.20	-0.9934	0.9934	5	20.00	0.2685

4/25/2016	(\$354.34)	\$0.00	\$82,295.72	-0.4287	1.294	10	50.00	0.6834
4/22/2016	\$617.42	\$0.00	\$82,650.06	0.7527	0.07291	4	50.00	10.87
4/20/2016	(\$1,832.06)	\$0.00	\$82,032.64	-2.185	2.578	14	28.57	0.3402
4/15/2016	(\$2,871.17)	\$0.00	\$83,864.70	-3.310	3.379	27	11.11	0.1668
4/13/2016	(\$3,550.88)	\$0.00	\$86,735.87	-3.933	4.522	28	17.86	0.1305
4/12/2016	(\$1,698.38)	\$0.00	\$90,286.75	-1.846	1.846	5	20.00	0.03386
4/11/2016	\$792.96	\$0.00	\$91,985.13	0.8695	0.000	1	100.0	100.0
4/7/2016	\$1,316.99	\$0.00	\$91,192.17	1.465	1.653	7	71.43	1.886
4/6/2016	(\$3,078.23)	\$0.00	\$89,875.18	-3.312	3.312	16	0.000	0.000
4/5/2016	(\$2,256.96)	\$0.00	\$92,953.41	-2.370	2.575	8	25.00	0.07933
4/4/2016	(\$94.93)	\$0.00	\$95,210.37	-0.09961	0.9831	4	25.00	0.8996
4/1/2016	(\$808.53)	\$0.00	\$95,305.30	-0.8412	1.171	9	44.44	0.3560
3/31/2016	(\$1,029.83)	\$0.00	\$96,113.83	-1.060	1.708	12	50.00	0.4867
3/29/2016	(\$2,856.34)	\$0.00	\$97,143.66	-2.856	2.856	12	16.67	0.1457
<b>Ave</b>	<b>(\$1,336.58)</b>	<b>\$0.00</b>	<b>\$87,561.51</b>	<b>-1.501</b>	<b>2.012</b>	<b>11.00</b>	<b>33.05</b>	<b>6.498</b>
<b>SD</b>	<b>\$1,594.55</b>	<b>\$0.00</b>	<b>\$6,535.01</b>	<b>1.826</b>	<b>1.499</b>	<b>8.492</b>	<b>25.69</b>	<b>23.47</b>

### Dependency Analysis Results for All Trades

#### Dependency: Positive

Confidence Level: 99.32%

Total Number of Runs: 71

Number of Runs of Wins: 35

Number of Runs of Losses: 36

Average Length of Winning Runs: 1.4

Average Length of Losing Runs: 7.3

### Significance Test Settings

Number of rules and/or restrictions in trading system or method: 0

Confidence level for confidence intervals around average trade: 95.00%

### Significance Test Results

Number of Trades: 198

Number of Degrees of Freedom: 198

Average trade at 95.00% confidence: \$-121.51 +/- 40.87

Worst-case average trade at 95.00% confidence: \$-162.38

Probability that average trade is greater than zero: 200.00%

**<System/method may not be profitable at specified confidence level>**

Support and Breakout System Monte Carlo Report

**Market System: MarketSystem1****Trading Parameters**

Initial Account Equity: \$100,000.00  
 Trading Vehicle: Stocks  
 Minimum Margin Requirement: 100.0%  
 Slippage per side: \$0.00 per trade  
 Commissions and fees per side: \$0.00 per trade  
 Position Sizing Method: None  
 No. Shares: From input data  
 Number of Monte Carlo Samples: 500

**Key Results at Select Confidence Levels**

Confidence (%)	Rate of Return (%)	Max Drawdown (%)	Return-DD Ratio	Mod. Sharpe Ratio
50	-18.45	19.02	0.000	-0.2818
60	-19.18	19.74	0.000	-0.2962
70	-20.18	20.71	0.000	-0.3101
80	-20.92	21.55	0.000	-0.3295
85	-21.49	21.90	0.000	-0.3419
90	-21.99	22.62	0.000	-0.3633
91	-22.42	22.73	0.000	-0.3705
92	-22.43	22.93	0.000	-0.3777
93	-22.74	23.21	0.000	-0.3866
94	-22.95	23.33	0.000	-0.3885
95	-23.06	23.46	0.000	-0.3913
96	-23.44	23.63	0.000	-0.4002
97	-23.56	24.22	0.000	-0.4028
98	-24.26	24.31	0.000	-0.4106
99	-24.35	24.87	0.000	-0.4294
100	-25.57	25.63	0.000	-0.4463

**Monte Carlo Results at 95.00% Confidence**

Total Net Profit: (\$23,061.13)	Max Number of Shares: 5,555
Final Account Equity: \$76,938.87	Minimum Number of Shares: 1
Return on Starting Equity: -23.06%	Average Number of Shares: 1,267
Profit Factor: 0.2819	
Largest Winning Trade: \$700.00	Largest Losing Trade: (\$2,240.64)
Largest Winning Trade (%): 0.7927%	Largest Losing Trade (%): -2.347%
Average Winning Trade: \$148.86	Average Losing Trade: (\$229.95)
Average Winning Trade (%): 0.1712%	Average Losing Trade (%): -0.2578%
Average Trade: (\$112.23)	Win/Loss Ratio: 0.7065
Average Trade (%): -0.1267%	Win/Loss Ratio (%/%) : 0.7165
Trade Standard Deviation: \$366.46	Max Consecutive Wins: 3
Trade Standard Deviation (%): 0.4054%	Max Consecutive Losses: 17
Worst Case Drawdown: (\$23,556.19)	Return/Drawdown Ratio: 0.000

Worst Case Drawdown (%): 23.46%      Modified Sharpe Ratio: -0.3913  
Average Drawdown: (\$23,325.71)  
Average Drawdown (%): 23.33%

Symmetric Support and Breakout System Performance Report

**Market System: MarketSystem1****Account Settings**

Starting Equity: \$100,000.00  
 Trading Vehicle: Stocks  
 Minimum Margin Requirement: 100.00%  
 Slippage per side: \$0.00 per trade  
 Commissions and fees per side: \$0.00 per trade

**Input Data Settings**

Profit/loss and risk calculated from P/L and risk inputs.  
 Profit/loss input data include slippage/commissions/fees.  
 Entry and exit prices include slippage.  
 Trades File: Undef

**Position Sizing Settings & Rules**

Position Sizing Method: None  
 No. Shares: From input data

	All Trades	Long	Short
Total Net Profit	(\$18,746.97)	(\$6,414.53)	(\$12,332.44)
Gross Profit	10,197.35\$	3,341.95\$	6,855.40
Gross Loss	\$28,944.32	\$9,756.46	\$19,187.86
Profit Factor	0.3523	0.3425	0.3573
Pessimistic Return Ratio	0.2829	0.2376	0.2697
Trading Period	3/29/2016 10:05:00 AM to 4/29/2016 3:40:00 PM (31 days 5 hours)		
Starting Account Equity	\$100,000.00		
Highest Closed Trade Equity	\$100,895.76		
Lowest Closed Trade Equity	\$81,092.25		
Additions to Equity	\$0.00		
Withdrawals From Equity	\$0.00		
Final Account Equity	\$81,253.03		
Return on Starting Equity	-18.75%		
Total Number of Trades	291	120	171
Number of Winning Trades	92	13	8
Number of Losing Trades	456	28	3
Trades Not Taken	73	75	0
Percent Profitable	28.92%	25.30%	31.40%
Max Number of Shares	2,017	2,012	2,017
Minimum Number of Shares	1	1	1
Average Number of Shares	1,259	1,181	1,312
Largest Winning Trade	\$1,325.26	\$1,325.26	\$620.00
Percent of Equity	.88%	.88%	.713%
Largest Winning Trade (%)	1.588%	1.588%	0.7113%
Trade Value	1,325.26\$	1,325.26\$	620.00
Average Winning Trade	\$172.84	\$159.14	\$180.41
Average Winning Trade (%)	0.1951%	0.1854%	0.2005%

Average R-Multiple, Wins	1728.		
Average Length of Wins	1 hours 26 min	1 hours 45 min	1 hours 15 min
Max Number Consecutive Wins	4	3	4
Largest Losing Trade	(\$1,000.00)	(\$665.43)	(\$1,000.00)
/ Percent of Equity	1.007%	0.611%	1.007%
Largest Losing Trade (%)	-1.041%	-0.6811%	-1.041%
/ Trade Value	\$60.00	\$65.43	\$60.00
Average Losing Trade	(\$199.62)	(\$157.36)	(\$231.18)
Average Losing Trade (%)	-0.2219%	-0.1719%	-0.2592%
Average R-Multiple, Losses	1996.		
Average Length of Losses	1 hours 14 min	1 hours 20 min	1 hours 9 min
Max Number Consecutive Losses	10	14	7
Average Trade (Expectation)	(\$91.90)	(\$77.28)	(\$101.92)
Average Trade (%)	-0.1013%	-0.08153%	-0.1148%
Trade Standard Deviation	\$268.94	\$238.26	\$288.65
Trade Standard Deviation (%)	0.3013%	0.2719%	0.3204%
Win/Loss Ratio	0.8658	1.011	0.7804
Win/Loss Ratio (%/%)	0.8796	1.078	0.7737
Return/Drawdown Ratio	0.000	0.000	0.000
Modified Sharpe Ratio	-0.3360	-0.2998	-0.3583
Sharpe Ratio	-1.133		
Average Risk	\$0.10		
Average Risk (%)	0.000112%		
Average R-Multiple (Expectancy)	-919.0		
R-Multiple Standard Deviation	2689.		
Average Margin	\$70,201.35		
Average Margin (%)	78.24%		
Max Margin (%)	103.3%		
/ Margin Value	99,671.55		
Date of Max Margin	3/31/2016 3:40:00 PM		
Average Leverage	0.2669		
Risk of Ruin	-1.#1%		
Average Annual Profit/Loss	(\$219,407.13)		
Ave Annual Compounded Return	0.000%		
Average Monthly Profit/Loss	(\$18,283.93)		
Ave Monthly Compounded Return	0.000%		
Average Weekly Profit/Loss	(\$3,434.56)		
Ave Weekly Compounded Return	0.000%		
Average Daily Profit/Loss	(\$600.70)		
Ave Daily Compounded Return	0.000%		

Closed Trade Drawdowns	All Trades	Long	Short
Number of Drawdowns	1	1	1
Average Drawdown	(\$19,803.51)	(\$7,886.04)	(\$13,051.93)
Average Drawdown (%)	19.63%	7.871%	12.96%
Average Length of Drawdowns	31 days 3 hours	31 days 5 hours	31 days 3 hours

Average Trades in Drawdowns	200	81	119
Worst Case Drawdown	(\$19,803.51)	(\$7,886.04)	(\$13,051.93)
/ Percent of Equity	9.63%	7.871%	12.96%
Date at Trough	4/29/2016 3:05:00 PM	4/25/2016 11:50:00 AM	4/29/2016 3:40:00 PM
Trade Number at Trough	286	242	289
Length of Drawdown	31 days 3 hours	31 days 5 hours	31 days 3 hours
Trades in Drawdown	200	81	119
Worst Case Drawdown (%)	19.63%	7.871%	12.96%
/ Equity Value	\$19,803.51	\$7,886.04	\$13,051.93
Date at Trough	4/29/2016 3:05:00 PM	4/25/2016 11:50:00 AM	4/29/2016 3:40:00 PM
Trade Number at Trough	286	242	289
Length of Drawdown	31 days 3 hours	31 days 5 hours	31 days 3 hours
Trades in Drawdown	200	81	119
Longest Drawdown	31 days 3 hours	31 days 5 hours	31 days 3 hours
Start of Drawdown 3	/ 29 / 2016 12: 25: 00 AM	/ 29 / 2016 11: 50: 00 AM	/ 29 / 2016 12: 25: 00 PM
End of Drawdown 4	/ 29 / 2016 3:40: 00 PM	/ 29 / 2016 3:40: 00 PM	/ 29 / 2016 3:40: 00 PM
Percent of Equity	9.63%	7.871%	12.96%

**Annual Returns**

Year	Net Profit	Add/With	End Equity	Return(%)	Drawdown(%)	Trades	Wins(%)	P Fac	Sharpe
2016	(\$18,746.97)	\$0.00	\$81,253.03	-18.75	19.63	204	28.92	0.3523	-0.2887
<b>Ave</b>	<b>(\$18,746.97)</b>	<b>\$0.00</b>	<b>\$81,253.03</b>	<b>-18.75</b>	<b>19.63</b>	<b>204.0</b>	<b>28.92</b>	<b>0.3523</b>	<b>-0.2887</b>
<b>SD</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>

**Monthly Returns**

Month	Net Profit	Add/With	End Equity	Return(%)	Drawdown(%)	Trades	Wins(%)	P Fac
4-2016	(\$15,114.58)	\$0.00	\$81,253.03	-15.68	15.85	178	29.21	0.3785
3-2016	(\$3,632.39)	\$0.00	\$96,367.61	-3.632	4.488	26	26.92	0.2143
<b>Ave</b>	<b>(\$9,373.49)</b>	<b>\$0.00</b>	<b>\$88,810.32</b>	<b>-9.658</b>	<b>10.17</b>	<b>102.0</b>	<b>28.07</b>	<b>0.2964</b>
<b>SD</b>	<b>\$8,119.13</b>	<b>\$0.00</b>	<b>\$10,687.62</b>	<b>8.522</b>	<b>8.035</b>	<b>107.5</b>	<b>1.620</b>	<b>0.1162</b>

**Weekly Returns**

Week	Net Profit	Add/With	End Equity	Return(%)	Drawdown(%)	Trades	Wins(%)	P Fac
4/24/2016	(\$2,340.90)	\$0.00	\$81,253.03	-2.800	4.440	44	29.55	0.5885
4/17/2016	(\$3,545.64)	\$0.00	\$83,593.93	-4.069	4.069	22	22.73	0.09190
4/10/2016	(\$5,243.43)	\$0.00	\$87,139.57	-5.676	5.890	65	29.23	0.3821
4/3/2016	(\$2,505.91)	\$0.00	\$92,383.00	-2.641	3.062	34	38.24	0.4686
3/27/2016	(\$5,111.09)	\$0.00	\$94,888.91	-5.111	5.954	39	23.08	0.1690
<b>Ave</b>	<b>(\$3,749.39)</b>	<b>\$0.00</b>	<b>\$87,851.69</b>	<b>-4.059</b>	<b>4.683</b>	<b>40.80</b>	<b>28.56</b>	<b>0.3400</b>
<b>SD</b>	<b>\$1,383.65</b>	<b>\$0.00</b>	<b>\$5,749.63</b>	<b>1.352</b>	<b>1.238</b>	<b>15.80</b>	<b>6.307</b>	<b>0.2067</b>

**Daily Returns**

Day	Net Profit	Add/With	End Equity	Return(%)	Drawdown(%)	Trades	Wins(%)	P Fac
4/29/2016	(\$3,355.35)	\$0.00	\$81,253.03	-3.966	4.156	26	23.08	0.1848
4/28/2016	\$48.43	\$0.00	\$84,608.38	0.05727	0.3275	3	33.33	1.175
4/27/2016	\$1,085.20	\$0.00	\$84,559.95	1.300	0.3535	3	66.67	4.617
4/26/2016	\$92.56	\$0.00	\$83,474.75	0.1110	0.1422	4	50.00	1.748



4/25/2016	(\$211.74)	\$0.00	\$83,382.19	-0.2533	0.8286	8	25.00	0.7571
4/22/2016	(\$528.96)	\$0.00	\$83,593.93	-0.6288	0.6288	4	50.00	0.04793
4/20/2016	(\$3,016.68)	\$0.00	\$84,122.89	-3.462	3.587	18	16.67	0.09919
4/15/2016	(\$1,333.99)	\$0.00	\$87,139.57	-1.508	1.732	29	44.83	0.5990
4/13/2016	(\$3,052.94)	\$0.00	\$88,473.56	-3.336	3.336	30	16.67	0.1898
4/12/2016	(\$436.50)	\$0.00	\$91,526.50	-0.4746	0.5430	5	20.00	0.5506
4/11/2016	(\$420.00)	\$0.00	\$91,963.00	-0.4546	0.4546	1	0.000	0.000
4/7/2016	(\$195.39)	\$0.00	\$92,383.00	-0.2111	0.5915	7	28.57	0.7167
4/6/2016	(\$2,144.28)	\$0.00	\$92,578.39	-2.264	2.622	13	38.46	0.1842
4/5/2016	(\$220.79)	\$0.00	\$94,722.67	-0.2325	0.4523	8	50.00	0.7230
4/4/2016	\$54.55	\$0.00	\$94,943.46	0.05749	0.3590	6	33.33	1.091
4/1/2016	(\$1,478.70)	\$0.00	\$94,888.91	-1.534	1.534	13	15.38	0.03181
3/31/2016	(\$3,306.09)	\$0.00	\$96,367.61	-3.317	3.317	13	15.38	0.01633
3/29/2016	(\$326.30)	\$0.00	\$99,673.70	-0.3263	1.211	13	38.46	0.7415
<b>Ave</b>	<b>(\$1,041.50)</b>	<b>\$0.00</b>	<b>\$89,425.31</b>	<b>-1.136</b>	<b>1.454</b>	<b>11.33</b>	<b>31.44</b>	<b>0.7485</b>
<b>SD</b>	<b>\$1,366.08</b>	<b>\$0.00</b>	<b>\$5,557.05</b>	<b>1.518</b>	<b>1.338</b>	<b>9.055</b>	<b>16.72</b>	<b>1.079</b>

### Dependency Analysis Results for All Trades

#### Dependency: Positive

Confidence Level: 42.43%

Total Number of Runs: 92

Number of Runs of Wins: 46

Number of Runs of Losses: 46

Average Length of Winning Runs: 1.3

Average Length of Losing Runs: 5.0

### Significance Test Settings

Number of rules and/or restrictions in trading system or method: 0

Confidence level for confidence intervals around average trade: 95.00%

### Significance Test Results

Number of Trades: 204

Number of Degrees of Freedom: 204

Average trade at 95.00% confidence: \$-91.90 +/- 30.97

Worst-case average trade at 95.00% confidence: \$-122.87

Probability that average trade is greater than zero: 200.00%

**<System/method may not be profitable at specified confidence level>**

Symmetric Support and Breakout System Monte Carlo Report

**Market System: MarketSystem1****Trading Parameters**

Initial Account Equity: \$100,000.00  
 Trading Vehicle: Stocks  
 Minimum Margin Requirement: 100.0%  
 Slippage per side: \$0.00 per trade  
 Commissions and fees per side: \$0.00 per trade  
 Position Sizing Method: Fixed Risk  
 Fixed Fraction (%): 20.00  
 Number of Monte Carlo Samples: 500

**Key Results at Select Confidence Levels**

Confidence (%)	Rate of Return (%)	Max Drawdown (%)	Return-DD Ratio	Mod. Sharpe Ratio
50	-25.61	27.09	0.000	-0.3045
60	-27.16	28.07	0.000	-0.3258
70	-28.34	29.34	0.000	-0.3523
80	-29.73	30.65	0.000	-0.3696
85	-31.06	31.35	0.000	-0.3813
90	-32.04	32.52	0.000	-0.4003
91	-32.12	32.59	0.000	-0.4003
92	-32.25	32.67	0.000	-0.4054
93	-32.42	33.41	0.000	-0.4084
94	-33.13	33.43	0.000	-0.4114
95	-33.43	33.82	0.000	-0.4147
96	-33.82	34.27	0.000	-0.4147
97	-33.88	34.54	0.000	-0.4223
98	-35.13	35.36	0.000	-0.4260
99	-37.75	38.02	0.000	-0.4324
100	-38.54	39.54	0.000	-0.5141

**Monte Carlo Results at 95.00% Confidence**

Total Net Profit: (\$33,431.75)	Max Number of Shares: 5,000
Final Account Equity: \$66,568.25	Minimum Number of Shares: 1
Return on Starting Equity: -33.43%	Average Number of Shares: 2,081
Profit Factor: 0.2296	
Largest Winning Trade: \$1,014.50	Largest Losing Trade: (\$3,207.02)
Largest Winning Trade (%): 1.249%	Largest Losing Trade (%): -3.458%
Average Winning Trade: \$215.54	Average Losing Trade: (\$389.04)
Average Winning Trade (%): 0.2597%	Average Losing Trade (%): -0.4604%
Average Trade: (\$205.66)	Win/Loss Ratio: 0.6267
Average Trade (%): -0.2460%	Win/Loss Ratio (%/%) : 0.6212
Trade Standard Deviation: \$622.70	Max Consecutive Wins: 3
Trade Standard Deviation (%): 0.7058%	Max Consecutive Losses: 18

Worst Case Drawdown: (\$34,215.64)	Return/Drawdown Ratio: 0.000
Worst Case Drawdown (%): 33.82%	Modified Sharpe Ratio: -0.4147
Average Drawdown: (\$33,431.75)	
Average Drawdown (%): 33.43%	

### Double Opening Range System Performance Report

**Market System: MarketSystem1****Account Settings**

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

**Input Data Settings**

Profit/loss and risk calculated from P/L and risk inputs.  
 Profit/loss input data include slippage/commissions/fees.  
 Entry and exit prices include slippage.  
 Trades File: Undef

**Position Sizing Settings & Rules**

Position Sizing Method: None  
 No. Contracts: From input data

	All Trades	Long	Short
Total Net Profit	(\$10,415.62)	(\$2,284.66)	(\$8,130.96)
Gross Profit	2,841.88	1,254.66	1,587.22
Gross Loss	\$13,257.50	\$3,539.32	\$9,718.18
Profit Factor	0.2144	0.3545	0.1633
Pessimistic Return Ratio	0.1839	0.2797	0.1333
Trading Period	3/29/2016 10:10:00 AM to 4/29/2016 3:40:00 PM (31 days 5 hours)		
Starting Account Equity	\$100,000.00		
Highest Closed Trade Equity	\$100,002.49		
Lowest Closed Trade Equity	\$89,581.88		
Additions to Equity	\$0.00		
Withdrawals From Equity	\$0.00		
Final Account Equity	\$89,584.38		
Return on Starting Equity	-10.42%		
Total Number of Trades	404	171	233
Number of Winning Trades <sup>1</sup>	215	26	9
Number of Losing Trades <sup>2</sup>	831	191	64
Trades Not Taken <sup>0</sup>	0	0	
Percent Profitable	29.95%	30.41%	29.61%
Max Number of Contracts	250	250	250
Minimum Number of Contracts	247	247	249
Average Number of Contracts	249	249	249
Largest Winning Trade	\$234.06	\$234.06	\$210.00
Percent of Equity	.2500%	.2500%	.217%
Largest Winning Trade (%)	0.2500%	0.2500%	0.2317%
Trade Value	234.06	234.06	210.00
Average Winning Trade	\$23.49	\$24.13	\$23.00
Average Winning Trade (%)	0.02488%	0.02563%	0.02432%

Average R-Multiple, Wins	117.4		
Average Length of Wins	1 hours 2 min	58 min 51 sec	1 hours 5 min
Max Number Consecutive Wins	4	3	4
Largest Losing Trade	(\$950.00)	(\$317.50)	(\$950.00)
/ Percent of Equity	0.9702%	0.3219%	0.9702%
Largest Losing Trade (%)	-1.025%	-0.3219%	-1.025%
/ Trade Value	\$950.00	\$317.50	\$950.00
Average Losing Trade	(\$46.85)	(\$29.74)	(\$59.26)
Average Losing Trade (%)	-0.04941%	-0.03127%	-0.06258%
Average R-Multiple, Losses	234.2		
Average Length of Losses	1 hours 3 min	54 min 12 sec	1 hours 9 min
Max Number Consecutive Losses	11	9	18
Average Trade (Expectation)	(\$25.78)	(\$13.36)	(\$34.90)
Average Trade (%)	-0.02716%	-0.01396%	-0.03685%
Trade Standard Deviation	\$103.17	\$50.99	\$128.02
Trade Standard Deviation (%)	0.1087%	0.05361%	0.1349%
Win/Loss Ratio	0.5014	0.8112	0.3882
Win/Loss Ratio (%/%)	0.5035	0.8199	0.3885
Return/Drawdown Ratio	0.000	0.000	0.000
Modified Sharpe Ratio	-0.2498	-0.2605	-0.2731
Sharpe Ratio	-0.7870		
Average Risk	\$0.20		
Average Risk (%)	0.000212%		
Average R-Multiple (Expectancy)	-128.9		
R-Multiple Standard Deviation	515.9		
Average Margin	\$0.00		
Average Margin (%)	0.000%		
Max Margin (%)	0.000%		
/ Margin Value	0.00		
Date of Max Margin			
Average Leverage	0.09216		
Risk of Ruin	-1.#1%		
Average Annual Profit/Loss	(\$121,900.30)		
Ave Annual Compounded Return	0.000%		
Average Monthly Profit/Loss	(\$10,158.36)		
Ave Monthly Compounded Return	0.000%		
Average Weekly Profit/Loss	(\$1,908.21)		
Ave Weekly Compounded Return	0.000%		
Average Daily Profit/Loss	(\$333.74)		
Ave Daily Compounded Return	0.000%		

Closed Trade Drawdowns	All Trades	Long	Short
Number of Drawdowns	1	1	1
Average Drawdown	(\$10,420.61)	(\$2,366.79)	(\$8,133.46)
Average Drawdown (%)	10.42%	2.367%	8.133%
Average Length of Drawdowns	31 days 5 hours	31 days 5 hours	31 days 5 hours

Average Trades in Drawdowns	403	170	233
Worst Case Drawdown	(\$10,420.61)	(\$2,366.79)	(\$8,133.46)
/ Percent of Equity	0.42%	.37%	.13%
Date at Trough	4/29/2016 3:40:00 PM	4/29/2016 11:25:00 AM	4/29/2016 3:40:00 PM
Trade Number at Trough	403	389	403
Length of Drawdown	31 days 5 hours	31 days 5 hours	31 days 5 hours
Trades in Drawdown	403	170	233
Worst Case Drawdown (%)	10.42%	2.367%	8.133%
/ Equity Value	\$10,420.61	\$2,366.79	\$8,133.46
Date at Trough	4/29/2016 3:40:00 PM	4/29/2016 11:25:00 AM	4/29/2016 3:40:00 PM
Trade Number at Trough	403	389	403
Length of Drawdown	31 days 5 hours	31 days 5 hours	31 days 5 hours
Trades in Drawdown	403	170	233
Longest Drawdown	31 days 5 hours	31 days 5 hours	31 days 5 hours
Start of Drawdown 3	/ 29 / 2016 10:40:00 AM	/ 29 / 2016 10:40:00 AM	/ 29 / 2016 10:10:00 AM
End of Drawdown 4	/ 29 / 2016 3:40:00 PM	/ 29 / 2016 3:40:00 PM	/ 29 / 2016 3:40:00 PM
Percent of Equity	0.42%	.37%	.13%

**Annual Returns**

Year	Net Profit	Add/With	End Equity	Return(%)	Drawdown(%)	Trades	Wins(%)	P Fac	Sharpe
2016	(\$10,415.62)	\$0.00	\$89,584.38	-10.42	10.42	404	29.95	0.2144	-0.2887
<b>Ave</b>	<b>(\$10,415.62)</b>	<b>\$0.00</b>	<b>\$89,584.38</b>	<b>-10.42</b>	<b>10.42</b>	<b>404.0</b>	<b>29.95</b>	<b>0.2144</b>	<b>-0.2887</b>
<b>SD</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>

**Monthly Returns**

Month	Net Profit	Add/With	End Equity	Return(%)	Drawdown(%)	Trades	Wins(%)	P Fac
4-2016	(\$9,884.22)	\$0.00	\$89,584.38	-9.937	9.998	361	30.75	0.2040
3-2016	(\$531.40)	\$0.00	\$99,468.60	-0.5314	0.5339	43	23.26	0.3679
<b>Ave</b>	<b>(\$5,207.81)</b>	<b>\$0.00</b>	<b>\$94,526.49</b>	<b>-5.234</b>	<b>5.266</b>	<b>202.0</b>	<b>27.00</b>	<b>0.2860</b>
<b>SD</b>	<b>\$6,613.44</b>	<b>\$0.00</b>	<b>\$6,989.20</b>	<b>6.651</b>	<b>6.692</b>	<b>224.9</b>	<b>5.298</b>	<b>0.1160</b>

**Weekly Returns**

Week	Net Profit	Add/With	End Equity	Return(%)	Drawdown(%)	Trades	Wins(%)	P Fac
4/24/2016	(\$1,206.75)	\$0.00	\$89,584.38	-1.329	1.332	70	28.57	0.2420
4/17/2016	(\$187.22)	\$0.00	\$90,791.13	-0.2058	0.3757	37	29.73	0.6359
4/10/2016	(\$4,877.71)	\$0.00	\$90,978.35	-5.089	5.108	152	32.24	0.1925
4/3/2016	(\$3,336.19)	\$0.00	\$95,856.06	-3.363	3.407	71	26.76	0.1037
3/27/2016	(\$807.75)	\$0.00	\$99,192.25	-0.8078	0.8527	74	29.73	0.4185
<b>Ave</b>	<b>(\$2,083.12)</b>	<b>\$0.00</b>	<b>\$93,280.43</b>	<b>-2.159</b>	<b>2.215</b>	<b>80.80</b>	<b>29.41</b>	<b>0.3185</b>
<b>SD</b>	<b>\$1,960.16</b>	<b>\$0.00</b>	<b>\$4,084.74</b>	<b>2.023</b>	<b>1.988</b>	<b>42.56</b>	<b>1.995</b>	<b>0.2113</b>

**Daily Returns**

Day	Net Profit	Add/With	End Equity	Return(%)	Drawdown(%)	Trades	Wins(%)	P Fac
4/29/2016	(\$208.96)	\$0.00	\$89,584.38	-0.2327	0.2670	30	33.33	0.5795
4/28/2016	(\$112.15)	\$0.00	\$89,793.34	-0.1247	0.1303	12	33.33	0.2108
4/27/2016	(\$266.39)	\$0.00	\$89,905.49	-0.2954	0.2954	6	33.33	0.07785
4/26/2016	(\$219.75)	\$0.00	\$90,171.88	-0.2431	0.2623	6	16.67	0.07349

4/25/2016	(\$399.50)	\$0.00	\$90,391.63	-0.4400	0.4400	16	18.75	0.06440
4/22/2016	(\$55.37)	\$0.00	\$90,791.13	-0.06095	0.06871	9	33.33	0.4721
4/20/2016	(\$131.85)	\$0.00	\$90,846.50	-0.1449	0.3757	28	28.57	0.6779
4/15/2016	(\$2,677.06)	\$0.00	\$90,978.35	-2.858	2.877	58	31.03	0.1248
4/13/2016	(\$2,175.16)	\$0.00	\$93,655.41	-2.270	2.353	87	31.03	0.2496
4/12/2016	(\$45.37)	\$0.00	\$95,830.57	-0.04732	0.08597	4	25.00	0.4495
4/11/2016	\$19.88	\$0.00	\$95,875.94	0.02074	0.000	3	100.0	100.0
4/7/2016	(\$639.87)	\$0.00	\$95,856.06	-0.6631	0.6631	12	25.00	0.04817
4/6/2016	(\$2,125.19)	\$0.00	\$96,495.93	-2.155	2.173	40	25.00	0.09996
4/5/2016	(\$314.83)	\$0.00	\$98,621.12	-0.3182	0.3182	10	20.00	0.03067
4/4/2016	(\$256.30)	\$0.00	\$98,935.95	-0.2584	0.3036	9	44.44	0.2954
4/1/2016	(\$276.35)	\$0.00	\$99,192.25	-0.2778	0.3854	31	38.71	0.4961
3/31/2016	(\$104.79)	\$0.00	\$99,468.60	-0.1052	0.2027	25	32.00	0.7324
3/29/2016	(\$426.61)	\$0.00	\$99,573.39	-0.4266	0.4291	18	11.11	0.05008
<b>Ave</b>	<b>(\$578.65)</b>	<b>\$0.00</b>	<b>\$94,220.44</b>	<b>-0.6056</b>	<b>0.6461</b>	<b>22.44</b>	<b>32.26</b>	<b>5.818</b>
<b>SD</b>	<b>\$825.66</b>	<b>\$0.00</b>	<b>\$3,914.08</b>	<b>0.8636</b>	<b>0.8615</b>	<b>21.64</b>	<b>18.76</b>	<b>23.51</b>

### Dependency Analysis Results for All Trades

#### Dependency: Negative

Confidence Level: 40.54%

Total Number of Runs: 175

Number of Runs of Wins: 88

Number of Runs of Losses: 87

Average Length of Winning Runs: 1.4

Average Length of Losing Runs: 3.3

### Significance Test Settings

Number of rules and/or restrictions in trading system or method: 0

Confidence level for confidence intervals around average trade: 95.00%

### Significance Test Results

Number of Trades: 404

Number of Degrees of Freedom: 404

Average trade at 95.00% confidence: \$-25.78 +/- 8.44

Worst-case average trade at 95.00% confidence: \$-34.23

Probability that average trade is greater than zero: 200.00%

<System/method may not be profitable at specified confidence level>

Double Opening Range System Monte Carlo Report

**Market System: MarketSystem1****Trading Parameters**

Initial Account Equity: \$100,000.00  
 Trading Vehicle: Futures  
 Initial Margin: \$0.00  
 Round-turn slippage per contract: \$0.00  
 Round-turn commissions and fees per contract: \$0.00  
 Position Sizing Method: None  
 No. Contracts: From input data  
 Number of Monte Carlo Samples: 500

**Key Results at Select Confidence Levels**

Confidence (%)	Rate of Return (%)	Max Drawdown (%)	Return-DD Ratio	Mod. Sharpe Ratio
50	-10.42	10.45	0.000	-0.2501
60	-10.42	10.47	0.000	-0.2506
70	-10.42	10.51	0.000	-0.2511
80	-10.42	10.55	0.000	-0.2518
85	-10.42	10.59	0.000	-0.2520
90	-10.42	10.62	0.000	-0.2525
91	-10.42	10.62	0.000	-0.2526
92	-10.42	10.63	0.000	-0.2527
93	-10.42	10.63	0.000	-0.2528
94	-10.42	10.65	0.000	-0.2529
95	-10.42	10.66	0.000	-0.2532
96	-10.42	10.66	0.000	-0.2535
97	-10.42	10.68	0.000	-0.2536
98	-10.42	10.69	0.000	-0.2538
99	-10.42	10.74	0.000	-0.2540
100	-10.42	10.81	0.000	-0.2545

**Monte Carlo Results at 95.00% Confidence**

Total Net Profit: (\$10,415.62)	Max Number of Contracts: 250
Final Account Equity: \$89,584.38	Minimum Number of Contracts: 247
Return on Starting Equity: -10.42%	Average Number of Contracts: 249
Profit Factor: 0.2144	
Largest Winning Trade: \$234.06	Largest Losing Trade: (\$950.00)
Largest Winning Trade (%): 0.2349%	Largest Losing Trade (%): -1.049%
Average Winning Trade: \$23.49	Average Losing Trade: (\$46.85)
Average Winning Trade (%): 0.02439%	Average Losing Trade (%): -0.04955%
Average Trade: (\$25.78)	Win/Loss Ratio: 0.5014
Average Trade (%): -0.02716%	Win/Loss Ratio (%/%) : 0.4957
Trade Standard Deviation: \$103.17	Max Consecutive Wins: 3
Trade Standard Deviation (%): 0.1097%	Max Consecutive Losses: 20
Worst Case Drawdown: (\$10,668.14)	Return/Drawdown Ratio: 0.000



Worst Case Drawdown (%): 10.66%

Average Drawdown: (\$10,622.60)

Average Drawdown (%): 10.60%

Modified Sharpe Ratio: -0.2532

## **Appendix B: Full EasyLanguage Code of each System and Supporting Functions**

Note: without formatting and highlighting, this code is very difficult to read. It is best to use copy and paste to move the code into your preferred EasyLanguage text editor and read the code there.

It is important to note that the authors of this IQP paper did not write all of this code. In particular, some of the functions presented here were taken from the Internet. The source code of each function contains copyright information if it is relevant. The works created by authors of this IQP use the MIT software license.

### **B.1: Basic Breakout System Strategy**

Inputs:

```

printdebuginfo(False),
initialequity(100000), {initial account size. MUST BE SET FOR POSITION SIZING
TO WORK CORRECTLY}
fractionrisked(0.05), {portion of current equity to risk on each trade,
expressed as a decimal between 0 and 1}
avglosslargestloss(0.2), {average losing trade cost, per share, or largest
losing trade cost, per share. The default is a general estimate of average
loss per share; one should seriously consider using backtesting to determine
a more precise value before running the system with real money.}
ORlength(6), {numbers of bars in OR}
MaxEntriesPerDay(3), {maximum number of times to enter the market}
MLenS(4), {length of the short moving average}
MLenL(7), {length of the long moving average}
MEntryS(6), {length of the short moving average that is used specifically for
entry (when MA=True)}
third(0.50), {number of ATRs (if atreentry=True) or ORs to add to the OR when
entering for the third time that day}
second(0.25), {number of ATRs (if atreentry=True) or ORs to add to the OR when
entering for the second time that day}
ATRPeriod(6), {number of bars to evaluate ATRs on if using them}
atrcoeff(.75), {number of atrs above orhigh to put stop orders at if atreentry
and/or atrexit is true}
touchr(0.05), {ratio of Average True Range below the OR below which the price
has to drop to have 'touched' the OR. smaller numbers are less restrictive}
trailingprct(0.25), {portion, from 0 to 1, of maximum profit that can be lost
before the system gets out when usetrailingstop is true}
usedoubletouchentry(0), {if 0 (false), do not use the double-touch entry. if
1 (true), do use the double-touch entry}
useMAexit(0), {if 1 (true), use moving averages exit rule}
usetrailingstop(0), {if 1 (true) use trailing stop. if 0 (false), do not.}
useatrexit(0), {Activaiton variable for atrexit. If 1 (true), strategy will
exit if trade goes against us by more than atrcoeff ATRs}
useexitatrAvg(0), {if 1 (true), exit when the close drops below the slow
moving average. If 0 (false) do nothing when this happens}
useratio(0), {if 1 (true), add (second*or) to orhigh for second entry, and
(third*or) to orhigh for third and later entries. It is best to use
maxentriesperday = 3 when this is active. If 0 (false), enter normally}
useatreentry(0); {if 1 (True) use atrs to augment orhigh instead of ors. if 0
(False), do not}

```

Variables:

```

ORhigh(0), {value of Ceiling}
ORlow(0), {Value of Floor}

```

```

TLHigh(0), {Value for trend line, Ceiling}
TLLow(0), {Value for trend line, Floor}
OpeningBarNum(0), {Number of bar for the most recent open}
MAS(0), {short moving average, only relevant for MAExit}
MAL(0), {long moving average, only relevant for MAExit and exitatavg}
MAES(0), {short entry moving average. Relevant only when eratio is on}
ORRange(0), {ORHigh - ORLow}
traderisk(0), {amount of money in dollars that would be risked, were the
system to buy on this bar}
ratio(0), {convenience variable used with eratio entries}
buyprice(0), {price to buy at. Gets modified based on different conditions
before order is placed}
entrycond(False), {entry condition. If it gets set to true at any point
within the entry logic, the system will buy.}
didthouch(false),
highestprice(-1),
temp(0),
outfile("c:/tradestationportfoliomaestrodebuginfo.txt");
//debug info
If printdebuginfo then
Begin
    FileAppend(outfile, "Symbol Name: " + SymbolName + NewLine);
    FileAppend(outfile, "Max Bars Back: " + NumToStr(MaxBarsBack, 2) +
NewLine);
    FileAppend(outfile, "LastCalcDate: " + NumToStr>LastCalcDate, 2) +
NewLine);
    FileAppend(outfile, "LastCalcTime: " + NumToStr>LastCalcTime, 2) +
NewLine);
    FileAppend(outfile, NewLine);
end;

//breakpoint("session");
// Check Session
if CurrentSession(0) <> CurrentSession(0)[1] then
begin
    OpeningBarNum = CurrentBar;
    didtouch = false;
end;

//breakpoint("trade risk");
//compute risk for trade if the system buys on this bar
If useatexit <> 0 then traderisk = atrcoeff*AvgTrueRange(atrperiod)
Else traderisk = avglosslargestloss;
//breakpoint("or calculation");
// Define OR and trendlines
If (Currentbar - ORlength) + 1 = OpeningBarNum then
begin
    ORHigh = Highest(high,ORlength);
    ORLow = Lowest(Low,ORlength);
    temp = drawOR(cyan, ORHigh, ORLow); //assignment to ORRange is just to
trick trade station into doing what we want.
    ORRange = (ORhigh - ORlow);
end;
//breakpoint("moving averages");
//compute moving averages
MAS = Average(Close,MLenS); //short for 'moving average short'
MAL = Average(Close,MLenL); //short for 'moving average long'

```

```

MAES = Average(Close, MEntryS); //short for 'moving average entry slow'
//breakpoint("entry qualifications");
If time >= calctime(930, 5*ORLength) and time < 1530 and //if it is trading
hours. The '5' here is the length of the bar used, so it needs to change if
you use something besides 5-minute bars
    Marketposition = 0 and //system will not have two trades on at once
    EntriesToday(Date) < MaxEntriesPerDay then
begin
    buyprice = ORhigh; //the price to place the stop order at. It may be
modified as this logic progresses
    entrycond = false; //the system will only buy if this gets set to true
before the end of this if statement block.
    //breakpoint ("atrentry");
    //add an atr of padding to the OR High if ATR entry is on
    if useatrentry <> 0 then
    begin
        buyprice += atrcoeff*AvgTrueRange(ATRPeriod);
    end;
    //breakpoint("useeratio");
    //if eratio is true, our system becomes more conservative as the day goes
on. It adds fractions of the OR to its stop orders, to try to avoid false
breakouts.
    if useeratio <> 0 then
    Begin
        if EntriesToday(Date) >= 2 then ratio = third //if our next entry
will be the third
        else if EntriesToday(Date) = 1 then ratio = second //if our next
entry will be the second
        else ratio = 0; //if this will be our first entry today
        //breakpoint("entrycond");
        buyprice += ratio*ORRange;

        //with eratio, system enters only if the price is above the orhigh
AND the slow moving average crosses over the OR High.
        entrycond = (close > (ORhigh + ratio*ORRange)) and (MAES crosses over
(ORhigh + ratio*ORRange));
    end
    else entrycond = close crosses over ORhigh;
    //breakpoint("odoubletouchentry");
    //if the price hasn't already touched the buyprice yet, don't get in.
    if usedoubletouchentry <> 0 then
    begin
        entrycond = entrycond and didtouch;
    end;
    //breakpoint("Submit the order");
    //submit the order
    if entrycond then
    begin
        buy NConFF2(italiaequity, fractionrisked, traderisk, 1) shares next
bar buyprice stop;
    end;
    //breakpoint("doubletouch didtouch");
    //intuition: set didtouch = true if the price tests the ceiling and the
ceiling holds.
    //this statement must execute after the entry statement.
    if usedoubletouchentry <> 0 and high crosses under orhigh -
touchr*atrcoeff*avgTrueRange(atrperiod) then

```

```

begin
    didtouch = true;
end;
end;
//breakpoint("End of day exit");
//Exits
//exit at end of day
If time > 1530 then
Begin
    if marketposition = 1 then Sell next bar market
    else if marketposition = -1 then buy to cover next bar market;
end;
//breakpoint("trailing stop");
//Trailing stop
If marketposition <> marketposition(1) then highestprice = -1; //clearly a
new trade, so trailing stop tracking should reset
//long
if highestprice < close then highestprice = close; //track the maximum
if marketposition = 1 and usetrailingstop <> 0 and close > (entryprice +
0.07) then
Begin
    sell ("trailing long") next bar highestprice - ((highestprice -
entryprice)*trailingprct) stop;
end;

//breakpoint("maexit");
//exit if ma short is under ma long.
If useMAexit <> 0 then
Begin
If marketposition = 1 and
    MAS crosses under MAL then
    Sell ("MA Exit Long") next bar at market;
If Marketposition = -1 and
    MAS crosses over MAL then
    Buytocover ("MA Exit Short") next bar at market;
end;

//breakpoint("atrexit");
//exit if under ORhigh by a big enough fraction of the atr
If useatrexit <> 0 then
Begin
    If close crosses under (ORHigh - atrcoeff*AvgTrueRange(ATRPeriod)) then
sell next bar at market;
end;
//breakpoint("exitatravg");
//exit if close under moving average minus atr
If useexitatrAvg <> 0 then
Begin
    If close crosses under (MAL - atrcoeff*AvgTrueRange(ATRPeriod)) then sell
next bar at market;
end;
//breakpoint("warnings");
//warnings: this section contains code to print warnings if activation
varialbes have unusual values. These variables should all have values 0 or 1,
though the strategy will function if they are any number
if usedoubletouchentry <> 1 and usedoubletouchentry <> 0 then print("Warning:
variable usedoubletouchentry not defined to 0 or 1. Strategy will use double

```

```

touch entry for any value of usedoubletouchentry except 0.");
if useMAExit <> 1 and useMAexit <> 0 then print("Warning: variable useMAExit
not defined to 0 or 1. Strategy will use moving average exits for any value
of usemaexit except 0.");
if usetrailingstop <> 1 and usetrailingstop <> 0 then print("Warning:
variable usetrailingstop not defined to 0 or 1. Strategy will use trailing
stops for any value of usetrailingstop except 0.");
if useatexit <> 1 and useatexit <> 0 then print("Warning: variable
useatexit not defined to 0 or 1. Strategy will use money management stops
(atr exits) for any value of useatexit except 0.");
if useexitatavg <> 1 and useexitatAvg <> 0 then print("Warning: variable
useexitatavg not defined to 0 or 1. Strategy will use close crosses under
slow moving average exits for any value of useexitatavg except 0.");
if useeratio <> 1 and useeratio <> 0 then print("Warning: variable
useetration not defined to 0 or 1. Strategy will use entry ratios for any
value of useeratio except 0.");
if useatrentry <> 1 and useatrentry <> 0 then print("Warning, variable
useatrentry not defined to 0 or 1. Strategy will use atr padding on entries
for any value of useatrentry except 0.");

temp = WriteTrades32(traderisk, 0, 0, 10, 1, "c:\IQPx2OR_TradeData.txt");

```

## **B.2: Support and Breakout Strategy:**

Inputs:

```

initialequity(100000), {initial account size. MUST BE SET FOR POSITION SIZING
TO WORK CORRECTLY}
fractionrisked(0.05), {portion of current equity to risk on each trade,
expressed as a decimal between 0 and 1}
avglosslargestloss(0.2), {average losing trade cost, per share, or largest
losing trade cost, per share. The default is a general estimate of average
loss per share; one should seriously consider using backtesting to determine
a more precise value before running the system with real money.}
ORlength(6), {numbers of bars in Opening Range}
MaxEntriesPerDay(1), {maximum number of times per day to enter the market}
EATRcoeff(0.75), {Average True Range (ATR) coefficient for entry}
Atrperiod(6), {number of bars used to calculate average true range}
xlatrcoeff(1.5), {ATR coefficient for exit as price goes below orlow}
xhatrcoeff(1.5), {ATR coefficient for exit as price goes below orhigh}
minbreakslope(0.2), {minimum portion of OR linear regression slope must be to
trigger a buy}
linregperiod(4), {linear regression period number of bars back}
xlinregperiod(3), {number of bars for the linear regression used in the
linear regression exit}
trailingprct(.25), {percent of maximum profit lost at which the system get
out when using a trailing stop}
xslope(-0.1), {the regression slope at or below which the system exits when
using linear regression exit}
rsiperiod(9), {period of the RSI indicator used in the rsi exit}
activeday(1), {optional parameter specifying which day to trade (1 = monday,
2 = tuesday, and so on). Has no effect unless onlyactiveday is false}
onlyactiveday(false), {if true, strategy will only trade on the day specified
by activeday. if false, strategy will trade normally}
usetrailingstop(1), {if 0 (false), do not use a trailing stop. If 1 (true),
use a trailing stop}
uselinregentry(1), {if 0 (false), do not use linear regression entries. if 1
(true), use linear regression entries}

```

```

useatexit(1), {if 0 (false), do not use atr stop loss. If 1 (true), do use
an atr stop loss}
uselinexit(1), {if 0 (false), do not use linear regression exits. If 1
(true), use linear regression exits}
useRSIExit(0); {if 1 (true), exit when rsi indicates stock will move against
you. If 0 (false), do not use rsi exits}

```

Variables:

```

ORhigh(0), {value of Ceiling}
ORlow(0), {Value of Floor}
TLHigh(0), {Value for trend line, Ceiling}
TLLow(0), {Value for trend line, Floor}
ORrange(0), {Range of the Opening Range (OR)}
OpeningBarNum(0), {Number of bar for the most recent open}
traderisk(0), {amount of money that in dollars would be risked, were the
system to buy in on this bar}
temp(0),
bestprice(-1); {variable used to track the best price since the trade
started}

```

```

// Check Session
if CurrentSession(0) <> CurrentSession(0)[1] then
begin
    OpeningBarNum = CurrentBar;
end;

//compute risk for trade if the system were to trade this bar
//choose the greater atr coeff for risk calculation, for a simple
conservative estimate
If useatexit <> 0 and xhatrcoeff > xlatrcoeff then traderisk =
xhatrcoeff*AvgTrueRange(atrperiod)
Else if useatexit <> 0 then traderisk = xlatrcoeff*AvgTrueRange(atrperiod)
Else traderisk = avglosslargestloss;

// Define OR and trendlines
If (Currentbar - ORlength) + 1 = OpeningBarNum then
begin
    ORHigh = Highest(high,ORlength);
    ORLow = Lowest(Low,ORlength);
    temp = drawOR(cyan, ORHigh, ORLow);
    ORRange = (ORhigh - ORlow);
end;

//Entries
If time >= calctime(930, 5*ORlength) and
time < 1530 and
Marketposition = 0 and
EntriesToday(Date) < MaxEntriesPerDay and
Not onlyactiveday or dayofweek(date) = activeday
then
Begin
    If open crosses over ORlow and ORRange >= 0.03 then //ORRange >= profit
needed to make up for comission and slippage. Assume commission is 0.01 per
share as per trade station's website, and slippage is 0.02 per share.
        buy NConFF2(initialequity, fractionrisked, traderisk, 1) shares next
bar at (ORlow + eatrcoeff*AvgTrueRange(atrperiod)) stop
        else If uselinregentry <> 0 and high > ORHigh and LinearRegValue(close,

```

```

Linregperiod, 0) < close then {disable in trendless markets; enable in
uptrending markets}
    buy NConFF2(initialequity, fractionrisked, traderisk, 1) shares next
bar at (ORhigh + eatrcoeff*AvgTrueRange(atrperiod)) stop;
end;

//End of Day Exit
If time > 1530 then
Begin
    if marketposition = 1 then Sell next bar market
    else if marketposition = -1 then buy to cover next bar market;
end;

//Under Entry Price and ATR Exit
If useatrexit <> 0 and (high crosses under (ORhigh -
xhatrcoeff*Avgtruerange(Atrperiod)) or
    close < (ORlow - xlatrcoeff*Avgtruerange(Atrperiod))) then
    sell next bar at market;

//Trailing Stop Exit
If marketposition <> marketposition(1) then bestprice = -1; //clearly a new
trade, so trailing stop tracking should reset
if marketposition = 1 and usetrailingstop <> 0 and close > (entryprice +
0.05) then
Begin
    if bestprice < close then
        bestprice = close;
    sell ("trailing") next bar bestprice - ((bestprice -
entryprice)*trailingprct) stop;
end;

//Linear Regression Exit
If uselinexit <> 0 then
begin
    if marketposition = 1 and LinearRegSlopeFC(close, xLinregperiod) < xslope
and close > ORHigh then sell ("xlinreg") next bar market;
end;
//Relative Strength Index (RSI) Exit
If userSIExit <> 0 then
begin
    If close > ORhigh and marketposition = 1 and RSI(Close, 9) crosses under
70 then sell ("RSI") next bar market;
end;

//warnings: this section contains code to print warnings if activation
varialbes have unusual values. These variables should all have values 0 or 1,
though the strategy will function if they are any number
if useatrexit <> 1 and useatrexit <> 0 then print("Warning: variable
useatrexit not defined to 0 or 1. Strategy will use atr exits for any value
of useatrexit except 0.");
if usetrailingstop <> 1 and usetrailingstop <> 1 then print("Warning:
variable usetrailingstop not defined to 0 or 1. Strategy will use trailing
stops for any value of usetrailingstop except 0.");
if uselinexit <> 1 and uselinexit <> 0 then print("Warning: variable
uselinexit not defined to 0 or 1. Strategy will use atr exits for any value
of uselinexit except 0.");
if usersiexit <> 1 and uselinexit <> 0 then print("Warning: variable

```



```

usersiexit not defined to 0 or 1. Strategy will use rsi exits for any value
of usersiexit except 0.");
if uselinregentry <> 1 and uselinregentry <> 0 then print("Warning: variable
uselinregentry not defined to 0 or 1. Strategy will use linear regression
entries for any value of uselinregentry except 0.");

temp = WriteTrades32(traderisk, 0, 0, 10, 1, "c:\IQPx2OR_TradeData.txt");

```

### **B.3: Symmetric Support and Breakout Strategy:**

Inputs:

```

initialequity(100000), {initial account size. MUST BE SET FOR POSITION SIZING
TO WORK CORRECTLY}
fractionrisked(0.05), {portion of current equity to risk on each trade,
expressed as a decimal between 0 and 1}
avglosslargestloss(0.2), {average losing trade cost, per share, or largest
losing trade cost, per share. The default is a general estimate of average
loss per share; one should seriously consider using backtesting to determine
a more precise value before running the system with real money.}
ORlength(6), {numbers of bars in OR}
MaxEntriesPerDay(1), {maximum number of times to enter the market}
EATRcoeff(0.75), {Average True Range (ATR) coefficient for entry}
Atrperiod(6), {number of bars used to calculate average true range}
xlatrcoeff(1.5), {ATR coefficient for exit when price crosses out of the OR in
the wrong direction}
xhatrcoeff(1.5), {ATR coefficient for exit when price crosses into the OR in
the wrong direction}
minbreakslope(0.2), {minimum portion of OR linear regression slope must be to
trigger a buy}
linregperiod(4), {linear regression period number of bars back}
xlinregperiod(3), {number of bars to use in the exit linear regression
period}
trailingpct(0.25), {percentage, from 0 to 1, of maximum profit that must be
lost for us to get out when using trailing stops}
xslope(-0.1), {the slope at or below which the system exits when using linear
regression exit}
activeday(1), {day to trade on when onlyactiveday is true. 1 = monday, 2 =
tuesday, etc.}
onlyactiveday(false), {If true, only trade on the day specified by activeday.
Can be used to easily examine performance on specific days of the week}
usetrailingstop(0), {if 0 (false), do not use trailing stops. If 1 (true),
use trailing stops}
useatexit(1), {if 0 (false), do not use atr exits. If 1 (true), use linear
regression entries}
uselinexit(1), {if 0 (false), do not use linear regression exits. If 1
(true), use linear regression exits}
useRSIexit(0); {if 0 (false), do not use rsi exits. if 1 (true), use rsi
exits}

```

Variables:

```

ORhigh(0), {value of Ceiling}
ORlow(0), {Value of Floor}
TLHigh(0), {Value for trend line, Ceiling}
TLLow(0), {Value for trend line, Floor}
ORrange(0), {Range of the OR}
OpeningBarNum(0), {Number of bar for the most recent open}
highestprice(-1),

```

```

temp(0),
traderisk(0), {amount of money in dollars that would be risked, were the
system to buy in on this bar}
lowestprice(99999999999999);

// Check Session
if CurrentSession(0) <> CurrentSession(0)[1] then
begin
    OpeningBarNum = CurrentBar;
end;

//compute risk for trade if the system were to trade this bar
//choose the greater atr coefficient for risk calculation, for a simple
conservative estimate
If useatrexit <> 0 and xhatrcoeff > xlatrcoeff then traderisk =
xhatrcoeff*AvgTrueRange(atrperiod)
Else if useatrexit <> 0 then traderisk = xlatrcoeff*AvgTrueRange(atrperiod)
Else traderisk = avglosslargestloss;

// Define OR and trendlines
If (Currentbar - ORlength) + 1 = OpeningBarNum then
begin
    ORHigh = Highest(high,ORlength);
    ORLow = Lowest(Low,ORlength);
    temp = drawOR(cyan, ORHigh, ORLow);
    ORRange = (ORhigh - ORlow);
end;

//Entries
If time >= calctime(930, 5*ORlength) and
    time < 1530 and
    {Marketposition = 0 and
    EntriesToday(Date) < MaxEntriesPerDay and}
    (Not onlyactiveday) or dayofweek(date) = activeday and
    ORRange >= 0.03 then //ORRange >= profit needed to make up for comission
and slippage. Assume commission is 0.01 per share as per trade station's
website, and slippage is 0.02 per share.
Begin
    If open crosses over ORlow and marketposition <> 1 then
        buy NConFF2(italiaequity, fractionrisked, traderisk, 1) shares next
bar (ORlow + eatrcoeff*AvgTrueRange(atrperiod)) stop;
    If Open crosses over ORHigh and marketposition <> 1 then
        buy NConFF2(italiaequity, fractionrisked, traderisk, 1) shares next
bar (ORHigh + eatrcoeff*AvgTrueRange(atrperiod)) stop;
    If Open crosses under ORlow and marketposition <> -1 then
        sell short NConFF2(italiaequity, fractionrisked, traderisk, 1)
shares next bar (ORlow - eatrcoeff*AvgTrueRange(atrperiod)) stop;
    If Open crosses under ORHigh and marketposition <> -1 then
        sell short NConFF2(italiaequity, fractionrisked, traderisk, 1)
shares next bar (ORHigh - eatrcoeff*AvgTrueRange(atrperiod)) stop;
end;

//Exit end of day
If time > 1530 then
Begin
    if marketposition = 1 then
        Sell next bar at market

```

```

    else if marketposition = -1 then
        buy to cover next bar market;
end;

//Exit atr
If useatexit <> 0 then
begin
    if Marketposition = 1 and close < (entryprice -
xlatrcoeff*Avgtruerange(Atrperiod)) then sell ("ATR Exit Long") next bar
market
    else if Marketposition = -1 and close > (entryprice +
xhatrcoeff*Avgtruerange(Atrperiod)) then buytocover ("ATR Exit Short") next
bar market;
end;

//Trailing stop
If marketposition <> marketposition(1) then highestprice = -1; //clearly a
new trade, so trailing stop tracking should reset
If marketposition <> marketposition(1) then lowestprice = 9999999999999999;
//long
if highestprice < close then highestprice = close; //track the maximum
if marketposition = 1 and usetrailingstop <> 0 and close > (entryprice +
0.07) then
Begin
    sell ("trailing long") next bar highestprice - ((highestprice -
entryprice)*trailingpct) stop;
end;
//short
if lowestprice > close then lowestprice = close; //track the minimum
if marketposition = -1 and usetrailingstop <> 0 and close < (entryprice -
0.07) then
Begin
    buytocover ("trailing short") next bar lowestprice + ((entryprice -
lowestprice)*trailingpct) stop;
end;

//exit if negative slope but long
If uselinexit <> 0 and marketposition = 1 and LinearRegSlopeFC(close,
xLinregperiod) < xslope {and close > ORHigh} then sell ("xlinreg") next bar
market;
//exit if positive slope but short
If uselinexit <> 0 and marketposition = -1 and LinearRegSlopeFC(close,
xLinregperiod) < (-1 * xslope) {and close > ORHigh} then sell ("xplinreg")
next bar market;

//Exit RSI
If useRSIExit <> 1 then
begin
    If close > ORhigh and marketposition = 1 and RSI(Close, 9) crosses under
70 then sell ("RSI long") next bar market
    else If close < ORlow and marketposition = -1 and RSI(Close, 9) crosses
over 30 then buytocover ("RSI short") next bar market;
end;

//warnings: this section contains code to print warnings if activation
varialbes have unusual values. These variables should all have values 0 or 1,

```

```

though the strategy will function if they are any number
if useatexit <> 1 and useatexit <> 0 then print("Warning: variable
useatexit not defined to 0 or 1. Strategy will use atr exits for any value
of useatexit except 0.");
if usetrailingstop <> 1 and usetrailingstop <> 1 then print("Warning:
variable usetrailingstop not defined to 0 or 1. Strategy will use trailing
stops for any value of usetrailingstop except 0.");
if uselinexit <> 1 and uselinexit <> 0 then print("Warning: variable
uselinexit not defined to 0 or 1. Strategy will use atr exits for any value
of uselinexit except 0.");
if usersiexit <> 1 and usersiexit <> 0 then print("Warning: variable
usersiexit not defined to 0 or 1. Strategy will use rsi exits for any value
of usersiexit except 0.");

temp = WriteTrades32(traderisk, 0, 0, 10, 1, "c:\IQPx2OR_TradeData.txt");

```

#### **B.4: Double OR Strategy:**

```

//note about variables that begin with use-:
//there are some features, like money management exits (called ATR exits in
this document) that can be turned on or off.
//there are input variables to do this. for example, useatexit determines
whether or not the system will use atr exits.
//these features will be used whenever their input is not equal to zero.
//If the user enters something besides 0 or 1, the strategy will print a
warning but execute as if the input was set to 1.
inputs:
initialequity(100000), {initial account size. MUST BE SET FOR POSITION SIZING
TO WORK CORRECTLY}
fractionrisked(0.05), {portion of current equity to risk on each trade,
expressed as a decimal between 0 and 1}
avglosslargestloss(0.2), {average losing trade cost, per share, or largest
losing trade cost, per share. The default is a general estimate of average
loss per share; one should seriously consider using backtesting to determine
a more precise value before running the system with real money.}
ORLength(6), {number of bars to use in time-dependent Opening Range (OR)
calculations}
or1(1), {first type of OR to use. 1 is for the standard OR, 2 is for the OR
defined by the high and low of the bar with the highest volume, and 3 is for
the OR defined by the high and low from 930 to the first three bars of below-
average volume}
or2(2), {second type of OR to use. System will behave in unexpected way of
or1 = or2}
eatrcoeff(0.5), {number of average true ranges to consider during entry}
eatrperiod(3), {period of average true range used during entry}
xatrperiod(6), {period of average true range used for exits}
useatexit(1), {if 0 (false), do not use atr stop loss. If 1 (true), do use
an atr stop loss}
xatrcoeff(0.5), {number of atrs to use for the atr stop loss}
usetrailingstop(1), {if 0 (false), do not use a trailing stop. If 1 (true),
use a trailing stop}
trailingprct(0.25), {percent of maximum profit lost that trailing stop will
trigger at}
uselinexit(1), {if 0 (false), do not use linear regression exits. If 1
(true), use linear regression exits}
xLinregperiod(3), {number of bars to use for the linear regression exit
calculation}

```

```

xslope(-0.1), {slope at which to get out while using linear regression exit.
This number is multiplied by -1 while short}
rsiperiod(9), {period used for the rsi exit if rsi exit is set to 1 (true)}
useRSIExit(0), {if 1 (true), exit when rsi indicates stock will move against
you. If 0 (false), do not use rsi exits}
maxentriesperday(4); {maximum number of trades to make per day. If you want
there to be no limit, set this to a large number.}

variables:
ORHout(-1),
ORHin(-1),
ORLin(-1),
ORLout(-1),
ORHighStandard(0),
ORLowStandard(0),
ORHighMaxVol(0),
ORLowMaxVol(0),
ORHighVol(0),
ORLowVol(0),
ORRangeStandard(0),
ORRangeMaxVol(0),
ORRangeVol(0),
TLHout(0),
TLHin(0),
TLLin(0),
TLLout(0),
OpeningBarNum(0),
maxvol(-999999999999999999),
temp(0), //for swapping stuff
traderisk(0), {amount of money in dollars that would be risked, were the
system to buy in on this bar}
havetodaySORmaxvol(False),
havetodaySORvol(False),
havetodaySORstandard(False),
orsready(False),
highestprice(-1),
lowestprice(999999999999999999);

// Reset everything for beginning of new day
if CurrentSession(0) <> CurrentSession(0)[1] then
begin
    OpeningBarNum = CurrentBar;
    maxvol = -999999999999999999;

    ORHout = -1;
    ORHin = -1;
    ORLin = -1;
    ORLout = -1;

    haveTodaySORmaxvol = False;
    haveTodaySORvol = False;
    haveTodaySORstandard = False;
    orsready = False;
end;

//compute risk for trade if the system were to trade this bar
If useatexit <> 0 then traderisk = xatrcoeff*AvgTrueRange(xatrperiod)

```

```

Else traderisk = avglosslargestloss;

// Define OR and trendlines
If (Currentbar - ORlength) + 1 = OpeningBarNum then
begin
    ORHighStandard = Highest(high,ORlength);
    ORLowStandard = Lowest(Low,ORlength);
    havetodaysorstandard = true;
end;

//or is the high and low of the bar with the highest volume
If time < 1000 then
begin
    If maxvol < volume then
    begin
        maxvol = volume;
        ORLowMaxVol = low;
        ORHighMaxVol = high;
        ORRangeMaxVol = ORHighMaxVol - ORLowMaxVol;
    end;
end;
If time = 1000 then
Begin
    havetodaysormaxvol = True;
end;

// Define OR and trendlines
{OR is the high and low of the period from 930 to the first three bars of
below average volume}
If not havetodaysorvol and
    currentbar - 3 > openingbarnum and
    volume[0] < AverageFC(volume, 390) and
    volume[1] < AverageFC(volume, 390) and
    volume[2] < AverageFC(volume, 390) then
begin
    ORhighVol = Highest(High, currentbar - openingbarnum + 1);
    ORlowVol = Lowest(Low, currentbar - openingbarnum + 1);
    ORRangeVol = (ORhighVol - ORlowVol);
    havetodaysorvol = true;
end;

If (or1 = 1 or or2 = 1) and havetodaysorstandard then
begin
    if ORHout = -1 then
    begin
        ORHout = ORHighStandard;
        ORLout = ORLowStandard;
    end
    else
    begin
        ORHin = ORHighStandard;
        ORLin = ORLowStandard;
        orsready = True;
    end;
end;
end;

```

```

If (or1 = 2 or or2 = 2) and havetodaysormaxvol then
Begin
  if ORHout = -1 then
  begin
    ORHout = ORHighMaxVol;
    ORLout = ORLowMaxVol;
  end
  else
  begin
    ORHin = ORHighMaxVol;
    ORLin = ORLowMaxVol;
    orsready = True;
  end;
end;

If (or1 = 3 or or2 = 3) and havetodaysorvol then
Begin
  if ORHout = -1 then
  begin
    ORHout = ORHighVol;
    ORLout = ORLowVol;
  end
  else
  begin
    ORHin = ORHighVol;
    ORLin = ORLowVol;
    orsready = True;
  end;
end;

If orsready and ORHout < ORHin then
Begin
  temp = ORHout;
  ORHout = ORHin;
  ORHin = temp;
end;

If orsready and ORLout > ORLin then
Begin
  temp = ORLout;
  ORLout = ORLin;
  ORLin = temp;
end;

If orsready then
Begin
  print("ors are ready");
  temp = drawOR(cyan, ORHin, ORLin);
  temp = drawOR(red, ORHout, ORLout);
end;

//entries
If time >= calctime(930, 5*ORLength) and time < 1530 and orsready and
entriestoday(date) < maxentriesperday then
begin
  If close crosses over (ORHout - eatrcoeff*avgtruerange(eatrperiod)) then

```

```

buy NConFF2(initialequity, fractionrisked, traderisk, 1) shares next bar
ORHout stop;
  If close crosses under (ORHin + eatrcoeff*avgtruerange(eatrperiod)) then
sellshort NConFF2(initialequity, fractionrisked, traderisk, 1) shares next
bar ORHin stop;
  If close crosses over (ORLin - eatrcoeff*avgtruerange(eatrperiod)) then
buy NConFF2(initialequity, fractionrisked, traderisk, 1) shares next bar
ORLin stop;
  If close crosses under (ORLout + eatrcoeff*avgtruerange(eatrperiod)) then
sellshort NConFF2(initialequity, fractionrisked, traderisk, 1) shares next
bar ORHout stop;
end;
//Exits

//Exit end of day
If time > 1530 then
Begin
  if marketposition = 1 then Sell next bar at market
  else if marketposition = -1 then buy to cover next bar market;
end;

//Exit atr
If useatexit <> 0 then
begin
  if Marketposition = 1 and close < (entryprice -
xatrcoeff*Avgtruerange(xatrperiod)) then sell ("ATR Exit Long") next bar
market
  else if Marketposition = -1 and close > (entryprice +
xatrcoeff*Avgtruerange(xatrperiod)) then buytocover ("ATR Exit Short") next
bar market;
end;

//Trailing stop
If marketposition <> marketposition(1) then highestprice = -1; //clearly a
new trade, so trailing stop tracking should reset
If marketposition <> marketposition(1) then lowestprice = 9999999999999999;
//long
if highestprice < close then highestprice = close; //track the maximum
if marketposition = 1 and usetrailingstop <> 0 and close > (entryprice +
0.07) then
Begin
  sell ("trailing long") next bar highestprice - ((highestprice -
entryprice)*trailingprct) stop;
end;
//short
if lowestprice > close then lowestprice = close; //track the minimum
if marketposition = -1 and usetrailingstop <> 0 and close < (entryprice -
0.07) then
Begin
  buytocover ("trailing short") next bar lowestprice + ((entryprice -
lowestprice)*trailingprct) stop;
end;

//exit if negative slope
If uselinexit <> 0 then
begin
  //if the slope goes against us by enough (xslope) and the price is

```



```

outside the ORS or between the ORS (i.e., NOT in a neutral zone) then exit.
    if marketposition = 1 and LinearRegSlopeFC(close, xLinregperiod) < xslope
and (close > ORHOut or (close > ORLin and close < ORHin)) then sell ("xlinreg
long") next bar market
    else if marketposition = -1 and LinearRegSlopeFC(close, xLinregperiod) >
-1 * xslope and (close < ORLOut or (close > ORLin and close < ORHin)) then
sell ("xlinreg short") next bar market;
end;
//Exit RSI
If useRSIExit <> 0 then
begin
    If close > ORhout and marketposition = 1 and RSI(Close, rsiperiod)
crosses under 70 then sell ("RSI long") next bar market
    else If close < ORLout and marketposition = -1 and RSI(Close, rsiperiod)
crosses over 30 then buytocover ("RSI short") next bar market;
end;

//warnings: this section contains code to print warnings if activation
varialbes have unusual values.
if useatrexit <> 1 and useatrexit <> 0 then print("Warning: variable
useatrexit not defined to 0 or 1. Strategy will use atr exits for any value
of useatrexit except 0.");
if usetrailingstop <> 1 and usetrailingstop <> 1 then print("Warning:
variable usetrailingstop not defined to 0 or 1. Strategy will use trailing
stops for any value of usetrailingstop except 0.");
if uselinexit <> 1 and uselinexit <> 0 then print("Warning: variable
uselinexit not defined to 0 or 1. Strategy will use atr exits for any value
of uselinexit except 0.");
if usersiexit <> 1 and usersiexit <> 0 then print("Warning: variable
usersiexit not defined to 0 or 1. Strategy will use rsi exits for any value
of usersiexit except 0.");

temp = WriteTrades32(traderisk, 0, 0, 10, 1, "c:\IQPx2OR_TradeData.txt");

```

### **B.5 NConFF2 function:**

{ User function: NConFF2

Calculate the number of contracts for the current trade assuming a fixed percentage of account is risked on each trade.

This function implements a fixed fractional approach to position sizing; see R. Vince, Portfolio

Management Formulas, 1990 for a complete discussion of fixed fractional trading. The function is

intended to be called by a trading system prior to each trade to determine the number of contracts

to trade based on the accumulated trading equity, the risk of the current trade, and the amount to risk on each trade.

#### INPUTS:

StEqty: initial account size (starting equity) in dollars.

RiskPer: percentage risk per trade. This is the so-called "fixed fraction" of fixed

fractional trading.

TrRisk: risk for current trade in dollars; should be positive. This

number can be different

for each trade if desired.

MinNEq1: Set MinNEq1 to either 1 or 0. If equal to 1, the number of contracts is always

at least equal to 1. In other words, if the number of contracts would otherwise be equal

to 0 because of a small account size or high trade risk, this sets the number of contracts equal to 1.

#### OUTPUT:

The function returns the number of contracts for the current trade. If the account equity falls below

zero, the number zero ("0") will be returned. This is true even if MinNEq1=1.

You can use the "Expert Commentary" tool in charting to see the account equity, current profits,

trade risk, risk percentage, and number of contracts for the next trade on each bar.

#### NOTES:

1. This version is intended for Tradestation version 4. It writes error messages to the print log, rather than the MessageLog. If used in 2000i, the error messages will appear in the Debug window in the editor.

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 11/30/00

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```

}
input:  StEqty      (NumericSimple),      { starting account size, $ }
        RiskPer    (NumericSimple),      { risk percentage }
        TrRisk     (NumericSeries),      { risk for current
trade }
        MinNEq1    (NumericSimple);      { =1 --> # contracts
at least 1 }

Var:    NCon       (0),                  { number of contracts }
        Equity     (0);                  { account equity }

Equity = StEqty + NetProfit + OpenPositionProfit;
If ABSVALUE(TrRisk) > 0 then
    NCon = IntPortion(RiskPer/100 * Equity/ABSVALUE(TrRisk))
else Begin
    Print("**Error: Trade risk <= 0. Assign positive value to
TrRisk.");
    NCon = 0;
end;
If MinNEq1 > 0 and NCon < 1 then

```

```

        NCon = 1;

    If Equity <= 0 then Begin
        Print("**Warning: Account equity <= 0.");
        NCon = 0;
    end;

    #BeginCmtry
        If CheckCommentary then Begin
            Commentary("Starting Equity: $", StEqty:0:2,
NewLine);
            Commentary("Net Profit (closed + open): $",
(NewProfit + OpenPositionProfit):0:2, NewLine);
            Commentary("Current Equity: $", Equity:0:2, NewLine);
            Commentary("Trade Risk: $", TrRisk:0:2, NewLine);
            Commentary("Risk Percentage: ", RiskPer:0:2,"%",
NewLine);
            Commentary("Number of Contracts for Next Trade: ",
NCon:0:0);
        end;
    #End;

    NConFF2 = NCon;

```

### **B.6: Draw OR function:**

```

inputs:
    color(numeric), {guessing at what type this should be}
    ORHigh(numeric),
    ORLow(numeric);

variables:
    tlH(0),
    tlL(0);

TLH = TL_New(Date, 930, orHigh, Date, 1600, orHigh);
TL_SetColor(TLH, color);
TLL = TL_New(Date, 930, orLow, Date, 1600, orLow);
TL_SetColor(TLL, color);

drawOR = 0;

```

### **B.7: WriteTrades32 function:**

{NOTE: The datestring3 function does not appear to be defined. Replace it with a different appropriate function call to get this to work}

{ User function: WriteTrades32  
 Use this function to write out the trades generated by a trading system to a text file.  
 This function is designed to provide the input files needed by Market System Analyzer 3.2. To  
 use this function, call it as the last line in your trading system. Make sure the function  
 call is outside of all loops and other control statements.

#### INPUTS:

TrRisk: risk for current trade in dollars; should be positive. This

number can be different

for each trade if desired. TrRisk should be for the same number of contracts or shares as the profit/loss.

StopL: initial stop price for a long trade.

StopS: initial stop price for a short trade.

NATR: Averaging period for average true range calculation.

FName: full name of file for writing trade profit/loss and risk data to, including drive and path; e.g., "C:\Futures\Data\out1.csv". This file, if already present, will be deleted before being re-written.

#### Notes:

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

#### OUTPUT:

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

The function returns the number of trades.

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```

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

Var:   TradePL   (0),                { Trade profit/loss }
      NTrades    (0),                { Number of trades }
      EnDate     (0),                { Entry date }
      ExDate     (0),                { Exit date }
      EnTime     (0),                { Entry time }
      ExTime     (0),                { Exit time }
      EntPr      (0),                { Entry price }
      ExPr       (0),                { Exit price }
      StopPr     (0),                { Stop price }
      NSize      (0),                { size of position }
      NTNew      (0),                { Number of new trades on current
bar }
      MarkPos    (0),                { market position }
      ATR        (0),                { average true range }
      EntBar     (0),                { bar of entry, to use with ATR }

```

```

    ATREnt    (0),           { ATR value prior to entry }
    ii        (0),           { loop counter }
    EnDT      (""),         { Entry date/time string }
    ExDT      (""),         { Exit date/time string }
    StrOut    ("");         { output character string }

if BarNumber = 1 then
    FileDelete(FName);

ATR = Average(TrueRange, NATR);

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

WriteTrades32 = NTrades;

```

### Appendix C: Full List of Trades for Each System

#### Basic Breakout System:

entry date/time	entry price	exit date/time	exit price	stop price	market position	trade profit/loss	trade risk per share	size	symbol name	atr
4/11/2016 10:15:00	110.53	4/11/2016 10:45:00	110.41	0	1	-360	0.1	2000	AAPL	0.354
4/13/2016 10:30:00	111.9	4/13/2016 10:50:00	111.65	0	1	-620	0.1	2000	AAPL	0.288
4/13/2016 11:35:00	111.94	4/13/2016 11:40:00	112.05	0	1	99.35	0.1	1987	AAPL	0.188
4/13/2016 12:30:00	111.89	4/13/2016 13:00:00	111.83	0	1	-238.68	0.1	1989	AAPL	0.171
4/13/2016 10:15:00	16.14	4/13/2016 10:25:00	16.2	0	1	0	0.1	2000	ABX	0.127
4/13/2016 10:55:00	16.13	4/13/2016 11:10:00	16.19	0	1	0	0.1	2000	ABX	0.089
4/13/2016 12:20:00	16.15	4/13/2016 12:50:00	16.08	0	1	-260	0.1	2000	ABX	0.045
4/7/2016 13:45:00	27.21	4/7/2016 14:05:00	26.83	0	1	-880	0.1	2000	ALDR	0.3
4/15/2016 10:40:00	21.49	4/15/2016 11:00:00	21.45	0	1	-200	0.1	2000	AMAT	0.065
4/15/2016 11:50:00	21.48	4/15/2016 12:40:00	21.45	0	1	-179.55	0.1	1995	AMAT	0.035
4/15/2016 12:55:00	21.48	4/15/2016 13:15:00	21.44	0	1	-199.2	0.1	1992	AMAT	0.024
4/13/2016 10:15:00	4.06	4/13/2016 10:40:00	4.02	0	1	-200	0.1	2000	AUY	0.048
4/13/2016 11:00:00	4.06	4/13/2016 11:35:00	4.03	0	1	-179.55	0.1	1995	AUY	0.033
4/13/2016 12:40:00	4.07	4/13/2016 12:55:00	4.05	0	1	-159.36	0.1	1992	AUY	0.022
4/13/2016 11:15:00	79.33	4/13/2016 11:35:00	79.42	0	1	60	0.1	2000	BABA	0.161
4/13/2016 12:35:00	79.31	4/13/2016 12:50:00	79.4	0	1	60.03	0.1	2001	BABA	0.121
4/13/2016 13:35:00	79.33	4/13/2016 14:10:00	79.2	0	1	-380.38	0.1	2002	BABA	0.11
4/20/2016 10:20:00	14.74	4/20/2016 10:55:00	14.73	0	1	-140	0.1	2000	BAC	0.072
4/20/2016 11:00:00	14.74	4/20/2016 11:30:00	14.72	0	1	-159.76	0.1	1997	BAC	0.044
4/20/2016 13:55:00	14.73	4/20/2016 15:00:00	14.82	0	1	59.82	0.1	1994	BAC	0.023
4/27/2016 10:10:00	21.7	4/27/2016 10:25:00	21.45	0	1	-620	0.1	2000	BSX	0.296
4/27/2016 11:25:00	21.67	4/27/2016 11:40:00	21.76	0	1	59.61	0.1	1987	BSX	0.107
4/27/2016 13:45:00	21.67	4/27/2016 14:15:00	21.8	0	1	139.16	0.1	1988	BSX	0.098
4/13/2016	4.27	4/13/2016	4.39	0	1	120	0.1	2000	CLF	0.068



4/22/2016 10:20:00	34.69	4/22/2016 10:35:00	34.58	0	1	-340	0.1	2000FXI	0.07
4/13/2016 10:15:00	22.64	4/13/2016 10:25:00	22.72	0	1	40	0.1	2000GDX	0.15
4/13/2016 10:55:00	22.63	4/13/2016 11:10:00	22.69	0	1	0	0.1	2000GDX	0.106
4/15/2016 10:20:00	21.83	4/15/2016 10:30:00	21.89	0	1	0	0.1	2000GDX	0.129
4/15/2016 10:20:00	21.83	4/15/2016 10:30:00	21.89	0	1	0	0.1	2000GDX	0.129
4/20/2016 12:25:00	23.7	4/20/2016 13:00:00	23.77	0	1	20	0.1	2000GDX	0.086
4/20/2016 13:35:00	23.71	4/20/2016 14:30:00	23.65	0	1	-240	0.1	2000GDX	0.078
4/25/2016 10:25:00	22.87	4/25/2016 10:45:00	22.79	0	1	-280	0.1	2000GDX	0.127
4/29/2016 11:20:00	25.36	4/29/2016 11:30:00	25.42	0	1	0	0.1	2000GDX	0.089
4/29/2016 12:30:00	25.4	4/29/2016 13:05:00	25.39	0	1	-140	0.1	2000GDX	0.094
4/29/2016 13:45:00	25.39	4/29/2016 14:25:00	25.55	0	1	199.7	0.1	1997GDX	0.076
3/31/2016 14:55:00	61.68	3/31/2016 15:30:00	61.69	0	1	-100	0.1	2000HLF	0.132
4/6/2016 11:20:00	29.01	4/6/2016 11:45:00	28.94	0	1	-260	0.1	2000HTA	0.044
4/1/2016 13:45:00	7.12	4/1/2016 14:00:00	7.11	0	1	-140	0.1	2000IBN	0.013
4/1/2016 10:20:00	32.43	4/1/2016 10:45:00	32.35	0	1	-280	0.1	2000INTC	0.099
3/29/2016 10:10:00	204.04	3/29/2016 10:15:00	204.1	0	1	0	0.1	2000IVV	0.291
4/6/2016 11:05:00	11.03	4/6/2016 11:15:00	11.11	0	1	40	0.1	2000MRO	0.101
4/6/2016 14:15:00	10.97	4/6/2016 15:40:00	10.98	0	1	-100	0.1	2000MRO	0.05
4/13/2016 11:00:00	13.02	4/13/2016 11:15:00	13.22	0	1	280	0.1	2000MRO	0.114
4/13/2016 12:35:00	13	4/13/2016 13:10:00	12.96	0	1	-200.5	0.1	2005MRO	0.073
4/13/2016 13:25:00	13	4/13/2016 14:10:00	13.01	0	1	-100.05	0.1	2001MRO	0.045
4/1/2016 11:05:00	55.35	4/1/2016 11:25:00	55.18	0	1	-460	0.1	2000MSFT	0.123
4/1/2016 13:40:00	55.26	4/1/2016 13:50:00	55.34	0	1	39.8	0.1	1990MSFT	0.076
4/6/2016 11:05:00	54.62	4/6/2016 11:55:00	54.76	0	1	160	0.1	2000MSFT	0.117
3/31/2016 12:45:00	4.61	3/31/2016 13:25:00	4.63	0	1	-80	0.1	2000MT	0.019
3/31/2016 15:25:00	4.61	3/31/2016 15:40:00	4.61	0	1	-119.88	0.1	1998MT	0.017
4/6/2016	4.55	4/6/2016	4.63	0	1	40	0.1	2000MT	0.035





4/12/2016 11:50:00	11.2	4/12/2016 13:05:00	11.24	0	1	-39.9	0.1	1995SRC	0.03
4/28/2016 10:40:00	78.96	4/28/2016 10:55:00	79.26	0	1	480	0.1	2000STJ	0.31
4/28/2016 11:55:00	78.95	4/28/2016 12:30:00	78.84	0	1	-341.53	0.1	2009STJ	0.171
4/4/2016 12:30:00	250	4/4/2016 12:55:00	250.68	0	1	1240	0.1	2000TSLA	0.92
4/4/2016 14:15:00	250.19	4/4/2016 14:55:00	250.21	0	1	-80.96	0.1	2024TSLA	1.168
4/4/2016 15:10:00	249.99	4/4/2016 15:35:00	250.1	0	1	101.15	0.1	2023TSLA	0.762
4/6/2016 10:50:00	6.53	4/6/2016 11:15:00	6.53	0	1	-120	0.1	2000UNG	0.024
4/20/2016 11:45:00	7.14	4/20/2016 12:25:00	7.17	0	1	-60	0.1	2000UNG	0.031
4/20/2016 13:55:00	7.13	4/20/2016 14:05:00	7.06	0	1	-259.74	0.1	1998UNG	0.034
3/29/2016 10:10:00	9.72	3/29/2016 10:30:00	9.7	0	1	-160	0.1	2000USO	0.059
3/29/2016 12:30:00	9.76	3/29/2016 13:10:00	9.71	0	1	-219.56	0.1	1996USO	0.028
3/29/2016 13:45:00	9.73	3/29/2016 14:35:00	9.74	0	1	-99.6	0.1	1992USO	0.034
4/13/2016 10:55:00	10.65	4/13/2016 11:30:00	10.61	0	1	-200	0.1	2000USO	0.058
4/13/2016 11:45:00	10.62	4/13/2016 12:25:00	10.6	0	1	-159.6	0.1	1995USO	0.058
4/13/2016 12:55:00	10.61	4/13/2016 13:15:00	10.58	0	1	-179.28	0.1	1992USO	0.044
4/13/2016 12:05:00	5.66	4/13/2016 12:55:00	5.74	0	1	40	0.1	2000VALE	0.036
4/20/2016 11:25:00	5.98	4/20/2016 12:05:00	6.01	0	1	-60	0.1	2000VALE	0.051
4/20/2016 12:45:00	5.99	4/20/2016 13:00:00	6.05	0	1	0	0.1	1998VALE	0.038
4/20/2016 11:25:00	5.98	4/20/2016 12:05:00	6.01	0	1	-60	0.1	2000VALE	0.051
4/20/2016 12:45:00	5.99	4/20/2016 13:00:00	6.05	0	1	0	0.1	1998VALE	0.038
4/28/2016 11:45:00	5.95	4/28/2016 12:00:00	5.87	0	1	-280	0.1	2000VALE	0.034
4/4/2016 10:55:00	54.85	4/4/2016 11:30:00	54.95	0	1	80	0.1	2000VA	0.118
4/6/2016 10:10:00	8.13	4/6/2016 10:35:00	8.07	0	1	-240	0.1	2000WLL	0.115
4/6/2016 10:40:00	8.12	4/6/2016 10:55:00	8.2	0	1	39.9	0.1	1995WLL	0.101
3/29/2016 14:35:00	22.33	3/29/2016 15:35:00	22.39	0	1	0	0.1	2000XLF	0.022
4/7/2016 10:10:00	36.27	4/7/2016 10:30:00	36.35	0	1	40	0.1	2000YHOO	0.199
4/7/2016	36.32	4/7/2016	36.85	0	1	940	0.1	2000YHOO	0.172

14:55:00		15:00:00								
4/7/2016	36.29	4/7/2016	36.36	0	1	20.19	0.1	2019YHOO	0.369	
15:30:00		15:40:00								

### Support and Breakout:

entry date/time	entry price	exit date/time	exit price	stop price	market position	trade profit/loss	trade risk	size	symbol name	atr
4/7/2016 10:05:00	109.9	4/7/2016 11:25:00	109.24	0	-1	1200	0.1	2000AAPL	0.367	
4/11/2016 10:40:00	110.31	4/11/2016 15:40:00	109.29	0	-1	1920	0.1	2000AAPL	0.242	
4/13/2016 10:05:00	111.49	4/13/2016 10:35:00	111.97	0	-1	-1080	0.1	2000AAPL	0.331	
4/13/2016 10:35:00	111.97	4/13/2016 10:45:00	111.72	0	1	-613.8	0.1	1980AAPL	0.235	
4/13/2016 10:45:00	111.72	4/13/2016 11:40:00	112.07	0	-1	-807.7	0.1	1970AAPL	0.189	
4/13/2016 11:40:00	112.07	4/13/2016 11:50:00	112.1	0	1	-58.5	0.1	1950AAPL	0.186	
4/13/2016 12:35:00	111.96	4/13/2016 13:05:00	111.77	0	1	-487	0.1	1948AAPL	0.158	
4/13/2016 13:05:00	111.77	4/13/2016 13:45:00	111.97	0	-1	-504.92	0.1	1942AAPL	0.112	
4/13/2016 13:45:00	111.97	4/13/2016 15:05:00	112.06	0	1	57.9	0.1	1930AAPL	0.131	
4/15/2016 10:05:00	111.78	4/15/2016 10:40:00	111.75	0	-1	-60	0.1	2000AAPL	0.173	
4/15/2016 10:40:00	111.75	4/15/2016 13:15:00	111.01	0	1	-1600	0.1	2000AAPL	0.152	
4/15/2016 13:15:00	111.01	4/15/2016 14:05:00	110.35	0	-1	1179.6	0.1	1966AAPL	0.192	
4/6/2016 10:05:00	13.9	4/6/2016 15:40:00	13.93	0	-1	-180	0.1	2000ABX	0.081	
4/13/2016 10:05:00	15.98	4/13/2016 10:20:00	16.2	0	-1	-560	0.1	2000ABX	0.11	
4/13/2016 10:20:00	16.2	4/13/2016 11:30:00	16	0	1	-517.4	0.1	1990ABX	0.138	
4/13/2016 11:30:00	16	4/13/2016 12:25:00	16.15	0	-1	-415.8	0.1	1980ABX	0.073	
4/13/2016 12:25:00	16.15	4/13/2016 13:30:00	16.08	0	1	-256.36	0.1	1972ABX	0.045	
4/13/2016 13:30:00	16.08	4/13/2016 13:40:00	16.15	0	-1	-255.58	0.1	1966ABX	0.05	
4/13/2016 13:40:00	16.15	4/13/2016 14:20:00	16.07	0	1	-274.68	0.1	1962ABX	0.047	
4/13/2016 14:20:00	16.07	4/13/2016 15:40:00	16.01	0	-1	0	0.1	1955ABX	0.04	
4/7/2016 13:05:00	25.68	4/7/2016 13:55:00	26.82	0	1	2160	0.1	2000ALDR	0.187	
4/7/2016	26.82	4/7/2016	26.73	0	-1	61.38	0.1	2046ALDR	0.322	

13:55:00		15:40:00								
4/15/2016	21.4	4/15/2016	21.49	0	-1	-300	0.1	2000AMAT	0.065	
10:05:00		15:40:00								
4/15/2016	6.91	4/15/2016	7.05	0	-1	-400	0.1	2000ARIA	0.086	
10:45:00		11:15:00								
4/15/2016	7.05	4/15/2016	7.06	0	1	-99.65	0.1	1993ARIA	0.065	
11:15:00		15:40:00								
4/13/2016	4	4/13/2016	4.08	0	-1	-280	0.1	2000AUY	0.044	
10:05:00		11:05:00								
4/13/2016	4.08	4/13/2016	4.02	0	1	-239.52	0.1	1996AUY	0.033	
11:05:00		11:40:00								
4/13/2016	4.02	4/13/2016	3.96	0	-1	0	0.1	1990AUY	0.031	
11:40:00		15:40:00								
4/13/2016	78.97	4/13/2016	79.43	0	-1	-1040	0.1	2000BABA	0.283	
10:05:00		15:40:00								
4/15/2016	14.13	4/15/2016	14.03	0	-1	80	0.1	2000BAC	0.069	
10:05:00		10:30:00								
4/15/2016	14.12	4/15/2016	14.02	0	1	-320.16	0.1	2001BAC	0.057	
10:45:00		11:00:00								
4/15/2016	14.02	4/15/2016	14.11	0	-1	-299.4	0.1	1996BAC	0.048	
11:00:00		12:25:00								
4/15/2016	14.11	4/15/2016	14.05	0	1	-238.8	0.1	1990BAC	0.029	
12:25:00		13:10:00								
4/15/2016	14.05	4/15/2016	14.01	0	-1	-39.72	0.1	1986BAC	0.025	
13:10:00		13:35:00								
4/20/2016	14.76	4/20/2016	14.75	0	1	-140	0.1	2000BAC	0.044	
11:00:00		11:10:00								
4/20/2016	14.69	4/20/2016	14.74	0	-1	-219.67	0.1	1997BAC	0.039	
11:40:00		14:00:00								
4/20/2016	14.74	4/20/2016	14.73	0	1	-139.58	0.1	1994BAC	0.022	
14:00:00		14:05:00								
4/25/2016	15.01	4/25/2016	14.85	0	-1	200	0.1	2000BAC	0.056	
10:05:00		11:25:00								
4/25/2016	14.96	4/25/2016	14.94	0	1	-160.32	0.1	2004BAC	0.022	
14:05:00		15:40:00								
4/29/2016	14.63	4/29/2016	14.66	0	-1	-180	0.1	2000BAC	0.069	
10:05:00		10:25:00								
4/29/2016	14.66	4/29/2016	14.56	0	1	-319.68	0.1	1998BAC	0.079	
10:25:00		11:40:00								
4/29/2016	14.56	4/29/2016	14.53	0	-1	-59.73	0.1	1991BAC	0.043	
11:40:00		11:55:00								
4/29/2016	14.58	4/29/2016	14.5	0	-1	39.76	0.1	1988BAC	0.034	
13:40:00		14:25:00								
4/13/2016	31.41	4/13/2016	31.49	0	-1	-280	0.1	2000BP	0.114	
10:05:00		11:00:00								
4/13/2016	31.49	4/13/2016	31.36	0	1	-379.24	0.1	1996BP	0.09	
11:00:00		15:40:00								
4/27/2016	21.45	4/27/2016	21.71	0	-1	-640	0.1	2000BSX	0.333	
10:20:00		11:30:00								
4/27/2016	21.71	4/27/2016	21.72	0	1	-99.45	0.1	1989BSX	0.097	
11:30:00		11:45:00								
4/13/2016	6.02	4/13/2016	5.97	0	-1	-20	0.1	2000CHK	0.171	
10:05:00		15:40:00								

4/13/2016 10:05:00	4.11	4/13/2016 11:15:00	4.32	0	-1	-540	0.1	2000CLF	0.104
4/13/2016 11:15:00	4.32	4/13/2016 12:05:00	4.37	0	1	-19.91	0.1	1991CLF	0.074
3/29/2016 10:05:00	60.4	3/29/2016 11:50:00	60.95	0	-1	-1220	0.1	2000CNI	0.151
3/29/2016 11:50:00	60.95	3/29/2016 12:05:00	60.87	0	1	-276.92	0.1	1978CNI	0.093
3/29/2016 12:25:00	60.95	3/29/2016 13:05:00	61.31	0	1	591	0.1	1970CNI	0.104
4/1/2016 10:05:00	28.15	4/1/2016 10:25:00	28.37	0	-1	-560	0.1	2000CSCO	0.077
4/1/2016 10:25:00	28.37	4/1/2016 11:20:00	28.51	0	1	159.2	0.1	1990CSCO	0.088
4/13/2016 10:05:00	48.35	4/13/2016 15:40:00	48.65	0	-1	-720	0.1	2000CTRP	0.479
4/6/2016 10:30:00	18.42	4/6/2016 14:40:00	18.35	0	1	-260	0.1	2000DOC	0.066
4/6/2016 14:40:00	18.35	4/6/2016 15:40:00	18.32	0	-1	-59.91	0.1	1997DOC	0.038
4/27/2016 15:30:00	32.04	4/27/2016 15:40:00	32.01	0	-1	-60	0.1	2000DWA	0.127
4/15/2016 10:05:00	25.25	4/15/2016 12:30:00	25.1	0	-1	180	0.1	2000EBAY	0.076
4/15/2016 12:30:00	25.1	4/15/2016 14:05:00	25.04	0	1	-240.6	0.1	2005EBAY	0.029
4/15/2016 14:05:00	25.04	4/15/2016 14:40:00	25.1	0	-1	-240	0.1	2000EBAY	0.027
4/15/2016 14:40:00	25.1	4/15/2016 15:40:00	25.17	0	1	19.95	0.1	1995EBAY	0.03
4/15/2016 10:05:00	0.71	4/15/2016 14:45:00	0.56	0	-1	180	0.1	2000EBIO	0.06
4/15/2016 10:05:00	0.71	4/15/2016 14:45:00	0.56	0	-1	180	0.1	2000EBIO	0.06
3/29/2016 10:15:00	33.32	3/29/2016 12:10:00	33.4	0	1	40	0.1	2000EEM	0.058
4/1/2016 10:20:00	33.68	4/1/2016 11:55:00	33.96	0	1	440	0.1	2000EEM	0.138
4/13/2016 10:05:00	34.81	4/13/2016 13:50:00	34.82	0	-1	-140	0.1	2000EEM	0.111
4/13/2016 13:50:00	34.82	4/13/2016 15:40:00	34.89	0	1	19.98	0.1	1998EEM	0.034
4/29/2016 10:05:00	0.97	4/29/2016 11:40:00	0.81	0	-1	200	0.1	2000EGLE	0.083
4/15/2016 10:05:00	9.01	4/15/2016 10:45:00	9.05	0	-1	-200	0.1	2000ETE	0.093
4/15/2016 10:45:00	9.05	4/15/2016 11:55:00	9.22	0	1	219.67	0.1	1997ETE	0.058
4/22/2016 11:00:00	20.21	4/22/2016 12:40:00	20.18	0	-1	-60	0.1	2000EWH	0.022
4/1/2016 10:05:00	26.04	4/1/2016 10:30:00	26.35	0	-1	-740	0.1	2000EWZ	0.154
4/1/2016	26.35	4/1/2016	26.47	0	1	119.16	0.1	1986EWZ	0.141

10:30:00		11:00:00								
4/13/2016	28.58	4/13/2016	28.61	0	-1	-180	0.1	2000EWZ	0.145	
10:05:00		11:15:00								
4/13/2016	28.61	4/13/2016	28.83	0	1	319.52	0.1	1997EWZ	0.099	
11:15:00		14:10:00								
4/26/2016	4.98	4/26/2016	4.77	0	-1	300	0.1	2000EXEL	0.108	
10:05:00		15:40:00								
4/4/2016	113.18	4/4/2016	112.11	0	-1	2020	0.1	2000FB	0.464	
10:05:00		11:40:00								
4/4/2016	112.76	4/4/2016	112.43	0	-1	550.8	0.1	2040FB	0.247	
13:05:00		15:40:00								
4/6/2016	113.14	4/6/2016	113.6	0	-1	-1040	0.1	2000FB	0.381	
10:05:00		12:45:00								
4/6/2016	113.6	4/6/2016	113.51	0	1	-297	0.1	1980FB	0.12	
12:45:00		13:05:00								
4/6/2016	113.6	4/6/2016	113.4	0	1	-512.98	0.1	1973FB	0.147	
13:35:00		14:10:00								
4/6/2016	113.4	4/6/2016	113.65	0	-1	-609.77	0.1	1967FB	0.13	
14:10:00		15:10:00								
4/6/2016	113.65	4/6/2016	113.48	0	1	-448.73	0.1	1951FB	0.187	
15:10:00		15:40:00								
3/31/2016	10.36	3/31/2016	10.34	0	-1	-80	0.1	2000FCX	0.093	
10:05:00		15:40:00								
4/6/2016	9.16	4/6/2016	9.6	0	-1	-1000	0.1	2000FCX	0.091	
10:05:00		11:45:00								
4/6/2016	9.6	4/6/2016	9.57	0	1	-178.47	0.1	1983FCX	0.061	
11:45:00		12:10:00								
4/6/2016	9.52	4/6/2016	9.48	0	-1	-39.52	0.1	1976FCX	0.037	
13:30:00		15:40:00								
4/13/2016	10.97	4/13/2016	10.82	0	-1	180	0.1	2000FCX	0.125	
10:40:00		15:40:00								
4/20/2016	12.09	4/20/2016	12.28	0	-1	-500	0.1	2000FCX	0.1	
10:05:00		10:55:00								
4/20/2016	12.28	4/20/2016	12.33	0	1	-19.92	0.1	1992FCX	0.116	
10:55:00		11:35:00								
4/1/2016	15.3	4/1/2016	14.99	0	-1	500	0.1	2000FIT	0.29	
10:25:00		15:40:00								
4/13/2016	16.49	4/13/2016	16.56	0	1	20	0.1	2000FIT	0.157	
10:55:00		11:05:00								
4/1/2016	33.24	4/1/2016	33.47	0	1	340	0.1	2000FXI	0.162	
10:20:00		13:35:00								
4/22/2016	34.6	4/22/2016	34.28	0	-1	520	0.1	2000FXI	0.067	
10:30:00		12:40:00								
4/22/2016	34.34	4/22/2016	34.31	0	-1	-60.3	0.1	2010FXI	0.032	
14:00:00		15:40:00								
3/31/2016	20.39	3/31/2016	20.09	0	-1	480	0.1	2000GDX	0.116	
10:05:00		12:55:00								
4/13/2016	22.46	4/13/2016	22.7	0	-1	-600	0.1	2000GDX	0.131	
10:05:00		10:20:00								
4/13/2016	22.7	4/13/2016	22.52	0	1	-477.36	0.1	1989GDX	0.159	
10:20:00		11:30:00								
4/13/2016	22.52	4/13/2016	22.21	0	-1	494.75	0.1	1979GDX	0.082	
11:30:00		15:40:00								

4/15/2016 10:05:00	21.51	4/15/2016 10:25:00	21.89	0	-1	-880	0.1	2000GDX	0.093
4/15/2016 10:25:00	21.89	4/15/2016 10:40:00	21.85	0	1	-198.3	0.1	1983GDX	0.128
4/15/2016 10:05:00	21.51	4/15/2016 10:25:00	21.89	0	-1	-880	0.1	2000GDX	0.093
4/15/2016 10:25:00	21.89	4/15/2016 10:40:00	21.85	0	1	-198.3	0.1	1983GDX	0.128
4/20/2016 10:05:00	23.56	4/20/2016 10:35:00	23.33	0	-1	340	0.1	2000GDX	0.123
4/20/2016 10:35:00	23.33	4/20/2016 13:45:00	23.61	0	1	441.76	0.1	2008GDX	0.142
4/20/2016 13:45:00	23.61	4/20/2016 14:15:00	23.71	0	-1	-322.72	0.1	2017GDX	0.085
4/20/2016 14:15:00	23.71	4/20/2016 15:20:00	22.95	0	1	-1648.2	0.1	2010GDX	0.058
4/20/2016 15:20:00	22.95	4/20/2016 15:40:00	22.89	0	-1	0	0.1	1977GDX	0.104
4/25/2016 10:05:00	22.71	4/25/2016 12:10:00	22.52	0	-1	260	0.1	2000GDX	0.097
4/25/2016 12:30:00	22.59	4/25/2016 14:05:00	22.49	0	1	-320.8	0.1	2005GDX	0.056
4/25/2016 14:05:00	22.49	4/25/2016 14:35:00	22.41	0	-1	40	0.1	2000GDX	0.068
4/29/2016 10:05:00	25.04	4/29/2016 11:25:00	25.41	0	-1	-860	0.1	2000GDX	0.202
4/29/2016 11:25:00	25.41	4/29/2016 11:35:00	25.38	0	1	-178.56	0.1	1984GDX	0.089
4/29/2016 12:05:00	25.25	4/29/2016 12:35:00	25.4	0	-1	-415.59	0.1	1979GDX	0.101
4/29/2016 12:35:00	25.4	4/29/2016 14:20:00	25.52	0	1	118.32	0.1	1972GDX	0.09
4/15/2016 10:05:00	98.55	4/15/2016 10:35:00	97.95	0	-1	1080	0.1	2000GILD	0.304
4/1/2016 10:05:00	31.64	4/1/2016 15:40:00	31.5	0	-1	160	0.1	2000GLPI	0.189
3/31/2016 10:05:00	60.87	3/31/2016 15:00:00	61.73	0	-1	-1840	0.1	2000HLF	0.211
3/31/2016 15:00:00	61.73	3/31/2016 15:05:00	61.63	0	1	-314.24	0.1	1964HLF	0.133
4/12/2016 10:05:00	24.57	4/12/2016 15:40:00	24.96	0	-1	-900	0.1	2000HQY	0.222
4/6/2016 10:35:00	28.87	4/6/2016 11:40:00	28.94	0	1	20	0.1	2000HTA	0.044
4/6/2016 11:40:00	28.94	4/6/2016 15:40:00	28.91	0	-1	-60.06	0.1	2002HTA	0.039
4/1/2016 10:05:00	7.04	4/1/2016 14:00:00	7.12	0	-1	-280	0.1	2000IBN	0.043
4/1/2016 14:00:00	7.12	4/1/2016 15:10:00	7.14	0	1	-79.84	0.1	1996IBN	0.014
4/1/2016 10:05:00	32.32	4/1/2016 12:40:00	32.18	0	-1	160	0.1	2000INTC	0.082
4/1/2016	32.22	4/1/2016	32.38	0	1	200.3	0.1	2003INTC	0.048





3/31/2016 10:05:00	4.56	3/31/2016 12:45:00	4.62	0	-1	-240	0.1	2000MT	0.031
3/31/2016 12:45:00	4.62	3/31/2016 13:45:00	4.63	0	1	-99.8	0.1	1996MT	0.019
3/31/2016 15:30:00	4.61	3/31/2016 15:40:00	4.61	0	1	-119.58	0.1	1993MT	0.015
4/6/2016 10:05:00	4.45	4/6/2016 11:15:00	4.57	0	-1	-360	0.1	2000MT	0.032
4/6/2016 11:15:00	4.57	4/6/2016 11:25:00	4.57	0	1	-119.64	0.1	1994MT	0.035
4/13/2016 10:05:00	5.61	4/13/2016 15:40:00	5.57	0	-1	-40	0.1	2000MT	0.075
4/15/2016 10:25:00	5.51	4/15/2016 10:40:00	5.52	0	-1	-140	0.1	2000MT	0.057
4/15/2016 11:50:00	5.64	4/15/2016 12:00:00	5.57	0	1	-259.61	0.1	1997MT	0.028
4/15/2016 12:00:00	5.57	4/15/2016 12:20:00	5.64	0	-1	-259.09	0.1	1993MT	0.032
4/15/2016 12:20:00	5.64	4/15/2016 13:50:00	5.57	0	1	-258.44	0.1	1988MT	0.038
4/15/2016 13:50:00	5.57	4/15/2016 15:40:00	5.57	0	-1	-118.92	0.1	1982MT	0.012
4/13/2016 10:15:00	110.46	4/13/2016 12:05:00	109.28	0	1	-2480	0.1	2000NFLX	0.731
4/13/2016 12:05:00	109.28	4/13/2016 15:40:00	109.99	0	-1	-1501.5	0.1	1950NFLX	0.344
4/15/2016 10:15:00	84.54	4/15/2016 15:40:00	84.73	0	-1	-500	0.1	2000NXPI	0.411
3/31/2016 10:05:00	6.03	3/31/2016 12:10:00	5.95	0	-1	40	0.1	2000PBR	0.044
3/31/2016 12:10:00	5.95	3/31/2016 13:25:00	5.9	0	1	-220.22	0.1	2002PBR	0.031
3/31/2016 13:25:00	5.9	3/31/2016 14:55:00	5.83	0	-1	19.97	0.1	1997PBR	0.03
4/13/2016 10:05:00	6.51	4/13/2016 14:25:00	6.74	0	-1	-580	0.1	2000PBR	0.078
4/13/2016 14:25:00	6.74	4/13/2016 14:35:00	6.72	0	1	-159.12	0.1	1989PBR	0.024
4/13/2016 15:10:00	6.68	4/13/2016 15:40:00	6.74	0	-1	-238.2	0.1	1985PBR	0.027
4/5/2016 10:05:00	21.71	4/5/2016 10:20:00	22.04	0	-1	-780	0.1	2000PE	0.168
4/5/2016 10:20:00	22.04	4/5/2016 13:00:00	21.84	0	1	-516.1	0.1	1985PE	0.21
4/5/2016 13:00:00	21.84	4/5/2016 15:40:00	21.75	0	-1	59.28	0.1	1976PE	0.06
4/6/2016 10:20:00	32.4	4/6/2016 11:55:00	32.63	0	1	340	0.1	2000PFE	0.214
4/13/2016 10:05:00	32.16	4/13/2016 10:55:00	32.31	0	-1	-420	0.1	2000PFE	0.087
4/13/2016 10:55:00	32.31	4/13/2016 11:05:00	32.25	0	1	-239.04	0.1	1992PFE	0.068
4/13/2016	32.34	4/13/2016	32.44	0	1	79.44	0.1	1986PFE	0.069

11:25:00		12:40:00								
4/15/2016	12.01	4/15/2016	11.99	0	-1	-80	0.1	2000PLCM	0.095	
10:05:00		15:40:00								
4/29/2016	2.75	4/29/2016	2.38	0	-1	620	0.1	2000PRGN	0.516	
10:05:00		12:00:00								
4/29/2016	2.74	4/29/2016	2.52	0	1	-563.36	0.1	2012PRGN	0.15	
12:50:00		13:55:00								
4/29/2016	2.52	4/29/2016	2.71	0	-1	-500.75	0.1	2003PRGN	0.093	
13:55:00		14:35:00								
4/29/2016	2.71	4/29/2016	2.58	0	1	-378.48	0.1	1992PRGN	0.1	
14:35:00		15:40:00								
4/29/2016	10.08	4/29/2016	10.09	0	-1	-140	0.1	2000P	0.269	
10:05:00		11:15:00								
4/29/2016	10.09	4/29/2016	9.86	0	1	-579.42	0.1	1998P	0.145	
11:15:00		11:30:00								
4/29/2016	9.86	4/29/2016	10.06	0	-1	-516.36	0.1	1986P	0.117	
11:30:00		12:35:00								
4/29/2016	10.06	4/29/2016	9.93	0	1	-375.63	0.1	1977P	0.084	
12:35:00		12:50:00								
4/29/2016	9.93	4/29/2016	10.12	0	-1	-492.5	0.1	1970P	0.073	
12:50:00		15:20:00								
4/29/2016	10.12	4/29/2016	10.14	0	1	-78.36	0.1	1959P	0.061	
15:20:00		15:40:00								
4/13/2016	16.42	4/13/2016	16.18	0	-1	360	0.1	2000RICE	0.087	
10:05:00		10:55:00								
4/15/2016	2.39	4/15/2016	2.22	0	-1	220	0.1	2000RPRX	0.132	
10:05:00		12:00:00								
4/15/2016	2.26	4/15/2016	2.21	0	1	-220.44	0.1	2004RPRX	0.038	
12:15:00		13:30:00								
4/15/2016	2.21	4/15/2016	2.22	0	-1	-140.07	0.1	2001RPRX	0.02	
13:30:00		13:35:00								
4/15/2016	2.27	4/15/2016	2.2	0	1	-259.61	0.1	1997RPRX	0.024	
13:45:00		15:25:00								
4/15/2016	2.2	4/15/2016	2.16	0	-1	-39.86	0.1	1993RPRX	0.021	
15:25:00		15:40:00								
4/13/2016	3.81	4/13/2016	4.1	0	-1	-700	0.1	2000SDRL	0.098	
10:05:00		12:00:00								
4/13/2016	4.1	4/13/2016	4.07	0	1	-178.83	0.1	1987SDRL	0.063	
12:00:00		12:25:00								
4/13/2016	4	4/13/2016	3.89	0	-1	99.1	0.1	1982SDRL	0.052	
15:05:00		15:40:00								
4/20/2016	4.28	4/20/2016	4.2	0	-1	40	0.1	2000SDRL	0.073	
10:05:00		15:40:00								
4/29/2016	4.91	4/29/2016	4.5	0	-1	700	0.1	2000SDRL	0.17	
10:05:00		11:50:00								
4/15/2016	3.07	4/15/2016	3.02	0	-1	-20	0.1	2000SGYP	0.025	
10:05:00		11:10:00								
4/15/2016	3.11	4/15/2016	3.23	0	1	119.94	0.1	1999SGYP	0.026	
14:20:00		15:30:00								
4/6/2016	179.3	4/6/2016	180.28	0	-1	-2080	0.1	2000SHPG	0.734	
10:35:00		15:40:00								
4/13/2016	15.34	4/13/2016	15.52	0	-1	-480	0.1	2000SLV	0.044	
10:05:00		14:00:00								

4/13/2016 14:00:00	15.52	4/13/2016 14:15:00	15.48	0	1	-199.1	0.1	1991SLV	0.023
4/13/2016 14:15:00	15.48	4/13/2016 15:40:00	15.44	0	-1	-39.76	0.1	1988SLV	0.022
4/20/2016 10:05:00	16.28	4/20/2016 12:55:00	16.35	0	-1	-260	0.1	2000SLV	0.045
4/20/2016 12:55:00	16.35	4/20/2016 13:05:00	16.29	0	1	-239.52	0.1	1996SLV	0.024
4/20/2016 13:05:00	16.29	4/20/2016 15:40:00	16.15	0	-1	159.28	0.1	1991SLV	0.026
4/29/2016 10:05:00	16.94	4/29/2016 13:20:00	16.92	0	-1	-80	0.1	2000SLV	0.062
4/29/2016 14:35:00	16.95	4/29/2016 14:45:00	16.91	0	1	-199.8	0.1	1998SLV	0.026
4/29/2016 14:45:00	16.91	4/29/2016 15:05:00	16.95	0	-1	-199.6	0.1	1996SLV	0.025
4/29/2016 15:05:00	16.95	4/29/2016 15:40:00	16.98	0	1	-59.73	0.1	1991SLV	0.024
3/31/2016 10:05:00	17.03	3/31/2016 11:00:00	16.79	0	-1	360	0.1	2000SLW	0.152
3/31/2016 13:35:00	16.76	3/31/2016 14:20:00	16.66	0	-1	80.28	0.1	2007SLW	0.059
4/5/2016 10:05:00	25.81	4/5/2016 11:20:00	25.96	0	-1	-420	0.1	2000SNE	0.079
4/5/2016 11:20:00	25.96	4/5/2016 13:15:00	25.88	0	1	-278.88	0.1	1992SNE	0.051
4/5/2016 13:15:00	25.88	4/5/2016 14:15:00	25.95	0	-1	-258.31	0.1	1987SNE	0.037
4/5/2016 14:15:00	25.95	4/5/2016 14:55:00	25.9	0	1	-218.02	0.1	1982SNE	0.034
4/5/2016 14:55:00	25.9	4/5/2016 15:40:00	25.77	0	-1	138.39	0.1	1977SNE	0.035
4/15/2016 11:55:00	43.84	4/15/2016 12:20:00	43.9	0	1	0	0.1	2000SNY	0.067
4/15/2016 13:30:00	43.86	4/15/2016 14:35:00	43.75	0	1	-340	0.1	2000SNY	0.038
4/15/2016 14:35:00	43.75	4/15/2016 15:40:00	43.76	0	-1	-139.65	0.1	1995SNY	0.031
3/29/2016 10:15:00	203.08	3/29/2016 13:05:00	204.13	0	1	1980	0.1	2000SPY	0.29
4/12/2016 10:05:00	11.11	4/12/2016 11:30:00	11.23	0	-1	-360	0.1	2000SRC	0.073
4/12/2016 11:30:00	11.23	4/12/2016 11:40:00	11.16	0	1	-259.22	0.1	1994SRC	0.028
4/12/2016 11:40:00	11.16	4/12/2016 11:55:00	11.22	0	-1	-238.68	0.1	1989SRC	0.029
4/12/2016 11:55:00	11.22	4/12/2016 14:10:00	11.31	0	1	59.52	0.1	1984SRC	0.03
4/28/2016 10:45:00	79.07	4/28/2016 11:45:00	78.96	0	1	-340	0.1	2000STJ	0.302
4/28/2016 12:15:00	79	4/28/2016 12:35:00	78.82	0	1	-478.32	0.1	1993STJ	0.15
4/28/2016	78.82	4/28/2016	77.94	0	-1	1628.52	0.1	1986STJ	0.113



4/29/2016 11:30:00	11.26	4/29/2016 11:45:00	11.22	0	-1	-39.8	0.1	1990USO	0.047
4/29/2016 15:25:00	11.34	4/29/2016 15:40:00	11.33	0	1	-139.16	0.1	1988USO	0.023
3/31/2016 10:05:00	4.28	3/31/2016 14:20:00	4.16	0	-1	120	0.1	2000VALE	0.044
4/13/2016 10:05:00	5.55	4/13/2016 11:15:00	5.54	0	-1	-100	0.1	2000VALE	0.072
4/13/2016 11:15:00	5.54	4/13/2016 12:20:00	5.68	0	1	159.92	0.1	1999VALE	0.056
4/20/2016 10:05:00	5.83	4/20/2016 10:55:00	5.85	0	-1	-160	0.1	2000VALE	0.059
4/20/2016 10:55:00	5.85	4/20/2016 11:40:00	6	0	1	179.91	0.1	1999VALE	0.047
4/20/2016 12:50:00	6.02	4/20/2016 13:05:00	6.05	0	1	-60	0.1	2000VALE	0.037
4/22/2016 10:05:00	5.64	4/22/2016 11:30:00	5.5	0	-1	160	0.1	2000VALE	0.05
4/28/2016 10:05:00	5.77	4/28/2016 15:40:00	5.55	0	-1	320	0.1	2000VALE	0.078
4/15/2016 10:05:00	32.47	4/15/2016 11:25:00	32.31	0	-1	200	0.1	2000VRX	0.344
4/15/2016 11:25:00	32.31	4/15/2016 14:30:00	32.1	0	1	-541.35	0.1	2005VRX	0.139
4/15/2016 14:30:00	32.1	4/15/2016 14:35:00	32.18	0	-1	-279.16	0.1	1994VRX	0.131
4/15/2016 15:10:00	32.37	4/15/2016 15:40:00	32.35	0	1	-158.96	0.1	1987VRX	0.125
4/25/2016 10:05:00	37.09	4/25/2016 11:50:00	36.66	0	-1	740	0.1	2000VRX	0.413
4/25/2016 12:10:00	36.84	4/25/2016 12:30:00	36.49	0	1	-825.74	0.1	2014VRX	0.226
4/25/2016 12:30:00	36.49	4/25/2016 13:00:00	36.44	0	-1	-19.99	0.1	1999VRX	0.187
4/29/2016 10:20:00	35.47	4/29/2016 10:45:00	34.72	0	-1	1380	0.1	2000VRX	0.545
4/13/2016 10:05:00	35.36	4/13/2016 13:25:00	35.34	0	-1	-80	0.1	2000VWO	0.106
4/13/2016 13:35:00	35.37	4/13/2016 15:40:00	35.46	0	1	59.94	0.1	1998VWO	0.03
4/6/2016 10:15:00	8.15	4/6/2016 10:35:00	8	0	1	-420	0.1	2000WLL	0.118
4/6/2016 10:35:00	8	4/6/2016 10:45:00	8.15	0	-1	-418.95	0.1	1995WLL	0.095
4/6/2016 10:45:00	8.15	4/6/2016 12:10:00	8.52	0	1	615.04	0.1	1984WLL	0.104
4/13/2016 10:05:00	10.25	4/13/2016 15:40:00	10.4	0	-1	-420	0.1	2000WLL	0.197
3/29/2016 13:00:00	22.27	3/29/2016 14:40:00	22.34	0	-1	-260	0.1	2000XLF	0.04
3/29/2016 14:40:00	22.34	3/29/2016 15:00:00	22.36	0	1	-79.84	0.1	1996XLF	0.022
4/7/2016	36.03	4/7/2016	36.38	0	-1	-820	0.1	2000YHOO	0.179

10:05:00		10:30:00								
4/7/2016	36.38	4/7/2016	36.1	0	1	-674.9	0.1	1985YHOO	0.158	
10:30:00		10:45:00								
4/7/2016	36.1	4/7/2016	35.86	0	-1	354.78	0.1	1971YHOO	0.148	
10:45:00		14:40:00								
4/7/2016	35.86	4/7/2016	36.59	0	1	1325.26	0.1	1978YHOO	0.071	
14:40:00		15:10:00								
4/15/2016	36.96	4/15/2016	36.66	0	-1	480	0.1	2000YHOO	0.113	
10:05:00		11:45:00								
4/15/2016	7.06	4/15/2016	7.11	0	1	-37.03	0.06	3703ARIA	0.065	
11:15:00		11:35:00								
4/15/2016	14.12	4/15/2016	14.04	0	1	-1166.62	0.03	8333BAC	0.029	
12:25:00		13:15:00								
4/25/2016	14.97	4/25/2016	14.94	0	1	-999.99	0.02	11111BAC	0.022	
14:05:00		15:40:00								
4/15/2016	25.12	4/15/2016	25.18	0	1	0	0.03	7142EBAY	0.03	
14:40:00		15:30:00								
4/15/2016	9.12	4/15/2016	9.2	0	1	83.32	0.05	4166ETE	0.054	
11:20:00		11:45:00								
4/6/2016	28.9	4/6/2016	28.91	0	1	-238.05	0.03	4761HTA	0.044	
10:35:00		10:55:00								
3/29/2016	5.19	3/29/2016	5.03	0	1	-846.12	0.07	3846KERX	0.059	
14:35:00		15:15:00								
4/28/2016	56.42	4/28/2016	56.58	0	1	42.5	0.49	425MDVN	0.383	
10:50:00		11:00:00								
4/6/2016	10.9	4/6/2016	11	0	1	74.04	0.09	1851MRO	0.11	
10:45:00		11:05:00								
4/15/2016	5.64	4/15/2016	5.57	0	1	-764.66	0.02	5882MT	0.028	
11:50:00		13:55:00								
3/31/2016	5.96	3/31/2016	5.88	0	1	-1076.88	0.03	7692PBR	0.027	
13:10:00		13:50:00								
4/29/2016	2.74	4/29/2016	2.86	0	1	130.38	0.13	2173PRGN	0.1	
14:35:00		15:10:00								
4/29/2016	10.14	4/29/2016	10.14	0	1	-136.32	0.08	2272P	0.061	
15:20:00		15:40:00								
4/29/2016	16.96	4/29/2016	16.98	0	1	-400	0.02	10000SLV	0.024	
15:05:00		15:40:00								
4/20/2016	7.07	4/20/2016	7.09	0	1	-333.32	0.04	8333UNG	0.026	
11:15:00		11:40:00								
4/26/2016	6.99	4/26/2016	6.98	0	1	-538.44	0.01	7692UNG	0.02	
14:40:00		15:40:00								
4/13/2016	5.57	4/13/2016	5.62	0	1	-39.99	0.04	3999VALE	0.056	
11:15:00		11:50:00								
4/20/2016	5.89	4/20/2016	6.01	0	1	240	0.06	4000VALE	0.047	
10:55:00		11:35:00								
4/15/2016	32.37	4/15/2016	32.42	0	1	-20	0.17	2000VRX	0.139	
11:25:00		11:30:00								
4/7/2016	35.91	4/7/2016	36.77	0	1	2580	0.51	3225YHOO	0.071	
14:40:00		15:00:00								

**Symmetric Support and Breakout:**

entry date/time	entry price	exit date/time	exit price	stop price	market position	trade profit/loss	trade risk per share	size	symbol name	atr
3/29/2016 10:05:00	60.4	3/29/2016 11:50:00	60.95	0	-1	-1220	0.1	2000CNI	0.151	
3/29/2016 10:05:00	5.28	3/29/2016 13:50:00	5.03	0	-1	380	0.1	2000KERX	0.249	
3/29/2016 10:15:00	33.32	3/29/2016 12:10:00	33.4	0	1	40	0.1	2000EEM	0.058	
3/29/2016 10:15:00	204.12	3/29/2016 13:05:00	205.18	0	1	2000	0.1	2000IVV	0.281	
3/29/2016 10:15:00	203.08	3/29/2016 13:05:00	204.13	0	1	1980	0.1	2000SPY	0.29	
3/29/2016 10:25:00	9.68	3/29/2016 12:35:00	9.77	0	-1	-300	0.1	2000USO	0.067	
3/29/2016 11:50:00	60.95	3/29/2016 12:05:00	60.87	0	1	-276.92	0.1	1978CNI	0.093	
3/29/2016 12:25:00	60.95	3/29/2016 13:05:00	61.31	0	1	591	0.1	1970CNI	0.104	
3/29/2016 12:35:00	9.77	3/29/2016 12:40:00	9.76	0	1	-139.65	0.1	1995USO	0.026	
3/29/2016 13:00:00	22.27	3/29/2016 14:40:00	22.34	0	-1	-260	0.1	2000XLF	0.04	
3/29/2016 13:50:00	9.74	3/29/2016 15:40:00	9.77	0	1	-59.73	0.1	1991USO	0.034	
3/29/2016 14:25:00	5.07	3/29/2016 14:35:00	5.18	0	-1	-341.19	0.1	2007KERX	0.05	
3/29/2016 14:35:00	5.18	3/29/2016 15:20:00	4.96	0	1	-560.28	0.1	2001KERX	0.059	
3/29/2016 14:40:00	22.34	3/29/2016 15:00:00	22.36	0	1	-79.84	0.1	1996XLF	0.022	
3/29/2016 15:20:00	4.96	3/29/2016 15:30:00	5.01	0	-1	-218.9	0.1	1990KERX	0.055	
3/31/2016 10:05:00	10.36	3/31/2016 15:40:00	10.34	0	-1	-80	0.1	2000FCX	0.093	
3/31/2016 10:05:00	20.39	3/31/2016 12:55:00	20.09	0	-1	480	0.1	2000GDY	0.116	
3/31/2016 10:05:00	60.87	3/31/2016 15:00:00	61.73	0	-1	-1840	0.1	2000HLF	0.211	
3/31/2016 10:05:00	46.78	3/31/2016 14:05:00	46.47	0	-1	500	0.1	2000KO	0.093	
3/31/2016 10:05:00	4.56	3/31/2016 12:45:00	4.62	0	-1	-240	0.1	2000MT	0.031	
3/31/2016 10:05:00	6.03	3/31/2016 12:10:00	5.95	0	-1	40	0.1	2000PBR	0.044	
3/31/2016 10:05:00	17.03	3/31/2016 11:00:00	16.79	0	-1	360	0.1	2000SLW	0.152	
3/31/2016 10:05:00	4.28	3/31/2016 14:20:00	4.16	0	-1	120	0.1	2000VALE	0.044	
3/31/2016 12:10:00	5.95	3/31/2016 13:25:00	5.9	0	1	-220.22	0.1	2002PBR	0.031	

3/31/2016 12:45:00	4.62	3/31/2016 13:45:00	4.63	0	1	-99.8	0.1	1996MT	0.019
3/31/2016 13:25:00	5.9	3/31/2016 14:55:00	5.83	0	-1	19.97	0.1	1997PBR	0.03
3/31/2016 13:35:00	16.76	3/31/2016 14:20:00	16.66	0	-1	80.28	0.1	2007SLW	0.059
3/31/2016 15:00:00	61.73	3/31/2016 15:05:00	61.63	0	1	-314.24	0.1	1964HLF	0.133
3/31/2016 15:30:00	4.61	3/31/2016 15:40:00	4.61	0	1	-119.58	0.1	1993MT	0.015
4/1/2016 10:05:00	28.15	4/1/2016 10:25:00	28.37	0	-1	-560	0.1	2000CSCO	0.077
4/1/2016 10:05:00	26.04	4/1/2016 10:30:00	26.35	0	-1	-740	0.1	2000EWZ	0.154
4/1/2016 10:05:00	31.64	4/1/2016 15:40:00	31.5	0	-1	160	0.1	2000GLPI	0.189
4/1/2016 10:05:00	7.04	4/1/2016 14:00:00	7.12	0	-1	-280	0.1	2000IBN	0.043
4/1/2016 10:05:00	32.32	4/1/2016 12:40:00	32.18	0	-1	160	0.1	2000INTC	0.082
4/1/2016 10:05:00	54.84	4/1/2016 13:45:00	55.33	0	-1	-1100	0.1	2000MSFT	0.209
4/1/2016 10:20:00	33.68	4/1/2016 11:55:00	33.96	0	1	440	0.1	2000EEM	0.138
4/1/2016 10:20:00	33.24	4/1/2016 13:35:00	33.47	0	1	340	0.1	2000FXI	0.162
4/1/2016 10:25:00	28.37	4/1/2016 11:20:00	28.51	0	1	159.2	0.1	1990CSCO	0.088
4/1/2016 10:25:00	15.3	4/1/2016 15:40:00	14.99	0	-1	500	0.1	2000FIT	0.29
4/1/2016 10:30:00	26.35	4/1/2016 11:00:00	26.47	0	1	119.16	0.1	1986EWZ	0.141
4/1/2016 12:50:00	32.22	4/1/2016 15:40:00	32.38	0	1	200.3	0.1	2003INTC	0.048
4/1/2016 13:45:00	55.33	4/1/2016 13:55:00	55.3	0	1	-178.11	0.1	1979MSFT	0.074
4/1/2016 14:00:00	7.12	4/1/2016 15:10:00	7.14	0	1	-79.84	0.1	1996IBN	0.014
4/4/2016 10:05:00	113.18	4/4/2016 11:40:00	112.11	0	-1	2020	0.1	2000FB	0.464
4/4/2016 10:05:00	245.17	4/4/2016 12:55:00	250.87	0	-1	-11520	0.1	2000TSLA	2.659
4/4/2016 12:55:00	250.87	4/4/2016 13:25:00	250.76	0	1	-301.07	0.1	1771TSLA	1.126
4/4/2016 13:05:00	112.76	4/4/2016 15:40:00	112.43	0	-1	550.8	0.1	2040FB	0.247
4/4/2016 13:40:00	248.87	4/4/2016 15:15:00	250.36	0	-1	-2732.65	0.1	1763TSLA	1.067
4/4/2016 15:15:00	250.36	4/4/2016 15:40:00	249.68	0	1	-1283.16	0.1	1734TSLA	0.716
4/5/2016 10:05:00	21.71	4/5/2016 10:20:00	22.04	0	-1	-780	0.1	2000PE	0.168
4/5/2016	25.81	4/5/2016	25.96	0	-1	-420	0.1	2000SNE	0.079





4/6/2016 13:35:00	113.6	4/6/2016 14:10:00	113.4	0	1	-512.98	0.1	1973FB	0.147
4/6/2016 14:10:00	113.4	4/6/2016 15:10:00	113.65	0	-1	-609.77	0.1	1967FB	0.13
4/6/2016 14:40:00	18.35	4/6/2016 15:40:00	18.32	0	-1	-59.91	0.1	1997DOC	0.038
4/6/2016 14:40:00	10.88	4/6/2016 15:40:00	10.98	0	-1	-321.12	0.1	2007MRO	0.06
4/6/2016 14:50:00	6.44	4/6/2016 15:40:00	6.45	0	-1	-139.23	0.1	1989UNG	0.019
4/6/2016 15:10:00	113.65	4/6/2016 15:40:00	113.48	0	1	-448.73	0.1	1951FB	0.187
4/7/2016 10:05:00	109.9	4/7/2016 11:25:00	109.24	0	-1	1200	0.1	2000AAPL	0.367
4/7/2016 10:05:00	36.03	4/7/2016 10:30:00	36.38	0	-1	-820	0.1	2000YHOO	0.179
4/7/2016 10:30:00	36.38	4/7/2016 10:45:00	36.1	0	1	-674.9	0.1	1985YHOO	0.158
4/7/2016 10:45:00	36.1	4/7/2016 14:40:00	35.86	0	-1	354.78	0.1	1971YHOO	0.148
4/7/2016 13:05:00	25.68	4/7/2016 13:55:00	26.82	0	1	2160	0.1	2000ALDR	0.187
4/7/2016 13:55:00	26.82	4/7/2016 15:40:00	26.73	0	-1	61.38	0.1	2046ALDR	0.322
4/7/2016 14:40:00	35.86	4/7/2016 15:10:00	36.59	0	1	1325.26	0.1	1978YHOO	0.071
4/11/2016 10:40:00	110.31	4/11/2016 15:40:00	109.29	0	-1	1920	0.1	2000AAPL	0.242
4/12/2016 10:05:00	24.57	4/12/2016 15:40:00	24.96	0	-1	-900	0.1	2000HQY	0.222
4/12/2016 10:05:00	11.11	4/12/2016 11:30:00	11.23	0	-1	-360	0.1	2000SRC	0.073
4/12/2016 11:30:00	11.23	4/12/2016 11:40:00	11.16	0	1	-259.22	0.1	1994SRC	0.028
4/12/2016 11:40:00	11.16	4/12/2016 11:55:00	11.22	0	-1	-238.68	0.1	1989SRC	0.029
4/12/2016 11:55:00	11.22	4/12/2016 14:10:00	11.31	0	1	59.52	0.1	1984SRC	0.03
4/13/2016 10:05:00	111.49	4/13/2016 10:35:00	111.97	0	-1	-1080	0.1	2000AAPL	0.331
4/13/2016 10:05:00	15.98	4/13/2016 10:20:00	16.2	0	-1	-560	0.1	2000ABX	0.11
4/13/2016 10:05:00	4	4/13/2016 11:05:00	4.08	0	-1	-280	0.1	2000AUY	0.044
4/13/2016 10:05:00	78.97	4/13/2016 15:40:00	79.43	0	-1	-1040	0.1	2000BABA	0.283
4/13/2016 10:05:00	31.41	4/13/2016 11:00:00	31.49	0	-1	-280	0.1	2000BP	0.114
4/13/2016 10:05:00	6.02	4/13/2016 15:40:00	5.97	0	-1	-20	0.1	2000CHK	0.171
4/13/2016 10:05:00	4.11	4/13/2016 11:15:00	4.32	0	-1	-540	0.1	2000CLF	0.104
4/13/2016	48.35	4/13/2016	48.65	0	-1	-720	0.1	2000CTRP	0.479

10:05:00		15:40:00								
4/13/2016	34.81	4/13/2016	34.82	0	-1	-140	0.1	2000EEM	0.111	
10:05:00		13:50:00								
4/13/2016	28.58	4/13/2016	28.61	0	-1	-180	0.1	2000EWZ	0.145	
10:05:00		11:15:00								
4/13/2016	22.46	4/13/2016	22.7	0	-1	-600	0.1	2000GDY	0.131	
10:05:00		10:20:00								
4/13/2016	9.61	4/13/2016	9.62	0	-1	-140	0.1	2000ITUB	0.047	
10:05:00		10:20:00								
4/13/2016	0.44	4/13/2016	0.44	0	-1	-120	0.1	2000LNCO	0.025	
10:05:00		15:40:00								
4/13/2016	1.8442	4/13/2016	1.76	0	-1	48.4	0.1	2000MNKD	0.065	
10:05:00		11:15:00								
4/13/2016	12.63	4/13/2016	13.08	0	-1	-1020	0.1	2000MRO	0.131	
10:05:00		11:05:00								
4/13/2016	5.61	4/13/2016	5.57	0	-1	-40	0.1	2000MT	0.075	
10:05:00		15:40:00								
4/13/2016	6.51	4/13/2016	6.74	0	-1	-580	0.1	2000PBR	0.078	
10:05:00		14:25:00								
4/13/2016	32.16	4/13/2016	32.31	0	-1	-420	0.1	2000PFE	0.087	
10:05:00		10:55:00								
4/13/2016	16.42	4/13/2016	16.18	0	-1	360	0.1	2000RICE	0.087	
10:05:00		10:55:00								
4/13/2016	3.81	4/13/2016	4.1	0	-1	-700	0.1	2000SDRL	0.098	
10:05:00		12:00:00								
4/13/2016	15.34	4/13/2016	15.52	0	-1	-480	0.1	2000SLV	0.044	
10:05:00		14:00:00								
4/13/2016	10.52	4/13/2016	10.68	0	-1	-440	0.1	2000USO	0.032	
10:05:00		11:00:00								
4/13/2016	5.55	4/13/2016	5.54	0	-1	-100	0.1	2000VALE	0.072	
10:05:00		11:15:00								
4/13/2016	35.36	4/13/2016	35.34	0	-1	-80	0.1	2000VWO	0.106	
10:05:00		13:25:00								
4/13/2016	10.25	4/13/2016	10.4	0	-1	-420	0.1	2000WLL	0.197	
10:05:00		15:40:00								
4/13/2016	110.46	4/13/2016	109.28	0	1	-2480	0.1	2000NFLX	0.731	
10:15:00		12:05:00								
4/13/2016	16.2	4/13/2016	16	0	1	-517.4	0.1	1990ABX	0.138	
10:20:00		11:30:00								
4/13/2016	22.7	4/13/2016	22.52	0	1	-477.36	0.1	1989GDY	0.159	
10:20:00		11:30:00								
4/13/2016	9.62	4/13/2016	9.53	0	1	-299.7	0.1	1998ITUB	0.05	
10:20:00		10:45:00								
4/13/2016	111.97	4/13/2016	111.72	0	1	-613.8	0.1	1980AAPL	0.235	
10:35:00		10:45:00								
4/13/2016	10.97	4/13/2016	10.82	0	-1	180	0.1	2000FCX	0.125	
10:40:00		15:40:00								
4/13/2016	111.72	4/13/2016	112.07	0	-1	-807.7	0.1	1970AAPL	0.189	
10:45:00		11:40:00								
4/13/2016	9.53	4/13/2016	9.61	0	-1	-278.88	0.1	1992ITUB	0.038	
10:45:00		12:55:00								
4/13/2016	16.49	4/13/2016	16.56	0	1	20	0.1	2000FIT	0.157	
10:55:00		11:05:00								

4/13/2016 10:55:00	32.31	4/13/2016 11:05:00	32.25	0	1	-239.04	0.1	1992PFE	0.068
4/13/2016 11:00:00	31.49	4/13/2016 15:40:00	31.36	0	1	-379.24	0.1	1996BP	0.09
4/13/2016 11:00:00	10.68	4/13/2016 11:20:00	10.67	0	1	-139.44	0.1	1992USO	0.062
4/13/2016 11:05:00	4.08	4/13/2016 11:40:00	4.02	0	1	-239.52	0.1	1996AUY	0.033
4/13/2016 11:05:00	13.08	4/13/2016 11:20:00	13.22	0	1	158.48	0.1	1981MRO	0.111
4/13/2016 11:15:00	4.32	4/13/2016 12:05:00	4.37	0	1	-19.91	0.1	1991CLF	0.074
4/13/2016 11:15:00	28.61	4/13/2016 14:10:00	28.83	0	1	319.52	0.1	1997EWZ	0.099
4/13/2016 11:15:00	5.54	4/13/2016 12:20:00	5.68	0	1	159.92	0.1	1999VALE	0.056
4/13/2016 11:25:00	32.34	4/13/2016 12:40:00	32.44	0	1	79.44	0.1	1986PFE	0.069
4/13/2016 11:30:00	16	4/13/2016 12:25:00	16.15	0	-1	-415.8	0.1	1980ABX	0.073
4/13/2016 11:30:00	22.52	4/13/2016 15:40:00	22.21	0	-1	494.75	0.1	1979GDY	0.082
4/13/2016 11:40:00	112.07	4/13/2016 11:50:00	112.1	0	1	-58.5	0.1	1950AAPL	0.186
4/13/2016 11:40:00	4.02	4/13/2016 15:40:00	3.96	0	-1	0	0.1	1990AUY	0.031
4/13/2016 11:50:00	10.65	4/13/2016 12:35:00	10.56	0	1	-298.2	0.1	1988USO	0.054
4/13/2016 12:00:00	4.1	4/13/2016 12:25:00	4.07	0	1	-178.83	0.1	1987SDRL	0.063
4/13/2016 12:05:00	109.28	4/13/2016 15:40:00	109.99	0	-1	-1501.5	0.1	1950NFLX	0.344
4/13/2016 12:25:00	16.15	4/13/2016 13:30:00	16.08	0	1	-256.36	0.1	1972ABX	0.045
4/13/2016 12:35:00	111.96	4/13/2016 13:05:00	111.77	0	1	-487	0.1	1948AAPL	0.158
4/13/2016 12:35:00	10.56	4/13/2016 13:40:00	10.63	0	-1	-257.92	0.1	1984USO	0.048
4/13/2016 12:55:00	9.61	4/13/2016 15:40:00	9.6	0	1	-139.09	0.1	1987ITUB	0.026
4/13/2016 13:05:00	111.77	4/13/2016 13:45:00	111.97	0	-1	-504.92	0.1	1942AAPL	0.112
4/13/2016 13:15:00	12.94	4/13/2016 13:30:00	13.02	0	-1	-277.48	0.1	1982MRO	0.049
4/13/2016 13:30:00	16.08	4/13/2016 13:40:00	16.15	0	-1	-255.58	0.1	1966ABX	0.05
4/13/2016 13:30:00	13.02	4/13/2016 15:10:00	12.94	0	1	-277.2	0.1	1980MRO	0.045
4/13/2016 13:35:00	35.37	4/13/2016 15:40:00	35.46	0	1	59.94	0.1	1998VVO	0.03
4/13/2016 13:40:00	16.15	4/13/2016 14:20:00	16.07	0	1	-274.68	0.1	1962ABX	0.047
4/13/2016	10.63	4/13/2016	10.56	0	1	-257.27	0.1	1979USO	0.028

13:40:00		14:40:00								
4/13/2016	111.97	4/13/2016	112.06	0	1	57.9	0.1	1930AAPL	0.131	
13:45:00		15:05:00								
4/13/2016	34.82	4/13/2016	34.89	0	1	19.98	0.1	1998EEM	0.034	
13:50:00		15:40:00								
4/13/2016	15.52	4/13/2016	15.48	0	1	-199.1	0.1	1991SLV	0.023	
14:00:00		14:15:00								
4/13/2016	15.48	4/13/2016	15.44	0	-1	-39.76	0.1	1988SLV	0.022	
14:15:00		15:40:00								
4/13/2016	16.07	4/13/2016	16.01	0	-1	0	0.1	1955ABX	0.04	
14:20:00		15:40:00								
4/13/2016	6.74	4/13/2016	6.72	0	1	-159.12	0.1	1989PBR	0.024	
14:25:00		14:35:00								
4/13/2016	10.56	4/13/2016	10.55	0	-1	-98.65	0.1	1973USO	0.038	
14:40:00		15:40:00								
4/13/2016	4	4/13/2016	3.89	0	-1	99.1	0.1	1982SDRL	0.052	
15:05:00		15:40:00								
4/13/2016	12.94	4/13/2016	12.86	0	-1	39.46	0.1	1973MRO	0.047	
15:10:00		15:40:00								
4/13/2016	6.68	4/13/2016	6.74	0	-1	-238.2	0.1	1985PBR	0.027	
15:10:00		15:40:00								
4/15/2016	111.78	4/15/2016	111.75	0	-1	-60	0.1	2000AAPL	0.173	
10:05:00		10:40:00								
4/15/2016	21.4	4/15/2016	21.49	0	-1	-300	0.1	2000AMAT	0.065	
10:05:00		15:40:00								
4/15/2016	14.13	4/15/2016	14.03	0	-1	80	0.1	2000BAC	0.069	
10:05:00		10:30:00								
4/15/2016	25.25	4/15/2016	25.1	0	-1	180	0.1	2000EBAY	0.076	
10:05:00		12:30:00								
4/15/2016	0.71	4/15/2016	0.56	0	-1	180	0.1	2000EBIO	0.06	
10:05:00		14:45:00								
4/15/2016	0.71	4/15/2016	0.56	0	-1	180	0.1	2000EBIO	0.06	
10:05:00		14:45:00								
4/15/2016	9.01	4/15/2016	9.05	0	-1	-200	0.1	2000ETE	0.093	
10:05:00		10:45:00								
4/15/2016	21.51	4/15/2016	21.89	0	-1	-880	0.1	2000GDY	0.093	
10:05:00		10:25:00								
4/15/2016	21.51	4/15/2016	21.89	0	-1	-880	0.1	2000GDY	0.093	
10:05:00		10:25:00								
4/15/2016	98.55	4/15/2016	97.95	0	-1	1080	0.1	2000GILD	0.304	
10:05:00		10:35:00								
4/15/2016	62.4	4/15/2016	62.14	0	-1	400	0.1	2000JPM	0.169	
10:05:00		10:35:00								
4/15/2016	12.01	4/15/2016	11.99	0	-1	-80	0.1	2000PLCM	0.095	
10:05:00		15:40:00								
4/15/2016	2.39	4/15/2016	2.22	0	-1	220	0.1	2000RPRX	0.132	
10:05:00		12:00:00								
4/15/2016	3.07	4/15/2016	3.02	0	-1	-20	0.1	2000SGYP	0.025	
10:05:00		11:10:00								
4/15/2016	32.47	4/15/2016	32.31	0	-1	200	0.1	2000VRX	0.344	
10:05:00		11:25:00								
4/15/2016	36.96	4/15/2016	36.66	0	-1	480	0.1	2000YHOO	0.113	
10:05:00		11:45:00								

4/15/2016 10:15:00	84.54	4/15/2016 15:40:00	84.73	0	-1	-500	0.1	2000NXPI	0.411
4/15/2016 10:25:00	21.89	4/15/2016 10:40:00	21.85	0	1	-198.3	0.1	1983GDY	0.128
4/15/2016 10:25:00	21.89	4/15/2016 10:40:00	21.85	0	1	-198.3	0.1	1983GDY	0.128
4/15/2016 10:25:00	5.51	4/15/2016 10:40:00	5.52	0	-1	-140	0.1	2000MT	0.057
4/15/2016 10:40:00	111.75	4/15/2016 13:15:00	111.01	0	1	-1600	0.1	2000AAPL	0.152
4/15/2016 10:45:00	6.91	4/15/2016 11:15:00	7.05	0	-1	-400	0.1	2000ARIA	0.086
4/15/2016 10:45:00	14.12	4/15/2016 11:00:00	14.02	0	1	-320.16	0.1	2001BAC	0.057
4/15/2016 10:45:00	9.05	4/15/2016 11:55:00	9.22	0	1	219.67	0.1	1997ETE	0.058
4/15/2016 11:00:00	14.02	4/15/2016 12:25:00	14.11	0	-1	-299.4	0.1	1996BAC	0.048
4/15/2016 11:15:00	7.05	4/15/2016 15:40:00	7.06	0	1	-99.65	0.1	1993ARIA	0.065
4/15/2016 11:25:00	32.31	4/15/2016 14:30:00	32.1	0	1	-541.35	0.1	2005VRX	0.139
4/15/2016 11:50:00	5.64	4/15/2016 12:00:00	5.57	0	1	-259.61	0.1	1997MT	0.028
4/15/2016 11:55:00	43.84	4/15/2016 12:20:00	43.9	0	1	0	0.1	2000SNY	0.067
4/15/2016 12:00:00	5.57	4/15/2016 12:20:00	5.64	0	-1	-259.09	0.1	1993MT	0.032
4/15/2016 12:15:00	2.26	4/15/2016 13:30:00	2.21	0	1	-220.44	0.1	2004RPRX	0.038
4/15/2016 12:20:00	5.64	4/15/2016 13:50:00	5.57	0	1	-258.44	0.1	1988MT	0.038
4/15/2016 12:25:00	14.11	4/15/2016 13:10:00	14.05	0	1	-238.8	0.1	1990BAC	0.029
4/15/2016 12:30:00	25.1	4/15/2016 14:05:00	25.04	0	1	-240.6	0.1	2005EBAY	0.029
4/15/2016 13:10:00	14.05	4/15/2016 13:35:00	14.01	0	-1	-39.72	0.1	1986BAC	0.025
4/15/2016 13:15:00	111.01	4/15/2016 14:05:00	110.35	0	-1	1179.6	0.1	1966AAPL	0.192
4/15/2016 13:30:00	2.21	4/15/2016 13:35:00	2.22	0	-1	-140.07	0.1	2001RPRX	0.02
4/15/2016 13:30:00	43.86	4/15/2016 14:35:00	43.75	0	1	-340	0.1	2000SNY	0.038
4/15/2016 13:45:00	2.27	4/15/2016 15:25:00	2.2	0	1	-259.61	0.1	1997RPRX	0.024
4/15/2016 13:50:00	5.57	4/15/2016 15:40:00	5.57	0	-1	-118.92	0.1	1982MT	0.012
4/15/2016 14:05:00	25.04	4/15/2016 14:40:00	25.1	0	-1	-240	0.1	2000EBAY	0.027
4/15/2016 14:20:00	3.11	4/15/2016 15:30:00	3.23	0	1	119.94	0.1	1999SGYP	0.026
4/15/2016	32.1	4/15/2016	32.18	0	-1	-279.16	0.1	1994VRX	0.131



4/22/2016 10:30:00	34.6	4/22/2016 12:40:00	34.28	0	-1	520	0.1	2000FXI	0.067
4/22/2016 11:00:00	20.21	4/22/2016 12:40:00	20.18	0	-1	-60	0.1	2000EWH	0.022
4/22/2016 14:00:00	34.34	4/22/2016 15:40:00	34.31	0	-1	-60.3	0.1	2010FXI	0.032
4/25/2016 10:05:00	15.01	4/25/2016 11:25:00	14.85	0	-1	200	0.1	2000BAC	0.056
4/25/2016 10:05:00	22.71	4/25/2016 12:10:00	22.52	0	-1	260	0.1	2000GDY	0.097
4/25/2016 10:05:00	37.09	4/25/2016 11:50:00	36.66	0	-1	740	0.1	2000VRX	0.413
4/25/2016 10:10:00	10.75	4/25/2016 10:25:00	10.68	0	-1	20	0.1	2000USO	0.038
4/25/2016 12:10:00	36.84	4/25/2016 12:30:00	36.49	0	1	-825.74	0.1	2014VRX	0.226
4/25/2016 12:30:00	22.59	4/25/2016 14:05:00	22.49	0	1	-320.8	0.1	2005GDY	0.056
4/25/2016 12:30:00	36.49	4/25/2016 13:00:00	36.44	0	-1	-19.99	0.1	1999VRX	0.187
4/25/2016 14:05:00	14.96	4/25/2016 15:40:00	14.94	0	1	-160.32	0.1	2004BAC	0.022
4/25/2016 14:05:00	22.49	4/25/2016 14:35:00	22.41	0	-1	40	0.1	2000GDY	0.068
4/26/2016 10:05:00	4.98	4/26/2016 15:40:00	4.77	0	-1	300	0.1	2000EXEL	0.108
4/26/2016 12:35:00	6.97	4/26/2016 13:40:00	6.93	0	1	-200	0.1	2000UNG	0.02
4/26/2016 13:40:00	6.93	4/26/2016 14:40:00	6.99	0	-1	-239.64	0.1	1997UNG	0.015
4/26/2016 14:40:00	6.99	4/26/2016 15:40:00	6.98	0	1	-139.44	0.1	1992UNG	0.02
4/27/2016 10:20:00	21.45	4/27/2016 11:30:00	21.71	0	-1	-640	0.1	2000BSX	0.333
4/27/2016 11:30:00	21.71	4/27/2016 11:45:00	21.72	0	1	-99.45	0.1	1989BSX	0.097
4/27/2016 15:30:00	32.04	4/27/2016 15:40:00	32.01	0	-1	-60	0.1	2000DWA	0.127
4/28/2016 10:05:00	56.07	4/28/2016 10:50:00	56.2	0	-1	-380	0.1	2000MDVN	0.774
4/28/2016 10:05:00	5.77	4/28/2016 15:40:00	5.55	0	-1	320	0.1	2000VALE	0.078
4/28/2016 10:45:00	79.07	4/28/2016 11:45:00	78.96	0	1	-340	0.1	2000STJ	0.302
4/28/2016 10:50:00	56.2	4/28/2016 15:40:00	56	0	1	-518.18	0.1	1993MDVN	0.383
4/28/2016 12:15:00	79	4/28/2016 12:35:00	78.82	0	1	-478.32	0.1	1993STJ	0.15
4/28/2016 12:35:00	78.82	4/28/2016 15:40:00	77.94	0	-1	1628.52	0.1	1986STJ	0.113
4/29/2016 10:05:00	14.63	4/29/2016 10:25:00	14.66	0	-1	-180	0.1	2000BAC	0.069
4/29/2016	0.97	4/29/2016	0.81	0	-1	200	0.1	2000EGLE	0.083



10:05:00		11:40:00								
4/29/2016	25.04	4/29/2016	25.41	0	-1	-860	0.1	2000GDX	0.202	
10:05:00		11:25:00								
4/29/2016	2.75	4/29/2016	2.38	0	-1	620	0.1	2000PRGN	0.516	
10:05:00		12:00:00								
4/29/2016	10.08	4/29/2016	10.09	0	-1	-140	0.1	2000P	0.269	
10:05:00		11:15:00								
4/29/2016	4.91	4/29/2016	4.5	0	-1	700	0.1	2000SDRL	0.17	
10:05:00		11:50:00								
4/29/2016	16.94	4/29/2016	16.92	0	-1	-80	0.1	2000SLV	0.062	
10:05:00		13:20:00								
4/29/2016	11.34	4/29/2016	11.37	0	-1	-180	0.1	2000USO	0.062	
10:05:00		10:20:00								
4/29/2016	11.37	4/29/2016	11.26	0	1	-339.49	0.1	1997USO	0.073	
10:20:00		11:30:00								
4/29/2016	35.47	4/29/2016	34.72	0	-1	1380	0.1	2000VRX	0.545	
10:20:00		10:45:00								
4/29/2016	14.66	4/29/2016	14.56	0	1	-319.68	0.1	1998BAC	0.079	
10:25:00		11:40:00								
4/29/2016	53.29	4/29/2016	53.36	0	-1	-260	0.1	2000TLK	0.069	
10:55:00		11:15:00								
4/29/2016	10.09	4/29/2016	9.86	0	1	-579.42	0.1	1998P	0.145	
11:15:00		11:30:00								
4/29/2016	25.41	4/29/2016	25.38	0	1	-178.56	0.1	1984GDX	0.089	
11:25:00		11:35:00								
4/29/2016	9.86	4/29/2016	10.06	0	-1	-516.36	0.1	1986P	0.117	
11:30:00		12:35:00								
4/29/2016	11.26	4/29/2016	11.22	0	-1	-39.8	0.1	1990USO	0.047	
11:30:00		11:45:00								
4/29/2016	14.56	4/29/2016	14.53	0	-1	-59.73	0.1	1991BAC	0.043	
11:40:00		11:55:00								
4/29/2016	25.25	4/29/2016	25.4	0	-1	-415.59	0.1	1979GDX	0.101	
12:05:00		12:35:00								
4/29/2016	25.4	4/29/2016	25.52	0	1	118.32	0.1	1972GDX	0.09	
12:35:00		14:20:00								
4/29/2016	10.06	4/29/2016	9.93	0	1	-375.63	0.1	1977P	0.084	
12:35:00		12:50:00								
4/29/2016	2.74	4/29/2016	2.52	0	1	-563.36	0.1	2012PRGN	0.15	
12:50:00		13:55:00								
4/29/2016	9.93	4/29/2016	10.12	0	-1	-492.5	0.1	1970P	0.073	
12:50:00		15:20:00								
4/29/2016	14.58	4/29/2016	14.5	0	-1	39.76	0.1	1988BAC	0.034	
13:40:00		14:25:00								
4/29/2016	2.52	4/29/2016	2.71	0	-1	-500.75	0.1	2003PRGN	0.093	
13:55:00		14:35:00								
4/29/2016	2.71	4/29/2016	2.58	0	1	-378.48	0.1	1992PRGN	0.1	
14:35:00		15:40:00								
4/29/2016	16.95	4/29/2016	16.91	0	1	-199.8	0.1	1998SLV	0.026	
14:35:00		14:45:00								
4/29/2016	16.91	4/29/2016	16.95	0	-1	-199.6	0.1	1996SLV	0.025	
14:45:00		15:05:00								
4/29/2016	16.95	4/29/2016	16.98	0	1	-59.73	0.1	1991SLV	0.024	
15:05:00		15:40:00								

4/29/2016 15:20:00	10.12	4/29/2016 15:40:00	10.14	0	1	-78.36	0.1	1959P	0.061
4/29/2016 15:25:00	11.34	4/29/2016 15:40:00	11.33	0	1	-139.16	0.1	1988USO	0.023

**Double OR:**

entry date/time	entry price	exit date/time	exit price	stop price	market position	trade profit/loss	trade risk	size	symbol name	atr
4/7/2016 10:10:00	110.05	4/7/2016 10:10:00	110.17	0	-1	-45	0.2	250AAPL	0.383	
4/7/2016 10:10:00	110.17	4/7/2016 10:35:00	109.55	0	1	-170	0.2	250AAPL	0.383	
4/7/2016 10:35:00	109.55	4/7/2016 11:20:00	109.3	0	-1	47.31	0.2	249AAPL	0.232	
4/7/2016 12:15:00	109.55	4/7/2016 12:20:00	109.6	0	1	-2.49	0.2	249AAPL	0.17	
4/11/2016 10:10:00	110.25	4/11/2016 10:40:00	110.42	0	-1	-57.5	0.2	250AAPL	0.34	
4/11/2016 10:40:00	110.42	4/11/2016 11:40:00	109.62	0	1	-214.14	0.2	249AAPL	0.242	
4/11/2016 11:40:00	109.62	4/11/2016 11:45:00	109.76	0	-1	-49.8	0.2	249AAPL	0.25	
4/13/2016 10:10:00	111.53	4/13/2016 14:45:00	112.2	0	-1	-182.5	0.2	250AAPL	0.331	
4/13/2016 14:45:00	112.2	4/13/2016 15:05:00	112.06	0	1	-49.8	0.2	249AAPL	0.154	
4/13/2016 15:05:00	112.06	4/13/2016 15:25:00	112.2	0	-1	-49.8	0.2	249AAPL	0.149	
4/13/2016 15:25:00	112.2	4/13/2016 15:40:00	112.28	0	1	4.98	0.2	249AAPL	0.133	
4/15/2016 10:10:00	111.63	4/15/2016 10:15:00	111.7	0	-1	-32.5	0.2	250AAPL	0.188	
4/15/2016 10:30:00	111.6	4/15/2016 10:40:00	111.69	0	1	7.47	0.2	249AAPL	0.17	
4/15/2016 13:10:00	111.45	4/15/2016 13:15:00	111.15	0	-1	59.76	0.2	249AAPL	0.128	
4/6/2016 10:10:00	13.9	4/6/2016 15:40:00	13.93	0	-1	-22.5	0.2	250ABX	0.078	
4/13/2016 10:10:00	16.04	4/13/2016 10:15:00	16.14	0	-1	-40	0.2	250ABX	0.116	
4/13/2016 10:15:00	16.14	4/13/2016 10:25:00	16.19	0	1	-2.49	0.2	249ABX	0.127	
4/13/2016 10:35:00	16.11	4/13/2016 11:30:00	16.05	0	-1	0	0.2	249ABX	0.103	
4/7/2016 10:10:00	26.69	4/7/2016 10:15:00	26.62	0	-1	2.5	0.2	250ALDR	0.442	
4/7/2016 12:25:00	25.59	4/7/2016 12:35:00	25.54	0	-1	-2.5	0.2	250ALDR	0.206	
4/7/2016 12:50:00	25.54	4/7/2016 13:45:00	27.21	0	-1	-432.5	0.2	250ALDR	0.188	
4/7/2016	27.21	4/7/2016	26.73	0	1	-133.92	0.2	248ALDR	0.3	

13:45:00		15:40:00								
4/15/2016	21.44	4/15/2016	21.39	0	-1	-2.5	0.2	250AMAT	0.065	
10:05:00		10:20:00								
4/15/2016	21.47	4/15/2016	21.45	0	1	-19.92	0.2	249AMAT	0.085	
10:25:00		11:00:00								
4/15/2016	21.45	4/15/2016	21.48	0	-1	-22.41	0.2	249AMAT	0.052	
11:00:00		11:50:00								
4/15/2016	21.48	4/15/2016	21.49	0	1	-12.45	0.2	249AMAT	0.035	
11:50:00		15:40:00								
4/15/2016	7.23	4/15/2016	7.14	0	-1	7.5	0.2	250ARIA	0.127	
10:10:00		10:15:00								
4/15/2016	7.14	4/15/2016	7.09	0	-1	-2.5	0.2	250ARIA	0.142	
10:15:00		10:25:00								
4/15/2016	7.06	4/15/2016	7.08	0	1	-10	0.2	250ARIA	0.068	
11:10:00		11:40:00								
4/15/2016	7.08	4/15/2016	6.99	0	-1	7.5	0.2	250ARIA	0.055	
11:40:00		13:05:00								
4/13/2016	4.04	4/13/2016	4.05	0	-1	-17.5	0.2	250AUY	0.047	
10:10:00		10:10:00								
4/13/2016	4.05	4/13/2016	4.05	0	1	-15	0.2	250AUY	0.047	
10:10:00		10:30:00								
4/13/2016	4.05	4/13/2016	4.09	0	-1	-24.9	0.2	249AUY	0.041	
10:30:00		11:10:00								
4/13/2016	4.09	4/13/2016	3.96	0	1	-47.31	0.2	249AUY	0.033	
11:10:00		15:40:00								
4/13/2016	78.92	4/13/2016	79.26	0	-1	-100	0.2	250BABA	0.29	
10:10:00		11:10:00								
4/13/2016	79.26	4/13/2016	79.3	0	1	-4.98	0.2	249BABA	0.169	
11:10:00		11:20:00								
4/13/2016	79.26	4/13/2016	79.18	0	-1	4.98	0.2	249BABA	0.103	
11:55:00		12:10:00								
4/15/2016	14.05	4/15/2016	14.03	0	-1	-10	0.2	250BAC	0.076	
10:10:00		10:30:00								
4/15/2016	14.02	4/15/2016	14.07	0	1	-2.49	0.2	249BAC	0.048	
11:00:00		12:45:00								
4/15/2016	13.96	4/15/2016	13.98	0	-1	-19.92	0.2	249BAC	0.024	
14:20:00		15:40:00								
4/20/2016	14.79	4/20/2016	14.77	0	1	-20	0.2	250BAC	0.044	
11:05:00		11:05:00								
4/20/2016	14.77	4/20/2016	14.72	0	-1	-2.5	0.2	250BAC	0.044	
11:05:00		11:40:00								
4/20/2016	14.77	4/20/2016	14.82	0	1	-2.49	0.2	249BAC	0.021	
14:35:00		15:00:00								
4/25/2016	14.98	4/25/2016	14.85	0	-1	17.5	0.2	250BAC	0.057	
10:10:00		11:05:00								
4/25/2016	14.85	4/25/2016	14.85	0	1	-15	0.2	250BAC	0.038	
11:05:00		11:40:00								
4/25/2016	14.85	4/25/2016	14.85	0	-1	-15	0.2	250BAC	0.031	
11:40:00		11:50:00								
4/25/2016	14.85	4/25/2016	14.94	0	1	7.47	0.2	249BAC	0.029	
11:50:00		15:40:00								
4/29/2016	14.57	4/29/2016	14.63	0	-1	-30	0.2	250BAC	0.074	
10:10:00		10:20:00								

4/29/2016 10:40:00	14.71	4/29/2016 11:40:00	14.56	0	1	-52.29	0.2	249BAC	0.064
4/29/2016 11:40:00	14.56	4/29/2016 11:55:00	14.53	0	-1	-7.47	0.2	249BAC	0.043
4/29/2016 11:55:00	14.55	4/29/2016 15:40:00	14.57	0	1	-9.96	0.2	249BAC	0.041
4/13/2016 10:10:00	31.37	4/13/2016 10:45:00	31.28	0	-1	7.5	0.2	250BP	0.113
4/13/2016 11:15:00	31.48	4/13/2016 12:05:00	31.53	0	1	-2.5	0.2	250BP	0.091
4/27/2016 10:20:00	21.45	4/27/2016 10:35:00	21.34	0	-1	12.5	0.2	250BSX	0.333
4/27/2016 10:45:00	21.5	4/27/2016 11:00:00	21.58	0	1	5	0.2	250BSX	0.147
4/27/2016 11:10:00	21.5	4/27/2016 15:40:00	22.03	0	-1	-147.5	0.2	250BSX	0.108
4/13/2016 10:10:00	6.17	4/13/2016 10:45:00	6.1	0	-1	2.5	0.2	250CHK	0.187
4/13/2016 10:45:00	6.1	4/13/2016 15:20:00	6.01	0	-1	7.5	0.2	250CHK	0.104
4/13/2016 15:20:00	6.01	4/13/2016 15:40:00	5.97	0	-1	-5	0.2	250CHK	0.067
4/13/2016 10:10:00	4.13	4/13/2016 10:50:00	4.25	0	-1	-45	0.2	250CLF	0.107
4/13/2016 10:50:00	4.25	4/13/2016 11:05:00	4.23	0	1	-19.92	0.2	249CLF	0.071
4/13/2016 11:05:00	4.23	4/13/2016 15:05:00	4.04	0	-1	32.37	0.2	249CLF	0.07
4/28/2016 10:10:00	5.07	4/28/2016 10:25:00	5.1	0	-1	-22.5	0.2	250CLF	0.185
4/28/2016 10:25:00	5.1	4/28/2016 10:55:00	5.2	0	1	9.96	0.2	249CLF	0.198
4/28/2016 14:10:00	5.67	4/28/2016 15:15:00	5.6	0	-1	2.49	0.2	249CLF	0.067
3/29/2016 10:10:00	60.61	3/29/2016 11:45:00	60.92	0	-1	-92.5	0.2	250CNI	0.154
3/29/2016 11:45:00	60.92	3/29/2016 12:05:00	60.87	0	1	-27.39	0.2	249CNI	0.094
3/29/2016 12:05:00	60.87	3/29/2016 12:10:00	60.81	0	-1	0	0.2	249CNI	0.097
3/29/2016 12:20:00	60.98	3/29/2016 13:05:00	61.31	0	1	67.23	0.2	249CNI	0.112
4/1/2016 10:10:00	28.17	4/1/2016 10:20:00	28.34	0	-1	-57.5	0.2	250CSCO	0.077
4/1/2016 10:20:00	28.34	4/1/2016 11:20:00	28.51	0	1	27.39	0.2	249CSCO	0.091
4/1/2016 11:35:00	28.5	4/1/2016 12:15:00	28.4	0	-1	9.96	0.2	249CSCO	0.053
4/1/2016 14:10:00	28.58	4/1/2016 15:40:00	28.58	0	1	-14.94	0.2	249CSCO	0.033
4/13/2016 10:10:00	48.4	4/13/2016 11:30:00	48.16	0	-1	45	0.2	250CTRP	0.493
4/6/2016	18.3	4/6/2016	18.32	0	-1	-20	0.2	250DOC	0.025

12:40:00		12:45:00								
4/6/2016	18.32	4/6/2016	18.27	0	1	-27.39	0.2	249DOC	0.025	
12:45:00		13:00:00								
4/6/2016	18.27	4/6/2016	18.34	0	-1	-32.37	0.2	249DOC	0.029	
13:00:00		13:15:00								
4/6/2016	18.34	4/6/2016	18.37	0	1	-7.47	0.2	249DOC	0.036	
13:15:00		13:50:00								
4/27/2016	31.8	4/27/2016	31.43	0	-1	77.5	0.2	250DWA	0.805	
10:10:00		11:25:00								
4/27/2016	31.85	4/27/2016	31.8	0	1	-27.5	0.2	250DWA	0.256	
11:40:00		13:10:00								
4/27/2016	31.8	4/27/2016	31.75	0	-1	-2.5	0.2	250DWA	0.085	
13:10:00		14:10:00								
4/15/2016	25.2	4/15/2016	25.14	0	-1	0	0.2	250EBAY	0.081	
10:10:00		11:00:00								
4/15/2016	25.07	4/15/2016	25.03	0	-1	-5	0.2	250EBAY	0.039	
11:45:00		13:15:00								
4/15/2016	25.07	4/15/2016	25.17	0	1	9.96	0.2	249EBAY	0.023	
13:35:00		15:40:00								
4/15/2016	0.69	4/15/2016	0.56	0	-1	17.5	0.2	250EBIO	0.061	
10:10:00		14:45:00								
3/29/2016	33.26	3/29/2016	33.91	0	-1	-177.5	0.2	250EEM	0.061	
10:20:00		15:40:00								
4/1/2016	33.96	4/1/2016	34	0	-1	-25	0.2	250EEM	0.037	
12:00:00		12:50:00								
4/1/2016	34	4/1/2016	34.11	0	1	12.45	0.2	249EEM	0.034	
12:50:00		14:25:00								
4/13/2016	34.83	4/13/2016	34.92	0	-1	-37.5	0.2	250EEM	0.111	
10:10:00		10:55:00								
4/13/2016	34.92	4/13/2016	34.85	0	1	-32.37	0.2	249EEM	0.049	
10:55:00		11:05:00								
4/13/2016	34.85	4/13/2016	34.93	0	-1	-34.86	0.2	249EEM	0.057	
11:05:00		11:40:00								
4/13/2016	34.93	4/13/2016	34.89	0	1	-24.9	0.2	249EEM	0.061	
11:40:00		15:40:00								
4/29/2016	0.94	4/29/2016	0.89	0	-1	-2.5	0.2	250EGLE	0.087	
10:10:00		10:30:00								
4/29/2016	0.78	4/29/2016	0.85	0	1	2.49	0.2	249EGLE	0.033	
12:00:00		13:00:00								
4/15/2016	9.02	4/15/2016	8.98	0	-1	-5	0.2	250ETE	0.092	
10:10:00		10:20:00								
4/15/2016	8.98	4/15/2016	9.18	0	1	35	0.2	250ETE	0.097	
10:20:00		12:00:00								
4/15/2016	9.17	4/15/2016	9.12	0	-1	-2.5	0.2	250ETE	0.051	
12:00:00		14:25:00								
4/15/2016	9.17	4/15/2016	9.01	0	1	-55	0.2	250ETE	0.05	
14:30:00		15:40:00								
4/22/2016	20.28	4/22/2016	20.21	0	-1	2.5	0.2	250EWH	0.03	
10:15:00		11:30:00								
4/22/2016	20.21	4/22/2016	20.17	0	1	-25	0.2	250EWH	0.02	
11:55:00		12:30:00								
4/22/2016	20.17	4/22/2016	20.18	0	-1	-17.43	0.2	249EWH	0.014	
12:30:00		12:40:00								

4/22/2016 13:10:00	20.2	4/22/2016 15:40:00	20.17	0	1	-22.41	0.2	249EWH	0.013
4/1/2016 10:10:00	26.03	4/1/2016 10:20:00	26.18	0	-1	-52.5	0.2	250EWZ	0.153
4/1/2016 10:20:00	26.18	4/1/2016 10:30:00	26.28	0	1	9.96	0.2	249EWZ	0.161
4/1/2016 12:05:00	26.89	4/1/2016 12:05:00	26.93	0	-1	-24.9	0.2	249EWZ	0.087
4/1/2016 12:05:00	26.93	4/1/2016 15:40:00	26.88	0	1	-27.39	0.2	249EWZ	0.087
4/13/2016 10:10:00	28.59	4/13/2016 11:05:00	28.54	0	-1	-2.5	0.2	250EWZ	0.15
4/13/2016 11:05:00	28.54	4/13/2016 13:35:00	28.77	0	-1	-72.5	0.2	250EWZ	0.102
4/13/2016 13:35:00	28.77	4/13/2016 13:55:00	28.76	0	1	-17.43	0.2	249EWZ	0.075
4/13/2016 13:55:00	28.76	4/13/2016 15:40:00	28.84	0	-1	-34.86	0.2	249EWZ	0.066
4/26/2016 10:10:00	4.93	4/26/2016 10:35:00	4.88	0	-1	-2.5	0.2	250EXEL	0.113
4/26/2016 13:35:00	4.79	4/26/2016 15:40:00	4.77	0	1	-19.92	0.2	249EXEL	0.038
4/4/2016 10:10:00	113.21	4/4/2016 10:20:00	113.12	0	-1	7.5	0.2	250FB	0.501
4/4/2016 13:15:00	112.86	4/4/2016 15:40:00	112.43	0	1	-122.5	0.2	250FB	0.252
4/6/2016 10:10:00	113.22	4/6/2016 10:30:00	113	0	-1	40	0.2	250FB	0.399
4/6/2016 12:35:00	113.5	4/6/2016 12:45:00	113.55	0	1	-2.5	0.2	250FB	0.115
4/6/2016 13:05:00	113.5	4/6/2016 14:20:00	113.38	0	-1	15	0.2	250FB	0.14
4/6/2016 15:05:00	113.51	4/6/2016 15:10:00	113.6	0	1	7.5	0.2	250FB	0.176
3/31/2016 10:10:00	10.38	3/31/2016 10:15:00	10.33	0	-1	-2.5	0.2	250FCX	0.094
4/6/2016 10:10:00	9.25	4/6/2016 10:30:00	9.18	0	-1	2.5	0.2	250FCX	0.095
4/6/2016 11:00:00	9.34	4/6/2016 11:15:00	9.39	0	1	-2.5	0.2	250FCX	0.08
4/6/2016 11:30:00	9.47	4/6/2016 12:05:00	9.57	0	1	10	0.2	250FCX	0.061
4/6/2016 12:20:00	9.55	4/6/2016 14:20:00	9.5	0	-1	-2.5	0.2	250FCX	0.061
4/13/2016 11:25:00	11.12	4/13/2016 12:30:00	11.04	0	-1	5	0.2	250FCX	0.094
4/20/2016 10:10:00	12.1	4/20/2016 10:25:00	11.99	0	-1	12.5	0.2	250FCX	0.107
4/20/2016 10:50:00	12.23	4/20/2016 11:05:00	12.3	0	1	2.5	0.2	250FCX	0.121
4/20/2016 12:25:00	12.44	4/20/2016 12:25:00	12.45	0	-1	-17.5	0.2	250FCX	0.064
4/20/2016	12.45	4/20/2016	12.55	0	1	10	0.2	250FCX	0.064



4/20/2016 10:25:00	23.24	4/20/2016 10:35:00	23.35	0	-1	-42.5	0.2	250GDX	0.151
4/20/2016 10:35:00	23.35	4/20/2016 10:50:00	23.4	0	1	-2.49	0.2	249GDX	0.142
4/20/2016 11:00:00	23.45	4/20/2016 15:40:00	22.89	0	-1	124.5	0.2	249GDX	0.107
4/25/2016 10:10:00	22.77	4/25/2016 10:25:00	22.86	0	-1	-37.5	0.2	250GDX	0.101
4/25/2016 10:25:00	22.86	4/25/2016 12:00:00	22.54	0	1	-94.62	0.2	249GDX	0.127
4/25/2016 12:00:00	22.54	4/25/2016 12:10:00	22.52	0	-1	-9.96	0.2	249GDX	0.062
4/25/2016 12:10:00	22.54	4/25/2016 13:30:00	22.61	0	1	2.49	0.2	249GDX	0.066
4/29/2016 10:10:00	25.08	4/29/2016 10:10:00	25.17	0	-1	-37.5	0.2	250GDX	0.211
4/29/2016 10:10:00	25.17	4/29/2016 10:45:00	25.23	0	1	0	0.2	250GDX	0.211
4/29/2016 12:20:00	25.25	4/29/2016 12:40:00	25.48	0	-1	-72.21	0.2	249GDX	0.091
4/29/2016 12:40:00	25.48	4/29/2016 14:25:00	25.55	0	1	2.49	0.2	249GDX	0.091
4/15/2016 10:10:00	98.31	4/15/2016 10:30:00	97.92	0	-1	82.5	0.2	250GILD	0.329
4/15/2016 10:40:00	98.23	4/15/2016 15:40:00	98.29	0	1	0	0.2	250GILD	0.278
4/1/2016 10:25:00	31.5	4/1/2016 10:35:00	31.59	0	-1	-37.5	0.2	250GLPI	0.188
4/1/2016 10:35:00	31.59	4/1/2016 12:20:00	31.58	0	1	-17.43	0.2	249GLPI	0.127
4/1/2016 12:30:00	31.55	4/1/2016 15:40:00	31.5	0	-1	-2.49	0.2	249GLPI	0.066
3/31/2016 10:10:00	60.99	3/31/2016 11:05:00	60.92	0	-1	2.5	0.2	250HLF	0.226
3/31/2016 11:15:00	60.84	3/31/2016 14:50:00	61.53	0	-1	-187.5	0.2	250HLF	0.18
3/31/2016 14:50:00	61.53	3/31/2016 15:00:00	61.66	0	1	17.43	0.2	249HLF	0.127
4/12/2016 10:10:00	24.51	4/12/2016 15:40:00	24.96	0	-1	-127.5	0.2	250HQY	0.231
4/6/2016 10:10:00	28.88	4/6/2016 10:25:00	28.83	0	-1	-2.5	0.2	250HTA	0.114
4/6/2016 10:30:00	28.85	4/6/2016 11:10:00	28.94	0	1	7.47	0.2	249HTA	0.053
4/6/2016 11:10:00	28.94	4/6/2016 11:55:00	28.94	0	-1	-15	0.2	250HTA	0.041
4/6/2016 11:55:00	28.94	4/6/2016 15:40:00	28.91	0	1	-22.41	0.2	249HTA	0.037
4/1/2016 11:05:00	7.07	4/1/2016 13:20:00	7.11	0	-1	-25	0.2	250IBN	0.023
4/1/2016 13:20:00	7.11	4/1/2016 13:50:00	7.11	0	1	-14.94	0.2	249IBN	0.013
4/1/2016	7.11	4/1/2016	7.15	0	-1	-24.9	0.2	249IBN	0.014



13:50:00		15:40:00								
4/1/2016	32.25	4/1/2016	32.38	0	-1	-47.5	0.2	250INTC	0.087	
10:10:00		10:15:00								
4/1/2016	32.38	4/1/2016	32.35	0	1	-22.41	0.2	249INTC	0.095	
10:15:00		10:40:00								
4/1/2016	32.35	4/1/2016	32.18	0	-1	27.39	0.2	249INTC	0.079	
10:40:00		12:40:00								
4/1/2016	32.18	4/1/2016	32.31	0	1	17.43	0.2	249INTC	0.046	
12:40:00		14:15:00								
4/13/2016	9.58	4/13/2016	9.53	0	-1	-2.5	0.2	250ITUB	0.048	
10:10:00		11:10:00								
4/13/2016	9.54	4/13/2016	9.59	0	1	-2.49	0.2	249ITUB	0.04	
11:45:00		14:05:00								
3/29/2016	204.14	3/29/2016	204.24	0	1	10	0.2	250IVV	0.127	
11:35:00		12:00:00								
3/29/2016	204.12	3/29/2016	206.09	0	-1	-507.5	0.2	250IVV	0.118	
12:05:00		15:40:00								
4/15/2016	62.13	4/15/2016	62.06	0	-1	2.5	0.2	250JPM	0.192	
10:10:00		10:25:00								
4/15/2016	62.12	4/15/2016	62.01	0	1	-42.5	0.2	250JPM	0.139	
10:55:00		11:00:00								
4/15/2016	62.01	4/15/2016	61.85	0	-1	24.9	0.2	249JPM	0.12	
11:00:00		13:10:00								
3/29/2016	5.21	3/29/2016	5.3	0	-1	-37.5	0.2	250KERX	0.259	
10:10:00		10:40:00								
3/29/2016	5.3	3/29/2016	5.35	0	1	-2.49	0.2	249KERX	0.127	
10:40:00		10:45:00								
3/29/2016	5.26	3/29/2016	5.21	0	-1	-2.49	0.2	249KERX	0.11	
10:50:00		11:20:00								
3/31/2016	46.78	3/31/2016	46.73	0	-1	-2.5	0.2	250KO	0.094	
10:10:00		11:10:00								
3/31/2016	46.54	3/31/2016	46.53	0	-1	-12.45	0.2	249KO	0.042	
13:15:00		13:35:00								
4/13/2016	0.44	4/13/2016	0.48	0	-1	-25	0.2	250LNCO	0.024	
10:10:00		10:25:00								
4/13/2016	0.48	4/13/2016	0.44	0	1	-24.9	0.2	249LNCO	0.027	
10:25:00		15:40:00								
4/20/2016	38.19	4/20/2016	38.08	0	-1	12.5	0.2	250LXK	0.416	
10:10:00		10:45:00								
4/20/2016	37.97	4/20/2016	37.9	0	-1	2.5	0.2	250LXK	0.044	
13:15:00		13:45:00								
4/28/2016	56.01	4/28/2016	55.81	0	-1	35	0.2	250MDVN	0.789	
10:10:00		10:20:00								
4/28/2016	55.9	4/28/2016	56.1	0	1	35	0.2	250MDVN	0.36	
10:45:00		10:50:00								
4/13/2016	1.88	4/13/2016	1.82	0	-1	0	0.2	250MNKD	0.0675	
10:10:00		10:55:00								
4/13/2016	1.82	4/13/2016	1.82	0	1	-15	0.2	250MNKD	0.0331	
10:55:00		10:55:00								
4/13/2016	1.82	4/13/2016	1.715	0	-1	11.25	0.2	250MNKD	0.0331	
10:55:00		11:35:00								
4/6/2016	10.88	4/6/2016	10.77	0	-1	12.5	0.2	250MRO	0.12	
10:10:00		10:35:00								

4/6/2016 11:00:00	10.95	4/6/2016 11:05:00	11	0	1	-2.5	0.2	250MRO	0.098
4/6/2016 14:10:00	10.95	4/6/2016 14:55:00	10.9	0	-1	-2.5	0.2	250MRO	0.048
4/6/2016 15:05:00	10.95	4/6/2016 15:40:00	10.98	0	1	-7.5	0.2	250MRO	0.058
4/13/2016 10:10:00	12.71	4/13/2016 11:00:00	12.99	0	-1	-85	0.2	250MRO	0.139
4/13/2016 11:00:00	12.99	4/13/2016 11:20:00	13.13	0	1	19.92	0.2	249MRO	0.114
4/13/2016 11:40:00	12.98	4/13/2016 12:25:00	12.93	0	-1	-2.49	0.2	249MRO	0.121
4/1/2016 10:10:00	54.96	4/1/2016 10:35:00	54.89	0	-1	2.5	0.2	250MSFT	0.218
4/1/2016 11:05:00	55.35	4/1/2016 11:15:00	55.2	0	1	-52.5	0.2	250MSFT	0.123
4/1/2016 11:15:00	55.2	4/1/2016 11:35:00	55.15	0	-1	-2.49	0.2	249MSFT	0.118
4/1/2016 13:40:00	55.26	4/1/2016 13:50:00	55.32	0	1	0	0.2	249MSFT	0.076
4/6/2016 10:10:00	54.44	4/6/2016 10:30:00	54.35	0	-1	7.5	0.2	250MSFT	0.159
4/6/2016 10:45:00	54.44	4/6/2016 12:00:00	54.77	0	1	67.5	0.2	250MSFT	0.118
4/6/2016 12:00:00	54.77	4/6/2016 13:15:00	54.87	0	-1	-40	0.2	250MSFT	0.065
4/6/2016 13:15:00	54.87	4/6/2016 13:45:00	54.92	0	1	-2.5	0.2	250MSFT	0.059
3/31/2016 10:10:00	4.56	3/31/2016 12:40:00	4.61	0	-1	-27.5	0.2	250MT	0.032
3/31/2016 12:40:00	4.61	3/31/2016 13:45:00	4.63	0	1	-9.96	0.2	249MT	0.018
3/31/2016 14:10:00	4.59	3/31/2016 15:10:00	4.6	0	-1	-17.43	0.2	249MT	0.014
3/31/2016 15:10:00	4.6	3/31/2016 15:40:00	4.61	0	1	-12.45	0.2	249MT	0.017
4/6/2016 10:10:00	4.49	4/6/2016 11:10:00	4.55	0	-1	-30	0.2	250MT	0.034
4/6/2016 11:10:00	4.55	4/6/2016 11:25:00	4.57	0	1	-9.96	0.2	249MT	0.035
4/13/2016 10:10:00	5.61	4/13/2016 10:35:00	5.59	0	-1	-10	0.2	250MT	0.078
4/13/2016 10:35:00	5.59	4/13/2016 11:35:00	5.57	0	1	-19.92	0.2	249MT	0.053
4/13/2016 11:35:00	5.57	4/13/2016 12:00:00	5.59	0	-1	-19.92	0.2	249MT	0.043
4/13/2016 12:00:00	5.59	4/13/2016 15:40:00	5.57	0	1	-19.92	0.2	249MT	0.033
4/15/2016 10:05:00	5.56	4/15/2016 10:25:00	5.55	0	-1	-12.5	0.2	250MT	0.047
4/15/2016 10:25:00	5.55	4/15/2016 11:50:00	5.6	0	1	-2.49	0.2	249MT	0.057
4/15/2016	5.59	4/15/2016	5.61	0	-1	-19.92	0.2	249MT	0.031



4/29/2016 10:10:00	10.11	4/29/2016 10:15:00	10.01	0	-1	10	0.2	250P	0.291
4/29/2016 10:25:00	10.15	4/29/2016 10:50:00	10.2	0	1	-2.5	0.2	250P	0.33
4/29/2016 10:55:00	10.07	4/29/2016 11:00:00	10	0	-1	2.5	0.2	250P	0.19
4/29/2016 13:00:00	9.9	4/29/2016 13:25:00	9.97	0	1	2.5	0.2	250P	0.074
4/13/2016 10:10:00	16.26	4/13/2016 10:50:00	16.13	0	-1	17.5	0.2	250RICE	0.106
4/13/2016 15:05:00	16.08	4/13/2016 15:25:00	16	0	1	-35	0.2	250RICE	0.058
4/13/2016 15:25:00	16	4/13/2016 15:35:00	15.95	0	-1	-2.49	0.2	249RICE	0.049
4/15/2016 10:05:00	2.39	4/15/2016 11:15:00	2.32	0	-1	2.5	0.2	250RPRX	0.132
4/15/2016 11:35:00	2.23	4/15/2016 11:45:00	2.23	0	-1	-15	0.2	250RPRX	0.038
4/15/2016 11:45:00	2.23	4/15/2016 12:15:00	2.23	0	1	-14.94	0.2	249RPRX	0.043
4/15/2016 12:15:00	2.23	4/15/2016 13:35:00	2.22	0	-1	-12.45	0.2	249RPRX	0.038
4/13/2016 10:10:00	3.84	4/13/2016 10:25:00	3.95	0	-1	-42.5	0.2	250SDRL	0.096
4/13/2016 10:25:00	3.95	4/13/2016 11:00:00	4.04	0	1	7.47	0.2	249SDRL	0.095
4/13/2016 11:30:00	3.93	4/13/2016 12:00:00	4.1	0	-1	-57.27	0.2	249SDRL	0.075
4/13/2016 12:00:00	4.1	4/13/2016 12:45:00	4.16	0	1	0	0.2	249SDRL	0.063
4/20/2016 10:10:00	4.21	4/20/2016 10:40:00	4.26	0	-1	-27.5	0.2	250SDRL	0.075
4/20/2016 10:40:00	4.26	4/20/2016 10:45:00	4.2	0	1	-29.88	0.2	249SDRL	0.062
4/20/2016 10:45:00	4.2	4/20/2016 11:30:00	4.37	0	-1	-57.27	0.2	249SDRL	0.073
4/20/2016 11:30:00	4.37	4/20/2016 15:40:00	4.2	0	1	-57.27	0.2	249SDRL	0.072
4/29/2016 10:10:00	4.86	4/29/2016 10:35:00	4.79	0	-1	2.5	0.2	250SDRL	0.184
4/15/2016 10:05:00	3.07	4/15/2016 11:10:00	3.02	0	-1	-2.5	0.2	250SGYP	0.025
4/15/2016 11:20:00	3.04	4/15/2016 14:25:00	3.09	0	1	-2.49	0.2	249SGYP	0.022
4/15/2016 15:20:00	3.4	4/15/2016 15:25:00	3.45	0	1	-2.49	0.2	249SGYP	0.042
4/6/2016 10:10:00	179.58	4/6/2016 10:10:00	179.76	0	-1	-60	0.2	250SHPG	1.336
4/6/2016 10:10:00	179.76	4/6/2016 10:20:00	179.81	0	1	-2.5	0.2	250SHPG	1.336
4/6/2016 11:05:00	179.76	4/6/2016 11:40:00	180.34	0	1	129.48	0.2	249SHPG	0.663
4/6/2016	187.08	4/6/2016	186.53	0	-1	122.5	0.2	250SHPG	1.475



4/4/2016 10:10:00	245.04	4/4/2016 10:40:00	247.42	0	-1	-610	0.2	250TSLA	2.674
4/4/2016 10:40:00	247.42	4/4/2016 12:00:00	247.77	0	1	71.92	0.2	248TSLA	1.364
4/4/2016 12:25:00	249.77	4/4/2016 12:30:00	249.88	0	1	12.4	0.2	248TSLA	0.86
4/4/2016 12:45:00	249.77	4/4/2016 12:50:00	249.83	0	1	0	0.2	248TSLA	1.071
4/5/2016 11:10:00	245.05	4/5/2016 12:45:00	248.79	0	-1	-950	0.2	250TSLA	1.221
4/5/2016 12:45:00	248.79	4/5/2016 12:50:00	249	0	1	37.05	0.2	247TSLA	0.749
4/5/2016 11:10:00	245.05	4/5/2016 12:45:00	248.79	0	-1	-950	0.2	250TSLA	1.221
4/5/2016 12:45:00	248.79	4/5/2016 12:50:00	249	0	1	37.05	0.2	247TSLA	0.749
4/5/2016 11:10:00	245.05	4/5/2016 12:45:00	248.79	0	-1	-950	0.2	250TSLA	1.221
4/5/2016 12:45:00	248.79	4/5/2016 12:50:00	249	0	1	37.05	0.2	247TSLA	0.749
4/28/2016 10:10:00	26.01	4/28/2016 12:40:00	25.98	0	-1	-7.5	0.2	250TXTR	0.66
4/28/2016 12:40:00	25.98	4/28/2016 15:40:00	25.98	0	1	-14.94	0.2	249TXTR	0.011
4/6/2016 10:10:00	6.48	4/6/2016 10:15:00	6.51	0	-1	-22.5	0.2	250UNG	0.034
4/6/2016 10:15:00	6.51	4/6/2016 13:25:00	6.45	0	1	-29.88	0.2	249UNG	0.036
4/6/2016 13:25:00	6.45	4/6/2016 14:55:00	6.45	0	-1	-14.94	0.2	249UNG	0.02
4/20/2016 10:05:00	7.03	4/20/2016 10:25:00	7.01	0	-1	-10	0.2	250UNG	0.028
4/20/2016 10:40:00	7.03	4/20/2016 12:10:00	7.18	0	1	22.41	0.2	249UNG	0.038
4/20/2016 13:00:00	7.12	4/20/2016 13:45:00	7.12	0	-1	-15	0.2	250UNG	0.025
4/20/2016 13:45:00	7.12	4/20/2016 15:40:00	7.04	0	1	-35	0.2	250UNG	0.034
4/26/2016 10:15:00	6.97	4/26/2016 10:55:00	6.95	0	-1	-10	0.2	250UNG	0.034
4/26/2016 10:55:00	6.95	4/26/2016 11:15:00	6.95	0	1	-14.94	0.2	249UNG	0.018
4/26/2016 11:15:00	6.95	4/26/2016 11:25:00	6.95	0	-1	-14.94	0.2	249UNG	0.013
4/26/2016 11:25:00	6.95	4/26/2016 15:40:00	6.98	0	1	-7.47	0.2	249UNG	0.012
3/29/2016 10:10:00	9.71	3/29/2016 12:30:00	9.76	0	-1	-27.5	0.2	250USO	0.059
3/29/2016 12:30:00	9.76	3/29/2016 13:05:00	9.75	0	1	-17.43	0.2	249USO	0.028
3/29/2016 13:05:00	9.75	3/29/2016 14:05:00	9.76	0	-1	-17.43	0.2	249USO	0.038
3/29/2016	9.76	3/29/2016	9.77	0	1	-12.45	0.2	249USO	0.03



4/28/2016 10:10:00	5.8	4/28/2016 10:20:00	5.75	0	-1	-2.5	0.2	250VALE	0.082
4/28/2016 10:40:00	5.79	4/28/2016 11:50:00	5.9	0	1	12.45	0.2	249VALE	0.046
4/28/2016 11:50:00	5.9	4/28/2016 12:50:00	5.83	0	-1	2.5	0.2	250VALE	0.039
4/28/2016 15:10:00	5.7	4/28/2016 15:40:00	5.55	0	-1	22.5	0.2	250VALE	0.026
4/4/2016 10:10:00	54.51	4/4/2016 10:10:00	54.55	0	-1	-25	0.2	250VA	1.78
4/4/2016 10:10:00	54.55	4/4/2016 10:45:00	54.65	0	1	10	0.2	250VA	1.78
4/4/2016 13:55:00	55.21	4/4/2016 14:10:00	55.12	0	-1	7.47	0.2	249VA	0.059
4/15/2016 10:10:00	32.51	4/15/2016 10:15:00	32.36	0	-1	22.5	0.2	250VRX	0.347
4/15/2016 10:25:00	32.41	4/15/2016 10:35:00	32.23	0	1	-60	0.2	250VRX	0.34
4/15/2016 10:35:00	32.23	4/15/2016 10:45:00	32.18	0	-1	-2.49	0.2	249VRX	0.259
4/15/2016 10:55:00	32.24	4/15/2016 13:15:00	32.53	0	1	57.27	0.2	249VRX	0.199
4/25/2016 10:10:00	37.3	4/25/2016 10:30:00	36.96	0	-1	70	0.2	250VRX	0.442
4/25/2016 10:30:00	36.96	4/25/2016 10:40:00	37.15	0	1	32.5	0.2	250VRX	0.394
4/25/2016 11:30:00	36.9	4/25/2016 11:45:00	36.64	0	-1	50	0.2	250VRX	0.24
4/25/2016 12:10:00	36.72	4/25/2016 15:40:00	35.51	0	1	-317.5	0.2	250VRX	0.226
4/29/2016 10:10:00	35.52	4/29/2016 10:15:00	35.35	0	-1	27.5	0.2	250VRX	0.492
4/29/2016 13:30:00	33.28	4/29/2016 14:15:00	32.38	0	1	-240	0.2	250VRX	0.281
4/29/2016 14:15:00	32.38	4/29/2016 15:40:00	33.37	0	-1	-261.45	0.2	249VRX	0.223
4/13/2016 10:10:00	35.36	4/13/2016 11:00:00	35.47	0	-1	-42.5	0.2	250VWO	0.105
4/13/2016 11:00:00	35.47	4/13/2016 11:05:00	35.39	0	1	-34.86	0.2	249VWO	0.05
4/13/2016 11:05:00	35.39	4/13/2016 11:40:00	35.47	0	-1	-34.86	0.2	249VWO	0.054
4/13/2016 11:40:00	35.47	4/13/2016 15:40:00	35.46	0	1	-17.43	0.2	249VWO	0.053
4/6/2016 10:10:00	8.13	4/6/2016 10:55:00	8.18	0	1	-2.5	0.2	250WLL	0.115
4/6/2016 12:25:00	8.48	4/6/2016 15:40:00	8.63	0	-1	-52.29	0.2	249WLL	0.088
4/13/2016 10:10:00	10.37	4/13/2016 10:20:00	10.56	0	-1	-62.5	0.2	250WLL	0.205
4/13/2016 10:20:00	10.56	4/13/2016 10:25:00	10.63	0	1	2.49	0.2	249WLL	0.213
4/13/2016	10.43	4/13/2016	10.55	0	-1	-44.82	0.2	249WLL	0.144



10:40:00		10:50:00								
4/13/2016	10.55	4/13/2016	10.75	0	1	34.86	0.2	249WLL	0.14	
10:50:00		11:00:00								
3/29/2016	22.27	3/29/2016	22.31	0	-1	-25	0.2	250XLF	0.054	
10:10:00		12:35:00								
3/29/2016	22.31	3/29/2016	22.36	0	1	-2.49	0.2	249XLF	0.028	
12:35:00		15:00:00								
4/7/2016	36.25	4/7/2016	36.18	0	1	-32.5	0.2	250YHOO	0.199	
10:10:00		10:20:00								
4/7/2016	36.18	4/7/2016	36.07	0	-1	12.45	0.2	249YHOO	0.225	
10:20:00		10:50:00								
4/7/2016	35.84	4/7/2016	35.78	0	-1	0	0.2	249YHOO	0.067	
14:20:00		14:30:00								
4/7/2016	35.83	4/7/2016	35.9	0	1	2.49	0.2	249YHOO	0.072	
14:35:00		14:45:00								
4/15/2016	36.93	4/15/2016	36.82	0	-1	12.5	0.2	250YHOO	0.113	
10:10:00		10:20:00								
4/15/2016	36.68	4/15/2016	36.71	0	1	-7.5	0.2	250YHOO	0.077	
11:05:00		11:20:00								
4/15/2016	36.71	4/15/2016	36.66	0	-1	-2.5	0.2	250YHOO	0.079	
11:20:00		11:40:00								
4/15/2016	36.68	4/15/2016	36.55	0	1	-47.5	0.2	250YHOO	0.067	
11:45:00		15:40:00								