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Stock Market Investing Using Autonomous Agents

An Interactive Qualifying Project Report

submitted to the Faculty of

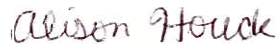WORCESTER POLYTECHNIC INSTITUTE

in partial fulfillment of the requirements for the

Degree of Bachelor of Science

by

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Abstract

This Interactive Qualifying Project examines the process of analyzing, selecting, and investing successfully in the stock market. Specifically, it focuses on the current and future impact of autonomous trading agents and their impact on investing and investment strategies. A seven week simulation was used to test the effectiveness and utility of an autonomous trading agent. This project compares the investment success of the agent, human counterparts, and the stock market as a whole.

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Chapter 1

Project Introduction

1.1 Project Overview

This Interactive Qualifying Project examines the process of analyzing, selecting, and investing successfully in the stock market. Specifically, it focuses on the current and future impact of autonomous trading agents and their impact on investing and investment strategies. Autonomous agents have several advantages over their human counterparts. Primarily, software can run continuously and can process large amounts of data in a short amount of time. A seven week simulation was performed to study the effectiveness of an agent's stock investments versus our own stock investments and the stock market as a whole.

1.2 Project Objectives

The primary objective and goal of this project is to examine the ability for computer programs, known as agents, to invest autonomously in the stock market. We will program our own agent and test its effectiveness in picking and tracking investments in various stocks. Also, we will examine the current and future impact that such agents would have on society and the economy.

Another objective of this project is to learn the fundamentals of investing. Specifically, our project focuses on the stock market, but other important investments, such as mutual funds and bonds, are also explored.

Chapter 2

Introduction to the Stock Market and Investing

2.1 Common Types of Investments

In today's global economy there is an endless array of different investment types, ranging from a simple savings account to call or put options, for individuals to choose from. Some of the most fundamental and common investment include common stock, bonds, annuities, and mutual funds.

Common stock is what is normally called shares or securities. It signifies a small part of ownership of a company and voting rights to elect board members who make management decisions. Some companies also give out dividends for their stock. Stocks have historically yielded more profit than most other types of investments; however, stock investments are usually the most risky. There has typically been about a twelve percent return for long-term stock investments. Common stock is easy to buy and sell, and the Internet provides an easy means to find data and information about a company.[1]

A corporate bond is like a mortgage, where they are issued by a lender to a borrower. A bond is like loaning your money to a company for a certain amount of time called the maturity, usually for 1,000 dollars. When the bond matures, the lender will be repaid. The borrower also pays a premium, or coupon, at a set interest rate when they accept the money, which are made every six months until maturity. Corporate bonds have a higher return rate than government bonds, with only a little more risk. The chance of losing money is low if you research the companies well and invest in ones that are well

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[1] "Common Stock," *Investopedia*, http://www.investopedia.com/university/20_investments/5.asp, May 24, 2004.

established. However, the interest payments are taxed and are not protected against inflation.[2]

An annuity is an annual payment of a fixed amount that is paid at regular intervals for a specific amount of time, usually purchased through an insurance company, bank, or broker. There are many different kinds of annuities. A deferred annuity means the payments do not begin until a later time, which means the taxes on it are also deferred. The interest, dividends, and capital gains appreciate tax free until you start receiving payments. An immediate annuity means the payments start right away. If the annuity is life-long, then the insurance company will continue to pay. In essence, the insurance company is depending on you dying before the full value of the annuity is paid. A fixed annuity is when the insurance company pays a fixed amount to the holder until they die, which gives the annuitant a stable fixed investment income. A variable annuity is when the insurance company guarantees a minimum payment after the accumulation stage. The remaining payments varying depending on the performance of the investment portfolio, which is based on stocks, bonds, money market funds, and others. The annuity is a low-risk investment with a good return rate. The deferred annuity allows the benefits of the payments while worrying about the taxes later. Annuities are considered to be very safe, however if you die early then you will not receive the full value of your investment.[3]

A mutual fund is another simple way of investing. When you invest in a mutual fund, you are giving money to a management company who will then invest the money for you into different markets and industries using different stocks and bonds. Mutual funds have a large amount of capital to invest and can therefore diversify their portfolios

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[2] "Corporate Bond," *Investopedia*, http://www.investopedia.com/university/20_investments/7.asp, May 24, 2004.
[3] "Annuity," *Investopedia*, http://www.investopedia.com/university/20_investments/2.asp, May 24, 2004.

much more than an individual investor. Mutual funds are a long term investment and can be aggressive or low risk, depending on your preference of risk and return. Money is made from the dividends on stocks and interest from bonds. If a fund sells securities that have increased in price, the capital gain is passed on to the investor. If it is not sold, then the investor can sell the shares themselves for profit. The mutual fund can be bought through a mutual fund company, bank, broker, or financial planner, with some commission. A load mutual fund charges for the shares bought plus a sales charge, and a no load mutual fund does not charge for sales or commission. The advantage is that the mutual fund is diversified and a professional is handling the money, which should yield average return. However, most mutual fund companies do not beat the market averages, commission can be high, and management fees must be paid whether or not you make money.[4]

A growth fund is a mutual fund that invests in growth stocks, with high capital appreciation. It invests in common stock of companies that are consistently increasing in value. This type of fund is more conservative than income funds. The fund is usually held for a long period of time because it is hoped that the stock will appreciate in price per share and dividends in the future. An income mutual fund invests in stocks that give the investor income. This investment is typically in different types of bonds or utility stocks that have a consistent history of highly paid dividends. However the investor is taxed for the income, unless the income fund is in a tax-deferred account such as a 403b or an IRA. A growth/income fund is a mutual fund that uses appreciation and current income, and combines a steady income with long-term financial gains. The fund is based on investing

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[4] "Mutual Funds," *Investopedia,* http://www.investopedia.com/university/20_investments/13.asp, May 24, 2004.

in dividend-paying and growth stocks for capital appreciation, and bonds for current income. If an investor finds the growth fund too risky, this is a good option.[5]

There are a countless number of other investment types. A lesser known, and more advanced type of investment is a Real Estate Investment Trust (REIT). A REIT is like a stock that is traded on exchanges, and is invested in real estate through property or mortgages. There are more than 300 REITs in the United States, and they have an average yield of 9% to 12% with an increase in trading volume. It is possible to invest in residential or commercial, in different areas, and the REIT's value is only determined by the value of the real estate's assets. This makes REITs less unstable. The dividends are higher than most common stock, and the REIT follows the real estate market rather than the stock market.[6]

Another advanced type of investment is the stock option. A stock option is a privilege that is sold by someone to another which gives the buyer the right to buy (call) or sell (put) a stock at a price that is agreed upon during a certain period of time or date. With a call option the buyer hopes the stock will increase, so they can buy and sell quickly to make money. With a put option the buyer hopes the stock price will fall, so they can sell it at a higher price than its current value and make money. The stock option has a high risk, and the value can change as much as 40% in one trading day. It is highly complex and leveraged, and requires more than just an understanding of the stock market.[7]

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[5] "Mutual Funds," *Investopedia*, http://www.investopedia.com/university/20_investments/13.asp, May 24, 2004.
[6] "Real Estate Investment Trust - REIT," *Investopedia*, http://www.investopedia.com/university/20_investments/17.asp, May 24, 2004.
[7] "Options(Stocks)," *Investopedia*, http://www.investopedia.com/university/20_investments/14.asp, May 24, 2004.

All of these investment types are significant and can be an important part in a balanced and diversified portfolio. By diversifying an individual investor can reduce risk and increase return. The focus of this project is on the most common type of investment, stock.

2.2 What is a Stock?

One of the most common investment entities is stock, which is a piece of ownership of a company and signifies a claim on the assets and earnings of the company. Owning a company's stock makes you part owner of that company and entitles you to what the company owns. Since there are typically many millions of shares outstanding, an individual shareholder's say in a company's daily practices is usually non-existent. However, shareholders usually get to vote annually to elect members of the board of directors. A final important feature of a stock is the concept of limited liability, which states that as an individual shareholder you are not personally responsible for the company's debts.[8]

There are two primary forms of stocks: common and preferred. Common stock is the most familiar form, and allows the investor to get one vote per share in the election of board members who make major company decisions. The average long-term return on common stock has historically been around ten to twelve percent, depending on economic conditions. Also, common stocks usually yield higher returns than most other investment types, but involve the most risk. If a company decided to file for bankruptcy

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[8] "Stock Basics: What are Stocks?," *Investopedia*, http://www.investopedia.com/university/stocks/stocks1.asp, May 25, 2004.

and liquidates itself, then common shareholders do not receive any money until after the creditors, bondholders, and preferred shareholders are paid.[9]

The other main form of stock is preferred. Like common, preferred stock gives investors a small claim on company assets, but preferred shareholders typically do not have the same voting rights. A preferred stock shareholder generally receives a fixed dividend forever, whereas common stock owners receive varying dividends or none at all. Also, in case of bankruptcy, the preferred shareholders get their money before the common shareholders which makes preferred stock a little less risky. The company could also buy the shares from the investor at anytime for any reason.[10]

Although common and preferred stock are the two primary forms of stock, companies can categorize their stock in different classes. This is sometimes done to control which shareholders retain voting power. For example, shareholders of one class of stock may be given five votes per share while another class's shareholders may only be allowed one vote.[11]

2.3 How Stocks are Traded

Most stocks are traded on exchanges, which are places where buyers and sellers convene and decide prices. An exchange can be an actual location where the transactions are made on a trading floor, called a 'listed' exchange, or it can be virtual where a network of computers make the trades electronically, called 'over the counter' (OTC).[12]

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[9] "Stock Basics: Different Types of Stocks," *Investopedia,*
http://www.investopedia.com/university/stocks/stocks2.asp, May 25, 2004.
[10] Ibid.
[11] Ibid.
[12] "Stock Basics: How Stocks Trade," *Investopedia,*
http://www.investopedia.com/university/stocks/stocks3.asp, May 25, 2004.

The New York Stock Exchange (NYSE), founded in 1792, is the most prominent

exchange in the world. It is the market where the largest companies in America are

traded, such as General Electric, McDonald's, Coca Cola, and Walmart. In the NYSE, the

trading is done on a trading floor. Brokerage firms that are members of the exchange send

orders to their floor brokers. These floor brokers go to a specific spot, called the trading

post, on the floor where the stock is traded. A specific person, known as the specialist,

then matches buyers and sellers; specialists oversee and facilitate all of the trades for a

particular stock. The stock prices are determined like an auction. The highest amount any

buyer is willing to pay is the current price, and the lowest price at which someone is

willing to sell. After a trade has been made, the details are sent to the brokerage firm who

notifies the investor that placed the order.[13]

The other major exchange in the United States is the virtual exchange called the

National Association of Securities Dealers Automated Quotation System (NASDAQ),

where the trading is done through a communications network between thousands of

computers to a network of dealers. It trades several big technology companies such as

Microsoft, Intel, Dell, and Oracle. NASDAQ brokers are 'market makers', who provide

continuous bid and ask prices within a percentage spread for shares for each stock.

Instead of brokers calling out orders, market makers place their name on a list of buyers

and sellers, which is then distributed by the NASDAQ in a split second to thousands of

other computers. The NASDAQ is a NYSE's competitor. Many other exchanges exist,

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[13] "Stock Basics: How Stocks Trade," *Investopedia*,
http://www.investopedia.com/university/stocks/stocks3.asp, May 25, 2004.

including the American Stock Exchange (AMEX) and exchanges in almost every major country around the world.[14]

There is also electronic trading called the Electronic Communications Network or ECN. This system eliminates the need for the third party orders which are input by a broker. Major brokerages and traders are networked so trading can happen without a third party. Using the NYSE, the investor only sees the bid and ask prices, but the ECN shows orders in real time. One popular type of an ECN is Island, which is frequently used by small traders, because it allows anyone to access the NASDAQ. It is easy to use and inexpensive with respect to other ECNs. Each investor is treated equally, where all the orders are put together and all the bid and ask orders are listed for each stock.[15]

An index is a statistical measure of the changes in a portfolio of stocks representing a portion of the overall market. Charles Dow created the first and most widely known index in 1896. The Dow Jones Industrial Average (DJIA) contains thirty of the largest and most influential companies in the United States. The DIJA is unique because it uses a price-based weighting system, where the weight of each security is the price of the stock relative to the sum of all the stock prices. Most other indices weigh the companies based on market capitalization. This kind of system uses computers which calculate by the minute and are accurate reflections of the market. Another index is the S&P 500 which is 500 of the largest companies in the United States.[16]

Indices are important because they list the most influential and largest companies in the market at the time. They are a representative group of the current market and

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[14] "Stock Basics: How Stocks Trade," *Investopedia*, http://www.investopedia.com/university/stocks/stocks3.asp, May 25, 2004.
[15] Ibid.
[16] "Index Investing: What is an Index?," *Investopedia*, http://www.investopedia.com/university/indexes/index1.asp, May 25, 2004.

economy and are useful for seeing the trends in the market. They are used to provide past performance of the market. However the wrong stocks may be put in the index due to human error. Also, there is much more to the stock market than just the indexes, which some people overlook. Many companies with high earnings are not recognized because no one notices them.[17]

2.4 What Causes Stock Prices to Change

Supply and demand in the market determines the stock prices, along with investors' sentiments, attitudes, and expectations. Demand is when people want to buy a stock, and supply is when people want to sell. If demand is higher than supply, the price goes up. If more people want to sell a stock than buy it, the supply would be greater than demand and the price would fall. The price of a stock reflects a company's current value and the growth that investors expect in the future. The value of a company is most affected by its earnings, which is the profit a company makes. Public companies are required to report their earnings four times a year, which is once a quarter, and called the earnings season. This is because analysts base the future value of a company on their earnings projection. If a company's results are better than expected then the price increases. If a company's results are worse than expected then the price falls.[18]

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[17] "Index Investing: What is an Index?," *Investopedia*, http://www.investopedia.com/university/indexes/index1.asp, May 25, 2004.
[18] "Stock Basics: What Causes Prices to Change?," *Investopedia*, http://www.investopedia.com/university/stocks/stocks4.asp, May 25, 2004.

2.5 Determining the Value of a Stock

There are thousands of stocks that an investor could choose to invest his or her money in. They differ in many ways from price, exchange, industry, and country. From this vast array of stocks an investor can usually only choose only a small number to actually invest in due to the limit of investment capital. Determining the "best" stock at a given time is always the goal, but it is not easy. There are hundreds of indicators and statistics available on most of the listed stocks, and this information can be easily accessed with the advent of the World Wide Web.

Choosing the right stock is usually difficult for several reasons. For one, there are a countless number of factors that affect a company's health. Consequently, it is nearly impossible to construct a single, strict formula that will predict success. Secondly, a lot of significant information is intangible and cannot be measured. The quantifiable aspects of a company, such as income and debt, are easy to find. However, it is more difficult measure and compare the qualitative factors, such as the company's competitive advantages, reputation, and employees. This combination of tangible and intangible aspects often makes picking stocks a highly subjective and intuitive process. Finally, there is a powerful human element that affects the stock market. Human emotions are volatile and can change unpredictably. As a result, stocks do not always do what is anticipated.[19]

Due to these factors there is no one way to pick successful and profitable stocks. One common technique is to combine the use of both fundamental and technical analysis procedures to determine the "best" stock.

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[19] "Guide to Stock Picking Strategies?," *Investopedia*,
http://www.investopedia.com/university/stockpicking/, May 25, 2004.

2.6 Types of Analysis: Fundamental vs. Technical

There are two different methodologies for researching and predicting the future trends of stocks. Technical analysis involves the use of statistical analysis of the market by using past trading data, volumes traded, charts, and patterns to try and predict how a stock might behave in the future. However, the biggest problem with using technical analysis if that there are many different technical indicators, and there is no indicator that is considered the best. Fundamental analysis involves evaluating the stock's intrinsic value based on many factors, ranging from the overall economy to the management of a company. Earnings, expenses, assets, and liabilities are all important in this type of analysis.

Fundamental analysis involves using real data to evaluate the value of a stock such as revenue, earnings, future growth, return on equity, profit margins, and other types of data to determine the value of a company and its future growth. It requires researching a company's many financial statements, which are published both quarterly and annually. The audited financial reports are more credible than non-audited. The balance sheet lists the assets, liabilities, and shareholder's equity, where assets is the liabilities plus equity and the two sides are equal and balanced. The income statement lists revenue, expenses, earnings, and earnings per share. The top line is the revenue and the bottom line is net income. The statement also includes non-cash items such as depreciation. The cash-flow statement strips away all non-cash items and tells you how much actual money the company generated. The cash-flow statement includes cash from operations, financing, and investing.[20]

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[20] "Intro to Fundamental Analysis: Conclusion and Resources," *Investopedia*, http://www.investopedia.com/university/fundamentalanalysis/conclusion.asp, May 25, 2004.

Chapter 3

Fundamental Stock Analysis

Fundamental analysis, or quantitative analysis, involves using company data and financial statements to determine what will happen in the future. Figures such as company revenue, expenses, assets, and liabilities are used to provide insight. Most of the historical data can be found in the annual and quarterly company reports which are issued by the management, and include a balance sheet, income statement, auditor's statement, cash flow statement and an outlook for the coming year.

The auditor's report helps an investor by letting them know if the financial statements are accurate, credible, and where important information is disclosed. A non-audited financial statement is most likely fraudulent, and therefore useless.

The balance sheet shows the financial situation of the company, and it shows the assets, liabilities and debt, and equity. Both sides are balanced: the assets is equal to the liabilities and equity. Assets include cash, property, and equipment. Liabilities and equity include debt, bonds, retained earnings, and stockholder's equity.

The income statement shows how much money a company acquires, spends, and the overall profit or loss. It contains information such as revenue, net income, and earnings per share (EPS). The top line is the revenue, and the bottom line is net income. It also takes into account non-cash items such as depreciation.

The cash flow statement shows how much money the company has made, and how they handle their cash, pay their bills, and encourage growth. Although most of the information on this statement is on the income statement or balance sheet, in the cash flow statement they are used to show the cash made and its relation to earnings. It has

three parts: cash from operations, financing, and investing. Cash flow is important because it cannot be manipulated; it is straight-forward. Lastly, the footnotes on the financial statements can be informative and give more information about accounting methods and disclosure (calculations, rates, and other information).[21]

Ratio analysis is another way to evaluate stocks, and is often another category of fundamental analysis. The numbers from the balance sheet, income statement, and cash flow statement are compared to previous years, other companies, the industry, or market. How the company has performed in the past and the relationship between the values can be used to predict how the company will perform in the future. There are many ratios from which to get information about a stock's worth. Book value per share (BV) is the relation of the stockholder's equity to the number of shares. BV is equal to:

$$\frac{\text{Stockholders Equity - Preferred Stock}}{\text{Average Outstanding Shares}}$$

The book value is based on costs and retained earnings. If the market value is trading below the book value, then the company is undervalued and is a good buy. Therefore, comparing the market value and the book value can determine whether the stock is overvalued or undervalued.

The cash flow to assets ratio is equal to:

$$\frac{\text{Cash from Operations}}{\text{Total Assets}}$$

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[21] "Intro to Fundamental Analysis," *Investopedia*, http://www.investopedia.com/university/fundamentalanalysis/, May 26, 2004.

This ratio tells the amount of cash a company can make with respect to its asset size. If this ratio has decreased from last year, then it could mean the company could have cash problems eventually. A ratio of 0.3 is considered to be good.

The dividend payout ratio is equal to:

$$\frac{\text{Yearly Dividend per Share}}{\text{Earnings per Share}}$$

This ratio tells the amount of earnings used to pay the shareholder's dividends. If this number decreases, it is seen negatively by investors and the stock price declines. If the number is zero, it means the company does not pay a dividend. If the dividend is stable, the company has a good dividend policy.

The earnings per share (EPS) ratio is the most used ratio. It is equal to:

$$\frac{\text{Net Income - Dividends on Preferred Stock}}{\text{Average Outstanding Shares}}$$

This ratio tells how much profit was made on a per share basis. If the EPS is compared to previous years, it shows the rate of growth at which a company's earnings are growing on a per share basis.

The gross profit margin is equal to:

$$\frac{\text{Revenue} - \text{Cost of Goods Sold}}{\text{Revenue}}$$

This ratio tells what the company's pricing policy is and what the mark-up margins are. If the company has a large variety of products, the results may be distorted. It gives insight into the company's financial health, and should be a stable value.

The price to earnings ratio (P/E ratio) is one of the most used ratios and it is equal to:

$$\frac{\text{Market Value per Share}}{\text{Earnings per Share}}$$

This ratio, sometimes called the multiple, compares the current share price with the earnings. It determines whether a stock is overvalued or undervalued, and is a prediction of the company's performance in the future. The average P/E value is 20. A high P/E ratio indicates an anticipated growth by investors. If a company is losing money it does not have a P/E ratio. By using estimated earnings, it is possible to get a forward-looking P/E ratio.

The profit margin ratio is equal to:

$$\frac{\text{Net Income}}{\text{Revenue}}$$

This ratio tells what portion of the company's sales contribute to their income. A low profit margin can be attributed to competition. The percentage is how many cents per dollar contribute to the net income.

The return on assets ratio (ROA or ROI) is equal to:

$$\frac{\text{Net Income} + \text{Interest Expense}}{\text{Total Assets}}$$

This ratio tells the return a company is receiving on their investments and assets. If the company's ROA is above the rate at which company borrows at, then a pending company project should be accepted, if not it should be rejected.

The return on equity (ROE) ratio, also called the stockholder's return on investment, is equal to:

$$\frac{\text{Net Income}}{\text{Shareholder's Equity}}$$

This ratio tells the return the company is receiving on the stockholder's investment and the rate the shareholders earn on their shares. A company that has high growth should also have a high ROE.

The asset turnover ratio is equal to:

$$\frac{\text{Revenue}}{\text{Total Assets}}$$

This ratio tells the correlation between company assets and revenue. Companies with low profit margins have a high assets turnover and vice versa, because it is a pricing strategy.

The inventory turnover is equal to:

$$\frac{\text{Cost of Goods Sold}}{\text{Average or Current Period Inventory}}$$

This ratio tells about company inventory levels. Higher inventory could mean there is a higher demand.

The debt-asset ratio is equal to:

$$\frac{\text{Total Liabilities}}{\text{Total Assets}}$$

This ratio tells what part of the company's assets are being funded through debt. It is similar to the debt-equity ratio. If the ratio is under 1, it means most of the assets are being funded by equity. If the ratio is above 1, it means they are funded mostly by debt.

The debt-equity ratio is equal to:

$$\frac{\text{Total Liabilities}}{\text{Shareholders Equity}}$$

This ratio tells what part of equity and debt the company uses to fund its assets. If the ratio under 1, it means the funding is mostly provided by equity. If the ratio is above 1, it means the assets are funded with debt, which is risky.

All of these ratios serve as indicators to fundamental investors. Alone they often server little purpose, but when combined and used together they can be extremely useful.[22]

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[22] "Ratio Analysis," *Investopedia*, http://www.investopedia.com/university/ratios/, May 26, 2004.

Chapter 4

Technical Stock Analysis

There are several technical indicators that can be easily utilized to determine the value of a stock. Typically, technical analysis is concerned with historical prices and charts and graphs of these prices. One common technical indicator is the Relative Strength Index (RSI), which measures a stock's recent performance in relation to its historical strength by comparing the number and magnitude of recent and historical ups and downs. A high RSI indicates a sell, and a low RSI indicates a buy.[23]

Related to the RSI is relative strength, which uses price trends to evaluate how a stock is performing compared to others. The relative strength of a stock is calculated by taking the percentage price change of a stock over a set period of time and ranking it on a scale of 1 to 100 against all other stocks on the market, with 1 being worst and 100 being best.[24]

Another important index is the money flow index, or MFI. The MFI evaluates the amount of money in and out of a stock. It is similar to the RSI, but the MFI also evaluates volume, not only price. If the MFI deviates from the price trend, it could indicate a trend reversal.[25]

An important tool in chart analysis is the use of Bollinger Bands. Bollinger bands are two bands that are plotted two standard deviations away from the moving average (standard deviation measures the volatility of a stock). The bands are wide when the

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[23] "Relative Strength Index - RSI," *Investopedia*, http://www.investopedia.com/terms/r/rsi.asp, May 27, 2004.
[24] "Relative Strength," *Investopedia*, http://www.investopedia.com/terms/r/relativestrength.asp, May 28, 2004.
[25] "Money Flow Index - MFI," *Investopedia*, http://www.investopedia.com/terms/m/mfi.asp, May 28, 2004.

market is more volatile, and are slimmer when the market is less volatile and closer to the market average. When the stock price is close to the upper band the market is overbought, and oversold when the prices are near the lower band.[26]

Another indicator is the William's %R, which evaluates overbought and oversold conditions. When the William's is over 80% the stock is considered oversold, and when it is below 20% it is considered overbought.[27]

The price rate of change, or ROC, evaluates the price changes of a stock and whether it is overbought or oversold. It is mostly used for short-term, and is calculated by using the closing price minus the closing price N days ago, divided by the closing price N days ago.[28]

Another indicator is the trading range, which is when the high, low, and closing prices are graphed for a specific period of time. Then lines are drawn along the top and bottom of the range, called support and resistance lines. This is when the current trend should stop and reverse direction, like a floor or ceiling price. Where there is a point above or below the lines is a breakout. Pattern analysis is the analysis of these graphs for patterns that have appeared. The most commonly observed patterns are triangle-up or triangle-down patterns, and rounded tops or rounded bottoms. Trend analysis is more mathematical; it uses short and long term trends to identify where prices cross over their long term averages (also called moving averages). The price range is then smoothed by averaging data points, and then the smoothed line is plotted against the actual price of the

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[26] "Bollinger Band," *Investopedia,* http://www.investopedia.com/terms/b/bollingerbands.asp, May 28, 2004.
[27] "Williams %R," *Investopedia*, http://www.investopedia.com/terms/w/williamsr.asp, May 28, 2004.
[28] "Price Rate of Change - ROC," *Investopedia*, http://www.investopedia.com/terms/p/pricerateofchange.asp, May 28, 2004

stock. The Moving Average Convergence Divergence (MACD) is used to identify crossovers, divergence, and convergence. Gap analysis can indicate the future movement of a stock by looking at the gap, or when the opening price of a stock is significantly higher or lower than its closing price the previous day, perhaps because of company news overnight. The most basic technical analysis indicator is the moving average, which shows the average value of a stock's price over a period of time, most commonly 20, 30, 50, 100, and 200 days.[29]

When analyzing price data charts, it is important to look at the trends. An uptrend is higher highs and lower lows. It continues until a previous relative low point is broken, which is also called a reaction low.[30]
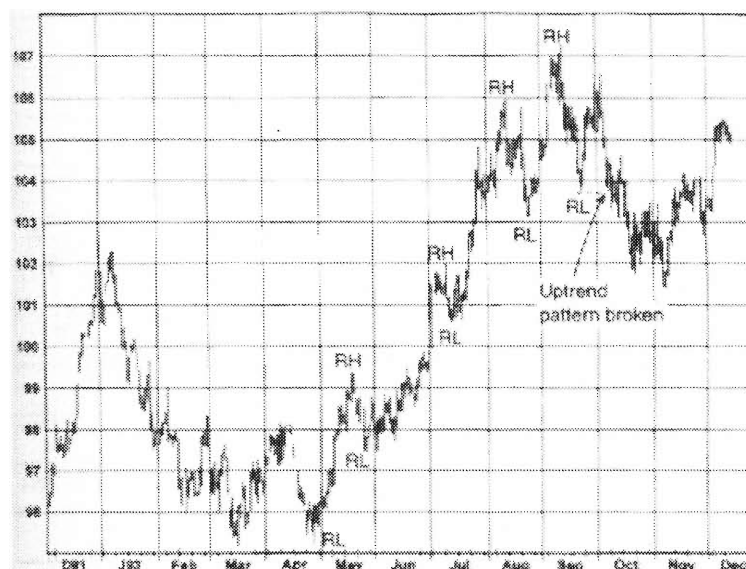
Figure 1: December 1992 T-bond Uptrend (RH is relative high, RL is relative low)

[29] "Moving Average Convergence Divergence - MACD," *Investopedia*, http://www.investopedia.com/terms/m/macd.asp, May 27, 2004.
[30] Schwager, Jack, *Getting Started in Technical Analysis*, 34-38.

A downtrend is lower lows and lower highs, which continues until a previous lower high is exceeded.[31]
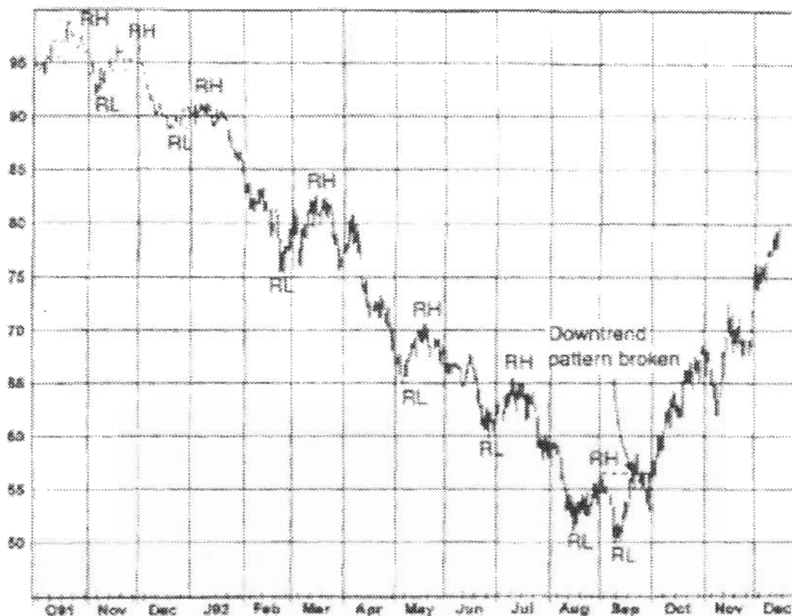
Figure 2: December 1992 Coffee Downtrend

Also, trend lines can be drawn to see the trend better. An uptrend line connects the series of higher lows, and the downtrend line connects the series of lower highs.[32]

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[31] Ibid.
[32] Schwager, Jack, *Getting Started in Technical Analysis*, 34-38.
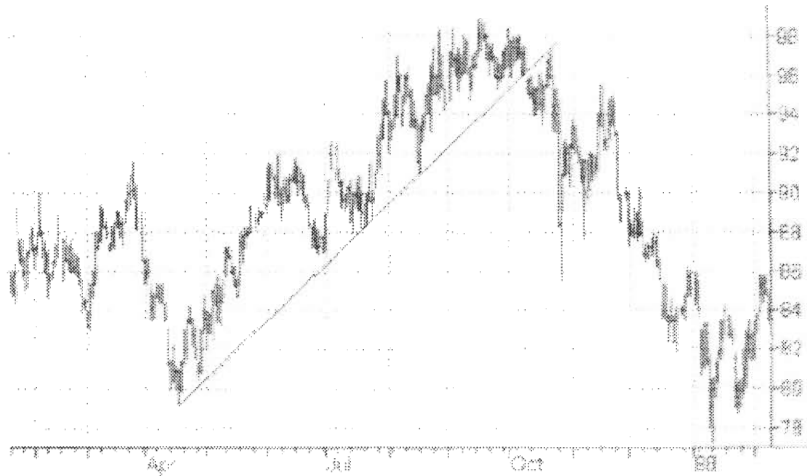
Figure 3: Uptrend Line
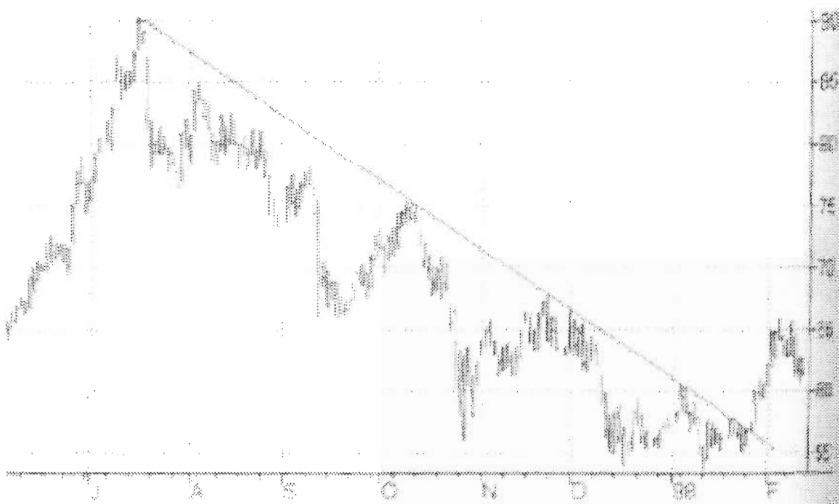
Figure 4: Downtrend Line

Parallel lines that enclose the trend form what is called a trend channel. When the uptrend is penetrated, it is a sell signal, and penetration of the downtrend line is a buy signal. The lower end of a downtrend and the upper end of an uptrend are good places for profit. Trends are often redefined as time moves on, so they tend to work better when used in hindsight then real time.[33]

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[33] Schwager, Jack, *Getting Started in Technical Analysis*, 35-41.
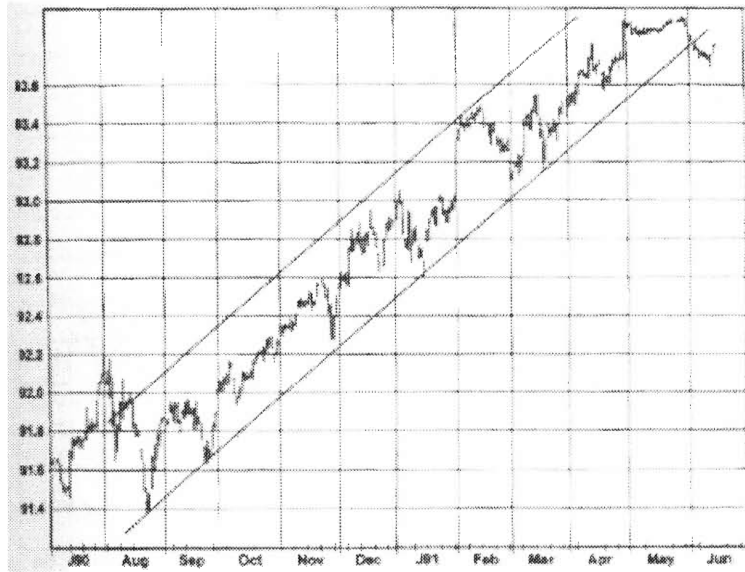
Figure 5: Uptrend Channel

Moving averages are another way to analyze stocks. It is a smoothed price series that makes trends more discernable. The past N days' closing prices including today's are averaged. The larger the N, the more short term "noise" will be removed. The moving average is rising if today's value is higher than yesterday, and declining if today's value is lower then yesterday.[34]

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[34] Schwager, Jack, *Getting Started in Technical Analysis*, 45-50.
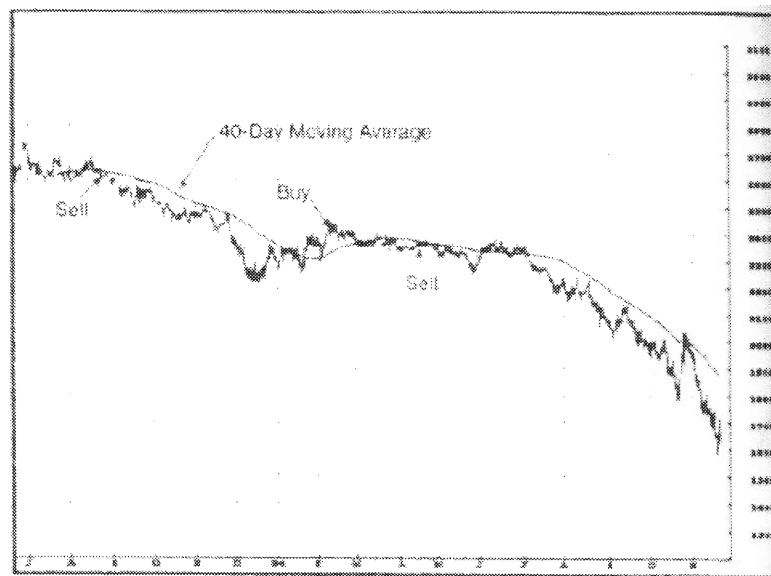
Notes: Buy = 10-tick rise in moving average off its low. Sell = 10-tick decline in moving average off its high.

Figure 6: 40-Day Moving Average

Another important skill in trading stocks is recognizing and analyzing the chart patterns. First, there are some important one day patterns and occurrences that each trader should know. A gap day is when the low is above the previous day's high, or the high is below the previous day's low. There are different types of gaps. A common gap is not that significant. A breakaway gap is when the prices rise beyond the extreme of the trading range area where no trading activity occurs. A runaway gap is when the trend accelerates. An exhaustion gap is after an extended price move, followed by a trend reversal. Another one day pattern is spikes. A spike high is a day whose high is way above the high of the days before and after it, and the closing price is near the lower end of the day's trading range. A spike low is a day whose low is way below the low of the days before and after it, and the closing price is near the upper end of the day's trading

range. The spike is more significant if it meets the closing price criteria, or there is price advance in the spike's direction.[35]

Figure 7: Spike High and Spike Low

Reversals are an important pattern. A reversal high day is a new high in an upmove, then a reversal to close below the preceding day's close. A reversal low day is a new low in a decline, then a reversal to close above the preceding day's close. Two consecutive reversal highs are a sell signal. A reversal day at its peak is also a sell signal, but often a reversal can generate false signals and are considered a worthless trading indicator to some. Also, sometimes a day can be both a spike and reversal day.[36]

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[35] Schwager, Jack, *Getting Started in Technical Analysis*, 73-81.
[36] Schwager, Jack, *Getting Started in Technical Analysis*, 73-81.
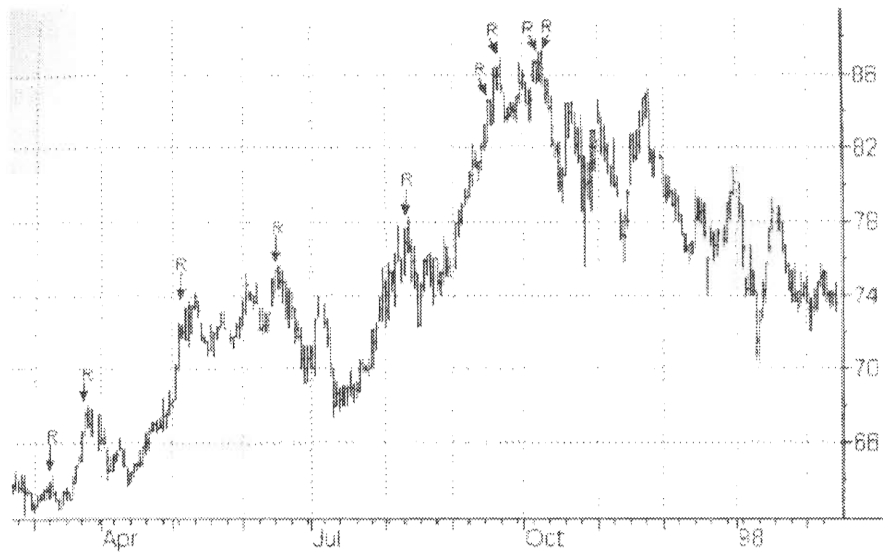
Figure 8: Reversals

Another one day pattern is a thrust day. An upthrust day is when the close is above the previous day's high, and a downthrust is when the close is below the previous day's low. A series of upthrusts is a sign of strength, and a series of downthrusts is a sign of market weakness.[37]
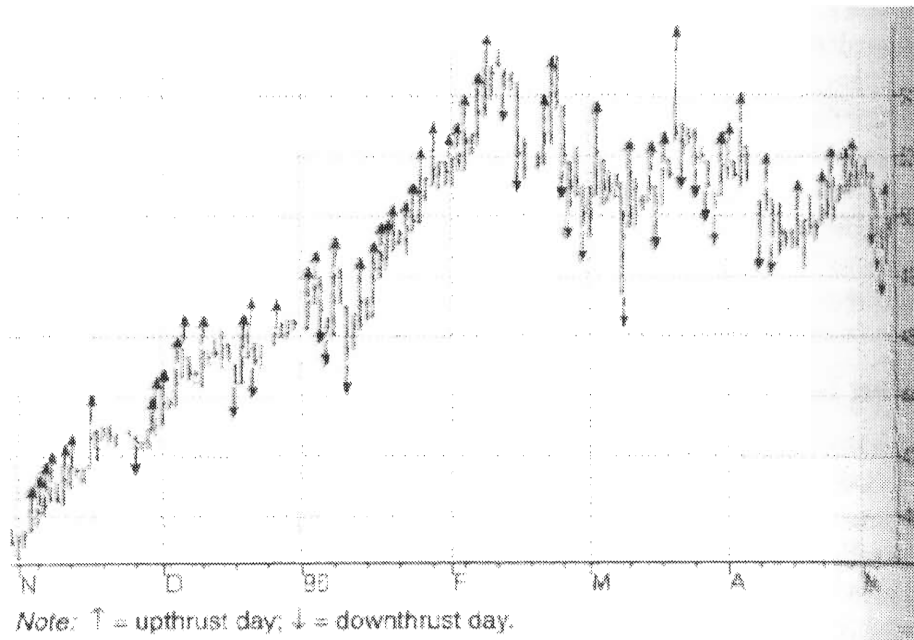
Note: ↑ = upthrust day; ↓ = downthrust day.
Figure 9: Upthrusts and Downthrusts

[37] Schwager, Jack, *Getting Started in Technical Analysis*, 81-83.

The last type of important one day pattern is a wide-ranging day. This is when the daily price range is bigger than the past days. A day with a strong close after a declining trend is a sign of an uptrend reversal, and a weak close after an advancing trend is a sign of a downside trend reversal.[38]
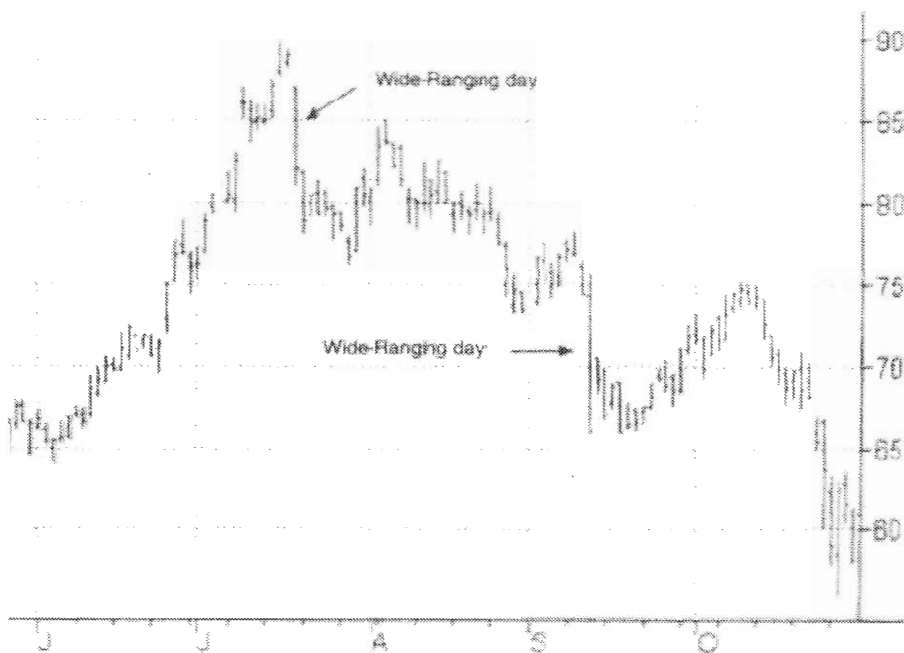
Figure 10: Wide Ranging Days

Besides one day patterns, there are continuation patterns, which are long term trends where the price swing if in the same direction of the preceding formation. One type of this pattern is a triangle. It is a symmetrical continuation of a trend before it ascends or descends.[39]

[38] Schwager, Jack, *Getting Started in Technical Analysis*, 83-85.
[39] Schwager, Jack, *Getting Started in Technical Analysis*, 85-87.
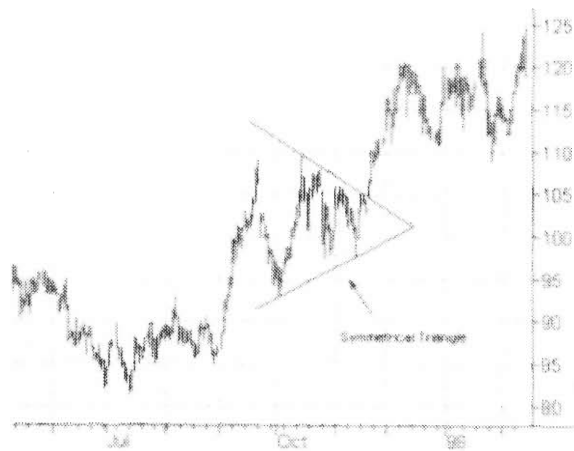
Figure 11: Triangle

Another pattern is a flag and pennant, which is a narrow band, short duration, series of congestion phases. A flag is enclosed by parallel lines, and a pennant has a shorter duration than a triangle.[40]
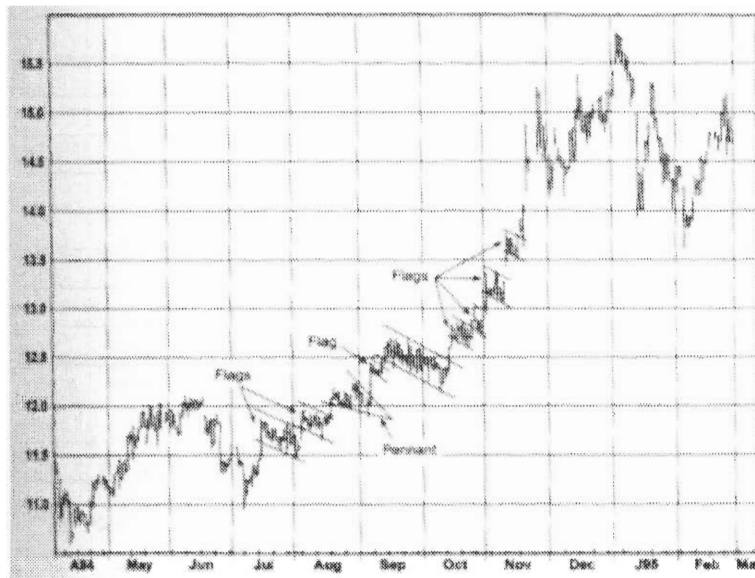
Figure 12: Flag and Pennant

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[40] Schwager, Jack, *Getting Started in Technical Analysis*, 87-93.

It pauses a major trend, where the price swings in the same direction then before the formation. A good time to enter the stock is during this formation, anticipating the trend. When there is a breakout in the opposite direction, it is a good stop-loss point because it signifies a trend reversal.[41]
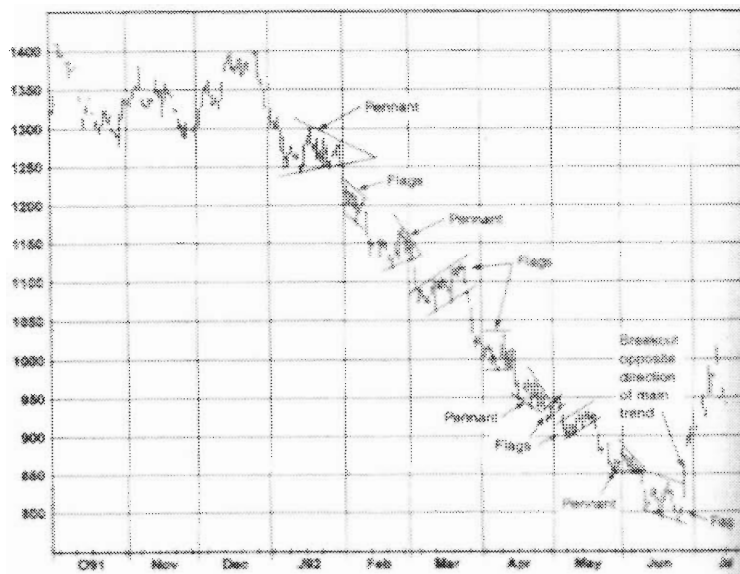
Figure 13: Flag Breakout

If the breakout is above the average trading range, then there may be explosive growth ahead. In addition to continuation patterns, there are top and bottom formations. V tops and bottoms are usually found with other indicates such as spikes and wide gaps.[42]

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[41] Ibid.
[42] Schwager, Jack, *Getting Started in Technical Analysis*, 93-96.
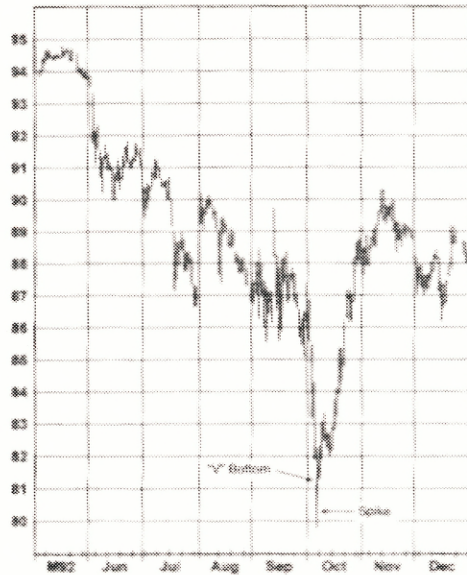
Figure 14: V Bottom

A double top and bottom is when the peak occurs in the same general price area. If this formation happens after a large price move, then it is an indication of a trend reversal. The formation is completed when the reaction low or high is between the top or bottom respectively. Another formation is the head and shoulders, which is when the middle high is above high points on either side and vice versa for low points. The formation continues until the neckline is penetrated.[43]

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[43] Schwager, Jack, *Getting Started in Technical Analysis*, 96-102.
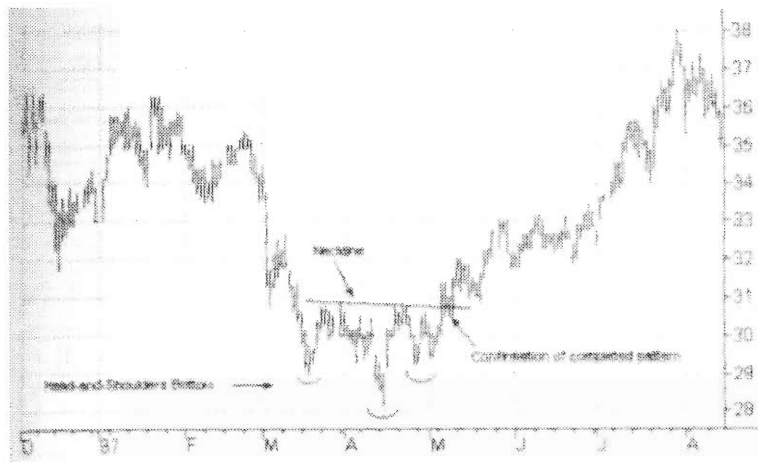
Figure 15: Head and Shoulders

Rounded tops and bottoms, also called saucers, are the most reliable top and bottom formations.[44]
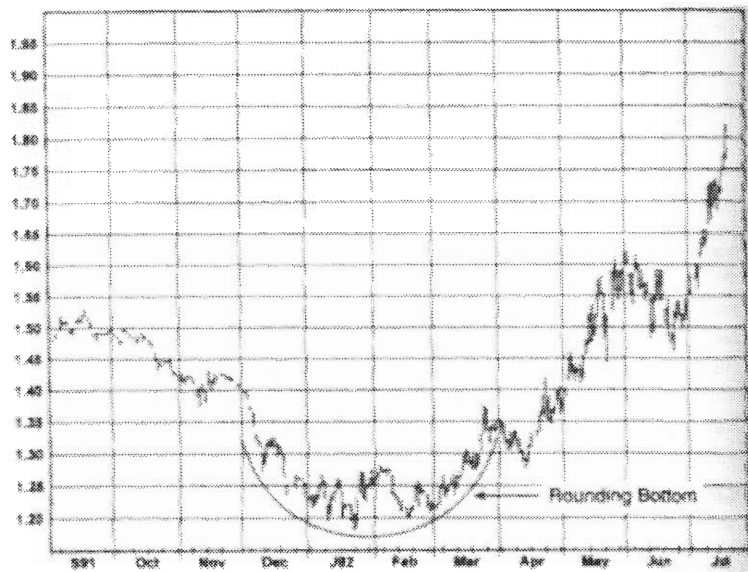
Figure 16: Rounded Top and Bottom

Triangles, which are the most common continuation pattern, can also be top and bottom. Another formation is the wedge. A rising wedge is when prices rise steadily

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[44] Ibid., 102-104.

higher in a converging pattern. The sell signal is when there is breakout below the wedge

line.[45]
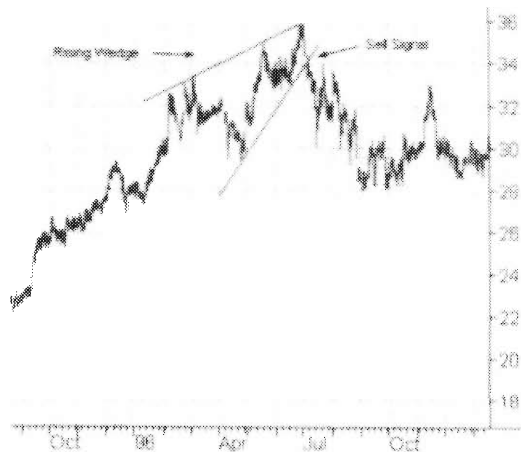
Figure 17: Rising Wedge

The last formation is the island reversal, which is when the prices gap higher

after an advance, then gap lower. It is a reversal signal.[46]
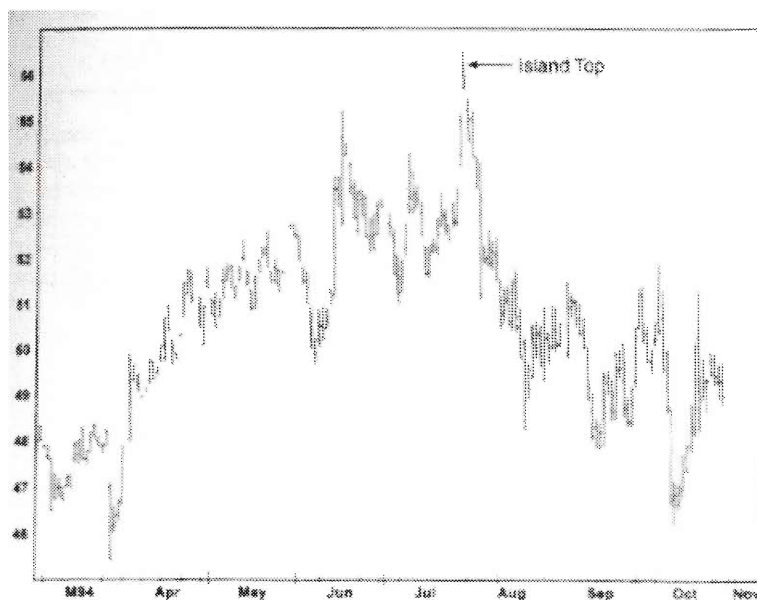
Figure 18: Island Top

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[45] Schwager, Jack, *Getting Started in Technical Analysis*, 104-106.
[46] Schwager, Jack, *Getting Started in Technical Analysis*, 107-109.

Chapter 5

The Role of Autonomous Agents

5.1 What is an Autonomous Agent?

An agent is a computer software program that is intelligent in that it is proactive and adaptive, and an autonomous agent is one that can run with little or no human intervention. Typically, agents sense the environment they are situated in, engage in decision-making, and perform certain actions that will influence the environment. In addition, several agents are usually programmed to work together in the same environment. These agents must cooperate, coordinate, and negotiate with each other in order to achieve a common objective.[47]

5.2 Advantages of Autonomous Market Agents

Autonomous market agents are agents that are programmed to trade or perform other actions within a given marketplace. Autonomous market agents have several obvious advantages over humans. Computationally they are faster and can handle more operations at a time. For example, an agent could be programmed to scan the World Wide Web for the best prices on a product; this agent would be able to scan the web much more effectively and efficiently than a human. Secondly, agents cannot become distracted and divert their attention from the task at hand. For example, an autonomous agent on the online auction site eBay can be programmed to watch and top any new bid on an item up to some maximum price. The agent will constantly monitor the auction and

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[47] Greenwald, Amy, Nicholas Jennings, and Peter Stone. "Agents and Markets," *Intelligent Systems*, November/December 2003, 12-14.

will not divert its attention. However, it would be very difficult for a human to monitor the same auction continuously for an extended period of time. Finally, agents are immune to human flaws in reasoning.[48]

Daniel Kahneman, a professor at Princeton University, and Amos Tversky demonstrated that people can make different decisions about different situation with the same outcome. In one experiment to demonstrate their theory, Tversky and Kahneman made two groups of people. One group was given a coffee mug while the other was given nothing. Next, the first group was asked to choose either to keep the mug or to trade it for money. The second group was asked to select between a mug or money. The researchers found that those without a mug initially were willing to accept less money than those who had a mug. The conclusion of the experiment was that an individual's emotions, rather than rational calculations affected their decision-making.[49]

Rajarshi Das, a researcher for IBM, has illustrated these advantages in the trading domain. In an experiment which put humans against computers in a stock market scenario, there was a significant amount of trading between the agent and the human and not just between the like kinds, but the agents ultimately performed much better, even against experienced humans.[50]

Although autonomous market agents seem quite advantageous, they are currently not widely used. This is primarily because it is possible for an agent to crash, which could result in a crisis in the marketplace. Also, the potential also exists that an agent would

[48] Ibid.
[49] Weiss, Beth, "Daniel Kahneman," *Jewish Virtual Library*, http://www.us-israel.org/jsource/biography/kahneman.html, June 8, 2004.
[50] "Rajarshi Das," *IBM Research*, http://www.research.ibm.com/people/r/rajarshi/, June 8, 2004.

reveal information about what its future bids will be to competitors who can take advantage of this information.[51]

5.3 The Penn-Lehman Automated Trading Project

The Penn-Lehman Automated Trading Project (PLAT) at the University of Pennsylvania is an ongoing investigation into several strategies for automated trading in the stock market. The project is a joint venture between the University of Pennsylvania and the Lehman Brothers' Propriety Trading Group, which is a group of Wall Street professionals who develop automated trading strategies. The primary goal of the project is to contribute to the growing field of automated markets.[52]

The PLAT project utilizes the NASDAQ stock market because it is entirely electronic, but the practices and strategies the project team has been developing could easily apply to other markets. The centerpiece of this project is a software simulator for automated stock trading called the Penn Exchange Simulator (PXS) which combines client orders for shares with real data. The PXS automatically computes the client's profit or loss, volumes traded, and other important information. PXS is essentially an experimental Electronic Crossing Network (ECN) that combines limit order data from trading clients and Island, where the Island data is taken from their website. The simulation can be run in live mode, which updates using Island's data in real time, or historical mode, which runs on archived data on Island. The live simulation is more

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[51] Greenwald, Amy, Nicholas Jennings, and Peter Stone. "Agents and Markets," *Intelligent Systems*, November/December 2003, 12-14.
[52] Kearns, Michael and Luis Ortiz. "The Penn-Lehman Automated Trading Project," *Intelligent Systems*, November/December 2003, 22-31.

realistic because it is real time, but the historical mode is faster because the data is already stored and there is no waiting.[53]

PXS is programmed in the C programming language and is run on Unix and Linux platforms. When the simulation is run it takes the following inputs: the stock symbol of the NASDAQ stock traded on Island, the port number that PXS will use to communicate with the trading clients, the date the simulation should run for historical simulations, and the start and stop times of the simulation. After the simulation has started, other trading clients may connect via the designated port. Clients are allowed to issue buy orders, sell order, and withdraw commands. In addition, computations for the client's cash and share holdings, current profit and loss, and volume of orders exist. During execution, the PXS maintains the order books, combines client limit orders, executes the matching orders of clients, computes the client's shares, cash, and profit or loss.[54]

Three formal competitions have been held to test the effectiveness of the PXS simulator. They ran from November to December 2002, February to March 2003, and April to May 2003. All of these competitions focused exclusively on the intraday (9:30 am to 4:00 pm) trading of Microsoft stock. The first two competitions were chiefly learning experiences, and the third competition, dubbed the *Platinum Platter Competition* (PPC), was probably the most significant. The goal of the competition was to manage risk and end each day with a large cash position and little or no share positions. The PPC had a total of fourteen different strategies competing and they were divided into a Red pool

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[53] Ibid.
[54] Kearns, Michael and Luis Ortiz. "The Penn-Lehman Automated Trading Project," *Intelligent Systems*, November/December 2003, 22-31.

and a Blue pool to help ensure a reasonable amount of client liquidity. The grading and

rating criteria are summarized in Figure 19 below.[55]

Criteria emphasizing profitability
- *Daily profit and loss.* On a daily basis, award 3 points to each client whose end-of-day P&L is highest in its seven-client pool; 2 points to the second highest; 1 point to the third highest. Maximum possible award: 30 (3×10) points.
- *Overall consistency of P&L.* A one-time award of 15 points goes to any client that has a positive cumulative P&L over the competition's 10 trading days and that ends with a negative daily P&L on three trading days at most. Maximum possible award: 15 points.

Criteria emphasizing robustness, with weak profitability prerequisites
- *Daily intraday position reversals.* On a daily basis, award 2 points to any client that finishes with a positive P&L for the trading day and that held share positions in excess of 10,000 shares in both the long and short direction at some point during the day. Maximum possible award: 20 (2×10) points.
- *Robustness to market variation.* Award 5 points to each client that has a positive P&L on any pair of trading days in which the share price rose overall (open to close) on one day of the pair and fell on the other. For each additional such pair, award an additional 5 points. Maximum possible award: 25 (5×5) points, if exactly 5 up days and 5 down days for the stock occur during the competition.

Criteria emphasizing good trading practices, with no profitability prerequisites
- *Daily risk saturation.* On a daily basis, award 2 points to each client that achieves a share position in excess of 50,000 shares (long or short) at some point during the trading day, without exceeding the maximum-allowed share position of 100,000 shares. Alternatively, award 2 points to clients whose total matched volume of shares for the trading day exceeds 1/14 (one-half of the per-client average of 1/7) of the total matched volume of all clients. Maximum possible award: 20 (2×10) points.
- *Daily position unwinding.* On a daily basis, any client that's awarded that day's risk saturation points can earn an additional 2 points by ending the trading day with a share position of fewer than 5,000 shares (long or short). Maximum possible award: 20 (2×10) points.

Figure 19: Client Scoring Criteria for the 2003 Platinum Platter Competition

Figure 20 describes each strategy entered into the PPC and how they ranked in

their respective pools. Figure 21 shows the final results of the competition. The client

entrants are sorted by their pool and their final ranking according to the grading criterion

of Figure 19.[56]

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[55] Ibid.
[56] Ibid.

Client	Description	Performance
CBR-SOBI	Case-based reasoning applied to the Static Order Book Imbalance strategy's parameters	First in the Blue pool; statistically significant profitability
MoneyFlow	A predictive strategy using money flow (price movement times volume traded) as a trend indicator	Second in the Blue pool
OBMM	A market-maker that positions orders in front of the nth orders on both books	Third in the Blue pool
CReaTiv	Capitalization on Real Time Volatility—SOBI modified by recent volatility	Fourth in the Blue pool
OBCrossover	Exponential Moving Average crossover strategy moderated by confirmation of order book quartile volume-weighted average prices	Tied for fifth in the Blue pool
OBBreakout	A breakout strategy applied to trend lines on the volume-weighted average prices of buy and sell books	Tied for fifth in the Blue pool
RaSTa	Resistance and Support Trading Agent—computes support and resistance levels on the basis of peaks in the order book volume	Seventh in the Blue pool
DAMM-STAT	A Mixture of a Dynamically Adjusted Market-Maker that calibrates by recent volatility and a trend-based predictive strategy	First in the Red pool; stellar position management
Contrarian	Sells on rising prices, buys on falling prices	Second in the Red pool
OBSigma	Trades on the basis of relative spreads in the buy and sell books, interpreting a small standard deviation as a sign of confidence	Third in the Red pool
OBVol	A simple predictive strategy using total volumes in buy and sell books	Fourth in the Red pool; highest Sharpe ratio and statistically significant profitability
RapidMM	A market-maker with rapid revision of quotes based on the current inside market	Fifth in the Red pool
CIA	Central Intelligent Agent—a predictive strategy applying boosting to order book snapshots	Sixth in the Red pool
SimpleTrend	A simple trend prediction strategy	Seventh in the Red pool; statistically significant negative earnings

Figure 20: 2003 Platinum Platter Competition's Clients

Strategy	Pool	Rank	Total points	Daily profit & loss	Daily risk saturation	Daily position unwinding	Daily intraday position reversal	Consistency of P&L	Robustness to market variation	Avg. P&L ($)	95% confidence interval	10-day Sharpe ratio
CBR-SOBI	Blue	1	74	9	18	2	10	15	20	4,187	± 3,733	0.70
MoneyFlow	Blue	2	69	15	20	0	4	15	15	2,007	± 15,592	0.08
OBMM	Blue	3	46	8	20	0	8	0	10	258	± 7,909	0.02
CReaTiv	Blue	4	42	7	20	0	10	0	5	(2,410)	± 6,770	(0.22)
OBCrossover	Blue	5	33	6	6	0	6	0	15	3,242	± 4,220	0.45
OBBreakout	Blue	5	33	10	18	0	0	0	5	3,680	± 7,963	0.29
RaSTa	Blue	7	21	5	2	0	4	0	10	1,182	± 2,441	0.39
DAMM-STAT	Red	1	65	6	20	14	10	0	15	685	± 5,195	0.08
Contrarian	Red	2	55	6	20	2	12	0	15	2,022	± 3,658	0.34
OBSigma	Red	3	54	8	20	6	10	0	10	1,649	± 2,382	0.43
OBVol	Red	4	63	14	0	0	4	15	20	4,037	± 1,900	1.32
RapidMM	Red	5	58	10	20	0	10	0	18	3,649	± 9,121	0.25
CIA	Red	6	30	13	12	0	0	0	5	(1,451)	± 9,822	(0.09)
SimpleTrend	Red	7	27	3	20	2	2	0	0	(24,467)	± 17,974	(0.84)

Figure 21: 2003 Platinum Platter Competition Final Results

The two winning clients were CBR-SOBI from the Blue pool and DAMM-STAT from the Red pool. In terms of profitability, eleven of the fourteen entrants ended the ten day competition with a profit gain. Concerning the trade-off of risk and return the Sharpe Ratio, which is the empirical daily average of returns divided by the standard deviation, was employed. Of the fourteen clients, CBR-SOBI and OBVol had notable Sharpe Ratios. Overall, the PLAT project team viewed this competition as a success and as another learning experience for future work.[57]

5.4 Competing Trading Agents

For the past three years, the Trading Agent Competition (TAC) serves to evaluate the programmed trading techniques for a market scenario. Researchers can observe the progress of the trading agents over time, and accelerate the growth of the autonomous traders. The competition allows techniques and problems to be shared between the researchers and evaluates efficiency. The scenario is a shopping task where the traders must use flights, hotels, and entertainment to create a trip based on different criteria, such as dates, price, and entertainment types. The agents are judged by their market effectiveness and efficiency, which is determined by how well the agents allocate travel goods through their market interactions. The effectiveness is found by comparing the TAC market allocations to calculated ideal global allocations. The total group is 64 clients, where the available resources are 16 hotel rooms and eight types of entertainment per day. The TAC 2002 competition, the TAC market was found to have an average of 89% of the optimal value, which was a steady improvement from the qualifying, to the

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[57] Kearns, Michael and Luis Ortiz. "The Penn-Lehman Automated Trading Project," *Intelligent Systems*, November/December 2003, 22-31.

seeding, to the semifinal round because the programmers can debug and improve their agents. Since this value is hard to understand, it is measured against two other values. When there is uniform hotel distribution and entertainment also allocated uniformly, and then each agent's allocation to the clients is optimized, the optimal value was 95.2%. When there was uniform hotel distribution and the entertainment was traded, then it was 85.4% effective.[58]

It was also found that the 2002 competitors were better than the 2001 competitors, which is to be expected. From the 2001 to the 2002 competition, of the 8 repeat entries, three were re-implemented from 2001, two were basically redesigned, and three made small changes.[59]

Optimal trips involve avoidance of wasted flights and hotels. For example, the agent bids to buy rooms lower than its marginal value, in a strategy called shading. The entertainment had another measure of trading efficiency: the 'fun bonus' (or entertainment market efficiency) which was compared with the actual TAC market optimum efficiency results. The TAC in 2001 and 2002 basically matched in the entertainment category, although overall market efficiency improved.[60]

There are two agents with which the others are compared, and a 'dummy' whose behavior is not modified throughout the competition, unlike the other agents. Consequently, the dummy's standing decreased through the competition.[61]

The analysis of the TAC shows the progress of increased competence of the trading agents, but because market efficiency is an indirect way of measuring

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[58] Wellman, Michael, Shih-Fen Cheng, Daniel Reeves, and Kevin Lochner. "Trading Agents Competing: Performance, Progress, and Market Effectiveness," *Intelligent Systems*, November/December 2003, 48-53.
[59] Ibid.
[60] Ibid.
[61] Ibid.

performance, these are only tentative conclusions. Other less ideal factors such as risk could be used to measure an agent's progress as well. The analysis of the past competitions shows that the autonomous agents are becoming more competent and progressing. However these agents have not been put against humans, so it is not known which would perform better. Different studies have shown that humans would probably not be as capable.[62]

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[62] Wellman, Michael, Shih-Fen Cheng, Daniel Reeves, and Kevin Lochner. "Trading Agents Competing: Performance, Progress, and Market Effectiveness," *Intelligent Systems*, November/December 2003, 48-53.

Chapter 6

Our Autonomous Agent

6.1 General Description of Operation

There are many different aspects to an autonomous stock agent. Our agent performs the following operations:

1.) Retrieve Current Stock Information

2.) Retrieve Historical Stock Information

3.) Analyzing All Stock Information

4.) Buying Stocks

5.) Selling Stocks

This set of functions is the basis of our agent and they have been developed to work seamlessly together. This has involved designing a logical order of events and intelligent programming that will void any suspect information.

Retrieving current stock information is the process of collecting data and storing it in a database. This database is where the analyzer will later query information from to analyze and rate each stock. Several different websites are used to obtain the current stock information needed to proficiently analyze each stock. This process is done two times daily: once in the morning and once at night.

The amount of data our script retrieves for each stock is so large that this process can take up to half a day to complete. The first time the data is collected starts in the morning when the market first opens. This allows us to usually grab most all of the data

for the current day. We then run the analyzer as soon as this is finished to analyze that days market data.

The analyzer can detect changes in stocks that are either owned or not owned. This is how it can make the choice (if necessary) to either buy or sell stocks. If buying or selling a stock is necessary then it will retrieve the current information once again to make sure no data was out of date. This is a safety procedure in place to make sure that no stock is bought or sold based on faulty or extreme data.

The analyzer can be described quickly as a list of formulas that adds a specific amount of points to the stock's total rating based on numerous indicators and fundamental characteristics. These points are awarded based on our decision of how important each formula may be. Other things are factored in, such as current price, last trade time, and if a dividend is paid.

The analyzer, after analysis is complete, will trigger the start of the buying and selling scripts. Any selling of unwanted stocks is done first to free up any money in which it will buy more stocks. To decide how much money to invest in each stock our agent will do the following:

1.) Add up the rating for each stock to get a total rating

2.) Divide the stocks rating by the total rating to get a *percent rating*

3.) Invest an amount of money that is equal to the *percent rating* multiplied by the total money to invest

To limit the excessiveness of our scripts we have set a limit of six stocks in which it may purchase at any one time. These functions must be executed in this order and if something finishes too quickly, a time is specified in which to start the next phase of the process.

6.2 The Collection and Storage of Data

There are many suppliers of financial trading information on the internet. Together they provide an extreme wealth of data that can be used to help better analyze the financial market. We have broken our data retrieving scripts into two different sections: current day stock information and historical stock information.

Our agent uses several different methods to retrieve and store data in our database; this process is often called data-mining. Our get_info.php script mines from three different resources: *MSN Money*, *Yahoo! Finance* and the *NASDAQ* Market websites. Combined, these web pages provide our autonomous analysis agent with all of the information necessary to adequately evaluate stocks. The values we currently collect and store in our database can be found in Appendix H.

To provide historical stock information, we mine the historical information section at *Yahoo! Finance*. This historical database structure and information is shown in Appendix I. Since these scripts mine from ordinary websites, we have used many advanced techniques in which to scan and retrieve data from them. Two of the techniques can be found below in Figure 22.

A.
/* get_item()

```php
 * Inputs:
 *        $search_text - text to search for
 *        $db_variable_name - name of database variable
 *        $parse - array to search
 *        $query - pass by reference query to update
 *        $offset - number of indices past search string to retrieve
 *
 * Outputs:
 *        returns the query with the updated database variable
 */
function get_item($search_text, $db_variable_name, $parse, &$query, $offset) {
        $flag = 0;
        for ($i=0; $i < count($parse); $i++) {
                if (trim($parse[$i]) == trim($search_text)) { //if found
                        $flag = 1;
                                break;
                }
        }
        if ($flag == 0) { //if never found
                $variable = "NaN";
                //fix variable format
                if ($db_variable_name == "last_trade_time")
                        $variable = correct_last_trade_time($variable);
                        elseif ($db_variable_name == "next_earnings_release")
                        $variable = correct_next_earnings($variable);
                }
                else {
                                $variable = trim($parse[$i + $offset]);

        //fix variable format
        if ($db_variable_name == "last_trade_time")
                $variable = correct_last_trade_time($variable);
                elseif ($db_variable_name == "next_earnings_release")
                $variable = correct_next_earnings($variable);

                $variable = correct_num($variable);
        } //end else

        $query = $query.", ".$db_variable_name."='".$variable."'";
}
```

B.

```php
/* remove_between()
 * Inputs:
 *        $start - line to start remove from
 *        $end - remove up to but not including
 *        $parse - array to update
 *        $offset - number of indices past search string to start removing
 *
 * Outputs:
 *        returns the new array with items removed
 */
function remove_between($start, $end, $parse, $offset) {
        $found_flag = 0;
        for ($i=0; $i < count($parse); $i++) {
                if (trim($parse[$i]) == trim($start)) {
```

```
Si = Si + Soffset; //locate start string
for (Sj=Si; Sj < count($parse); Sj++) {
if (trim($parse[Sj]) == trim($end)) { //located end string
                    $found_flag = 1;
                    break;
                    ;

                }
if ($found_flag == 1) { //only delete space if the end string was found
for (Si; Si < Sj; Si++) //remove between Si and Sj indices
        $parse[Si] = "\n";
            ;
            break; }
        ;
return $parse;
}
```

Figure 22: Sample Data Mining Code

Each function requires that the web page be stored as a variable array, where each spot in the array is a line of the html source code. This array must then be stripped of all html tags except for the <td> cell tag. This tag defines the beginning of any data and we have found this to be the perfect marker for the beginning of any of our necessary information.

The first of the techniques is the get_item() function. This function begins by searching the text array for the description of a value being searched for. This description is passed to the function as the $search_text variable. The corresponding value is passed back in the $db_variable_name. Each time this function finds the value indicated, it adds it to the $query string to later be stored in the database.

The next sample function is used to clean up the text array. It searches through for unnecessary spaces and trims them. This helps when using the get_item() because it enables the script to search each spot in an array easily. These two examples are only a few methods we have used to search, manipulate and store data off of the websites we have chosen to query.

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To retrieve historical stock information we utilize *Yahoo! Finance's* historical section. This section provides historical stock information in a comma separated value format, which has the .csv suffix and stores data with commas as separators. To extract the data from this format, we split each line of the file by commas using PHP's split function. This has been an effective way to retrieve all historical stock information for analysis.

6.3 The Interpretation and Analysis of Data

Our agent's analysis system assigns to each stock a fundamental, technical, and overall rating based on forty-nine separate measures. In theory, the stocks with the highest score will be the stock to purchase.

The analysis system is customizable and flexible to individual users' needs and preferences. A user can change the type of analysis and the analysis emphasis. There are three modes of operation for the analysis system: *ALL*, *INTRADAY*, and *ENDOFDAY*. *ALL* means that the agent will reset the status of all stocks in the database and reanalyze each stock. *INTRADAY* mode will only analyze the stocks that have an *active* status in the database. *ENDOFDAY* mode will analyze all stocks except for those with a status of *ignore_permanent* and will also recalculate the 50, 100, and 200 day moving averages for each stock. In addition to setting the analysis mode, a user can also choose an analysis emphasis. If a fundamental analysis is emphasized then the fundamental rating will have more weight towards the overall rating, if a technical analysis is emphasized then the technical rating will have more weight, and if no emphasis is chosen then the overall rating will simply be the sum of the fundamental and technical ratings.

In addition to selecting these options, the user can also specify some operational parameters. First, a minimum volume can be set and any stock with an average daily volume less that that amount will be ignored. Secondly, the amount of capital available for trading can also be specified to be used later on for calculations. Third, minimum and maximum share prices can be specified; any stock with a price not within these bounds will be ignored. Thirdly, a minimum market capitalization can be set if a user wants to ignore small market caps, such as nano-cap stocks. Finally, a minimum number of shares outstanding can be set so that a stock that does not have at least the given number of shares available will be ignored.

The analysis system assigns each stock a fundamental rating based on forty-two separate measures. At the end of the analysis, the stock with the highest fundamental rating is the company with the most solid fundamental characteristics. The measures and their affect on the fundamental rating are listed below.

1. *Dividend* – If the stock pays a dividend then add 25 points. A stock should be rated higher if they pay a dividend because of the additional income provided to the shareholder.

2. *Purchasable Shares* – Add the number of shares that can be bought. This is calculated by dividing the cash available for trading by the current share price of the stock. A maximum value of 200 points is set so that really cheap stocks do not get enormous rating boosts, which will inflate their fundamental rating.

3. *52 Week Percentage Change* – Add the percentage change for the year with a maximum of 100 and a minimum of -100. A stock is rated higher if the stock has increased within the last year.

4. *Monthly Percentage Change* – If the last three month percentage change is greater than the last six month and twelve month percentage changes then add 50. If the last three month percentage change is only greater than the last six month change percentage change then add 25. If the last three month percentage change is lower than the last six and twelve month percentage changes then minus 50. If the last three month percentage change is only lower than the last six month percentage then minus 25. This point assignment will favor stocks the most that have consistently increased throughout the year.

5. *Institutional Transactions* – If more shares have been purchased then sold then add the percentage of institutional ownership for the stock. If more shares have been sold then minus the percentage of institutional ownership for the stock. If there have been more buyers than sellers than add 50. If there have been more sellers than buyers then minus 50.

6. *1-yr Target Estimate* - Add the amount the current price is off its 1-yr target estimate times five. That is, take the one year target price, subtract

the current share price, and multiply the result by five. The multiplication simply is included to boost the point assignments. If the current stock price is above the one year target estimate then the stock will be rated lower; the higher above the estimate the lower the rating. If the current stock price is below the target estimate then the rating will be increased because analysts are expecting the stock to end the year higher.

7. *Beta* - A beta of one indicates that the security's price will move with the market, and if this is the case then nothing is added or subtracted from the rating. A beta greater than 1 indicates that the security's price will be more volatile than the market, and if this is the case then 50 points are added. A beta less than 1 means that it will be less volatile than the market, and if this is the case then 50 points are subtracted.

8. *Current Price Relative to the Year High/Low* – Add one divided by the year high minus the year low. This point assignment favors stocks whose year high and year low are closer to each other. Also, add the current share price time ten, divided by the year high. The multiplication times ten is simply a scale factor. Stocks who are closer to their year high are favored.

9. *52 Week Change Relative to the S&P 500* - Add half the amount the stock has changed relative to the S&P 500 with a maximum of 200.

10. *Market Capitalization* – If the market cap is between 300,000,000 and

2,000,000,000 then the stock is a small-cap and 10 points are added. If the

market cap is between 2,000,000,000 and 10,000,000,000 then the stock is

a mid-cap and 20 points are added. If the market cap is between

10,000,000,000 and 200,000,000,000 then the stock is a large-cap and 30

points are added. If the market cap is greater than 200,000,000,000 then

the stock is a mega-cap and 40 points are added. Stocks with a market cap

less than 300,000,000, which would classify them as micro-cap or nano-

cap, were ignored for our simulation.

11. *P/E Ratio* – If the P/E Ratio is nonexistent or negative then 250 points are

subtracted because the stock is not profitable. Otherwise, the inverse of the

P/E Ratio time 1000 is added with a maximum set at 100. This approach

will favor smaller P/E Ratios. Also, if the stock's P/E Ratio is less than the

industry's average P/E Ratio then 100 points are added; if it is greater than

the industry average then 100 points are subtracted.

12. *Forward P/E Ratio* – Add the forward P/E ratio minus the current P/E

ratio with a minimum of -50 and a maximum of 50. This approach looks

for a P/E ratio that is expected to decrease in the future.

13. *PEG Ratio* – The point assignment is the same as for the P/E ratio except that a maximum is set at 200 instead of 100. This is because the PEG ratio can be more valuable because it takes into account earnings growth.

14. *PB Ratio* – The point assignment is the same as the P/E ratio.

15. *Price Cashflow Ratio* – The point assignment is the same as the P/E ratio.

16. *Current Ratio* – The point assignment is the same as the P/E Ratio.

17. *Quick Ratio* – The point assignment is the same as the P/E Ratio.

18. *Leverage Ratio* – The point assignment is the same as the P/E Ratio.

19. *PS Ratio* – The point assignment is the same as the P/E Ratio.

20. *Analyst Recommendations* – For this measure, the lower the analyst recommendation the better. First, if the current recommendation is less than the recommendation one month ago then add 50; if it is less then subtract 50. Next, if the current broker recommendations are less than the average recommendations over the past three months then add 50; if it is less, then subtract 50.

21. Short Interest – First, the average short interest is calculated for the past 12 months. If the short interest for one month ago is less than this average then add 50; if it is greater then subtract 50. If the short interest for one month ago is less than the short interest from two months ago and three months ago then add 150; if it is greater then subtract 150. Finally, if the short ratio is greater than 2 then add 200. All of these point assignments favor a stock whose short interest has decreased and signals that less people are shorting. Therefore, more people think the stock is going to increase.

22. *Sales* – If the company's sales are greater than the industry average then add 75; if they are less then subtract 75. If the company's 5-year average sales are greater than the industry average 5-year sales then add 50; if they are less, then subtract 50.

23. *Earnings Estimate* – EPS estimates for this quarter, next quarter, this year, and next year are examined. For each EPS estimate that is greater than 0 then add ten. For each EPS estimate that is less than 0 then subtract 10. If the next quarter's EPS estimate is greater than the current quarter's estimate then add 10; if it is less then subtract 10. If the next year's EPS estimate is greater than the current year's estimate then add 10; if it is less, then subtract 10.

24. *Growth Estimate* – The point assignments are the same as the earnings estimates.

25. *EPS History* – The last five EPS estimates and actual results are examined. For each, if the actual EPS result was greater than the estimate then add 10; if it was less, then subtract 10.

26. *Profit Margin* – Add two times the profit margin with a maximum of 50.

27. *Operating Margin* - Add two times the operating margin with a maximum of 50.

28. *Gross Margin* - Add two times the gross margin with a maximum of 50.

29. *Return on Assets* – Add three times the return on assets with a maximum of 100. If the return on assets is greater than the industry's average then add 50; if it is less then subtract 50. Also, add two times the five year return on assets for the stock with a maximum set at 75. If the five year return on assets is greater than in industry's average then add 50; if it is less, then subtract 50.

30. *Return on Equity* – The point assignments are the same as the return on assets.

31. *Return on Capital* – The point assignments are the same as the return on assets.

32. *Receivable Turnover* – If the stock's receivable turnover is greater than in industry's average receivable turnover then add 50; if it is less, then subtract 50.

33. *Inventory Turnover* – If the inventory turnover is less than 1.5 time the industry's average inventory turnover then add the inventory turnover with a maximum set at 100. Because inventories are the least liquid form of asset, a high inventory turnover ratio is generally positive. On the other hand, an unusually high ratio compared to the average for your industry could mean a business is losing sales because of inadequate stock on hand.

34. *Asset Turnover* – Add the asset turnover with a maximum of 100. If the asset turnover is greater than the industry's average asset turnover then add 50; if it is less, then subtract 50.

35. *Revenue Per Share* – Add five times the revenue per share with a maximum set at 100.

36. *Revenue Growth* – Add forty times the revenue growth with a maximum set at 100.

37. *Earnings Growth* – Add the earnings growth with a maximum set at 250.

38. *Net Income Available to Common Shares* – If the net income is positive then add 50; if it is negative then subtract 50.

39. *Total Cash Per Share* – Add ten times the cash per share with a maximum set at 100.

40. *Debt Equity Ratio* – Add five times the debt equity ratio with a maximum set at 100.

41. *Book Value Per Share* – Add the book value per share with a maximum set at 100. If the book value per share is greater than the industry's average then add 10.

42. *Free Cash Flow* – If free cash flow is greater than 0 then add 10; if it is less, then subtract 10.

The analysis system also assigns each stock a technical rating based on seven separate measures. At the end of the analysis, the stock with the highest technical rating

is the company with the most solid technical characteristics. The measures and their affect on the technical rating are listed below.

1. *Moving Averages* – If the current stock price is above the two-hundred day moving average add 10; if it is less, then subtract 10. If the current stock price is above the one-hundred day moving average add 25; if it is less, then subtract 25. If the current stock price is above the fifty day moving average add 50; if it is less, then subtract 50. If the fifty day moving average is greater than both the one-hundred and two-hundred day moving averages then add 200. If it is only greater than one of them then add 100. Otherwise, subtract 50.

2. *RSI* – If the RSI is less than or equal to thirty then add 75. If it is greater than or equal to seventy then subtract 75.

3. *Relative Strength* – If the last three month relative strength is greater than both the last six month and last twelve month relative strength then add 200. If it is only greater than the last six month relative strength then add 100. If the last three month relative strength is less than both the last six month and last twelve month relative strength then subtract 200. If it is only less than the last six month relative strength then subtract 100.

4. *MFI* - If the MFI is less than or equal to thirty then add 75. If it is greater than or equal to seventy then subtract 75.

5. *Bollinger Bands* – If the current price is close to the lower Bollinger Band then add 75. If it is close to the upper Bollinger Band then subtract 75.

6. *William's %R* – If the Williams's %R is less than or equal to twenty then subtract 50. If it is greater than or equal to eighty then add 50.

7. *ROC* - If the ROC is less than or equal to -5 then add 50. If it is greater than or equal to 5 then subtract 50.

6.4 The Decision and Coordination System

To have all these scripts functioning together at any one time is a large task. There must be a great deal of coordination between the scripts, and since these scripts are not perfect, human intervention is sometimes necessary. To incorporate all of this into our autonomous agent we built a main page, which acts as a control center.

Our main control page is where all the decisions must be made. As shown in Figure 23, this page has several different control options. The *Analysis Type* is used when running the *Analysis Script*. The options: *All, End of Day,* and *Intra-Day* decide whether to run the analysis for all stocks in the database, only stocks labeled "Active" or only owned stocks.

The *Run Status* allows you to either stop or start the currently selected functions. The *Analysis Emphasis* is used to emphasize either the more fundamental or technical analysis techniques. The *Add Money to Investment Capital* is a way to tell your program it may invest more money in the market.

Number of investments is how we limit the excessiveness of the buying. There may be several well-rated stocks in our database, but we would like to keep the program from splitting up the money allocated to it too much. The *Amount of Safe Cash* is how much money should be kept out of the market to be used for trading commissions.

Lastly, the *Scripts to Run* section is used to indicate which scripts should be run. This is a way to control which scripts are running and for how long. This control option page is run by cookies on the user's computer.

Analysis Type: Currently: INTRADAY	Run Status: Currently: STOP	Analysis Emphasis: Currently: NONE	Add Money to Investment Capital: Current Capital: $50000
☐ All ☐ End of Day ☑ Intra-Day	☐ Run ☑ Stop	☐ Fundamental ☐ Technical ☑ None	$ 0
Number of Investments: Currently: 5 5	Amount of Safe Cash: Currently: $0 = 0.00% $ 0	Scripts to Run: Currently Running: ☐ Get Info ☐ Get Info Owned Stocks ☐ Analysis	

Figure 23: Control Options Page

6.5 Autonomous Capabilities

Autonomous Agents have an extreme capability to be the best in the financial market. They can make more decisions in a shorter amount of time than any team of brokers out there. They can also analyze more stocks and keep track of more trends. This is because of the processing power of a computer.

Most brokers run off of the different ratios and trends that they see in the market. This can be watched by a computer by developing best fit curves and analyzing most formula that can have any outlook on the stocks future. However, numbers are not all that the stock market relies on.

Most brokers get a lot of information from reading articles. To add this function in the development of an AI News Article reader is in progress. Artificial Intelligence is the way of the future in many aspects and we feel that one good spot may be our Autonomous Stock Agent. This AI article reader will read the most current articles and scan them for key words that may indicate any positive or negative changes in the market. Based on the words it may find, the amount of them, and also the stocks current condition it will add either a positive or negative rating to its total rating.

Chapter 7

Stock Investment Simulation

7.1 Overview of Simulation

Our simulation was seven weeks long and started on June 1, 2004 and ended on July 20, 2004. The simulation was broken into two major parts: our manual stock picks and our agent's stock picks. Each week both portfolios were examined and, if needed, transactions were made and new investments were chosen. The goal of the simulation was twofold. First, the primary goal was to develop and implement investment strategies (both manual and through the agent) to make a profit and to have a higher percentage return than the market as a whole for the seven weeks. Secondly, we wanted to examine and explore the effectiveness of autonomous trading agents. To do this, the agent's investment simulation was compared both to human counterparts and the market as a whole.

7.2 Manual Investment Strategies

Our manual investment strategy is buy and hold investing. As a result, a stock will be purchased and held until a 12% profit loss occurs or a substantial gain is made. If a gain is made then the sell STOP order will be increased above the initial purchase price, which will ensure a profit. The STOP order will continue to be increased as long as the stock's price increases. The reason we chose to utilize this investment strategy is twofold. Primarily, most investors cannot continually monitor the stock market and manage their

investments on an hourly, daily, or even weekly basis. Consequently, most investors

employ a similar buy and hold strategy. Secondly, it is usually a safer investment strategy

because the most you can lose on any investment is 12%. Also, the possibility of missing

a rally for the stock is minimized since the STOP order is increased. Although, this

strategy may be somewhat safer, it is also harder to make and maintain a profit,

especially in the short term.

We wanted our manual investment portfolio to contain a mix between safer blue-

chip stocks, and riskier, but potentially more profitable, stocks. We looked at both the

fundamental and technical characteristics of a large number of stocks and narrowed them

down to six stocks for investment. For fundamentals we looked for stocks with solid sales

values, ratios, and management effectiveness. We did not want stocks that are not

profitable or have large amounts of debt. On the technical side, we looked at historical

charts in order to find stock trends. We wanted stocks that we thought would rally in the

short seven week investment simulation. We also utilized several technical indicators,

such as the relative strength index, MACD, and moving averages, in order to predict

future trends.

7.3 Agent Investment Strategies

The agent has several potential advantages over humans. For one it can examine

and analyze numerous indicators for every stock listed on the NYSE and NASDAQ fairly

quickly. If our agent's investment strategies are successful then in theory it should be

able to pick successful investments easier than humans. This ability to analyze so many

securities so quickly is the agent's primary strength, and the investment strategy that the

agent employs is somewhat simple. Overall, the agent looks for stocks that have historically performed well against their respective industry, has solid fundamentals such as sales revenue, manageable debt, and positive returns on equity, has strong technical indicators, such as relative strength index and moving averages, and has institutional and insider support. The agent uses forty-nine separate indicators (forty-two fundamental indicators and seven technical indicators) to give each stock a single overall rating. The highest rating is in theory the best stock for investment. The agent will analyze all stocks weekly and will invest in the top six stocks regardless of profit or loss. The only safety feature the agent utilizes is that it issues sell STOP orders at a 12% profit loss at the time of a stock purchase. This will help minimize any potential losses.

Chapter 8

Manual Simulation

8.1 June 1, 2004

8.1.1 Transactions Made

We analyzed and looked at several stocks prior to the start of the simulation. After careful consideration, we decided to invest in the stocks listed in Table 1 below. The percentage of investment into each stock was based solely on which stocks we felt were the strongest and would increase the most.

Symbol	Price at Purchase	# of Shares	Additional Fees	Net Cost
HOTT	$21.68	922	$10.99	$19,999.95
NSM	$21.67	461	$10.99	$10,000.86
NET	$16.65	1200	$10.99	$19,990.99
PEP	$53.37	187	$10.99	$9,991.18
RAD	$5.02	3981	$10.99	$19,995.61
NTGR	$12.14	1646	$10.99	$19,993.43

Table 1: Manual Purchase Transactions for June 1, 2004

The total cost for the six purchase transactions was $99,972.02. Since the initial investment was $100,000, $27.98 in cash was retained in the investment portfolio. We also issued simulated STOP orders at a twelve percent profit loss for each stock. This will allow us to cut any losses that could occur, and these orders are shown below.

Order	Status
Sell 922 shares HOTT @ STOP of $19.09	not filled
Sell 461 shares NSM @ STOP of $19.079	not filled
Sell 1200 shares NET @ STOP of $14.66	not filled
Sell 187 shares PEP @ STOP of $47.02	not filled
Sell 3981 shares RAD @ STOP of $4.42	not filled
Sell 1646 shares NTGR @ STOP of $10.69	not filled

Table 2: Manual Sell STOP Orders for June 1, 2004

8.1.2 Reasons for Stock Picks

The first stock we chose for investment was Hot Topic (HOTT), which had strong fundamental characteristics. The P/E ratio for HOTT was around 20, which could suggest that the stock is undervalued. In addition, HOTT's PEG ratio was 0.67 compared to the industry average of 1.31. Finally, HOTT had no short-term or long-term debt. Figure 24 below shows the price movement for HOTT for the past year.
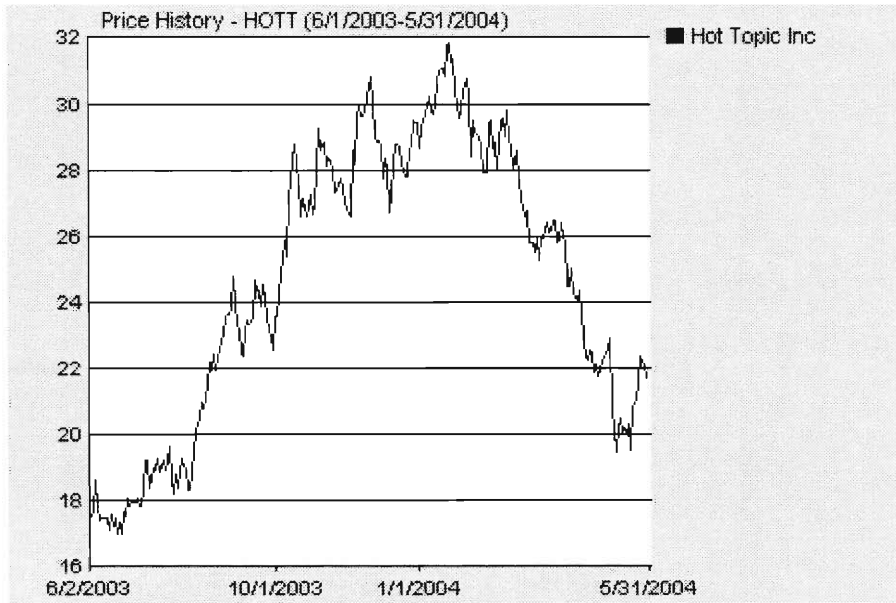
Figure 24: One Year Price Chart for HOTT

It looks like HOTT has reached its low and is now on its rebound. The charts in

Figure 25 below show some technical indicators for HOTT.
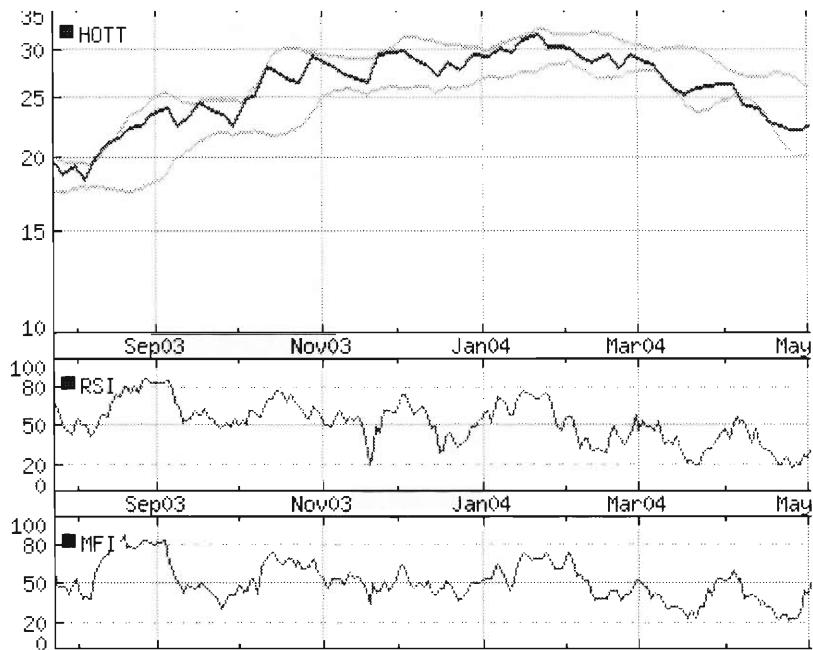
Figure 25: Technical Indicators for HOTT

Both the RSI and MFI are low and have just bounced of a value of twenty, which is a signal to buy. Also, the price of HOTT is leading toward the bottom Bollinger band, which also is a signal to buy.

The next investment was made in National Semiconductor Corporation (NSM), which also had a low P/E and PEG ratio compared to the industry average. NSM was also a fairly large company with a market capitalization of about six billion. NSM's return on both equity and assets was very good, and if you look at the yearly change with respect to the S&P 500 index, NSM has increased nearly 52% more.
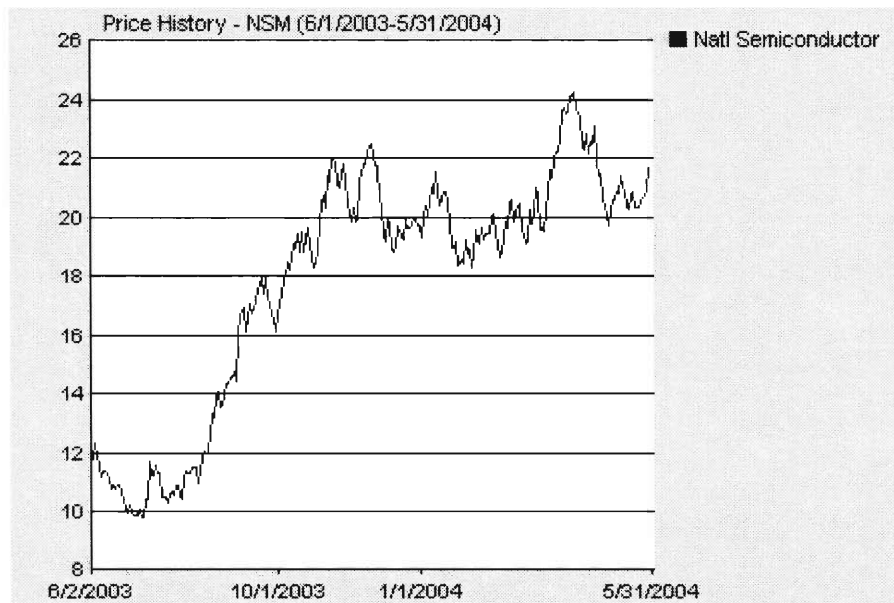
Figure 26: One Year Price Chart for NSM

Figure 26 above shows the one year price history for NSM, and it looks like NSM has just bounced off a relative low and will rise in the near future.
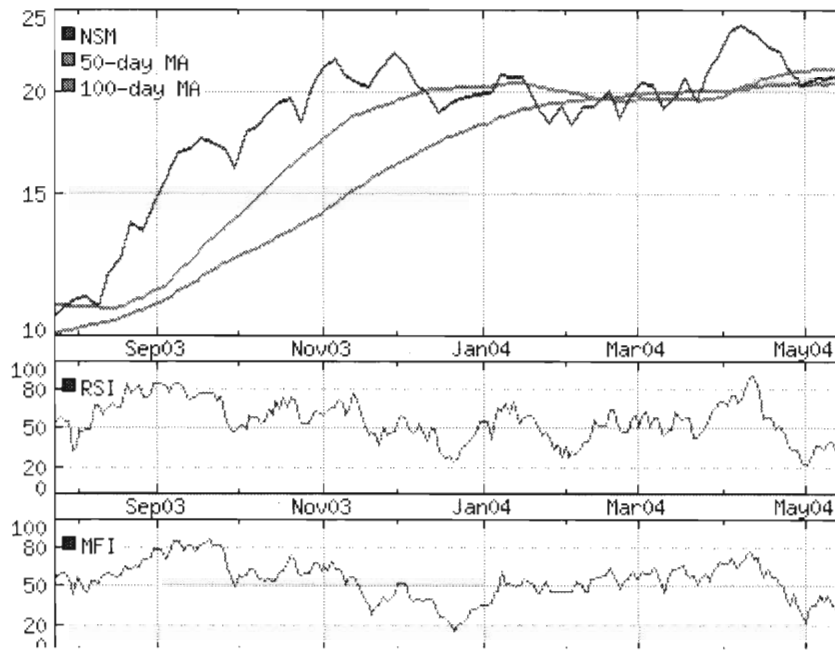
Figure 27: Technical Indicators for NSM

The technical indicators for NSM also indicate that it is a good time to buy. The RSI and MFI both reached the level of twenty, which is a good signal to buy. Also the fifty-day moving average crosses the one-hundred-day moving average, which is an indication that the momentum for the stock is positive.

The third stock we chose to invest in was Network Associates Incorporated (NET). Like the other stocks, NET also had a low P/E ratio. In addition, NET's fifty-two week change relative to the S&P 500 index was substantially high. Also a merger between McAfee and Network Associates was imminent, which would add to the company's profitability. Figure 28 below shows the one year price chart for NET.
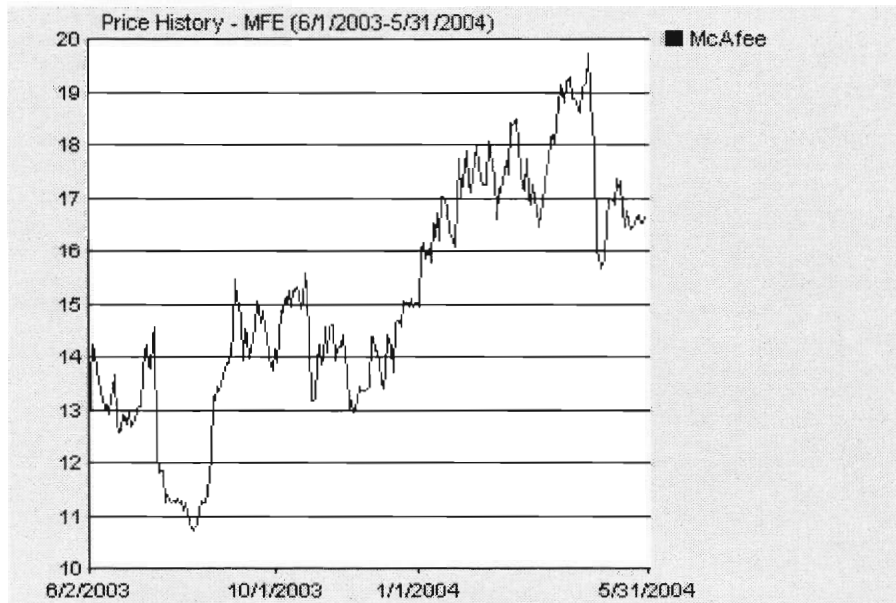
Figure 28: One Year Price Chart for NET
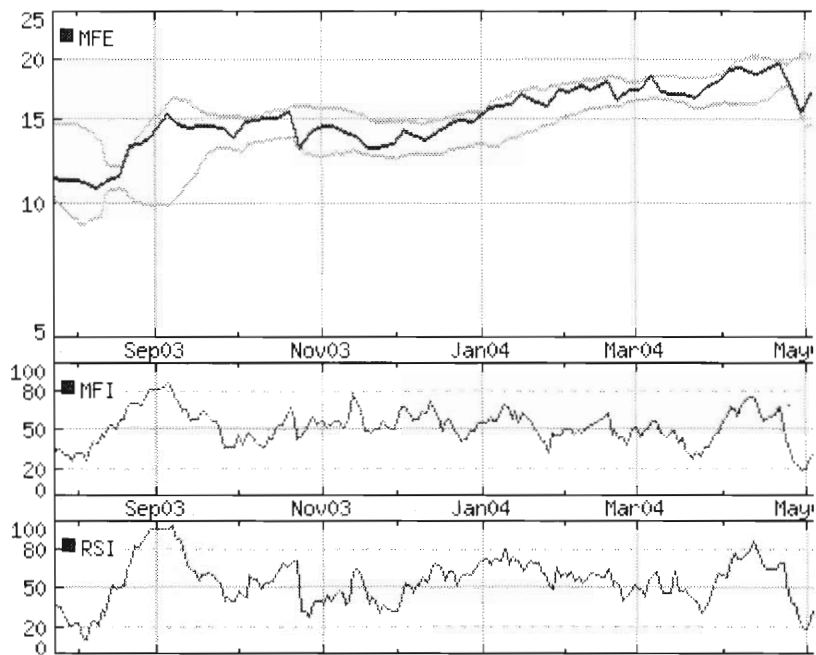
Figure 29: Technical Indicators for NET

Figure 29 above shows the technical indicators for NET, and like the other stocks both the RSI and MFI suggest that NET is a good buy. Also, the share price moved rapidly toward the lower Bollinger Band, which is a sign to buy.

The fourth stock we purchased was PepsiCo Incorporated (PEP), which was the largest company we invested in; PEP has a market cap of 86 billion. PEP was purchased as a safe investment to help balance our portfolio. PEP is a very stable and reliable company that had a relatively low P/E ratio. Also, PEP pays a nice dividend. Figure 30 below shows the one year price chart for PEP and Figure 31 shows some technical indicators for PEP.
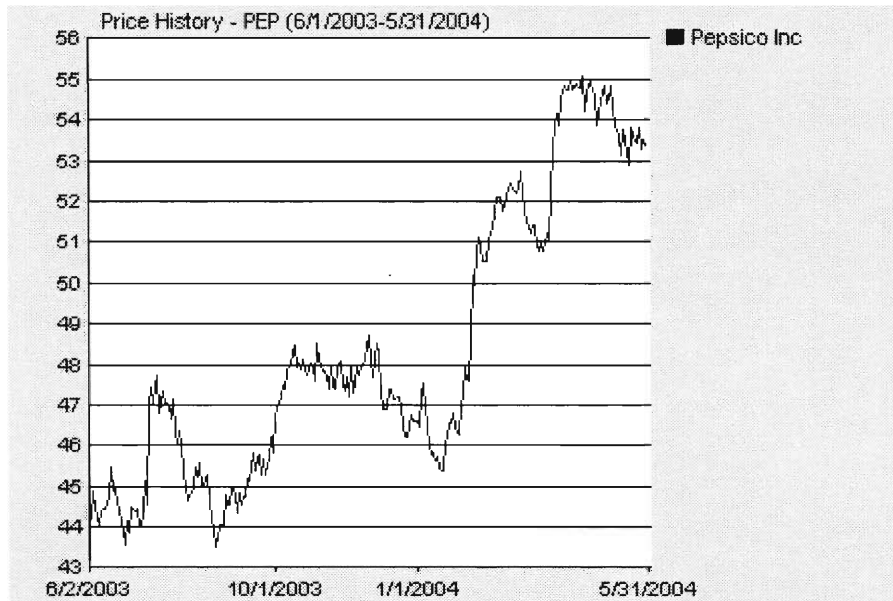
Figure 30: One Year Price Chart for PEP
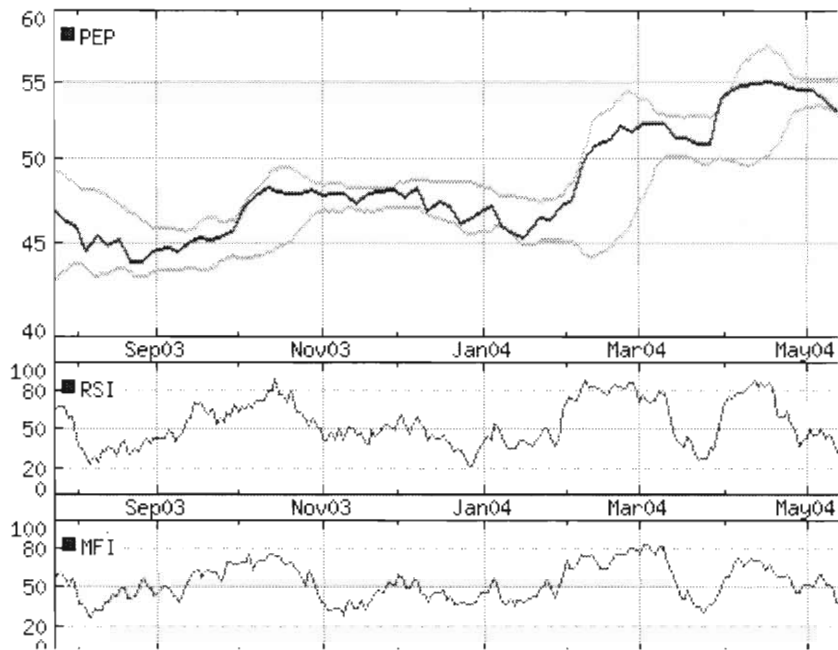
Figure 31: Technical Indicators for PEP

The RSI and MFI index do not strongly indicate either buy or sell for PEP, but the share price is converging with the lower Bollinger Band, which is a signal to purchase.

The fifth stock we invested in was Rite Aid Corporation (RAD). RAD has consistently beat analyst expectations for several quarters, and has a low P/E ratio. In addition, since RAD's share price is low more shares can be purchased and a small price increase can lead to significant profit. The chart displayed in Figure 32 below shows RAD's one year price history. It seems that the stock is bouncing off of a relative low and may return to higher values.
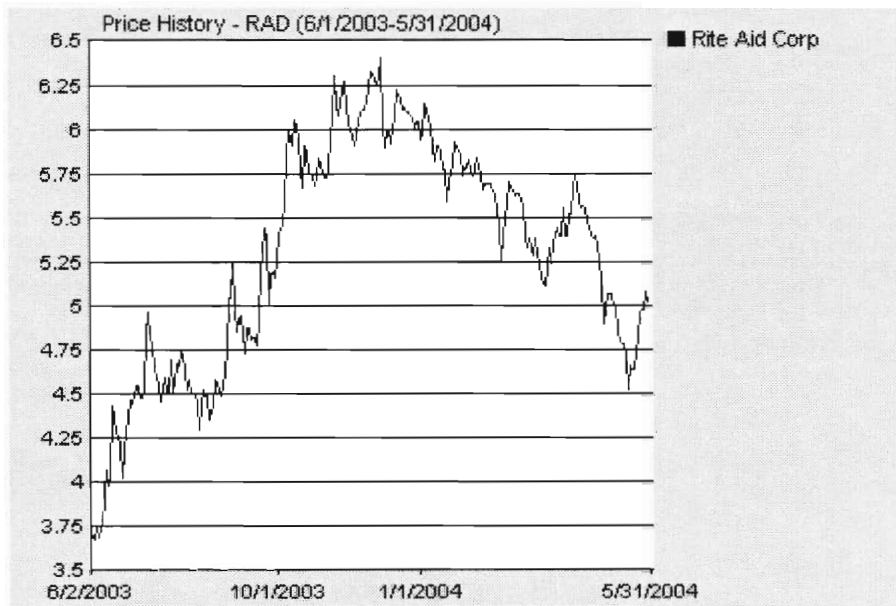
Figure 32: One Year Price Chart for RAD

Figure 33 below shows some technical indicators for RAD. Both the Bollinger Band plot and the Relative Strength Index (RSI) indicate a strong buy.
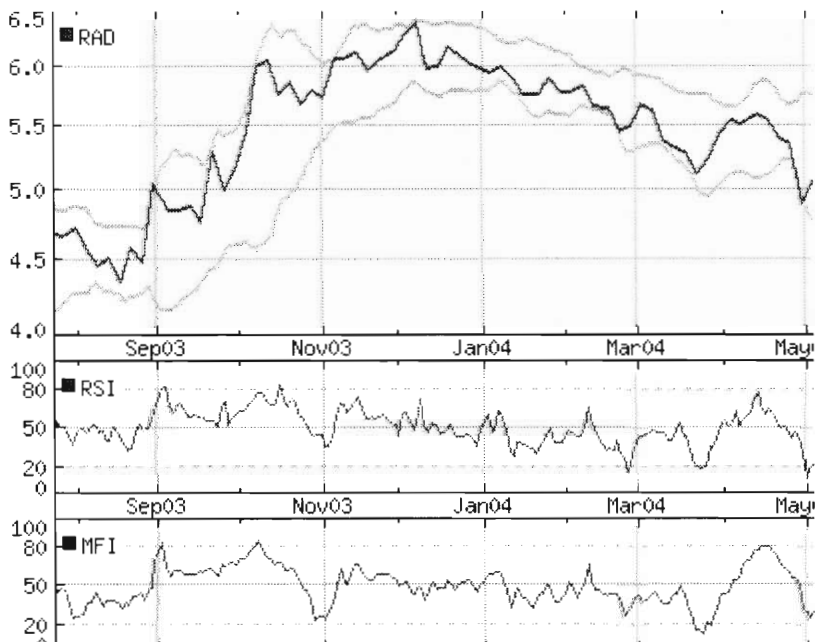
Figure 33: Technical Indicators for RAD

The sixth and final stock we chose to invest in was NetGear Incorporated (NTGR). NTGR is a newer company that specializes in wireless network devices, which has consistently been growing in popularity. The stock has a low P/E ratio, very little debt, and seems to be coming off its 52-week low as Figure 34 below shows.
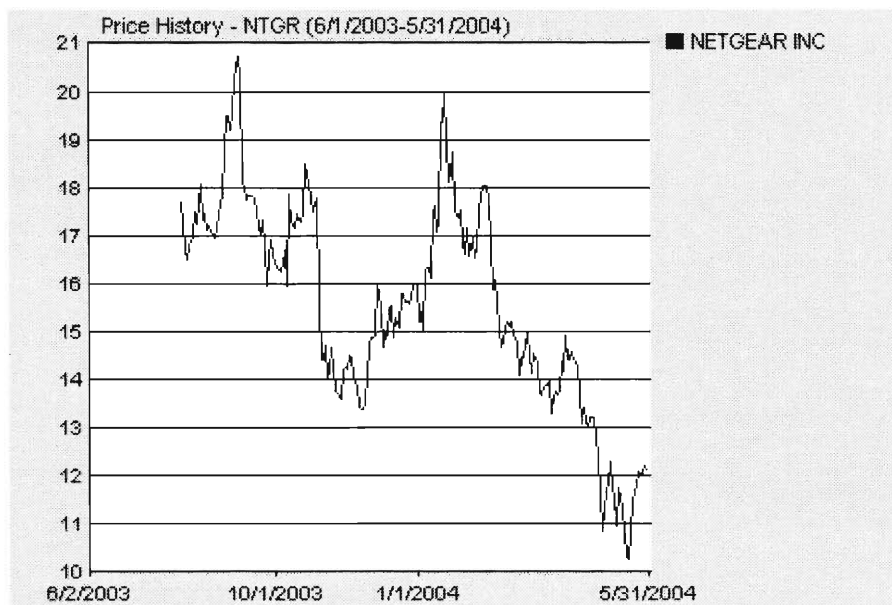
Figure 34: One Year Price Chart for NTGR

The technical characteristics of NTGR are also strong. As shown in Figure 35, the RSI, MFI, and Bollinger Band plot all indicate that it is a good time to buy NTGR stock.
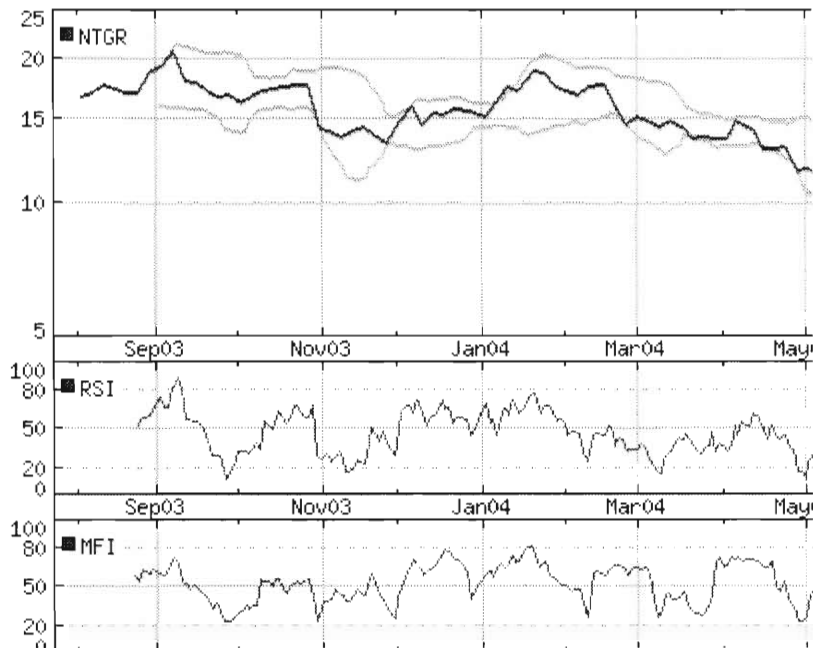
Figure 35: Technical Indicators for NTGR

8.1.3 Company Profiles

Hot Topic Incorporated (HOTT) is part of the services sector, in the retail industry. It is a member of the S&P 600 SmallCap index and traded on NASDAQ. This retail store sells clothing, accessories, gifts, and music for teenagers. Different types of music such as street, retro, punk, club, and gothic are reflected in the merchandise. Hot Topic sells a variety of pop-culture apparel, accessories, and gifts for young people between 12 and 22. It is a mall-based national chain shop with over 500 stores in 49 states.[63]

National Semiconductor Corporation (NSM) is part of the technology sector, in the semiconductors industry. It is a member of the S&P 500 index. The company designs, develops, manufactures, and markets different semiconductor products. Among these include analog, digital, mixed signal, and other integrated circuits. The company

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[63] "About Us," *Hot Topic*, http://www.hottopic.com/services/Aboutus.asp?LS=0&, June 2, 2004.

combines analog and digital technology to produce analog-based semiconductor products. The target markets they have products in are amplifiers, display drivers, personal computers, local and wide area networks, flat panel and cathode ray tube displays, and wireless communications. There are five groups of operation in the company including the Analog Group, the Displays Group, the Information Appliance and Wireless Group, the Wired Communications Group, and the Custom Solutions Group.[64]

Network Associates Incorporated (NET) is part of the technology sector, in the software and programming industry. It is a member of the S&P 400 MidCap and AMEX Internet indexes and traded in the NYSE. Network Associates was recently purchased by McAfee. The company develops computer security solutions to prevent network and computer system intrusion from attacks and other threats and offers their products to enterprises, governments, businesses, and consumers. They have two different product types, the McAfee System Protection Solutions for anti-virus and security products for desktops and servers, and the McAfee Network Protection Solutions for the performance and security of corporate networks. They also have Technical Support for assistance in installation, configuration and implementation of their products. There are company locations in North America, Europe, the Middle East, Africa, Japan, Asia-Pacific, and Latin America.[65]

PepsiCo Incorporated (PEP) is part of the consumer non-cyclical sector, in the non-alcoholic beverages industry. It is a member of the S&P 500 index. They manufacture, market, and sell different convenience snacks, carbonated and non-

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[64] "Corporate Information About National," *National Semiconductor*, http://www.national.com/about/, June 2, 2004.
[65] "About Us," *McAfee*, http://www.nai.com/us/about/home.htm, June 2, 2004.

carbonated beverages, and foods. They company has four different divisions, including

Frito-Lay North America, PepsiCo Beverages North America (which includes Pepsi-Cola

North America and Gatorade/Tropicana North America), PepsiCo International and

Quaker Foods North America. PepsiCo products are found in almost 200 countries. The

company has revenue of about 27 billion dollars.[66]

Rite Aid Corporation (RAD) is part of the services sector, in the drug retail

industry. The retail drugstore chain has about 3,400 stores in 28 states. In addition to

prescription drugs, the store sells a variety of other items such as over-the-counter

medications, health and beauty aids, personal care items, cosmetics, household items,

beverages, convenience foods, greeting cards, and photo processing. The company has

total sales on 16.5 billion dollars at the end of the 2004 fiscal year.[67]

NetGear Incorporated (NTGR) is part of the technology sector, in the

communications equipment industry. It is traded in NASDAQ. The company designs,

develops, and markets networking products for small businesses and consumers. They

sell about 100 different products to enable users to share Internet access, peripherals,

files, and digital multimedia through personal computers. Their products are in three

different categories for small businesses and the home including Ethernet networking

products, broadband products, and wireless networking products such as adapters and

wireless routers. The company has shipped over 17 million units to over 3,900 retailers in

North America such as Best Buy, CompUSA, Office Depot, Staples, over 2,500

international retailers such as PC World in England and MediaMarkt in Germany, and

[66] "Overview," *Pepsico,* http://www.pepsico.com/company/overview.shtml, June 2, 2004.
[67] "Our Company," *Rite Aid,* http://www.riteaid.com/company_info/index.php, June 2, 2004.

online retailers such as Amazon.com and Buy.com. They also sell their products to broadband service companies like Time-Warner Cable and Comcast.[68]

8.2 June 8, 2004

8.2.1 Previous Week's Results and Analysis

The results that follow are for the week ranging from June 1, 2004 to June 8, 2004. All calculations were done before any transactions took place for June 8, 2004. For the week, the stock market as a whole went up. The Dow Jones Industrial Average increased from 10,187.18 to 10,391.08 (+1.96%), the S&P 500 increased from 1,117.98 to 1,140.42 (+1.97%), and the NASDAQ increased from 1,978.52 to 2,020.62 (+2.08%). For the week, our manual stock picks portfolio increased from $100,000 to $101,469.21. This is a profit of $1,469.21, which is an increase of 1.45%. Overall, four out of our six stocks increased. The individual stock results are shown in Table 3 below.

Symbol	Previous Week's Value	This Week's Value	Weekly Profit/Loss (excluding commissions)
HOTT	$19,988.96	$18,983.98	($1,004.98)
NSM	$9,989.87	$10,142.00	$152.13
NET	$19,980.00	$21,264.00	$1,284.00
PEP	$9,980.19	$10,223.29	$243.10
RAD	$19,984.62	$19,347.66	($636.96)
NTGR	$19,982.44	$21,480.30	$1,497.86

Table 3: Manual Weekly Change for the Week Ranging from June 1, 2004 to June 8, 2004

Symbol	Last Price	Purchase Price	Shares	Profit/Loss (including commissions)	Notes
HOTT	$20.59	$21.68	922	($1,015.97)	
NSM	$22.00	$21.67	461	$141.14	
NET	$17.72	$16.65	1200	$1,273.01	
PEP	$54.67	$53.37	187	$232.11	
RAD	$4.86	$5.02	3981	($647.95)	

[68] "Corporate Overview," *NETGEAR*, http://investor.netgear.com/overview.cfm, June 2, 2004.

NTGR	$13.05	$12.14	1646	$1,486.87	
Cash in portfolio: $27.98					

Table 4: Manual Results as of June 8, 2004

8.2.2 Transactions Made

During the previous week (ranging from June 1, 2004 to June 8, 2004) none of the stock prices fell low enough to activate the STOP orders issued on June 1, 2004. Two stocks, NTGR and NET, increased significantly. Therefore, we decided to move their STOP orders up above the purchase price. By doing this, we ensure profits even if the stock drops. We set the new STOP orders to ensure a profit 50% below the current profit. For example, we made a profit of $1,497.86 on NTGR, and 50% of this profit divided by 1,646 shares would be $0.46. This amount is then added to the purchase price to determine the new STOP price. The STOP orders that were altered are shown below.

Order	Status
Sell 1200 shares NET @ STOP of $17.19	not filled
Sell 1646 shares NTGR @ STOP of $12.60	not filled

Table 5: Altered Sell STOP Orders for June 8, 2004

Since no stocks were sold the previous week, no new stocks were purchased on June 8, 2004. The following STOP orders remained from last week.

Order	Status
Sell 922 shares HOTT @ STOP of $19.09	not filled
Sell 461 shares NSM @ STOP of $19.079	not filled
Sell 187 shares PEP @ STOP of $47.02	not filled
Sell 3981 shares RAD @ STOP of $4.42	not filled

Table 6: Manual Previously Issued Sell STOP orders for June 8, 2004

8.3 June 15, 2004

8.3.1 Previous Week's Results and Analysis

For the week ranging from June 8, 2004 to June 15, 2004 the stock market as a whole went down. The Dow Jones Industrial Average went down from 10,391.08 to 10,334.73 (-0.55%), the S&P 500 decreased from 1,140.42 to 1,125.29 (-1.34%), and the NASDAQ decreased from 2,020.62 to 1,969.99 (-2.57%).

On June 9th PepsiCo Inc. (PEP) paid a $0.23 dividend; we owned 187 shares, which gave us a $43.01. On June 10th, NET fell and its STOP order was activated at $17.19. Since NET sold, we invested in new stock, STST; this investment and transaction is detailed in section 8.3.2.

For the week our manual stock portfolio decreased from $101,469.21 to $98,065.85. This is a $3,403.36 (-3.47%) decrease for the week. Overall, for the simulation as of June 15, 2004, our manual simulation portfolio has decreased $1,934.15 (-1.97%).

Symbol	Previous Week's Value	This Week's Value	Weekly Profit/Loss (excluding commissions)
HOTT	$18,983.98	$18,274.04	($709.94)
NSM	$10,142.00	$9,542.70	($599.30)
PEP	$10,223.29	$10,221.42	($1.87)
RAD	$19,347.66	$18,710.70	($636.96)
NTGR	$21,480.30	$21,184.02	($296.28)
STST	$20,673.52	$20,129.48	($544.04)

Table 7: Weekly Change for the Week Ranging from June 8, 2004 to June 15, 2004

Symbol	Last Price	Purchase Price	Shares	Profit/Loss (including commissions)	Notes
NET	$17.19	$16.65	1200	$626.02	Sold on 6/10/04
HOTT	$19.82	$21.68	922	($1,725.91)	
NSM	$20.70	$21.67	461	($458.16)	
PEP	$54.66	$53.37	187	$273.25	$0.23 dividend paid on 6/9

RAD	$4.70	$5.02	3981	($1,284.91)	
NTGR	$12.87	$12.14	1646	$1,190.59	
STST	$21.46	$22.04	938	($555.03)	Bought on 6/10/2004
Cash in portfolio: $3.49					

Table 8: Manual Results as of June 15, 2004

8.3.2 Transactions Made

Symbol	Purchase Date	Purchase Price	Shares	Net Cost	Price Sold	Value Sold	Profit/Loss
NET	06/01/04	$16.65	1200	$19,990.99	$17.19	$20,617.01	$626.02

Table 9: Manual Sell Transactions for the Week Ranging from June 8, 2004 to June 15, 2004

Symbol	Purchase Date	Purchase price	# of Shares	Additional Fees	Net Cost
STST	06/10/04	$22.04	938	$10.99	$20,684.51

Table 10: Manual Purchase Transactions for the Week Ranging from June 8, 2004 to June 15, 2004

Order	Status
Sell 1200 shares NET @ STOP of $17.19	filled on 6/10/04
Sell 938 shares STST @ STOP of $19.39	not filled

Table 11: Manual Sell STOP Orders for the Week Ranging from June 8, 2004 to June 15, 2004

8.3.3 Reasons for Stock Picks

The new stock that was bought this week was Sensytech Incorporated (STST).

The one year price chart for STST is shown in Figure 36 below. It differs from our

previous investments in that it is currently at or near its 52-week high. The reason we

chose this stock is because this trend looks like it will continue.
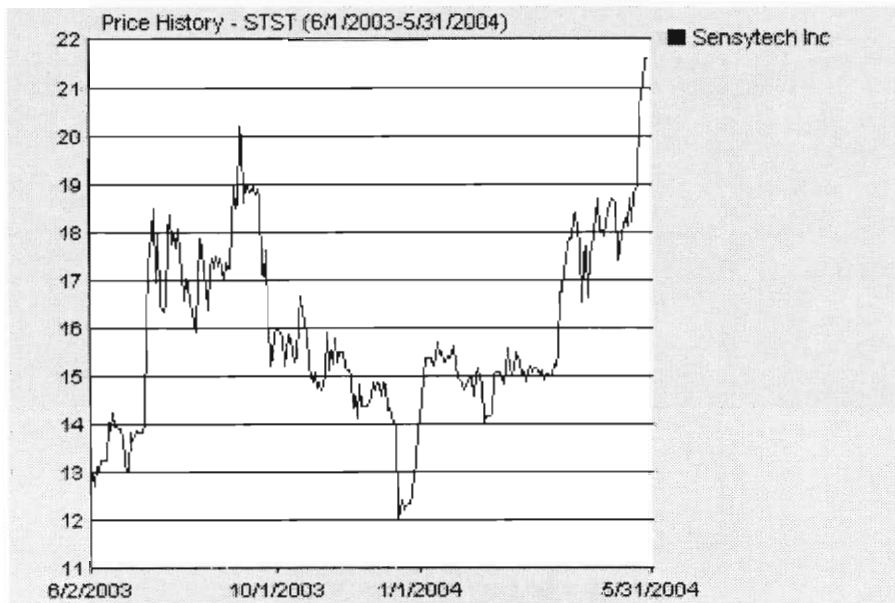
Figure 36: One Year Price Chart for STST

The company has no short-term or long-term debt. Also, the company has very

effective management as indicated by the good returns on both equity and assets. The

moving averages for STST, shown in Figure 37, also indicate that it is a good buy at this

time. The lower moving averages cross all of the higher ones and the share price has risen

and remains above the moving averages

Figure 37: Technical Indicators for STST
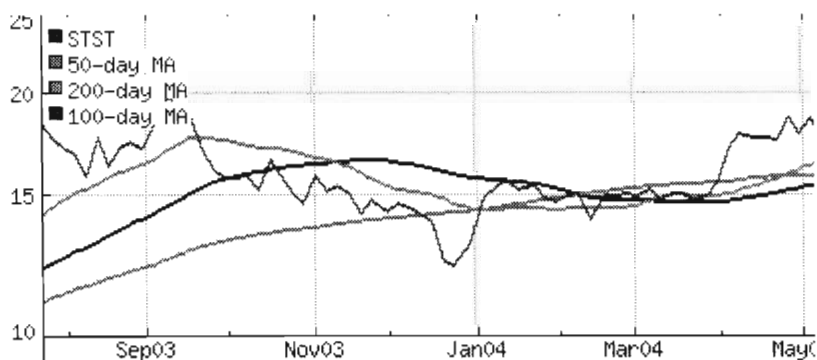
8.3.4 Company Profiles

Sensytech Incorporated (STST) is a member of the capital goods sector, in the
aerospace and defense industry. The company designs, develops, and manufactures
electronics and technology products for defense and intelligence markets. They specialize
in integrated passive surveillance, communications and data links, electronic
countermeasures and threat simulator systems, and airborne imaging and scanning
systems. The United States Department of Defense, other United States federal
government agencies, Lockheed Martin Corporation, foreign governments, agencies, and
defense contractors are among their customers. The United States federal government
intelligence agencies and other approved international agencies use their products in their
defense programs.[69]

8.4 June 22, 2004

8.4.1 Previous Week's Results and Analysis

For the week ranging from June 15, 2004 to June 22, 2004 the stock market as a
whole went up slightly. The Dow Jones Industrial Average went up from 10,334.73 to
10,371.47` (+0.35%), the S&P 500 increased from 1,125.29 to 1,130.30 (+0.44%), and
the NASDAQ went up from 1,969.99 to 1974.38 (+0.22%).

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[69] "Corporate Profile," *SenSyTech*, http://www.sensystech.com/corpinfo.html, June 17, 2004.

On June 17th NTGR fell and its STOP order was activated at $12.60, and on June 21st HOT fell and its STOP order was activated at $19.09. Since these two stocks sold, we invested in two new stocks, OCA and BIV; these investments and transactions are detailed in section 8.4.2.

For the week our manual stock portfolio increased from $98,065.85 to $98,438.31. This is a $372.46 (0.38%) increase for the week. Overall, for the simulation as of June 22, 2004, our manual simulation portfolio has decreased $1,561.69 (-1.59%).

Symbol	Previous Week's Value	This Week's Value	Weekly Profit/Loss (excluding commissions)
NSM	$9,542.70	$9,339.86	($202.84)
PEP	$10,221.42	$10,266.30	$4.88
RAD	$18,710.70	$19,745.76	$1,035.06
STST	$20,129.48	$20,917.40	$787.92
OCA	$20,718.18	$20,797.56	$79.38
BIV	$17,576.75	$17,366.25	($210.50)

Table 12: Manual Weekly Change for the Week Ranging from June 15, 2004 to June 22, 2004

Symbol	Last Price	Purchase Price	Shares	Profit/Loss (including commissions)	Notes
NET	$17.19	$16.65	1200	$626.02	Sold on 6/10/04
NTGR	$12.60	$12.14	1646	$735.18	Sold on 6/17/04
HOTT	$19.09	$21.68	922	($2,409.96)	Sold on 6/21/04
NSM	$20.26	$21.67	461	($661.00)	
PEP	$54.90	$53.37	187	$318.13	$0.23 dividend paid on 6/9/04
RAD	$4.96	$5.02	3981	($249.85)	
STST	$22.30	$22.04	938	$232.89	
OCA	$7.86	$7.83	2646	$68.39	Bought on 6/17/04
BIV	$8.25	$8.35	2105	($221.49)	Bought on 6/21/04
Cash in portfolio: $5.18					

Table 13: Manual Results as of June 22, 2004

8.4.2 Transactions Made

Symbol	Purchase	Purchase	Shares	Net Cost	Price	Value	Profit/Loss

	Date	Price			Sold	Sold	
NTGR	06/01/04	$12.14	1646	$19,971.45	$12.60	$20,728.61	$757.16
HOTT	06/01/04	$21.68	922	$19,977.97	$19.09	$17,589.99	($2,387.98)

Table 14: Manual Sell Transactions for the Week Ranging from June 15, 2004 to June 22, 2004

Symbol	Purchase Date	Purchase Price	# of Shares	Additional Fees	Net Cost
OCA	06/17/04	$7.83	2646	$10.99	$20,729.17
BIV	06/21/04	$8.35	2105	$10.99	$17,587.74

Table 15: Purchase Transactions for the Week Ranging from June 15, 2004 to June 22, 2004

Order	Status
Sell 1646 shares NTGR @ STOP of $12.60	filled on 6/17/04
Sell 922 shares HOTT @ STOP of $19.09	filled on 6/21/04
Sell 2646 shares OCA @ STOP of $6.89	not filled
Sell 2105 shares BIV @ STOP of $7.35	not filled

Table 16: Manual Sell STOP Orders for the Week Ranging from June 15, 2004 to June 22, 2004

8.4.3 Reasons for Stock Picks

The first stock purchased was Orthodontic Centers of America, Inc. (OCA), which has a low share price and a low P/E and PEG ratio compared to the industry average. The technical analysis of this stock was the primary impetus for our purchase. As Figure 38 below shows the RSI and MFI are both near the level of 20, which is a strong indication to buy. The current share price is near the lower Bollinger Band, which also is a signal to buy.
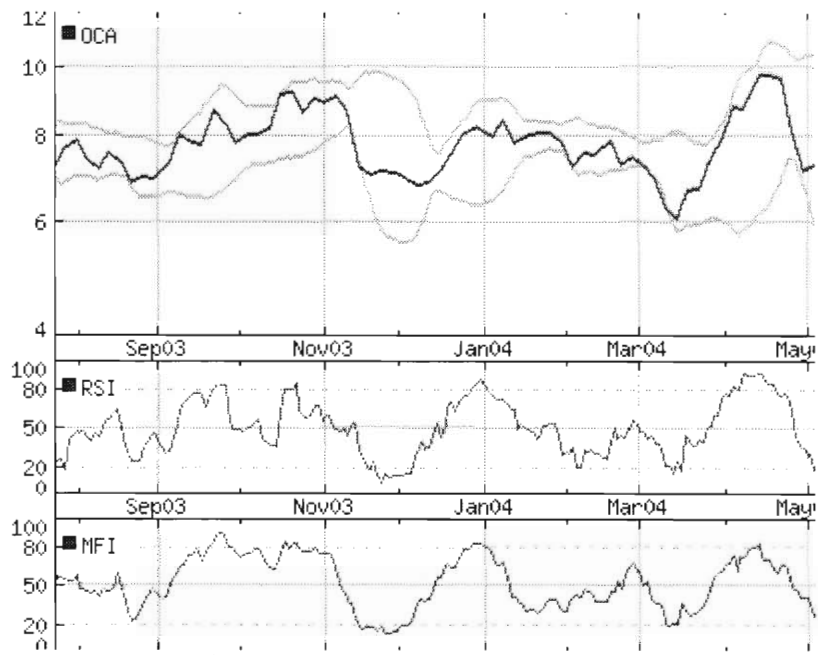
Figure 38: Technical Indicators for OCA

The second stock we invested in was Bioenvision Inc. (BIV). The one year price history is shown below in Figure 39. The stock reached its high and then dropped slightly when people sold to make a profit. The stock is now beginning to increases again, and there is no indication that this trend will stop.
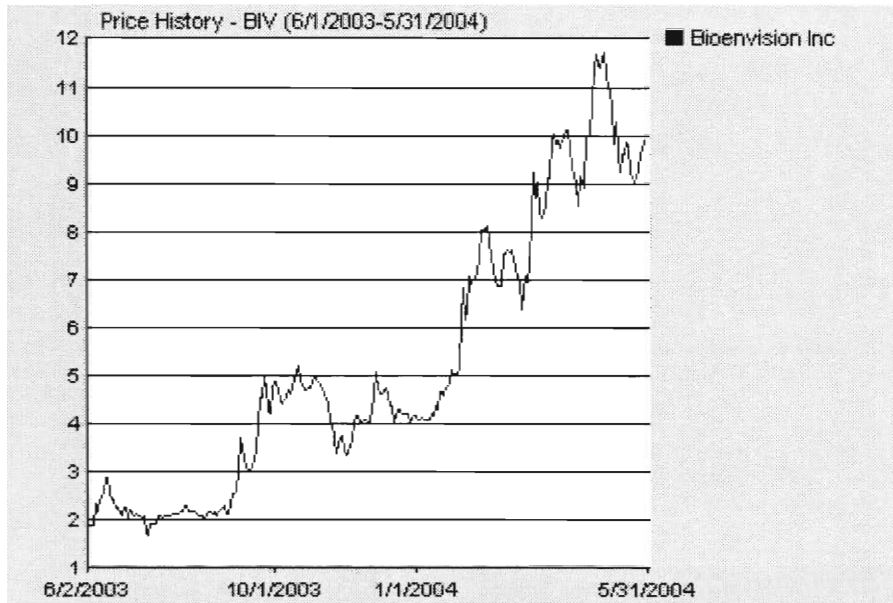
Figure 39: One Year Price Chart for BIV

The moving averages, which are shown in Figure 40 below, are indicative of our prediction. All of the lower moving averages are significantly above the higher moving averages. This indicates that the stock has consistently been going up, and since there have been no crossovers between the different moving averages and the current stock price, there is no reason to think this trend will stop.
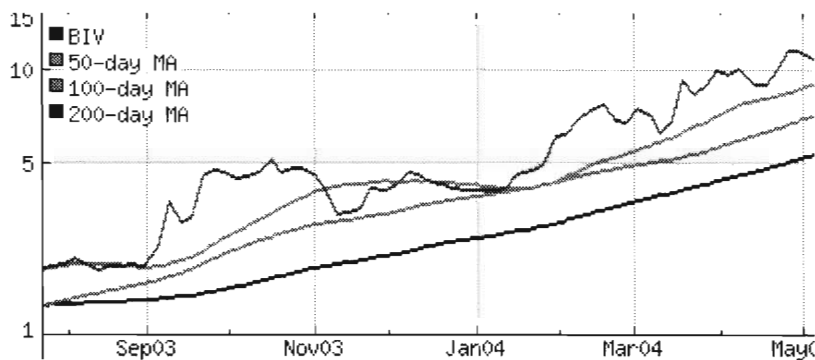
Figure 40: Technical Indicators for BIV

8.4.4 Company Profiles

Orthodontic Centers of America, Inc. (OCA) is a service provider for dental services and is traded on the NYSE. They are part of the healthcare sector and healthcare facilities industry. OCA is also a member of the S&P 600 SmallCap Index. The company was founded in 1985, and they have 371 practices throughout United States and parts of Japan, Mexico, Spain and Puerto Rico. Orthodontic Centers of America, Inc. was founded in 1985.[70]

Bioenvision Inc. (BIV) is in the healthcare sector and the biotechnology and drug industry; BIV is a member of the American Stock Exchange (AMEX). Bioenvision a biopharmaceutical company whose primary business practices included the acquisition, development and distribution of drugs to treat cancer. The company was founded in 1998. Bioenvision has taken part in the research for a wide range of solid tumors (including breast, prostate, colorectal, pancreatic and bladder) and hematologic malignancies (including acute myeloid leukemia, acute lymphocytic leukemia, chronic lymphocytic leukemia and lymphoma).[71]

8.5 June 29, 2004

8.5.1 Previous Week's Results and Analysis

For the week ranging from June 22, 2004 to June 29, 2004, the stock market as a whole was mixed. The Dow Jones Industrial Average decreased from 10,371.47 to 10,357.09 (-0.14%), the S&P 500 increased from 1,130.30 to 1,133.35 (+0.27%), and the NASDAQ went up from 1974.38 to 2,019.82 (+2.25%).

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[70] "Corporate Profile," *1-800-4Braces*, http://ir.thomsonfn.com/InvestorRelations/PubCorporateOverview.aspx?partner=8343, June 24, 2004.
[71] "Welcome," *Bioenvision*, http://www.bioenvision.com/, June 24, 2004.

During the week, none of the stocks fell low enough to activate any STOP orders. For the week, our manual stock portfolio increased from $98,438.31 to $102,957.42. This is a $4,519.11 (+4.39%) increase for the week. Overall, for the simulation as of June 29, 2004, our manual simulation portfolio has increased $2,957.42 (+2.87%).

Symbol	Previous Week's Value	This Week's Value	Weekly Profit/Loss (excluding commissions)
NSM	$9,339.86	$9,681.00	$341.14
PEP	$10,266.30	$10,129.79	($136.51)
RAD	$19,745.76	$21,298.35	$1,552.59
STST	$20,917.40	$21,677.18	$759.78
OCA	$20,797.56	$21,220.92	$423.36
BIV	$17,366.25	$18,945.00	$1,578.75

Table 17: Manual Weekly Change for the Week Ranging from June 22, 2004 to June 29, 2004

Symbol	Last Price	Purchase Price	Shares	Profit/Loss (including commissions)	Notes
NET	$17.19	$16.65	1200	$626.02	Sold on 6/10/04
NTGR	$12.60	$12.14	1646	$735.18	Sold on 6/17/04
HOTT	$19.09	$21.68	922	($2,409.96)	Sold on 6/21/04
NSM	$21.00	$21.67	461	($319.86)	
PEP	$54.17	$53.37	187	$181.62	$0.23 dividend paid on 6/9/04
RAD	$5.35	$5.02	3981	$1,302.74	
STST	$23.11	$22.04	938	$992.67	
OCA	$8.02	$7.83	2646	$491.75	
BIV	$9.00	$8.35	2105	$1,357.26	
Cash in portfolio: $5.18					

Table 18: Manual Results as of June 29, 2004

8.5.2 Transactions Made

During the previous week, ranging from June 22, 2004 to June 29, 2004, none of the stocks fell low enough to activate the STOP orders. Two stocks, RAD and BIV, increased significantly. Therefore, we decided to move their STOP orders up above the purchase price. By doing this we ensure profits even if the stock drops. We set the new

STOP orders to ensure a profit 50% below the current profit. The STOP orders that were altered are shown below.

Order	Status
Sell 3981 shares RAD @ STOP of $5.19	not filled
Sell 2105 shares BIV @ STOP of 8.68	not filled

Table 19: Manual Altered Sell STOP Orders for June 29, 2004

Since no stocks were sold the previous week, no new stocks were purchased on June 29, 2004. The following STOP orders remained from last week.

Order	Status
Sell 2646 shares OCA @ STOP of $6.89	not filled
Sell 461 shares NSM @ STOP of $19.079	not filled
Sell 187 shares PEP @ STOP of $47.02	not filled
Sell 938 shares STST @ STOP of $19.39	not filled

Table 20: Manual Previously Issued Sell STOP orders for June 29, 2004

8.6 July 6, 2004

8.6.1 Previous Week's Results and Analysis

For the week ranging from June 29, 2004 to July 6, 2004, the stock market as a whole went down. The Dow Jones Industrial Average decreased from 10,357.09 to 10,282.83 (-0.72%), the S&P 500 decreased from 1,133.35 to 1,125.38 (-0.71%), and the NASDAQ went down from 2,019.82 to 2,006.66 (-0.66%).

On June 30th RAD fell low enough to activate its sell STOP order at $5.19. For the week, our manual stock portfolio decreased from $102,957.42 to 101,422.63. This is a $1,534.79 (-1.51%) decrease for the week. Overall, for the simulation as of July 6, 2004, our manual simulation portfolio has increased $1,422.63 (+1.40%).

Symbol	Previous Week's Value	This Week's Value	Weekly Profit/Loss (excluding commissions)
NSM	$9,681.00	$9,362.91	($318.09)
PEP	$10,129.79	$9,955.88	($173.91)
BXG	$20,641.50	$21,054.33	$412.83
STST	$21,677.18	$21,461.44	($215.74)
OCA	$21,220.92	$20,850.48	($370.44)
BIV	$18,945.00	$18,734.50	($210.50)

Table 21: Manual Weekly Change for the Week Ranging from June 29, 2004 to July 6, 2004

Symbol	Last Price	Purchase Price	Shares	Profit/Loss (including commissions)	Notes
NET	$17.19	$16.65	1200	$626.02	Sold on 6/10/04
NTGR	$12.60	$12.14	1646	$735.18	Sold on 6/17/04
HOTT	$19.09	$21.68	922	($2,409.96)	Sold on 6/21/04
RAD	$5.19	$5.02	3981	$654.79	Sold on 6/30/04
NSM	$20.31	$21.67	461	($637.95)	
PEP	$53.24	$53.37	187	$7.71	$0.23 dividend paid on 6/9/04
BXG	$13.77	$13.50	1529	$401.84	Bought on 6/30/04
STST	$22.88	$22.04	938	$776.93	
OCA	$7.88	$7.83	2646	$121.31	
BIV	$8.90	$8.35	2105	$1,146.76	
Cash in portfolio: $3.09					

Table 22: Manual Results as of July 6, 2004

8.6.2 Transactions Made

Symbol	Purchase Date	Purchase Price	Shares	Net Cost	Price Sold	Value Sold	Profit/Loss
RAD	06/01/04	$5.02	3981	$19,995.61	$5.19	$20,650.40	$654.79

Table 23: Manual Sell Transactions for the Week Ranging from June 29, 2004 to July 6, 2004

Symbol	Purchase Date	Purchase Price	# of Shares	Additional Fees	Net Cost
BXG	06/30/04	$13.50	1529	$10.99	$20,652.49

Table 24: Purchase Transactions for the Week Ranging from June 29, 2004 to July 6, 2004

Table 25 below shows the STOP orders for the week. A new order was issued for BXG at a 12% loss below the purchase price.

Order	Status
Sell 3981 shares RAD @ STOP of $5.19	filled on 6/30/04
Sell 1529 shares BXG @ STOP of $11.88	not filled

Table 25: Manual Sell STOP Orders for the Week Ranging from June 29, 2004 to July 6, 2004

8.6.3 Reasons for Stock Picks

The new stock we invested in was Bluegreen Corporation (BXG). The fundamentals for BXG are strong in that its P/E and PEG ratios are low, the company has little debt, and it has a good return on both equity and assets. The one year price history for BXG is shown in Figure 41 below. It looks like BXG reached its high, experienced a short period of selling, but is now beginning to bounce back and increase again.
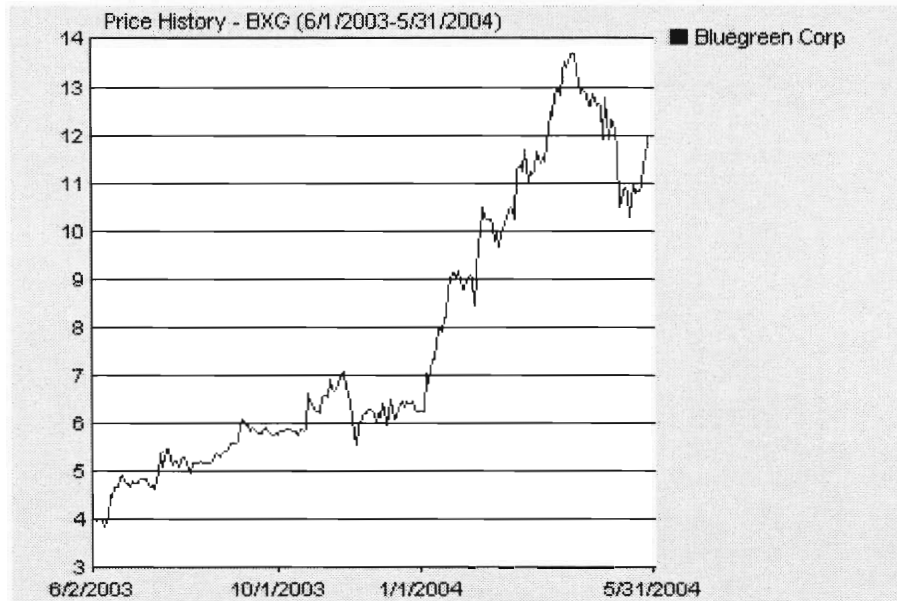
Figure 41: One Year Price Chart for BXG

The technical indicators for BXG are shown in Figure 42. The RSI and MFI both indicate that it is a good time to purchase the stock. Also, the current stock price is falling toward the lower Bollinger Band, which is a signal to buy.
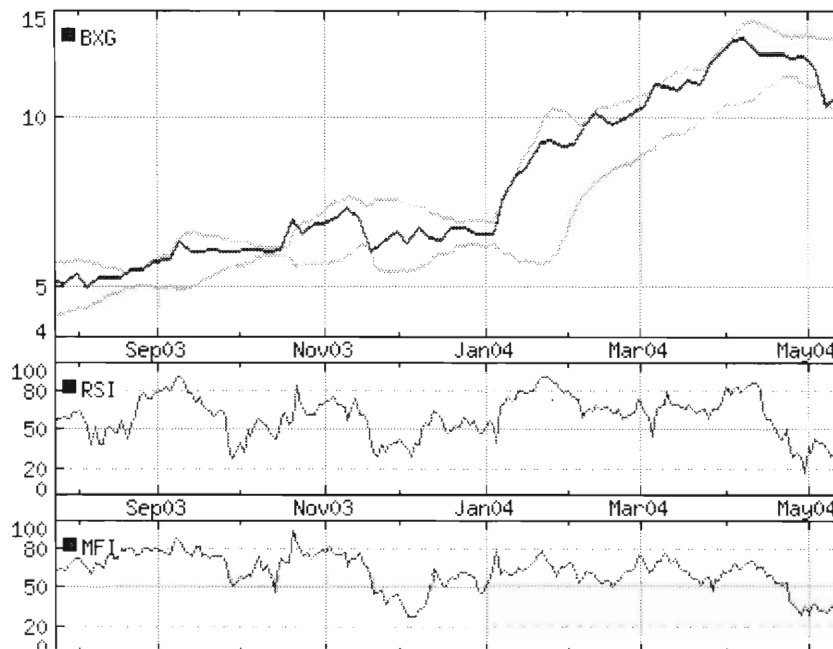
Figure 42: Technical Indicators for BXG

8.6.4 Company Profiles

The new stock we invested in this week was in Bluegreen Corporation (BXG), which is part of the capital goods sector, in the construction services industry. The company markets vacation options through their resorts, residential land, and golf businesses. They have timeshares in many popular vacation places. They also divide

residential lots and sell property to those seeking a high quality residential setting, sometimes in areas with a golf course and related amenities.[72]

8.7 July 13, 2004

8.7.1 Previous Week's Results and Analysis

For the week ranging from July 6, 2004 to July 13, 2004, the stock market as a whole went down. The Dow Jones Industrial Average decreased from 10,282.83 to 10,238.22 (-0.44%), the S&P 500 decreased from 1,125.38 to 1,114.35 (-0.99%), and the NASDAQ went down from 2,006.66 to 1,936.92 (-3.60%).

On July 7th BIV fell low enough to activate its sell STOP order and was sold at $8.68; a new stock, GE, was purchased. For the week, our manual stock portfolio decreased from 101,422.63 to $97,351.46. This is a $4,071.17 (-4.18%) decrease for the week. Overall, for the simulation as of July 13, 2004, our manual simulation portfolio has decreased $2,648.54 (-2.72%).

Symbol	Previous Week's Value	This Week's Value	Weekly Profit/Loss (excluding commissions)
NSM	$9,362.91	$8,851.20	($511.71)
PEP	$9,955.88	$9,924.09	($31.79)
BXG	$21,054.33	$19,571.20	($1,483.13)
STST	$21,461.44	$20,260.80	($1,200.64)
OCA	$20,850.48	$20,003.76	($846.72)
GE	$18,224.50	$18,712.40	$487.90

Table 26: Manual Weekly Change for the Week Ranging from July 6, 2004 to July 13, 2004

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[72] "Company Profile," *Bluegreen*, http://phx.corporate-ir.net/phoenix.zhtml?c=112002&p=irol-homeProfile&t=&id=&, July 10, 2004.

Symbol	Last Price	Purchase Price	Shares	Profit/Loss (including commissions)	Notes
NET	$17.19	$16.65	1200	$626.02	Sold on 6/10/04
NTGR	$12.60	$12.14	1646	$735.18	Sold on 6/17/04
HOTT	$19.09	$21.68	922	($2,409.96)	Sold on 6/21/04
RAD	$5.19	$5.02	3981	$654.79	Sold on 6/30/04
BIV	$8.68	$8.35	2105	$672.67	Sold on 7/7/04
PEP	$53.07	$53.37	187	($24.08)	$0.23 dividend paid on 6/9/04
BXG	$12.80	$13.50	1529	($1,081.29)	
STST	$21.60	$22.04	938	($423.71)	
OCA	$7.56	$7.83	2646	($725.41)	
GE	$32.60	$31.75	574	$476.91	Bought on 7/7/04
NSM	$19.20	$21.67	461	($1,149.66)	
Cash in portfolio: $28.01					

Table 27: Manual Results as of July 13, 2004

8.7.2 Transactions Made

Symbol	Purchase Date	Purchase Price	Shares	Net Cost	Price Sold	Value Sold	Profit/Loss
BIV	07/07/04	$8.35	2105	$17,587.74	$8.68	$18,260.41	$672.67

Table 28: Manual Sell Transactions for the Week Ranging from July 6, 2004 to July 13, 2004

Symbol	Purchase Date	Purchase price	# of Shares	Additional Fees	Net Cost
GE	07/07/04	$31.75	574	$10.99	$18,235.49

Table 29: Purchase Transactions for the Week Ranging from July 6, 2004 to July 13. 2004

Table 30 below shows the STOP orders for the week. A new order was issued for GE at a 12% loss below the purchase price.

Order	Status
Sell 2105 shares BIV @ STOP of $8.68	filled on 6/30/04
Sell 574 shares GE @ STOP of $27.94	not filled

Table 30: Manual Sell STOP Orders for the Week Ranging from July 6, 2004 to July 13, 2004

8.7.3 Reasons for Stock Picks

The new stock we invested in this week was General Electric (GE). Since we only had one week left and our portfolio value had been decreasing substantially, we wanted to play it safe and invest in a safe stock. GE is one of the largest conglomerates in the world with a market capitalization of over 330 billion. The current P/E ratio is around twenty, which indicates that the stock may be undervalued. Overall, GE was one of the safest stocks we could invest in for a short one week span.

8.7.4 Company Profiles

A new investment was made this week in General Electric (GE), which is part of the conglomerates sector and industry. It is a member of the Dow Industrials and S&P 500 indices. GE operates in more than 100 countries, and offers financial services, technology, media, and other products to help make life better. Some of the company's major products include home appliances, lighting products, medical diagnostic equipment, motors, locomotives, power generation products, plastics, and jet engines. They also provide electrical installation services and engineering, computer information services, and television programming.[73]

8.8 July 20, 2004

8.8.1 Previous Week's Results and Analysis

For the week ranging from July 6, 2004 to July 13, 2004, the stock market as a whole went down. The Dow Jones Industrial Average decreased from 10,282.83 to

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[73] "Fact Sheet," *GE*, http://www.ge.com/en/company/companyinfo/at_a_glance/fact_sheet.htm, July 10, 2004.

10,238.22 (-0.44%), the S&P 500 decreased from 1,125.38 to 1,114.35 (-0.99%), and the

NASDAQ went down from 2,006.66 to 1,936.92 (-3.60%).

For the week, our manual stock portfolio decreased from $97,351.46 to

$94,682.65. This is a $2,668.81 (-2.82%) decrease for the week. Overall, for the

simulation as of July 20, 2004 before trading, our manual simulation portfolio has

decreased $5,317.35 (-5.62%).

Symbol	Previous Week's Value	This Week's Value	Weekly Profit/Loss (excluding commissions)
NSM	$8,851.20	$8,298.00	($553.20)
PEP	$9,924.09	$9,727.74	($196.35)
BXG	$19,571.20	$19,571.20	$0.00
STST	$20,260.80	$18,694.34	($1,566.46)
OCA	$20,003.76	$19,289.34	($714.42)
GE	$18,712.40	$19,074.02	$361.62

Table 31: Manual Weekly Change for the Week Ranging from July 13, 2004 to July 20, 2004

Symbol	Last Price	Purchase Price	Shares	Profit/Loss (including commissions)	Notes
NET	$17.19	$16.65	1200	$626.02	Sold on 6/10/04
NTGR	$12.60	$12.14	1646	$735.18	Sold on 6/17/04
HOTT	$19.09	$21.68	922	($2,409.96)	Sold on 6/21/04
RAD	$5.19	$5.02	3981	$654.79	Sold on 6/30/04
BIV	$8.68	$8.35	2105	$672.67	Sold on 7/7/04
PEP	$52.02	$53.37	187	($220.43)	$0.23 dividend paid on 6/9/04
BXG	$12.80	$13.50	1529	($1,081.29)	
STST	$19.93	$22.04	938	($1,990.17)	
OCA	$7.29	$7.83	2646	($1,439.83)	
GE	$33.23	$31.75	574	$838.53	
NSM	$18.00	$21.67	461	($1,702.86)	
Cash in portfolio: $28.01					

Table 32: Manual Results as of July 20, 2004

8.8.2 Transactions Made

The simulation ended on July 20, 2004. Consequently, all shares in all securities were sold and all STOP orders that no longer were applicable were cancelled. These transactions are detailed below.

Symbol	Purchase Date	Purchase Price	Shares	Net Cost	Price Sold	Value Sold	Profit/Loss
NSM	06/01/04	$21.67	461	$10,000.86	$18.00	$8,287.01	($1,713.85)
PEP	06/01/04	$53.37	187	$9,991.18	$52.02	$9,716.75	($274.43)
STST	06/10/04	$22.04	938	$20,684.51	$19.93	$18,683.35	($2,001.16)
OCA	06/17/04	$7.83	2646	$20,729.17	$7.29	$19,278.35	($1,450.82)
BXG	06/30/04	$13.50	1529	$20,652.49	$12.80	$19,560.21	($1,092.28)
GE	07/07/04	$31.75	574	$18,235.49	$33.23	$19,063.03	$827.54

Table 33: Manual Sell Transactions for July 20, 2004

Order	Status
Sell 1529 shares BXG @ STOP of $11.88	cancelled
Sell 574 shares GE @ STOP of $27.94	cancelled
Sell 2646 shares OCA @ STOP of $6.89	cancelled
Sell 461 shares NSM @ STOP of $19.079	cancelled
Sell 187 shares PEP @ STOP of $47.02	cancelled
Sell 938 shares STST @ STOP of $19.39	cancelled

Table 34: Manual Cancelled Sell STOP orders for July 20, 2004

After the simulation ended and all transactions were completed, $94,616.71 in cash remained in the manual investment portfolio.

Chapter 9

Agent Simulation

9.1 June 1, 2004

9.1.1 Top Rated Stocks

We ran the autonomous agent after the market closed on May 28, 2004 to select stocks for the beginning of the investment simulation on June 1, 2004. The agent collected and analyzed data for all of the stocks listed on the NYSE and NASDAQ. The agent gave each stock a fundamental rating and a technical rating. Then the agent combined these two ratings to form an overall rating that would be used for selecting stocks. The top six rated stocks for June 1, 2004 are shown in Table 35 below.

Ranking	Symbol	Fundamental Rating	Technical Rating	Overall Rating
1	IMDC	2126.329	335	2461.329
2	TTWO	2119.210	285	2404.210
3	MGAM	2300.310	90	2390.310
4	XJT	2294.471	90	2384.471
5	MMSI	2316.443	15	2331.443
6	TUES	2096.194	85	2181.194

Table 35: Agent's Top Rated Stocks for June 1, 2004

Each stock was rated using forty-nine different criterions. Appendix A includes detailed descriptions of the top six stocks picked by the agent. The top rated stock was IMDC, and several things contributed to its high rating. For the fundamental contributions, the P/E Ratio and the PEG ratio were both favorable and below the industry average. Also, the short interest has consistently gone down, which added the

maximum of four hundred points to IMDC's score. Finally, IMDC has very favorable returns on capital, equity, and assets. For the technical contributions, the RSI and MFI were both favorable. The second rated stock, TTWO, had high institutional transactions. Similar to IMDC, TTWO also had a favorable P/E Ratio, PEG ratio, and PS ratio. In addition, it had a strong return on assets, equity, and capital. Again, the RSI and MFI added significantly to the technical rating. The third rated stock was MGAM, which also had favorable institutional transactions, P/E Ratio, PEG ratio, PS ratio, and return on assets, capital, and equity. Also, MGAM was rated high based on its sales. The fourth rated stock was XJT, which also had a favorable P/E Ratio, PEG ratio, PS ratio, short interest, and return on equity, capital, and assets. Revenue per share was also very higher. For the technical rating, the only major contributor was the relative strength. The fifth rated stock was MMSI, which had very favorable short interest and sales; the P/E Ratio, PEG ratio, and return on assets, equity, and capital also heavily contributed. Finally, the sixth rated stock was TUES, which had very favorable return on assets, equity, and capital. Overall, all six stocks had very strong fundamentals, and the top few stocks also had very strong technical attributes.

9.1.2 Company Profiles

INAMED Corporation (IMDC) is part of the healthcare sector, in the medical equipment and supplies industry. It is a member of the S&P 600 SmallCap index. The company develops, manufactures, and markets medical devices. The three main products are breast aesthetics such as breast implants and tissue expanders for use in plastic and

reconstructive surgery, facial aesthetics such as collagen for use by dermatologists and plastic surgeons, and products for use in treating severe obesity.[74]

Merit Medical Systems Incorporated (MMSI) is part of the healthcare sector, in the medical equipment and supplies industry. It is a member of the S&P 600 SmallCap index and traded on NASDAQ. The company manufactures and markets over 2,000 medical products for use in diagnosis and treatment of cardiovascular disease, and disposable products for diagnosis and intervention in radiology and cardiology procedures. Some of the main products include inflation devices used in angioplasty, plastics molding, diagnostic and therapeutic catheters used for cardiology and radiology procedures, guide wires, fluid dispensing systems, and standard and custom angiography kits.[75]

Take-Two 2 Interactive Software Incorporated (TTWO) is part of the technology sector, in the software and programming industry. It is a member of the S&P 600 SmallCap index and traded on NASDAQ. The company develops and distributes interactive software games, hardware, and accessories designed for personal computers, video game consoles, and handheld platforms. They also publish and distribute games by other companies, under the labels Rockstar Games, Gathering, and Global Star.[76]

Multimedia Games Incorporated (MGAM) is part of the services sector, in the casinos and gaming industry. It is a member of the S&P 600 SmallCap index and traded on NASDAQ. The company is a technology supplier to the gaming industry, by designing and developing interactive Class II and Class III electronic gaming systems, video lottery, and other player stations and equipment. These are sold to Native American

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[74] "About Inamed," *Inamed*, http://www.inamed.com/corporate/, June 3, 2004.
[75] "Profile," *MeritMedical*, http://www.merit.com/is/corporate/about, June 3, 2004.
[76] "Corporate Overview," *Take2 Interaction*, http://ir.take2games.com/index.cfm, June 3, 2004.

tribes and other casinos for their gaming facilities in the United States. The games work through a broadband telecommunications network, with the player stations interconnected within a casino and with others. There are over 7,500 electronic player stations in about 100 independently owned gaming facilities in the US.[77]

Tuesday Morning Corporation (TUES) is part of the services sector, in the department and discount retail industry. The company is a closeout retailer of upscale home furnishings, accessories, and gifts in the United States, with about 580 stores in 42 states. The stores are only open on an event basis: ten times a year for sales periods of three to five weeks at a time, about 270 days a year. They buy quality brand-name merchandise and sell it at 50 to 80 percent less than what it generally charged elsewhere.[78]

ExpressJet Holdings Incorporated (XJT) is part of the transportation sector, in the airline industry. The company is the largest regional United States air carrier that transports passengers, cargo, and mail. ExpressJet operates as Continental Express, flying on behalf of Continental Airlines, with scheduled passenger service and more than 1,100 daily departures to about 123 cities in the United States, Mexico, and Canada. ExpressJet provides Continental Airlines' regional jet service out of Houston, Newark, and Cleveland in a fleet of 50 and 37 seat jets. This allows more frequent flights to smaller cities than with the main aircraft, and connects passengers to Continental Airlines' flights- more than 9 million per year.[79]

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[77] "Profile," *Multimedia Games*, http://www.multimediagames.com/Company/Profile.htm, June 3, 2004.
[78] "Overview," *Tuesday Morning*, http://www.corporate-ir.net/ireye/ir_site.zhtml?ticker=TUES&script=2100, June 3, 2004.
[79] "Welcome To ExpressJet Airlines," *ExpressJet*, http://www.expressjetair.com/, June 3, 2004.

9.1.3 Transactions Made

Based on the ratings, the agent then calculated the percentage to invest in each of the top six rated stock based on the percentage of that stock's overall rating contribution to the summation of the top six overall ratings. After finding this percentage the agent placed the following purchase transactions:

Symbol	Purchase Price	# of Shares	Additional Fees	Net Cost
IMDC	$59.65	291	$10.99	$17,369.14
TTWO	$29.77	570	$10.99	$16,979.89
MGAM	$22.57	748	$10.99	$16,893.35
XJT	$11.92	1413	$10.99	$16,853.95
MMSI	$14.51	1134	$10.99	$16,465.33
TUES	$28.56	539	$10.99	$15,404.83

Table 36: Agent's Purchase Transactions for June 1, 2004

The investments in these six stocks collectively cost $99,966.49. Since the agent was given $100,000 in initial investment capital, $33.51 was retained in cash. The agent also placed the STOP orders show in Table 37 below. These orders will only be executed if the stocks drop in price enough to cause a 12% profit loss. The reason these orders are placed is to cut any losses that may occur with sudden, unexpected price drops.

Order	Status
Sell 291 shares IMDC @ STOP of $52.59	not filled
Sell 570 shares TTWO @ STOP of $26.23	not filled
Sell 748 shares MGAM @ STOP of $19.87	not filled
Sell 1413 shares XJT @ STOP of $10.46	not filled
Sell 1134 shares MMSI @ STOP of $12.78	not filled
Sell 539 shares TUES @ STOP of $25.16	not filled

Table 37: Agent's Sell STOP Orders for June 1, 2004

9.2 June 8, 2004

9.2.1 Previous Week's Results and Analysis

The results that follow are for the week ranging from June 1, 2004 to June 8, 2004. All calculations were done before any transactions took place for June 8, 2004. For the week, none of the stocks fell low enough to activate the STOP orders issued on June 1, 2004. Four out of the six stocks picked by the agent increased, and the two that decreased were minimal. For the week, the stock market as a whole increased. The Dow Jones Industrial Average increased 1.96% to 10,391.08, the S&P 500 increased 1.97% to 1,140.42, and the NASDAQ increased 2.08% to 2,020.62. The agent's portfolio increased from $100,000 at the start of the simulation to $103,821.54 this week, which is an overall increase of $3,821.54 (+3.68%). Overall, this week for the agent's picks went very well with an increase above the market. The individual stock results are shown in Tables 38 and 39 below.

Symbol	Previous Week's Value	This Week's Value	Weekly Profit/Loss (excluding commissions)
IMDC	$17,358.15	$17,058.42	($299.73)
TTWO	$16,968.90	$17,253.90	$285.00
MGAM	$16,882.36	$19,223.60	$2,341.24
XJT	$16,842.96	$17,874.45	$1,031.49
MMSI	$16,454.34	$16,261.56	($192.78)
TUES	$15,393.84	$16,116.10	$722.26

Table 38: Agent's Weekly Change for the Week Ranging from June 1, 2004 to June 8, 2004

Symbol	Last Price	Purchase Price	Shares	Profit/Loss (including commissions)	Notes
TUES	$29.90	$28.56	539	$711.27	
TTWO	$30.27	$29.77	570	$274.01	
MGAM	$25.70	$22.57	748	$2,330.25	
XJT	$12.65	$11.92	1413	$1,020.50	
MMSI	$14.34	$14.51	1134	($203.77)	
IMDC	$58.62	$59.65	291	($310.72)	
Cash in portfolio: $33.51					

Table 39: Agent Results as of June 8, 2004

9.2.2 Top Rated Stocks

The agent was run after the market close on June 7, 2004. Table 40 below shows the top six rated stocks for June 8, 2004.

Ranking	Symbol	Fundamental Rating	Technical Rating	Overall Rating
1	MMSI	2299.214	165	2464.214
2	CTSH	2250.462	135	2385.462
3	BZH	2398.843	-35	2363.843
4	IMDC	2144.934	185	2329.934
5	XJT	2294.471	15	2309.471
6	NVDA	2001.965	285	2286.965

Table 40: Agent's Top Rated Stocks for June 8, 2004

Appendix B includes rating details for the top six stocks picked by the agent. The top rated stock this week was MMSI, which had favorable institutional transactions, PEG ratio, and return on capital. Also, MMSI's short interest has been consecutively decreasing, and therefore was rated a lot higher. CTSH was rated highly due a lot of small factors; there were no aspects that stood out. CTSH had good fundamentals in that they had favorable sales numbers and return on capital, equity, and assets were all favorable. The third rated stock, BZH, had favorable P/E, PS, PB, and PEG ratios. Similar to MMSI, short interest also contributed greatly to BZH's high rating. IMDC had

strong fundamentals all around. The only factor that really was exceptional was short interest. XJT had very favorable return values on capital, equity, and assets. It also had an exceptional short interest and P/E ratio. Finally, NVDA had many favorable factors but the ones that stood out most were short interest and relative strength. Most of the top six stocks had favorable short interest values as well as strong fundamentals. NVDA also had a very strong technical rating.

9.2.3 Company Profiles

The new stocks that the agent chose for investment were CTSH, BZH, and NVDA. Cognizant Technology Solutions Corporation (CTSH) is part of the technology sector, in the software and programming industry. It is a member of the S&P 400 MidCap index. The company provides information technology design, development, integration, and maintenance services for Fortune 1000 companies in the United States and Europe. Their products include Web-centric applications, data warehousing, and client-server systems. It is an offshore outsourcing company, using technical and account management teams located at the customer location and offshore at development centers located in India and Ireland.[80]

Beazer Homes USA Incorporated (BZH) is part of the capital goods sector, in the construction services industry. It is traded on the NYSE. The company operates as a family of local homebuilders that designs, builds, and sells single family homes in over

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[80] "About Us," *Cognizant Technology Solutions*, http://www.cognizant.com/aboutus/aboutus_who.htm, June 10, 2004.

forty markets that are offered for sale before their construction, and designed to appeal to first time homebuyers.[81]

NVIDIA Corporation (NVDA) is part of the technology sector, in the semiconductors industry. It is a member of the S&P 500 index and traded on the NASDAQ. The company focuses on visual computing technology, and designs, develops, and markets graphic processing units, media and communications processors, and related software that are used in personal computers and notebooks, professional workstations, personal digital assistants, cellular phones, and game consoles such as Microsoft's Xbox. There are three major product groups in the company, including Graphic Processing Units, Media and Communications Processors, and Ultra-Low Power Media Processors.[82]

9.2.4 Transactions Made

Some of the stocks that were previously in the top six rated stocks for June 1st were replaced by other stocks. The stocks that were removed were TTWO, MGAM, and TUES. They were replaced by BZH, CTSH, and NVDA. Consequently, the following sell and purchase transactions were issued by the agent:

Symbol	Purchase Date	Purchase Price	Shares	Net Cost	Price Sold	Value Sold	Profit/Loss
TTWO	06/01/04	$29.77	570	$16,979.89	$30.27	$17,242.91	$263.02
MGAM	06/01/04	$22.57	748	$16,893.35	$25.70	$19,212.61	$2,319.26
TUES	06/01/04	$28.56	539	$15,404.83	$29.90	$16,105.11	$700.28

Table 41: Agent's Sell Transactions for June 8, 2004

[81] "Corporate Information," *Beazer Homes*, http://www.beazer.com/CorpInfo/, June 10, 2004.
[82] "Company Info," *nVIDIA*, http://www.nvidia.com/page/companyinfo.html, June 10, 2004.

Symbol	Purchase Price	# of Shares	Additional Fees	Net Cost
CTSH	$45.90	388	$10.99	$17,820.19
BZH	$105.11	168	$10.99	$17,669.47
NVDA	$22.44	761	$10.99	$17,087.83

Table 42: Agent's Purchase Transactions for June 8, 2004

These transactions left a total of $16.65 in cash in the agent's investment portfolio. The agent also placed STOP orders at a 12% profit loss for the three new stocks; the STOP orders for the stocks that were sold were cancelled.

Order	Status
Sell 388 shares CTSH @ STOP of $40.42	not filled
Sell 168 shares BZH @ STOP of $92.55	not filled
Sell 761 shares NVDA @ STOP of $19.75	not filled

Table 43: Agent's New Sell STOP orders for June 8, 2004

Order	Status
Sell 570 shares TTWO @ STOP of $26.23	cancelled
Sell 748 shares MGAM @ STOP of $19.87	cancelled
Sell 539 shares TUES @ STOP of $25.16	cancelled

Table 44: Agent's Cancelled Sell STOP orders for June 8, 2004

Order	Status
Sell 291 shares IMDC @ STOP of $52.59	not filled
Sell 1413 shares XJT @ STOP of $10.46	not filled
Sell 1134 shares MMSI @ STOP of $12.78	not filled

Table 45: Agent's Previously Issued Sell STOP orders for June 8, 2004

9.3 June 15, 2004

9.3.1 Previous Week's Results and Analysis

For the week ranging from June 8, 2004 to June 15, 2004 the stock market as a whole went down. The Dow Jones Industrial Average went down 0.55%, the S&P 500

went down 1.34%, and the NASDAQ went down 2.57%. On June 8th Beazer Homes

USA Inc (BZH) paid a $0.10 dividend; we owned 168 shares, which gave us $16.80. For

the week our agent's investment portfolio decreased from $103,821.54 to $97,738.09.

This is a $6,083.45 (-6.22%) decrease for the week. Overall, for the entire simulation as

of June 15, 2004, our overall agent investment simulation portfolio has decreased

$2,261.91 (-2.31%).

Symbol	Previous Week's Value	This Week's Value	Weekly Profit/Loss (excluding commissions)
MMSI	$16,261.56	$15,773.94	($487.62)
CTSH	$17,809.20	$17,972.16	$162.96
BZH	$17,658.48	$15,803.76	($1,854.72)
IMDC	$17,058.42	$16,330.92	($727.5)
XJT	$17,874.45	$16,489.71	($1,384.74)
NVDA	$17,076.28	$15,334.15	($1,742.13)

Table 46: Agent's Weekly Change for the Week Ranging from June 8, 2004 to June 15, 2004

Symbol	Last Price	Purchase Price	Shares	Profit/Loss (including commissions)	Notes
TUES	$29.90	$28.56	539	$700.28	Sold on 6/8/04
TTWO	$30.27	$29.77	570	$263.02	Sold on 6/8/04
MGAM	$25.70	$22.57	748	$2,319.26	Sold on 6/8/04
XJT	$11.67	$11.92	1413	($364.24)	
IMDC	$56.12	$59.65	291	($1,038.22)	
MMSI	$13.91	$14.51	1134	($691.39)	
BZH	$94.07	$105.11	168	($1,848.91)	$0.10 dividend paid on 6/8
NVDA	$20.15	$22.44	761	($1,753.68)	
CTSH	$46.32	$45.90	388	$151.97	
Cash in portfolio: $33.45					

Table 47: Agent Results as of June 15, 2004

9.3.2 Top Rated Stocks

The agent was run after the market close on June 14, 2004. Table 48 below shows

the top six rated stocks for June 15, 2004.

Ranking	Symbol	Fundamental Rating	Technical Rating	Overall Rating
1	NVDA	2023.856	485	2508.856
2	CTSH	2312.225	185	2497.225
3	CBK	2217.174	240	2457.174
4	PIXR	1955.062	360	2315.062
5	ASF	2274.104	15	2289.104
6	CSC	2152.690	115	2267.690

Table 48: Agent's Top Rated Stocks for June 15, 2004

The top six stocks' ratings are shown in detail in Appendix C. The top rated stock for June 15, 2004 was NVDA, which was the sixth rated stock for the previous week. Like last week, NVDA had very favorable short interest and relative strength values. NVDA's technical rating was very high due to the fact that almost every technical factor was rated favorably. The second rated stock was CTSH, which was also chosen before by the agent. CTSH again had a lot of small contributions that in the end added up to a large overall rating. CBK was the third rated stock, and had a high rating due to the favorable return on equity, capital, and assets, P/E and PEG ratios, short interest, and relative strength. The fourth rated stock, PIXR, was rated highly due primarily to all of the ratios, which indicates strong fundamental characteristics. ASF had many contribution factors, but the one that stood out the most was its favorable institutional transactions. The final stock was CSC, which had favorable sales values, return on capital, equity, and assets, and relative strength.

9.3.3 Company Profiles

The new stocks that the agent chose for investment were CBK, PIXR, ASF, and CSC. Christopher and Banks Corporation (CBK) is part of the services sector, in the apparel retail industry. It is a member of the S&P 600 SmallCap index. The company

sells women's specialty apparel such as sportswear, sweaters, and casual dresses targeting working women ages 40 to 60. They operate over 550 stores in 42 states.[83]

Pixar Animation Studios (PIXR) is part of the services sector, in the motion pictures industry. It is traded on the NASDAQ. The company is a digital animation studio that creates films and other products such as toys and interactive games. They have created and produced five full-length animated films so far, which were marketed and distributed by The Walt Disney Company. They also produce short films to develop their computer animation further.[84]

Administaff Incorporated (ASF) is part of the services sector in the business services industry. It is a member of the S&P 600 SmallCap index. It is traded on the NYSE. The company is a professional employer organization which serves as a human resources department. The company uses a Personal Management System to provide a range of services such as benefits and payroll administration, health and workers' compensation insurance programs, personnel records management, employer liability management, and employee recruiting, selection, and training to small and medium-sized businesses. It is designed to improve the productivity and profitability of the business by helping business owners and executives to lessen their employer-related administrative and regulatory duties. The company serves more and 4,500 companies and 75,000 employees.[85]

Computer Sciences Corporation (CSC) is part of the technology sector, in the computer services industry. It is a member of the S&P 500 index. The company provides consulting, business process outsourcing, and planning of complex information

[83] "Our Business," *Christoper Banks*, http://www.christopherandbanks.com/business/, June 18, 2004.
[84] "Corporate Overview," *PIXAR*, http://www.pixar.com/companyinfo/aboutus/index.html, June 18, 2004.
[85] "About Administaff," *Administaff*, http://www.administaff.com/about_asf/index.asp, June 18, 2004.

technology to global commercial and government markets. These services include systems analysis, applications development, network operations, desktop computing and data center management.[86]

9.3.4 Transactions Made

Some of the stocks that were previously in the top six rated stocks for June 8th were replaced by other stocks. The stocks that were removed were IMDC, XJT, MMSI, and BZH. They were replaced by CBK, PIXR, ASF, and CSC. Consequently, the following sell and purchase transactions were issued by the agent:

Symbol	Purchase Date	Purchase Price	Shares	Net Cost	Price Sold	Value Sold	Profit/Loss
IMDC	06/01/04	$59.65	291	$17,369.14	$56.12	$16,319.93	($1,049.21)
XJT	06/01/04	$11.92	1413	$16,853.95	$11.67	$16,478.72	($375.23)
MMSI	06/01/04	$14.51	1134	$16,465.33	$13.91	$15,762.95	($702.38)
BZH	06/08/04	$105.11	168	$17,669.47	$94.07	$15,792.77	($1,865.71)

Table 49: Agent's Sell Transactions for June 15, 2004

Symbol	Purchase Price	# of Shares	Additional Fees	Net Cost
CBK	$16.96	999	$10.99	$16,954.03
PIXR	$65.34	244	$10.99	$15,953.95
ASF	$15.69	1006	$10.99	$15,795.13
CSC	$42.30	370	$10.99	$15,661.99

Table 50: Agent's Purchase Transactions for June 15, 2004

After these transactions the agent maintained $22.61 in cash in the portfolio. The agent also placed STOP orders at a 12% profit loss for the four new stocks; the STOP orders for the stocks that were sold were cancelled.

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[86] "About Us," *CSC*, http://www.csc.com/aboutus/ataglance.shtmlJune 18, 2004.

Order	Status
Sell 999 shares CBK @ STOP of $14.93	not filled
Sell 244 shares PIXR @ STOP of $57.53	not filled
Sell 1006 shares ASF @ STOP of $13.81	not filled
Sell 370 shares CSC @ STOP of $37.25	not filled

Table 51: Agent's New Sell STOP orders for June 15, 2004

Order	Status
Sell 291 shares IMDC @ STOP of $52.59	cancelled
Sell 1413 shares XJT @ STOP of $10.46	cancelled
Sell 1134 shares MMSI @ STOP of $12.78	cancelled
Sell 168 shares BZH @ STOP of $92.55	cancelled

Table 52: Agent's Cancelled Sell STOP orders for June 15, 2004

Order	Status
Sell 388 shares CTSH @ STOP of $40.42	not filled
Sell 762 shares NVDA @ STOP of $19.75	not filled

Table 53: Agent's Previously Issued Sell STOP orders for June 15, 2004

9.4 June 22, 2004

9.4.1 Previous Week's Results and Analysis

For the week ranging from June 15, 2004 to June 22, 2004 the stock market as a whole was up slightly. The Dow Jones Industrial Average went up 0.35% to 10,371.47, the S&P 500 went up 0.44% to 1,130.30, and the NASDAQ composite went up 0.22% to 1,974.38. On June 17th NVDA hit its sell STOP order price for a 12% loss and was sold at $19.75. For the week our agent stock portfolio increased from $97,738.09 to $100,265.96. This is a $2,527.87 (+2.52%) increase for the week. Overall, for the entire simulation as of June 22, 2004, our agent simulation portfolio has increased $265.96 +0.27%).

Symbol	Previous Week's Value	This Week's Value	Weekly Profit/Loss (excluding commissions)
NVDA	$15,334.15	$15,029.75	($304.40)
CTSH	$17,972.16	$19,283.60	$1,311.44
CBK	$16,943.04	$17,782.20	$839.16
PIXR	$15,942.96	$16,418.76	$475.80
CSC	$15,651.00	$16,076.50	$425.50
ASF	$15,784.14	$15,663.42	($120.72)

Table 54: Agent's Weekly Change for the Week Ranging from June 15, 2004 to June 22, 2004

Symbol	Last Price	Purchase Price	Shares	Profit/Loss (excluding commissions)	Notes
TUES	$29.90	$28.56	539	$700.28	Sold on 6/8/04
TTWO	$30.27	$29.77	570	$263.02	Sold on 6/8/04
MGAM	$25.70	$22.57	748	$2,319.26	Sold on 6/8/04
IMDC	$56.12	$59.65	291	($1,049.21)	Sold on 6/15/04
XJT	$11.67	$11.92	1413	($375.23)	Sold on 6/15/04
MMSI	$13.91	$14.51	1134	($702.38)	Sold on 6/15/04
BZH	$94.07	$105.11	168	($1,859.90)	$0.10 dividend paid on 6/8 Sold on 6/15/04
NVDA	$19.75	$22.44	761	($2,069.07)	Sold on 6/17/04
CTSH	$49.70	$45.90	388	$1,463.41	
CBK	$17.80	$16.96	999	$828.17	
PIXR	$67.29	$65.34	244	$464.81	
CSC	$43.45	$42.30	370	$414.51	
ASF	$15.57	$15.69	1006	($131.71)	
Cash in portfolio: $15,041.48					

Table 55: Agent Results as of June 22, 2004

9.4.2 Top Rated Stocks

The agent was run after the market close on June 21, 2004. Table 56 below shows
the top six rated stocks for June 22, 2004.

Ranking	Symbol	Fundamental Rating	Technical Rating	Overall Rating
1	SAFM	2310.002	310	2620.002
2	TECD	2169.753	235	2404.753
3	CCMP	2003.956	390	2393.956
4	ASF	2321.153	65	2386.153
5	STNR	2047.820	285	2332.820
6	MXRE	2246.055	85	2231.055

Table 56: Agent's Top Rated Stocks for June 22, 2004

The top stocks' ratings are detailed in Appendix D. The top rated stock, SAFM, had strong ratios, sales, and return on capital, equity, and assets. Also, SAFM had a strong technical rating due primarily to relative strength. The second rated stock was TECD, and it had a high rating due primarily to institutional transactions and short interest. The third rated stock, CCMP, had many small fundamental contributions, but also had a very high technical rating, which was augmented by every technical aspect examined. The fourth rated stock was ASF, which had many small, but significant contributions. The only factor that was exceptional was short interest. The fifth rated stock, STNR, again had strong ratios and return on capital, equity, and assets. Finally, MXRE had many contributions, but the most favorable were the ratios, which contributed significantly to its high fundamental rating.

9.4.3 Company Profiles

The new stocks that the agent chose for investment were SAFM, STNR, TECD, CCMP, and MXRE. Sanderson Farms, Inc (SAFM) is part of the non-cyclical consumer sector and the food processing industry. SAFM is a member of the S&P 600 SmallCap Index and is traded on NASDAQ. Sanderson Farms, Inc. is a well known southern poultry processing company. They are active throughout many parts of the business including production, processing, marketing, and distribution of fresh and frozen chicken products. Their primary customer base is made up of retailers, distributors and dining

operators generally located in the southeastern, southwestern and western parts of the United States.[87]

Steiner Leisure Limited (STNR) is an international spa service provider, and is in the services sector and personal services industry; STNR is traded on NASDAQ. They are well known for their relaxing and therapeutic ambience in which many customers choose to receive beauty treatments. Steiner Leisure Limited is often seen on many luxury cruise ships or resorts. In addition, Steiner Leisure educated future massage therapists or skin care specialists. They own three post-secondary schools in Florida, Virginia, and Maryland.[88]

Tech Data Corporation (TECD) is in the technology sector and the computer hardware industry. TECD is traded on NASDAQ and is part of the S&P 400 MidCap Index. They are a distributor of information technology products, logistics management, and other value-added services worldwide. They employ approximately 8,400 employees. They distribute computer related products to a wide variety of resellers and also provide support for their products. The Tech Data Corporation was founded in 1974 and has a customer base in over 80 countries.[89]

Cabbot Microelectrics Corporation (CCMP) is part of the basic materials sector and the chemical manufacturing industry. They are part of the S&P 400 MidCap Index and are traded on NASDAQ. Cabbot Microelectrics supplies devices used to manufacture ICs (integrated circuits). They supply the compounds used in polishing these wafer boards used to make the ICs. These compounds are used by many and they are

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[87] "About Us," *Sanderson Farms*, http://www.sandersonfarms.com/company/about_us.html, June 23, 2004.
[88] "Our Story," *Steiner*, http://www.steinerleisure.com/, June 23, 2004.
[89] "About Tech Data," *Tech Data*, http://www.techdata.com/content/visitor/abouttd/td_corpov.aspx, June 23, 2004.

considered the leading supplier in this area. Cabbot Microelectrics went public in the year 2000.[90]

Max Re Capital Ltd (MXRE) is part of the financial sector and the life insurance industry; it is also traded on NASDAQ. Max Re Capital is a company that provides insurance and reinsurance through its subsidiaries. This is a relatively small company with an employee base of only 55 people. They are known internationally for being the provider of alternate risk financing solutions.[91]

9.4.4 Transactions Made

Some of the stocks that were previously in the top six rated stocks for June 15th were replaced by other stocks. The stocks that were removed were NVDA, CTSH, CBK, PIXR, and CSC. They were replaced by SAFM, STNR, MXRE, TECD, and CCMP. Consequently, the following sell and purchase transactions were issued by the agent:

Symbol	Purchase Date	Purchase Price	Shares	Net Cost	Price Sold	Value Sold	Profit/Loss
NVDA	06/08/04	$22.44	761	$17,087.83	$19.75	$15,018.76	($2,042.16)
CTSH	06/08/04	$45.90	388	$17,820.19	$49.70	$19,272.61	$1,452.42
CBK	06/15/04	$16.96	999	$16,954.03	$17.80	$17,771.21	$817.18
PIXR	06/15/04	$65.34	244	$15,953.95	$67.29	$16,407.77	$453.82
CSC	06/15/04	$42.30	370	$15,661.99	$43.45	$16,065.51	$403.52

Table 57: Agent's Sell Transactions for June 22, 2004

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[90] "Overview," *Cabot Microelectronics*, http://www.cabotcmp.com/overview.htm, June 23, 2004.
[91] "Welcome," *MaxRe*, http://www.maxre.bm/home-index.html, June 23, 2004.

Symbol	Purchase Price	# of Shares	Additional Fees	Net Cost
SAFM	$51.27	360	$10.99	$18,468.19
TECD	$37.95	447	$10.99	$16,974.64
CCMP	$27.95	604	$10.99	$16,892.79
STNR	$20.55	801	$10.99	$16,471.54
MXRE	$18.49	851	$10.99	$15,745.98

Table 58: Agent's Purchase Transactions for June 22, 2004

After these transactions $5.44 in cash remained in the agent's portfolio. The agent also placed STOP orders at a 12% profit loss for the five new stocks; the STOP orders for the stocks that were sold were cancelled.

Order	Status
Sell 361 shares SAFM @ STOP of $45.11	not filled
Sell 447 shares TECD @ STOP of $33.39	not filled
Sell 604 shares CCMP @ STOP of $24.59	not filled
Sell 801 shares STNR @ STOP of $18.08	not filled
Sell 852 shares MXRE @ STOP of $16.27	not filled

Table 59: Agent's New Sell STOP orders for June 22, 2004

Order	Status
Sell 999 shares CBK @ STOP of $14.93	cancelled
Sell 244 shares PIXR @ STOP of $57.53	cancelled
Sell 388 shares CTSH @ STOP of $40.42	cancelled
Sell 370 shares CSC @ STOP of $37.25	cancelled

Table 60: Agent's Cancelled Sell STOP orders for June 22, 2004

Order	Status
Sell 761 shares NVDA @ STOP of $19.75	filled on 6/17/04
Sell 1006 shares ASF @ STOP of $13.81	not filled

Table 61: Agent's Previously Issued Sell STOP orders for June 22, 2004

9.5 June 29, 2004

9.5.1 Previous Week's Results and Analysis

For the week ranging from June 22, 2004 to June 29, 2004, the stock market as a whole was mixed. The Dow Jones Industrial Average went down 0.14% to 10,357.09, the S&P 500 went up 0.27% to 1,133.35, and the NASDAQ composite went up 2.25% to 2,019.82. For the week our agent stock portfolio increased from $100,265.96 to $104,550.63. This is a $4,284.67 (+4.10%) increase for the week. Overall, for the entire simulation as of June 22, 2004, our agent simulation portfolio has increased $4,550.63 (+4.25%).

Symbol	Previous Week's Value	This Week's Value	Weekly Profit/Loss (excluding commissions)
ASF	$15,554.43	$16,619.12	$949.05
SAFM	$18,457.20	$19,645.20	$1,188.00
TECD	$16,963.65	$17,227.38	$263.73
CCMP	$16,881.80	$17,485.80	$604.00
STNR	$16,460.55	$16,973.19	$512.64
MXRE	$15,734.99	$16,594.50	$859.51
Cash in portfolio: $5.44			

Table 62: Agent's Weekly Change for the Week Ranging from June 22, 2004 to June 29, 2004

Symbol	Last Price	Purchase Price	Shares	Profit/Loss (including commissions)	Notes
TUES	$29.90	$28.56	539	$700.28	Sold on 6/8/04
TTWO	$30.27	$29.77	570	$263.02	Sold on 6/8/04
MGAM	$25.70	$22.57	748	$2,319.26	Sold on 6/8/04
IMDC	$56.12	$59.65	291	($1,049.21)	Sold on 6/15/04
XJT	$11.67	$11.92	1413	($375.23)	Sold on 6/15/04
MMSI	$13.91	$14.51	1134	($702.38)	Sold on 6/15/04
BZH	$94.07	$105.11	168	($1,859.90)	$0.10 dividend paid on 6/8 Sold on 6/15/04
NVDA	$19.76	$22.44	762	($2,069.07)	Sold on 6/17/04
CTSH	$49.70	$45.90	388	$1,452.42	Sold on 6/22/04
CBK	$17.80	$16.96	999	$817.18	Sold on 6/22/04
PIXR	$67.29	$65.34	244	$453.82	Sold on 6/22/04
CSC	$43.45	$42.30	370	$403.52	Sold on 6/22/04
MXRE	$19.50	$18.49	851	$848.52	
TECD	$38.54	$37.95	447	$252.74	
CCMP	$28.95	$27.95	604	$593.01	
STNR	$21.19	$20.55	801	$501.65	
ASF	$16.52	$15.69	1006	$823.99	
SAFM	$54.57	$51.27	360	$1,177.01	

Table 63: Agent Results as of June 29, 2004

9.5.2 Top Rated Stocks

The agent was run after the market close on June 28, 2004. Table 64 below shows

the top six rated stocks for June 29, 2004.

Ranking	Symbol	Fundamental Rating	Technical Rating	Overall Rating
1	SAFM	2281.770	185	2466.770
2	BZH	2175.268	190	2365.268
3	NSIT	2105.177	235	2340.177
4	ADBE	1940.293	360	2300.293
5	ASF	2260.272	-35	2225.272
6	ABFS	2076.918	135	2211.918

Table 64: Agent's Top Rated Stocks for June 29, 2004

The top rated stocks for June 29th are detailed in Appendix E. The top rated stock

for the week was SAFM, which had favorable fundamentals dominated by the return on

assets, capital, and equity values. On the technical side, relative strength contributed greatly to SAFM's rating. The second rated stock, BZH, had favorable ratios, and strong relative strength. The third rated stock NSIT, which had a high rating due to the contributions of favorable ratios and short interest. ADBE had very favorable return on equity, assets, and capital. ASF, which was the fifth rated stock, had positive institutional transactions and short interest. Finally, ABFS had very positive short interest. Also, ABFS's ratings were augmented by the ratios.

9.5.3 Company Profiles

The new stocks that the agent chose for investment were BZH, NSIT, ABFS, and ADBE. Beazer Homes USA Incorporated (BZH) was chosen previously on June 8th for investment. Insight Enterprises Incorporated (NSIT) is part of the services sector, in the catalog and mail order retail industry. It is a member of the S&P SmallCap index. The company is a technology solution provider for information technology, computing products (including hardware, software and peripherals), and services to businesses, federal governments, and education institutions. The company has four operating segments, which are Insight North America, Insight UK, Direct Alliance, and PlusNet. The company operates in the United States, Canada, and United Kingdom. They also provide business process outsourcing and are an Internet service provider in the UK.[92]

Arkansas Best Corporation (ABFS) is part of the transportation sector, in the trucking industry. It is a member of the S&P 600 SmallCap index. The company provides national transportation of less-than-truckload (LTL) general commodities to more than 40,000 locations in all 50 states, and also Canada, Puerto Rico, and Mexico. They also

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[92] "About Insight," *Insight,* http://www.insight.com/site/static/about/index.cfm#overview, July 2, 2004.

have an intermodal subsidiary which provides freight services using road and rail transportation.[93]

Adobe Systems Incorporated (ADBE) is part of the technology sector, in the software and programming industry. It is a member of the S&P 500 index and traded on the NASDAQ. The company provides software and services to consumers, professionals, and businesses. They offer visual communications products for digital imaging, design, and document technology platforms. The company has four product segments which are Creative Professional, Digital Imaging and Video, ePaper and OEM Postscript, and Other. The software runs on most every platform, and can be purchased at a wide variety of places. Adobe's Portable Document Format (PDF) technologies for intelligent documents make viewing and sharing of documents across platforms and devices easy.[94]

9.5.4 Transactions Made

Some of the stocks that were previously in the top six rated stocks for June 22nd were replaced by other stocks. The stocks that were removed were TECD, CCMP, STNR, and MXRE. They were replaced by BZH, NSIT, ADBE, and ABFS. Consequently, the following sell and purchase transactions were issued by the agent:

Symbol	Purchase Date	Purchase Price	Shares	Net Cost	Price Sold	Value Sold	Profit/Loss
TECD	06/22/04	$37.95	447	$16,974.64	$38.54	$17,216.39	$241.75
CCMP	06/22/04	$27.95	604	$16,892.79	$28.95	$17,474.81	$582.02
STNR	06/22/04	$20.55	801	$16,471.54	$21.19	$16,962.20	$490.66
MXRE	06/22/04	$18.49	851	$15,745.98	$19.50	$16,583.51	$837.53

Table 65: Agent's Sell Transactions for June 29, 2004

[93] "About ABC," *Arkansas Best Corporation,* http://www.arkbest.com/About/index.asp, July 2, 2004.
[94] "Company Profile," *Adobe,* http://www.adobe.com/aboutadobe/pressroom/companyprofile.html, July 2, 2004.

Symbol	Purchase Price	# of Shares	Additional Fees	Net Cost
BZH	$98.12	178	$10.99	$17,476.35
NSIT	$17.23	1005	$10.99	$17,327.14
ADBE	$44.84	380	$10.99	$17,050.19
ABFS	$32.10	510	$10.99	$16,381.99

Table 66: Agent's Purchase Transactions for June 29, 2004

The agent also placed STOP orders at a 12% profit loss for the four new stocks; the STOP orders for the stocks that were sold were cancelled.

Order	Status
Sell 178 shares BZH @ STOP of $86.34	not filled
Sell 1005 shares NSIT @ STOP of $15.16	not filled
Sell 380 shares ADBE @ STOP of $39.46	not filled
Sell 510 shares ABFS @ STOP of $28.25	not filled

Table 67: Agent's New Sell STOP orders for June 29, 2004

Order	Status
Sell 447 shares TECD @ STOP of $33.39	cancelled
Sell 604 shares CCMP @ STOP of $24.59	cancelled
Sell 801 shares STNR @ STOP of $18.08	cancelled
Sell 852 shares MXRE @ STOP of $16.27	cancelled

Table 68: Agent's Cancelled Sell STOP orders for June 29, 2004

Order	Status
Sell 361 shares SAFM @ STOP of $45.11	not filled
Sell 1006 shares ASF @ STOP of $13.81	not filled

Table 69: Agent's Previously Issued Sell STOP orders for June 29, 2004

9.6 July 6, 2004

9.6.1 Previous Week's Results and Analysis

For the week ranging from June 29, 2004 to July 6, 2004 the stock market as a whole was down. The Dow Jones Industrial Average went down 0.72% to 10,282.83, the S&P 500 decreased 0.71% to 1,125.38, and the NASDAQ composite went down 0.66% to 2,006.66. For the week our agent stock portfolio decreased from $104,550.63 to $103,508.06. This is a $1,042.57 (-1.01%) decrease for the week. Overall, for the entire simulation as of July 6, 2004, our agent simulation portfolio has increased $3,508.06 (+3.39%).

Symbol	Previous Week's Value	This Week's Value	Weekly Profit/Loss (excluding commissions)
ASF	$16,619.12	$16,478.28	($140.84)
SAFM	$19,645.20	$18,234.00	($1,411.20)
BZH	$17,465.36	$17,782.20	$316.84
NSIT	$17,316.15	$17,346.30	$30.15
ADBE	$17,039.20	$17,157.00	$117.80
ABFS	$16,371.00	$16,503.60	$132.60
Cash in portfolio: $6.68			

Table 70: Agent's Weekly Change for the Week Ranging from June 29, 2004 to July 6, 2004

Symbol	Last Price	Purchase Price	Shares	Profit/Loss (including commissions)	Notes
TUES	$29.90	$28.56	539	$700.28	Sold on 6/8/04
TTWO	$30.27	$29.77	570	$263.02	Sold on 6/8/04
MGAM	$25.70	$22.57	748	$2,319.26	Sold on 6/8/04
IMDC	$56.12	$59.65	291	($1,049.21)	Sold on 6/15/04
XJT	$11.67	$11.92	1413	($375.23)	Sold on 6/15/04
MMSI	$13.91	$14.51	1134	($702.38)	Sold on 6/15/04
BZH	$94.07	$105.11	168	($1,859.90)	$0.10 dividend paid on 6/8 Sold on 6/15/04
NVDA	$19.76	$22.44	762	($2,069.07)	Sold on 6/17/04
CTSH	$49.70	$45.90	388	$1,452.42	Sold on 6/22/04
CBK	$17.80	$16.96	999	$817.18	Sold on 6/22/04
PIXR	$67.29	$65.34	244	$453.82	Sold on 6/22/04
CSC	$43.45	$42.30	370	$403.52	Sold on 6/22/04
MXRE	$19.50	$18.49	851	$837.53	Sold on 6/29/04
TECD	$38.54	$37.95	447	$241.75	Sold on 6/29/04
CCMP	$28.95	$27.95	604	$582.02	Sold on 6/29/04
STNR	$21.19	$20.55	801	$490.66	Sold on 6/29/04
ASF	$16.38	$15.69	1006	$683.15	
SAFM	$50.65	$51.27	360	($234.19)	
BZH	$99.90	$98.12	178	$305.85	
NSIT	$17.26	$17.23	1005	$19.16	
ADBE	$45.15	$44.84	380	$106.81	
ABFS	$32.36	$32.10	510	$121.61	

Table 71: Agent Results as of July 6, 2004

9.6.2 Top Rated Stocks

The agent was run after the market close on July 5, 2004. Table 72 below shows the top six rated stocks for July 6, 2004.

Ranking	Symbol	Fundamental Rating	Technical Rating	Overall Rating
1	CDWC	2410.721	-65	2345.721
2	PDII	2077.228	260	2337.228
3	BLTI	2089.950	235	2324.950
4	ABFS	2125.210	185	2310.210
5	ANF	2468.512	-185	2283.512
6	AAP	2175.981	90	2265.981

Table 72: Agent's Top Rated Stocks for July 6, 2004

The top rated stocks are detailed in Appendix F. The top rated stock for the week, CDWC, was rated highly due to several factors including short interest and return on capital, equity, and assets. PDII rating was increased due to many small, yet significant contributions. The third rated stock, BLTI, had positive return on equity, capital, and assets. The fourth rated stock was ABFS, which had favorable ratios and other fundamental factors including return on capital, equity, and assets. ANF's rating was augmented due to institutional transactions, short interest, and favorable returns on equity, capital, and assets. Finally, APP had a high rating due primarily to institutional transactions and short interest.

9.6.3 Company Profiles

The new stocks that the agent chose for investment were PDII, ANF, AAP, CDWC and BLTI. PDI Incorporated (PDII) is part of the services sector, in the business services industry. It is a healthcare sales and marketing company for biopharmaceutical, medical devices, and diagnostics industries. The company partners with the other companies that own the property rights to the products. This allows PDI to commercialize the products and maximize sales performance by global sales and marketing services, with clinical sales teams.[95]

Abercrombie and Fitch Company (ANF) is part of the services industry in the apparel retail industry. It is a member of the S&P 400 MidCap index. The company sells casual classic American clothing, personal care items, and other accessories for men, women, and kids under the Abercrombie & Fitch (targeting ages 18 to 22), abercrombie (targeting ages 7 to 14), and Hollister (targeting ages 14 to 18) brands. They have over

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[95] "PDI Corporate Information," *PDI*, http://www.pdi-inc.com/corporate.html, July 10, 2004.

700 stores in 49 states. The design, furniture, fixtures and music in the store are planned and coordinated to create a shopping experience that is consistent with the clothing's depicted lifestyle.[96]

Advance Auto Parts Incorporated (AAP) is part of the services sector, in the specialty retail industry. It is traded on the NYSE. The company is the nation's second largest retailer of auto parts and accessories, which sells various automotive parts, such as replacement parts (excluding tires), accessories, maintenance items, batteries, and automotive chemicals for cars and light trucks to customers who maintain their vehicles themselves. They have over 2,500 stores in 39 states.[97]

CDW Corporation (CDWC) is part of the services sector, in the catalog and mail order retail industry. It is a member of the S&P 400 MidCap index. The company is a direct marketer of different brand computers and other technology products such as hardware, software, and accessories for computers on operation platforms including Microsoft, Macintosh, Linux, and Unix. The products they offers include brands such as Apple, Cisco, HP, IBM, Microsoft, Sony, Symantec, Toshiba, and ViewSonic. CDW also offers technical support, and provides technology solutions for businesses, government, and education purposes.[98]

Biolase Technology Incorporated (BLTI) is part of the healthcare sector, in the medical equipment and supplies industry. It is a member of the S&P 600 SmallCap index. It is a medical technology company that designs, manufactures, and markets dental,

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[96] "Corporate Profile," *Abercrombie & Fitch,*
http://www.abercrombie.com/anf/lifestyles/html/investorrelations.html, July 10, 2004.
[97] "Company Profile," *Advanced Auto Parts,* http://www.advanceautoparts.com/investor/index.html, July 10, 2004.
[98] "About Us," *CDW,* http://www.cdw.com/webcontent/inside/corp/companyoverview.asp, July 10, 2004.

cosmetic, and surgical laser products. Their main product is called the Waterlase dental laser, which can cut hard and soft tissue with no damage to surrounding areas, and with no drill and no pain. Their products have been cleared with the FDA.[99]

9.6.4 Transactions Made

Some of the stocks that were previously in the top six rated stocks for June 29th were replaced by other stocks. The stocks that were removed were ASF, SAFM, BZH, NSIT, and ADBE. They were replaced by CDWC, PDII, BLTI, ANF, and AAP. Consequently, the following sell and purchase transactions were issued by the agent:

Symbol	Purchase Date	Purchase Price	Shares	Net Cost	Price Sold	Value Sold	Profit/Loss
ASF	6/15/04	$15.69	1006	$15,795.13	$16.38	$16,467.29	$672.16
SAFM	6/29/04	$51.27	360	$18,468.19	$50.65	$18,223.01	($245.18)
BZH	6/29/04	$98.12	178	$17,476.35	$99.90	$17,771.21	$294.86
NSIT	6/29/04	$17.23	1005	$17,327.14	$17.26	$17,335.31	$8.17
ADBE	6/29/04	$44.84	380	$17,050.19	$45.15	$17,146.01	$95.82

Table 73: Agent's Sell Transactions for July 6, 2004

Symbol	Purchase Price	# of Shares	Additional Fees	Net Cost
CDWC	$61.03	289	$10.99	$17,648.66
PDII	$29.98	586	$10.99	$17,579.27
BLTI	$12.96	1349	$10.99	$17,494.03
ANF	$37.58	457	$10.99	$17,185.05
AAP	$43.44	392	$10.99	$17,039.47

Table 74: Agent's Purchase Transactions for July 6, 2004

After these transactions $3.03 remained in the agent's portfolio. The agent also placed STOP orders at a 12% profit loss for the four new stocks; the STOP orders for the stocks that were sold were cancelled.

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[99] "About Biolase," *Biolase,* http://www.biolase.com/profile.html, July 10, 2004.

Order	Status
Sell 289 shares CDWC @ STOP of $53.70	not filled
Sell 586 shares PDII @ STOP of $26.38	not filled
Sell 1349 shares BLTI @ STOP of $11.40	not filled
Sell 457 shares ANF @ STOP of $33.07	not filled
Sell 392 shares AAP @ STOP of $38.22	not filled

Table 75: Agent's New Sell STOP orders for July 6, 2004

Order	Status
Sell 178 shares BZH @ STOP of $86.34	cancelled
Sell 1005 shares NSIT @ STOP of $15.16	cancelled
Sell 380 shares ADBE @ STOP of $39.46	cancelled
Sell 361 shares SAFM @ STOP of $45.11	cancelled
Sell 1006 shares ASF @ STOP of $13.81	cancelled

Table 76: Agent's Cancelled Sell STOP orders for July 6, 2004

Order	Status
Sell 510 shares ABFS @ STOP of $28.25	not filled

Table 77: Agent's Previously Issued Sell STOP orders for July 6, 2004

9.7 July 13, 2004

9.7.1 Previous Week's Results and Analysis

For the week ranging from July 6, 2004 to July 13, 2004 the stock market as a whole was down. The Dow Jones Industrial Average went down 0.44% to 10,238.22, the S&P 500 decreased 0.99% to 1,114.35, and the NASDAQ composite went down 3.60% to 1,936.92. For the week our agent stock portfolio decreased significantly from $103,508.06 to $99,462.34. This is a $4,045.72 (-4.07%) decrease for the week. Overall, for the entire simulation as of July 13, 2004, our agent simulation portfolio has decreased $537.66 (-0.54%).

Symbol	Previous Week's Value	This Week's Value	Weekly Profit/Loss (excluding commissions)
CDWC	$17,637.67	$17,345.78	($291.89)
PDII	$17,568.28	$16,712.72	($855.56)
BLTI	$17,483.04	$16,997.40	($485.64)
ANF	$17,174.06	$16,922.71	($251.35)
AAP	$17,028.48	$16,032.80	($995.68)
ABFS	$16,503.60	$15,447.90	($1055.70)
Cash in portfolio: $3.03			

Table 78: Agent's Weekly Change for the Week Ranging from July 6, 2004 to July 13, 2004

Symbol	Last Price	Purchase Price	Shares	Profit/Loss (including commissions)	Notes
TUES	$29.90	$28.56	539	$700.28	Sold on 6/8/04
TTWO	$30.27	$29.77	570	$263.02	Sold on 6/8/04
MGAM	$25.70	$22.57	748	$2,319.26	Sold on 6/8/04
IMDC	$56.12	$59.65	291	($1,049.21)	Sold on 6/15/04
XJT	$11.67	$11.92	1413	($375.23)	Sold on 6/15/04
MMSI	$13.91	$14.51	1134	($702.38)	Sold on 6/15/04
BZH	$94.07	$105.11	168	($1,859.90)	$0.10 dividend paid on 6/8 Sold on 6/15/04
NVDA	$19.76	$22.44	762	($2,069.07)	Sold on 6/17/04
CTSH	$49.70	$45.90	388	$1,452.42	Sold on 6/22/04
CBK	$17.80	$16.96	999	$817.18	Sold on 6/22/04
PIXR	$67.29	$65.34	244	$453.82	Sold on 6/22/04
CSC	$43.45	$42.30	370	$403.52	Sold on 6/22/04
MXRE	$19.50	$18.49	851	$837.53	Sold on 6/29/04
TECD	$38.54	$37.95	447	$241.75	Sold on 6/29/04
CCMP	$28.95	$27.95	604	$582.02	Sold on 6/29/04
STNR	$21.19	$20.55	801	$490.66	Sold on 6/29/04
ASF	$16.38	$15.69	1006	$672.16	Sold on 7/6/04
SAFM	$50.65	$51.27	360	($245.18)	Sold on 7/6/04
BZH	$99.90	$98.12	178	$294.86	Sold on 7/6/04
NSIT	$17.26	$17.23	1005	$8.17	Sold on 7/6/04
ADBE	$45.15	$44.84	380	$95.82	Sold on 7/6/04
ABFS	$30.29	$32.10	510	($934.09)	
CDWC	$60.02	$61.03	289	($302.88)	
PDII	$28.52	$29.98	586	($866.55)	
BLTI	$12.60	$12.96	1349	($496.63)	
ANF	$37.03	$37.58	457	($262.34)	
AAP	$40.90	$43.44	392	($1,006.67)	

Table 79: Agent Results as of July 13, 2004

9.7.2 Top Rated Stocks

The agent was run after the market close on July 12, 2004. Table 80 below shows the top six rated stocks for July 13, 2004.

Ranking	Symbol	Fundamental Rating	Technical Rating	Overall Rating
1	NSIT	2241.050	185	2426.050
2	SAFM	2233.360	185	2418.360
3	THQI	1887.357	435	2322.357
4	WGO	2232.158	65	2297.158
5	CSC	2081.524	115	2196.524
6	ABFS	1674.123	335	2009.123

Table 80: Agent's Top Rated Stocks for July 13, 2004

The top stocks' ratings are detailed in Appendix G. The top rated stock for the week, NSIT, had favorable P/E and P/S ratios. Also, NSIT received the maximum number of points for short interest because every month the short interest has been decreasing. NSIT had strong return on equity, capital, and assets. The second rated stock was SAFM, which also had strong ratios and return on equity, capital, and assets. In addition, SAFM has had strong institutional purchases lately. The third rated stock, THQI, did not have any fundamental characteristics that stood out. Instead, it had many small contributions. THQI's technical rating was dominated by the favorable relative strength. The fourth rated stock was WGO. WGO had strong P/E, PEG, and P/S ratios. Also, WGO had favorable return on equity, capital, and assets. The fifth rated stock was CSC, which also had favorable ratios and return on capital, equity, and assets. In addition, CSC had positive institutional trading and also strong relative strength. The sixth and final stock was ABFS, which again had strong ratios. Also, ABFS had the maximum number of points allocated for short interest and relative strength.

9.7.3 Company Profiles

The new stocks that the agent chose for investment were WGO, NSIT, SAFM, THQI, and CSC. The agent chose CSC and SAFM for investment during previous weeks. Winnebago Industries Incorporated (WGO) is part of the capital goods sector, in the mobile homes and RVs industry. It is a member of the S&P 600 SmallCap index. The company manufactures and markets self-contained recreational vehicles and motor homes for leisure and outdoor recreation under the brand names Winnebago, Itasca, Rialta, and Ultimate. They are sold by wholesale to over 300 dealers in the United States and Canada.[100]

THQ Incorporated (THQI) is part of the technology sector, in the software and programming industry. It is a member of the S&P 600 SmallCap index. The company develops and publishes interactive entertainment software for a variety of platforms like Sony PlayStation and PlayStation 2, Microsoft Xbox, and Nintendo GameCube, Nintendo Game Boy Advance, and personal computers. The games are in genres such as action, adventure, children's, puzzles, strategy, role-playing, and sports. They market and distribute their games to retailers and merchandising chains in North America, and also a global network in over 70 countries worldwide.[101]

9.7.4 Transactions Made

Some of the stocks that were previously in the top six rated stocks for July 6th were replaced by other stocks. The stocks that were removed were CDWC, PDII, BLTI,

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[100] "About Us," *Winnebago Industries,* http://www.winnebagoind.com/html/company/aboutUs.html, July 14, 2004.
[101] "Investor Relations," *THQ,* http://phx.corporate-ir.net/phoenix.zhtml?c=96376&p=irol-IRHome, July 14, 2004.

ANF, and AAP. They were replaced by WGO, NSIT, SAFM, THQI, and CSC.

Consequently, the following sell and purchase transactions were issued by the agent:

Symbol	Purchase Date	Purchase Price	Shares	Net Cost	Price Sold	Value Sold	Profit/Loss
CDWC	7/6/04	$61.03	289	$17,648.66	60.02	$17,334.79	($313.87)
PDII	7/6/04	$29.98	586	$17,579.27	28.52	$16,701.73	($877.54)
BLTI	7/6/04	$12.96	1349	$17,494.03	12.60	$16,986.41	($507.62)
ANF	7/6/04	$37.58	457	$17,185.05	37.03	$16,922.71	($262.34)
AAP	7/6/04	$43.44	392	$17,039.47	40.90	$16,021.81	($1,017.66)

Table 81: Agent's Sell Transactions for July 13, 2004

Symbol	Purchase Price	# of Shares	Additional Fees	Net Cost
WGO	$33.88	488	$10.99	$16,544.43
NSIT	$16.47	1060	$10.99	$17,469.19
SAFM	$47.78	364	$10.99	$17,402.91
THQI	$21.54	776	$10.99	$16,726.03
CSC	$44.35	356	$10.99	$15,799.59

Table 82: Agent's Purchase Transactions for July 13, 2004

After these transactions $17.34 remained in the agent's portfolio. The agent also placed STOP orders at a 12% profit loss for the four new stocks; the STOP orders for the stocks that were sold were cancelled.

Order	Status
Sell 488 shares WGO @ STOP of $29.81	not filled
Sell 1060 shares NSIT @ STOP of $14.49	not filled
Sell 364 shares SAFM @ STOP of $42.04	not filled
Sell 776 shares THQI @ STOP of $18.95	not filled
Sell 356 shares CSC @ STOP of $39.02	not filled

Table 83: Agent's New Sell STOP orders for July 13, 2004

Order	Status
Sell 289 shares CDWC @ STOP of $53.70	cancelled
Sell 586 shares PDII @ STOP of $26.38	cancelled
Sell 1349 shares BLTI @ STOP of $11.40	cancelled
Sell 457 shares ANF @ STOP of $33.07	cancelled
Sell 392 shares AAP @ STOP of $38.22	cancelled

Table 84: Agent's Cancelled Sell STOP orders for July 13, 2004

Order	Status
Sell 510 shares ABFS @ STOP of $28.25	not filled

Table 85: Agent's Previously Issued Sell STOP orders for July 13, 2004

9.8 July 20, 2004

9.8.1 Previous Week's Results and Analysis

For the week ranging from July 13, 2004 to July 20, 2004 the stock market as a whole was down. The Dow Jones Industrial Average went down 0.88% to 10,149.07, the S&P 500 decreased 0.51% to 1,108.67, and the NASDAQ composite went down 1.04% to 1,917.07. For the week our agent stock portfolio increased significantly from $99,462.34 to $104,960.20. This is a $5,497.86 (+5.24%) increase for the week. Overall, for the entire simulation as of July 20, 2004 before trading, our agent simulation portfolio has increased $4,960.20 (+4.73%).

Symbol	Previous Week's Value	This Week's Value	Weekly Profit/Loss (excluding commissions)
WGO	$16,533.44	$17,304.48	$771.04
NSIT	$17,458.20	$17,013.00	($445.20)
SAFM	$17,391.92	$19,310.20	$1,918.28
THQI	$16,715.04	$17,227.20	$512.16
CSC	$15,785.04	$16,671.48	$886.44
ABFS	$15,447.90	$17,416.50	$1,968.60
Cash in portfolio: $17.34			

Table 86: Agent's Weekly Change for the Week Ranging from July 13, 2004 to July 20, 2004

Symbol	Last Price	Purchase Price	Shares	Profit/Loss (including commissions)	Notes
TUES	$29.90	$28.56	539	$700.28	Sold on 6/8/04
TTWO	$30.27	$29.77	570	$263.02	Sold on 6/8/04
MGAM	$25.70	$22.57	748	$2,319.26	Sold on 6/8/04
IMDC	$56.12	$59.65	291	($1,049.21)	Sold on 6/15/04
XJT	$11.67	$11.92	1413	($375.23)	Sold on 6/15/04
MMSI	$13.91	$14.51	1134	($702.38)	Sold on 6/15/04
BZH	$94.07	$105.11	168	($1,859.90)	$0.10 dividend paid on 6/8 Sold on 6/15/04
NVDA	$19.76	$22.44	762	($2,069.07)	Sold on 6/17/04
CTSH	$49.70	$45.90	388	$1,452.42	Sold on 6/22/04
CBK	$17.80	$16.96	999	$817.18	Sold on 6/22/04
PIXR	$67.29	$65.34	244	$453.82	Sold on 6/22/04
CSC	$43.45	$42.30	370	$403.52	Sold on 6/22/04
MXRE	$19.50	$18.49	851	$837.53	Sold on 6/29/04
TECD	$38.54	$37.95	447	$241.75	Sold on 6/29/04
CCMP	$28.95	$27.95	604	$582.02	Sold on 6/29/04
STNR	$21.19	$20.55	801	$490.66	Sold on 6/29/04
ASF	$16.38	$15.69	1006	$672.16	Sold on 7/6/04
SAFM	$50.65	$51.27	360	($245.18)	Sold on 7/6/04
BZH	$99.90	$98.12	178	$294.86	Sold on 7/6/04
NSIT	$17.26	$17.23	1005	$8.17	Sold on 7/6/04
ADBE	$45.15	$44.84	380	$95.82	Sold on 7/6/04
AAP	$40.90	$43.44	392	($1,017.66)	Sold on 7/13/04
CDWC	$60.02	$61.03	289	($313.87)	Sold on 7/13/04
PDII	$28.52	$29.98	586	($877.54)	Sold on 7/13/04
BLTI	$12.60	$12.96	1349	($507.62)	Sold on 7/13/04
ANF	$37.03	$37.58	457	($273.33)	Sold on 7/13/04
ABFS	$34.15	$32.10	510	1,034.51	
WGO	$35.46	$33.88	488	760.05	
NSIT	$16.05	$16.47	1060	($456.19)	
SAFM	$53.05	$47.78	364	1,907.29	
THQI	$22.20	$21.54	776	501.17	
CSC	$46.83	$44.35	356	871.89	

Table 87: Agent Results as of July 20, 2004

9.8.2 Transactions Made

The simulation ended on July 20, 2004. Consequently, all shares in all securities were sold and all STOP orders that no longer were applicable were cancelled. These transactions are detailed below.

Symbol	Purchase Date	Purchase Price	Shares	Net Cost	Price Sold	Value Sold	Profit/Loss
ABFS	6/29/04	$32.10	510	$16,381.99	$34.15	$17,405.51	$1,023.52
WGO	7/13/04	$33.88	488	$16,544.43	$35.46	$17,293.49	$749.06
NSIT	7/13/04	$16.47	1060	$17,469.19	$16.05	$17,002.01	($467.18)
SAFM	7/13/04	$47.78	364	$17,402.91	$53.05	$19,299.21	$1,896.30
THQI	7/13/04	$21.54	776	$16,726.03	$22.20	$17,216.21	$490.18
CSC	7/13/04	$44.35	356	$15,799.59	$46.83	$16,660.49	$860.90

Table 88: Agent's Sell Transactions for July 20, 2004

Order	Status
Sell 488 shares WGO @ STOP of $29.81	cancelled
Sell 1060 shares NSIT @ STOP of $14.49	cancelled
Sell 364 shares SAFM @ STOP of $42.04	cancelled
Sell 776 shares THQI @ STOP of $18.95	cancelled
Sell 356 shares CSC @ STOP of $39.02	cancelled
Sell 510 shares ABFS @ STOP of $28.25	cancelled

Table 89: Agent's Cancelled Sell STOP orders for July 20, 2004

After the simulation ended and all transactions were completed, $104,894.26 in cash remained in the agent's investment portfolio.

Chapter 10

Final Simulation Results

10.1 Stock Market as a Whole

For the seven week simulation, which began on June 1, 2004 and ended on July 20, 2004, the stock market, as represented by the Dow Jones Industrial Average, NASDAQ Composite Index, and the S&P 500 Index, was down. The Dow Jones Industrial Average decreased 38.11 (-0.38%) from 10,187.18 to 10,149.07. The NASDAQ decreased 61.45 (-3.21%) from 1,978.52 to 1,917.07. The S&P 500 decreased 9.31 (-0.84%) from 1,117.98 to 1,108.67. The seven week charts for these different indices are shown below.
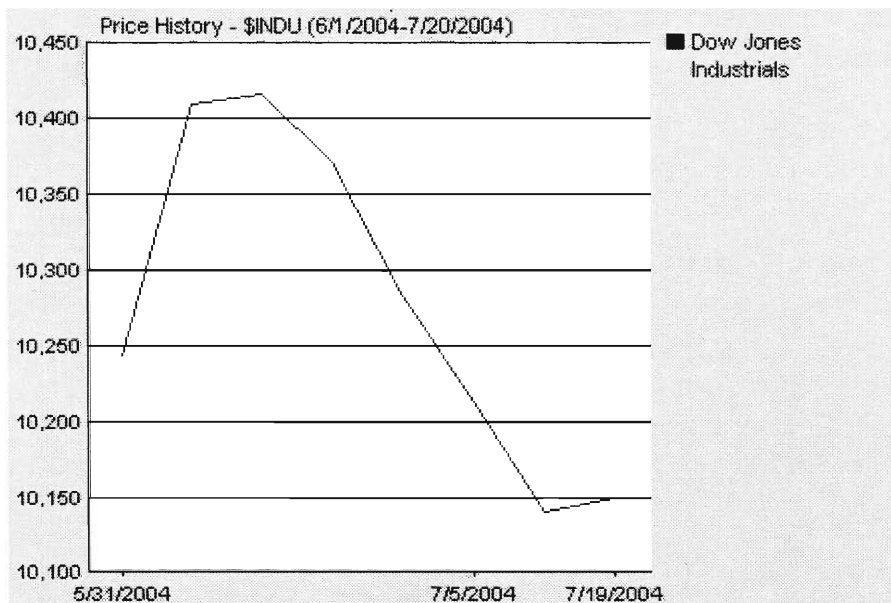
Figure 43: Dow Jones Industrial Average from June 1, 2004 to July 20, 2004
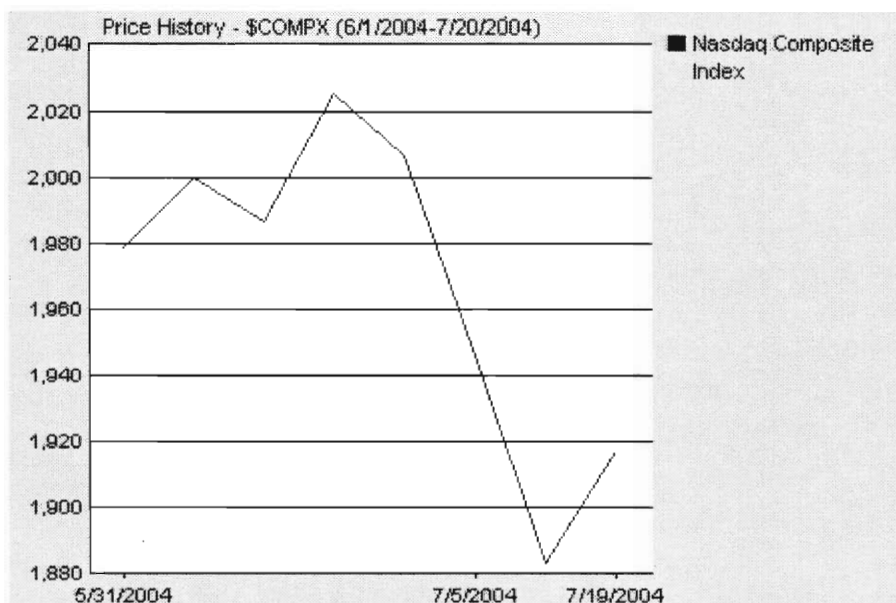
Figure 44: NASDAQ Composite Index from June 1, 2004 to July 20, 2004
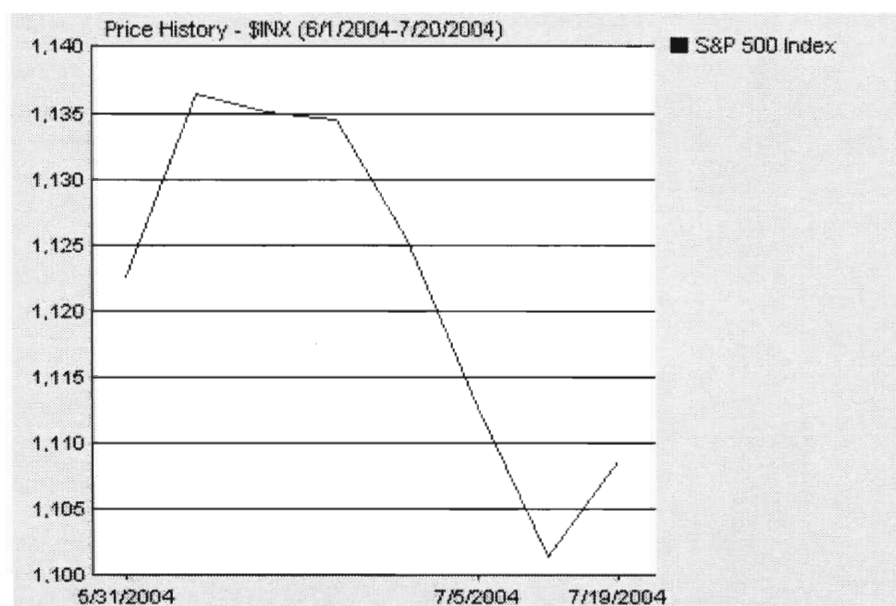
Figure 45: S&P 500 Index from June 1, 2004 to July 20, 2004

10.2 Autonomous Agent Results

At the end of the simulation the agent's portfolio was worth $104,894.26. Since

the initial investment was $100,000, the agent made a total of $4,894.26 in seven weeks.

This is a 4.67% increase of funds in the agent's portfolio. Since the market as a whole decreased, the agent was mostly successful for the seven week simulation. The graph below shows the agent's portfolio for the duration of the simulation.
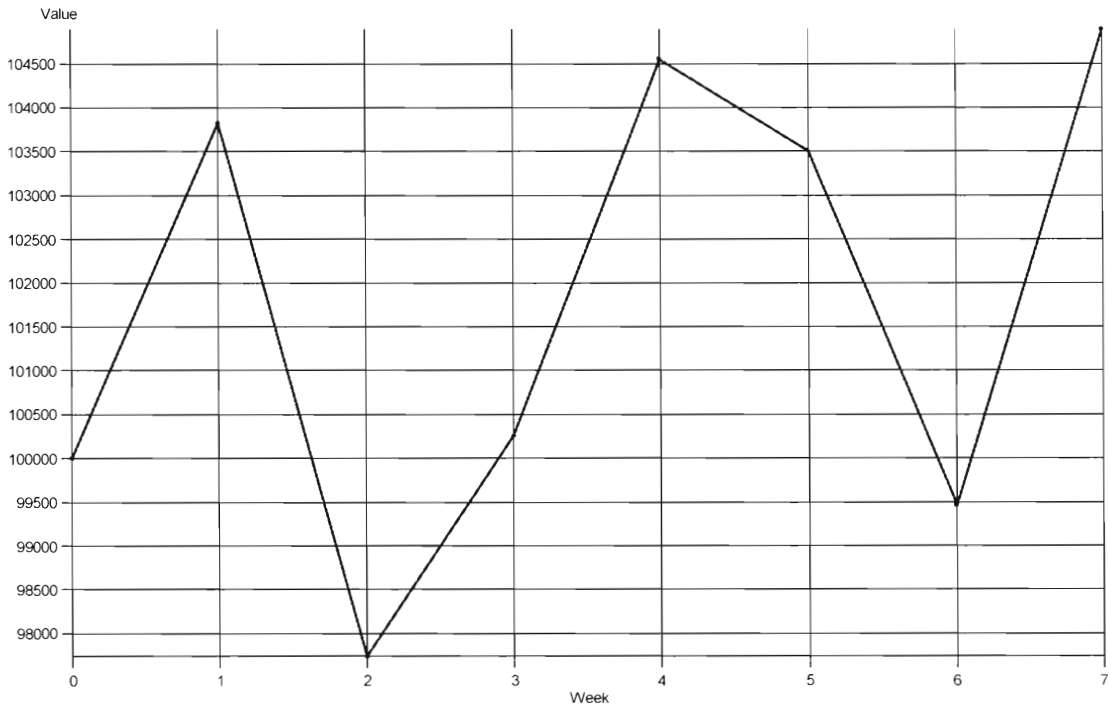
Figure 46: Autonomous Agent's Portfolio Value from June 1, 2004 to July 20, 2004

10.3 Manual Results

At the end of the simulation our manual portfolio contained $94,616.71. Since the initial investment was $100,000, we lost a total of $5,383.29 in seven weeks. This is a 5.69% decrease of funds in our manual portfolio. Since the market as a whole decreased, our investments were expected to decrease. However, our manual investments decreased substantially when compared to the market as a whole. The graph below shows the manual portfolio for the extent of the simulation.
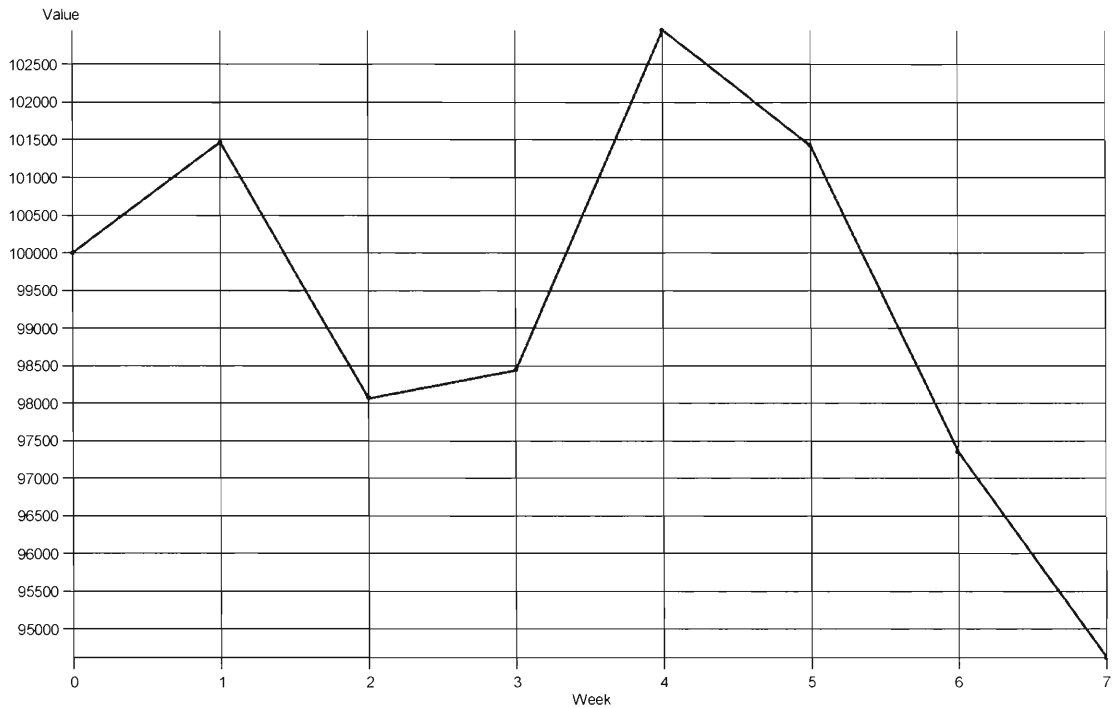
Figure 47: Manual Portfolio Value from June 1, 2004 to July 20, 2004

10.4 Analysis and Comparisons

At the end of the simulation, there was a clear difference between the results of the two investment portfolios. The agent's portfolio increased 4.67%, while our manual portfolio decreases 5.69%. However, this fact is not enough to conclude that the agent would be the best investment choice or the most successful. The simulation was too short to definitely predict that the agent was a complete success, but it does give some insight. Nineteen of thirty-one (61%) of the agent's stock picks made money compared to five of eleven (45%) of our manual picks.

The charts shown in sections 10.2 and 10.3 have a strong correlation until the last week. Both portfolios saw an initial spike in value, dipped in the second week, reached relative highs by the fourth week, and dropped during the fifth and sixth weeks.

However, during the last week of the simulation our manual investments plummeted dramatically, while the agent's portfolio grew just as dramatically. Neither portfolio had a clear advantage until the last week of the simulation when the agent's stock picks made a significant amount of money.

A final point must be made about the limitations of the autonomous trading agent. During the second week of the simulation one of the agent's stock picks, Beazer Homes USA Inc. (BZH), dropped significantly. When the stock was sold at the end of the week the agent lost $1,859.90. The primary reason the stock dropped was that the Federal Reserve, headed by chairman Greenspan, hinted that they might raise interest rates. Greenspan expressed concern over high energy prices, and said that inflation was also becoming a concern. As a result, he suggested that a rate increase was probably imminent. The agent had no way of considering or analyzing the news' impact on the stock market. The news of possible interest rate hikes especially hurt the homes construction industry, which Beazer is a part of. The company may have had solid fundamental and technical indicators, but at the time it probably would not have been a safe or appropriate investment choice.

Chapter 11

Conclusion

11.1 Project Summary

This Interactive Qualifying Project examined the process of analyzing, selecting, and investing successfully in the stock market. Specifically, it focused on the current and future impact of autonomous trading agents and their impact on investing and investment strategies. Autonomous agents have several advantages over their human counterparts. Primarily, software can run continuously and can process large amounts of data in a short amount of time.

A seven week simulation, which began on June 1, 2004 and ended on July 20, 2004, was used to test the effectiveness of investment strategies and the usefulness of an autonomous trading agent. The simulation was broken into two major parts: our manual stock picks and our agent's stock picks. Each week both portfolios were examined and if needed transactions were made and new investments were chosen. The goal of the simulation was twofold. First, the primary goal was to develop and implement investment strategies (both manual and through the agent) to make a profit and to have a higher percentage return than the market as a whole for the seven weeks. Secondly, we wanted to examine and explore the effectiveness of autonomous trading agents. To do this the agent's investment simulation will be compared both to human counterparts and the market as a whole.

11.2 Lessons Learned

The primary objective and goal of this project was to examine the ability for computer programs, known as agents, to invest autonomously in the stock market. By utilizing a seven week investment simulation we were able to prove that an autonomous agent can be quite useful when investing in the stock market. However, the simulation was too short to make any definitive statements. Consequently, we would not depend solely on the autonomous agent for investing. Instead, we would use the agent to give us a list of top stocks and then manually examine and analyze each company. This way we can still analyze every stock while at the same time being able to examine the human factors of trading and the impact of news and current events on a company's stock price.

Another objective of this project was to learn the fundamentals of investing. After completing this project all of us have learned a lot about the entire process of investing. We learned how to analyze and evaluate stocks based on both fundamental and technical characteristics, how to maintain and manage an investment portfolio, and how to manage and assess the risk of investing. Overall, the project was a success. It helped us understand and experiment with both traditional investing and through the use of an autonomous trading agent.

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Appendix A

Agent's Top Rated Stocks for June 1, 2004

IMDC				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	79.900	279.900
	4	Monthly percentage change	25.000	304.900
	5	Institutional transactions	143.000	447.900
	6	1 year target estimate	20.750	468.650
	7	Beta	50.000	418.650
	8	Yearly high/low	9.683	428.333
	9	52 week change relative to S&P 500	26.185	554.518
	10	Market capitalization	20.000	574.518
	11	P/E ratio	127.248	701.766
	12	Forward P/E ratio	6.800	708.566
	13	PEG ratio	137.037	845.603
	14	PB ratio	67.361	912.964
	15	Price cashflow ratio	53.448	966.412
	16	Current ratio	64.000	1030.412
	17	Quick ratio	59.500	1089.912
	18	Leverage ratio	57.000	1146.912
	19	PS ratio	-33.793	1113.119
	20	Analyst recommendations	-100.000	1013.119
	21	Short interest	400.000	1413.119
	22	Sales	-25.000	1388.119
	23	Earnings estimate	40.000	1428.119
	24	Growth estimate	10.000	1438.119
	25	EPS estimate history	30.000	1468.119
	26	Profit margin	33.600	1501.719
	27	Operating margin	0.000	1501.719
	28	Gross margin	50.000	1551.719
	29	Return on assets	168.300	1720.019
	30	Return on equity	181.500	1901.519
	31	Return on capital	169.900	2071.419
	32	Receivable turnover	50.000	2121.419
	33	Inventory turnover	0.000	2121.419
	34	Asset turnover	-49.300	2072.119
	35	Revenue per share	49.169	2121.169
	36	Revenue growth	0.000	2121.169
	37	Earnings growth	0.000	2121.169
	38	Net income available to common shares	-50.000	2071.169
	39	Total cash per share	24.900	2096.069

	40	Debt equity ratio	-0.250	2095.819
	41	Book value per share	20.510	2116.329
	42	Free cash flow	10.000	2126.329
Technical	43	Moving averages (50, 100, 200)	35.000	2161.329
	44	RSI	75.000	2236.329
	45	Relative Strength	100.000	2336.329
	46	MFI	75.000	2411.329
	47	Bollinger bands	0.000	2411.329
	48	Williams %R	50.000	2461.329
	49	Price rate of change (ROC)	0.000	2461.329

Table 90: IMDC Rating for June 1, 2004

TTWO				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	23.890	223.890
	4	Monthly percentage change	25.000	248.890
	5	Institutional transactions	250.000	498.890
	6	1 year target estimate	46.150	545.040
	7	Beta	50.000	595.040
	8	Yearly high/low	7.202	602.242
	9	52 week change relative to S&P 500	2.460	604.702
	10	Market capitalization	10.000	614.702
	11	P/E ratio	158.823	773.525
	12	Forward P/E ratio	2.200	775.725
	13	PEG ratio	160.241	935.966
	14	PB ratio	92.736	1028.702
	15	Price cashflow ratio	58.264	1086.966
	16	Current ratio	65.000	1151.966
	17	Quick ratio	60.500	1212.466
	18	Leverage ratio	56.500	1268.966
	19	PS ratio	124.074	1393.040
	20	Analyst recommendations	-100.000	1293.040
	21	Short interest	0.000	1293.040
	22	Sales	-25.000	1268.040
	23	Earnings estimate	40.000	1308.040
	24	Growth estimate	-10.000	1298.040
	25	EPS estimate history	10.000	1308.040
	26	Profit margin	15.800	1323.840
	27	Operating margin	0.000	1323.840
	28	Gross margin	50.000	1373.840
	29	Return on assets	161.300	1535.140
	30	Return on equity	171.500	1706.640
	31	Return on capital	171.100	1877.740

	32	Receivable turnover	50.000	1927.740
	33	Inventory turnover	0.000	1927.740
	34	Asset turnover	51.500	1979.240
	35	Revenue per share	100.000	2079.240
	36	Revenue growth	0.000	2079.240
	37	Earnings growth	0.000	2079.240
	38	Net income available to common shares	-50.000	2029.240
	39	Total cash per share	57.000	2086.240
	40	Debt equity ratio	0.000	2086.240
	41	Book value per share	22.970	2109.210
	42	Free cash flow	10.000	2119.210
Technical	43	Moving averages (50, 100, 200)	35.000	2154.210
	44	RSI	75.000	2229.210
	45	Relative Strength	100.000	2329.210
	46	MFI	75.000	2404.210
	47	Bollinger bands	0.000	2404.210
	48	Williams %R	0.000	2404.210
	49	Price rate of change (ROC)	0.000	2404.210

Table 91: TTWO Rating for June 1, 2004

MGAM				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	87.230	287.230
	4	Monthly percentage change	-50.000	237.230
	5	Institutional transactions	250.000	487.230
	6	1 year target estimate	64.500	551.730
	7	Beta	50.000	601.730
	8	Yearly high/low	8.347	610.077
	9	52 week change relative to S&P 500	29.285	639.362
	10	Market capitalization	10.000	649.362
	11	P/E ratio	148.076	797.438
	12	Forward P/E ratio	3.400	800.838
	13	PEG ratio	165.790	966.628
	14	PB ratio	-3.858	962.770
	15	Price cashflow ratio	59.615	1022.385
	16	Current ratio	59.000	1081.385
	17	Quick ratio	58.000	1139.385
	18	Leverage ratio	57.000	1196.385
	19	PS ratio	118.965	1315.350
	20	Analyst recommendations	0.000	1315.350
	21	Short interest	0.000	1315.350
	22	Sales	125.000	1440.350
	23	Earnings estimate	60.000	1500.350

	24	Growth estimate	50.000	1550.350
	25	EPS estimate history	-10.000	1540.350
	26	Profit margin	15.000	1555.350
	27	Operating margin	0.000	1555.350
	28	Gross margin	50.000	1605.350
	29	Return on assets	208.500	1813.850
	30	Return on equity	130.100	1943.950
	31	Return on capital	219.700	2163.650
	32	Receivable turnover	50.000	2213.650
	33	Inventory turnover	0.000	2213.650
	34	Asset turnover	52.800	2266.450
	35	Revenue per share	76.600	2343.050
	36	Revenue growth	0.000	2343.050
	37	Earnings growth	0.000	2343.050
	38	Net income available to common shares	-50.000	2293.050
	39	Total cash per share	13.100	2306.150
	40	Debt equity ratio	-0.550	2305.600
	41	Book value per share	4.710	2310.310
	42	Free cash flow	-10.000	2300.310
Technical	43	Moving averages (50, 100, 200)	-135.000	2165.310
	44	RSI	0.000	2165.310
	45	Relative Strength	100.000	2265.310
	46	MFI	0.000	2265.310
	47	Bollinger bands	75.000	2340.310
	48	Williams %R	50.000	2390.310
	49	Price rate of change (ROC)	0.000	2390.310

Table 92: MGAM Rating for June 1, 2004

XJT				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	5.090	205.090
	4	Monthly percentage change	25.000	230.090
	5	Institutional transactions	102.800	332.890
	6	1 year target estimate	19.800	352.690
	7	Beta	50.000	402.690
	8	Yearly high/low	7.017	409.707
	9	52 week change relative to S&P 500	-5.500	404.207
	10	Market capitalization	10.000	414.207
	11	P/E ratio	200.000	614.207
	12	Forward P/E ratio	0.600	614.807
	13	PEG ratio	235.135	849.942
	14	PB ratio	-22.079	827.863
	15	Price cashflow ratio	70.408	898.271

	16	Current ratio	56.000	954.271
	17	Quick ratio	55.000	1009.271
	18	Leverage ratio	117.000	1126.271
	19	PS ratio	150.000	1276.271
	20	Analyst recommendations	-100.000	1176.271
	21	Short interest	300.000	1476.271
	22	Sales	-25.000	1451.271
	23	Earnings estimate	40.000	1491.271
	24	Growth estimate	-10.000	1481.271
	25	EPS estimate history	50.000	1531.271
	26	Profit margin	16.200	1547.471
	27	Operating margin	0.000	1547.471
	28	Gross margin	50.000	1597.471
	29	Return on assets	162.400	1759.871
	30	Return on equity	200.000	1959.871
	31	Return on capital	200.000	2159.871
	32	Receivable turnover	50.000	2209.871
	33	Inventory turnover	0.000	2209.871
	34	Asset turnover	52.800	2262.671
	35	Revenue per share	100.000	2362.671
	36	Revenue growth	0.000	2362.671
	37	Earnings growth	0.000	2362.671
	38	Net income available to common shares	-50.000	2312.671
	39	Total cash per share	40.100	2352.771
	40	Debt equity ratio	-68.650	2284.121
	41	Book value per share	0.350	2284.471
	42	Free cash flow	10.000	2294.471
Technical	43	Moving averages (50, 100, 200)	-135.000	2159.471
	44	RSI	0.000	2159.471
	45	Relative Strength	100.000	2259.471
	46	MFI	75.000	2334.471
	47	Bollinger bands	0.000	2334.471
	48	Williams %R	50.000	2384.471
	49	Price rate of change (ROC)	0.000	2384.471

Table 93: XJT Rating for June 1, 2004

MMSI				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	42.900	242.900
	4	Monthly percentage change	25.000	267.900
	5	Institutional transactions	193.200	461.100
	6	1 year target estimate	42.450	503.550
	7	Beta	-50.000	453.550

	8	Yearly high/low	5.780	459.330
	9	52 week change relative to S&P 500	10.510	469.840
	10	Market capitalization	10.000	479.840
	11	P/E ratio	145.871	625.711
	12	Forward P/E ratio	1.200	626.911
	13	PEG ratio	147.619	774.530
	14	PB ratio	75.126	849.656
	15	Price cashflow ratio	55.814	905.470
	16	Current ratio	73.500	978.970
	17	Quick ratio	66.500	1045.470
	18	Leverage ratio	56.000	1101.470
	19	PS ratio	87.453	1188.923
	20	Analyst recommendations	-100.000	1088.923
	21	Short interest	400.000	1488.923
	22	Sales	125.000	1613.923
	23	Earnings estimate	60.000	1673.923
	24	Growth estimate	10.000	1683.923
	25	EPS estimate history	10.000	1693.923
	26	Profit margin	25.200	1719.123
	27	Operating margin	0.000	1719.123
	28	Gross margin	50.000	1769.123
	29	Return on assets	175.600	1944.723
	30	Return on equity	85.800	2030.523
	31	Return on capital	180.600	2211.123
	32	Receivable turnover	50.000	2261.123
	33	Inventory turnover	0.000	2261.123
	34	Asset turnover	51.400	2312.523
	35	Revenue per share	27.000	2339.523
	36	Revenue growth	0.000	2339.523
	37	Earnings growth	0.000	2339.523
	38	Net income available to common shares	-50.000	2289.523
	39	Total cash per share	13.300	2302.823
	40	Debt equity ratio	0.000	2302.823
	41	Book value per share	3.620	2306.443
	42	Free cash flow	10.000	2316.443
Technical	43	Moving averages (50, 100, 200)	-135.000	2181.443
	44	RSI	0.000	2181.443
	45	Relative Strength	100.000	2281.443
	46	MFI	-75.000	2206.443
	47	Bollinger bands	75.000	2281.443
	48	Williams %R	50.000	2331.443
	49	Price rate of change (ROC)	0.000	2331.443

Table 94: MMSI Rating for June 1, 2004

TUES	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	26.140	226.140
	4	Monthly percentage change	-50.000	176.140
	5	Institutional transactions	170.400	346.540
	6	1 year target estimate	44.200	390.740
	7	Beta	50.000	440.740
	8	Yearly high/low	8.198	448.938
	9	52 week change relative to S&P 500	3.415	452.353
	10	Market capitalization	10.000	462.353
	11	P/E ratio	146.948	609.301
	12	Forward P/E ratio	4.100	613.401
	13	PEG ratio	158.140	771.541
	14	PB ratio	-13.024	758.517
	15	Price cashflow ratio	-19.286	739.231
	16	Current ratio	58.500	797.731
	17	Quick ratio	-49.500	748.231
	18	Leverage ratio	60.500	808.731
	19	PS ratio	21.943	830.674
	20	Analyst recommendations	0.000	830.674
	21	Short interest	200.000	1030.674
	22	Sales	-25.000	1005.674
	23	Earnings estimate	60.000	1065.674
	24	Growth estimate	30.000	1095.674
	25	EPS estimate history	10.000	1105.674
	26	Profit margin	13.200	1118.874
	27	Operating margin	0.000	1118.874
	28	Gross margin	50.000	1168.874
	29	Return on assets	232.000	1400.874
	30	Return on equity	275.000	1675.874
	31	Return on capital	252.800	1928.674
	32	Receivable turnover	50.000	1978.674
	33	Inventory turnover	0.000	1978.674
	34	Asset turnover	53.100	2031.774
	35	Revenue per share	100.000	2131.774
	36	Revenue growth	0.000	2131.774
	37	Earnings growth	0.000	2131.774
	38	Net income available to common shares	-50.000	2081.774
	39	Total cash per share	1.700	2083.474
	40	Debt equity ratio	-0.700	2082.774
	41	Book value per share	3.420	2086.194
	42	Free cash flow	10.000	2096.194
Technical	43	Moving averages (50, 100, 200)	35.000	2131.194
	44	RSI	0.000	2131.194
	45	Relative Strength	100.000	2231.194

	46	MFI	0.000	2231.194
	47	Bollinger bands	0.000	2231.194
	48	Williams %R	0.000	2231.194
	49	Price rate of change (ROC)	-50.000	2181.194

Table 95: TUES Rating for June 1, 2004

Appendix B

Agent's Top Rated Stocks for June 8, 2004

MMSI				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	26.390	226.390
	4	Monthly percentage change	25.000	251.390
	5	Institutional transactions	194.800	446.190
	6	1 year target estimate	43.300	489.490
	7	Beta	-50.000	439.490
	8	Yearly high/low	5.714	445.204
	9	52 week change relative to S&P 500	5.610	450.814
	10	Market capitalization	110.000	560.814
	11	P/E ratio	46.296	607.110
	12	Forward P/E ratio	1.300	608.410
	13	PEG ratio	148.077	756.487
	14	PB ratio	75.445	831.932
	15	Price cashflow ratio	55.883	887.815
	16	Current ratio	73.500	961.315
	17	Quick ratio	66.500	1027.815
	18	Leverage ratio	56.000	1083.815
	19	PS ratio	87.879	1171.694
	20	Analyst recommendations	-100.000	1071.694
	21	Short interest	400.000	1471.694
	22	Sales	125.000	1596.694
	23	Earnings estimate	61.000	1657.694
	24	Growth estimate	9.000	1666.694
	25	EPS estimate history	10.000	1676.694
	26	Profit margin	25.200	1701.894
	27	Operating margin	0.000	1701.894
	28	Gross margin	50.000	1751.894
	29	Return on assets	175.600	1927.494
	30	Return on equity	85.800	2013.294
	31	Return on capital	180.600	2193.894
	32	Receivable turnover	50.000	2243.894
	33	Inventory turnover	0.000	2243.894
	34	Asset turnover	51.400	2295.294
	35	Revenue per share	27.000	2322.294
	36	Revenue growth	0.000	2322.294
	37	Earnings growth	0.000	2322.294
	38	Net income available to common shares	-50.000	2272.294
	39	Total cash per share	13.300	2285.594

	40	Debt equity ratio	0.000	2285.594
	41	Book value per share	3.620	2289.214
	42	Free cash flow	10.000	2299.214
Technical	43	Moving averages (50, 100, 200)	-135.000	2164.214
	44	RSI	0.000	2164.214
	45	Relative Strength	100.000	2264.214
	46	MFI	75.000	2339.214
	47	Bollinger bands	75.000	2414.214
	48	Williams %R	50.000	2464.214
	49	Price rate of change (ROC)	0.000	2464.214

Table 96: MMSI Rating for June 8, 2004

CTSH				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	96.000	296.000
	4	Monthly percentage change	-50.000	246.000
	5	Institutional transactions	238.400	484.400
	6	1 year target estimate	55.500	539.900
	7	Beta	-50.000	489.900
	8	Yearly high/low	108.055	597.955
	9	52 week change relative to S&P 500	36.235	634.190
	10	Market capitalization	20.000	654.190
	11	P/E ratio	121.322	775.512
	12	Forward P/E ratio	9.900	785.412
	13	PEG ratio	142.735	928.147
	14	PB ratio	-14.594	913.553
	15	Price cashflow ratio	-22.246	891.307
	16	Current ratio	74.500	965.807
	17	Quick ratio	72.500	1038.307
	18	Leverage ratio	56.500	1094.807
	19	PS ratio	-35.935	1058.872
	20	Analyst recommendations	0.000	1058.872
	21	Short interest	100.000	1158.872
	22	Sales	125.000	1283.872
	23	Earnings estimate	60.000	1343.872
	24	Growth estimate	30.000	1373.872
	25	EPS estimate history	50.000	1423.872
	26	Profit margin	32.600	1456.472
	27	Operating margin	0.000	1456.472
	28	Gross margin	50.000	1506.472
	29	Return on assets	195.600	1702.072
	30	Return on equity	210.000	1912.072
	31	Return on capital	210.000	2122.072

	32	Receivable turnover	50.000	2172.072
	33	Inventory turnover	0.000	2172.072
	34	Asset turnover	51.300	2223.372
	35	Revenue per share	31.700	2255.072
	36	Revenue growth	0.000	2255.072
	37	Earnings growth	0.000	2255.072
	38	Net income available to common shares	-50.000	2205.072
	39	Total cash per share	30.700	2235.772
	40	Debt equity ratio	0.000	2235.772
	41	Book value per share	4.690	2240.462
	42	Free cash flow	10.000	2250.462
Technical	43	Moving averages (50, 100, 200)	35.000	2285.462
	44	RSI	0.000	2285.462
	45	Relative Strength	100.000	2385.462
	46	MFI	0.000	2385.462
	47	Bollinger bands	0.000	2385.462
	48	Williams %R	50.000	2435.462
	49	Price rate of change (ROC)	-50.000	2385.462

Table 97: CTSH Rating for June 8, 2004

BZH				
	Step	**Description**	**Numerical Change**	**Overall Rating**
Fundamental	1	Dividend	0.000	25.000
	2	Purchasable shares	200.000	225.000
	3	52 week percentage change	21.960	246.960
	4	Monthly percentage change	-50.000	196.960
	5	Institutional transactions	250.000	446.960
	6	1 year target estimate	162.400	609.360
	7	Beta	50.000	659.360
	8	Yearly high/low	8.945	668.305
	9	52 week change relative to S&P 500	1.645	669.950
	10	Market capitalization	10.000	679.950
	11	P/E ratio	200.000	879.950
	12	Forward P/E ratio	0.800	880.750
	13	PEG ratio	221.951	1102.701
	14	PB ratio	128.741	1231.442
	15	Price cashflow ratio	65.151	1296.593
	16	Current ratio	128.000	1424.593
	17	Quick ratio	-45.500	1379.093
	18	Leverage ratio	62.500	1441.593
	19	PS ratio	150.000	1591.593
	20	Analyst recommendations	-100.000	1491.593
	21	Short interest	300.000	1791.593
	22	Sales	-125.000	1666.593
	23	Earnings estimate	60.000	1726.593

			Numerical Change	Overall Rating
	24	Growth estimate	-10.000	1716.593
	25	EPS estimate history	50.000	1766.593
	26	Profit margin	11.000	1777.593
	27	Operating margin	0.000	1777.593
	28	Gross margin	40.200	1817.793
	29	Return on assets	155.000	1972.793
	30	Return on equity	-12.900	1959.893
	31	Return on capital	146.500	2106.393
	32	Receivable turnover	50.000	2156.393
	33	Inventory turnover	0.000	2156.393
	34	Asset turnover	51.500	2207.893
	35	Revenue per share	100.000	2307.893
	36	Revenue growth	0.000	2307.893
	37	Earnings growth	0.000	2307.893
	38	Net income available to common shares	-50.000	2257.893
	39	Total cash per share	65.400	2323.293
	40	Debt equity ratio	-4.350	2318.943
	41	Book value per share	89.900	2408.843
	42	Free cash flow	-10.000	2398.843
Technical	43	Moving averages (50, 100, 200)	-135.000	2263.843
	44	RSI	0.000	2263.843
	45	Relative Strength	100.000	2363.843
	46	MFI	0.000	2363.843
	47	Bollinger bands	0.000	2363.843
	48	Williams %R	50.000	2413.843
	49	Price rate of change (ROC)	-50.000	2363.843

Table 98: BZH Rating for June 8, 2004

IMDC				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	71.250	271.250
	4	Monthly percentage change	25.000	296.250
	5	Institutional transactions	143.000	439.250
	6	1 year target estimate	25.900	465.150
	7	Beta	50.000	515.150
	8	Yearly high/low	9.516	524.666
	9	52 week change relative to S&P 500	25.345	550.011
	10	Market capitalization	20.000	570.011
	11	P/E ratio	128.169	698.180
	12	Forward P/E ratio	6.600	704.780
	13	PEG ratio	138.168	842.948
	14	PB ratio	67.954	910.902
	15	Price cashflow ratio	53.571	964.473

	16	Current ratio	64.000	1028.473
	17	Quick ratio	59.500	1087.973
	18	Leverage ratio	57.000	1144.973
	19	PS ratio	-33.249	1111.724
	20	Analyst recommendations	-100.000	1011.724
	21	Short interest	400.000	1411.724
	22	Sales	-25.000	1386.724
	23	Earnings estimate	40.000	1426.724
	24	Growth estimate	30.000	1456.724
	25	EPS estimate history	30.000	1486.724
	26	Profit margin	33.600	1520.324
	27	Operating margin	0.000	1520.324
	28	Gross margin	50.000	1570.324
	29	Return on assets	168.300	1738.624
	30	Return on equity	181.500	1920.124
	31	Return on capital	169.900	2090.024
	32	Receivable turnover	50.000	2140.024
	33	Inventory turnover	0.000	2140.024
	34	Asset turnover	-49.300	2090.724
	35	Revenue per share	49.050	2139.774
	36	Revenue growth	0.000	2139.774
	37	Earnings growth	0.000	2139.774
	38	Net income available to common shares	-50.000	2089.774
	39	Total cash per share	24.900	2114.674
	40	Debt equity ratio	-0.250	2114.424
	41	Book value per share	20.510	2134.934
	42	Free cash flow	10.000	2144.934
Technical	43	Moving averages (50, 100, 200)	35.000	2179.934
	44	RSI	0.000	2179.934
	45	Relative Strength	100.000	2279.934
	46	MFI	0.000	2279.934
	47	Bollinger bands	0.000	2279.934
	48	Williams %R	50.000	2329.934
	49	Price rate of change (ROC)	0.000	2329.934

Table 99: IMDC Rating for June 8, 2004

XJT				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	5.090	205.090
	4	Monthly percentage change	25.000	230.090
	5	Institutional transactions	102.800	332.890
	6	1 year target estimate	19.800	352.690
	7	Beta	50.000	402.690

	8	Yearly high/low	7.017	409.707
	9	52 week change relative to S&P 500	-5.500	404.207
	10	Market capitalization	10.000	414.207
	11	P/E ratio	200.000	614.207
	12	Forward P/E ratio	0.600	614.807
	13	PEG ratio	235.135	849.942
	14	PB ratio	-22.079	827.863
	15	Price cashflow ratio	70.408	898.271
	16	Current ratio	56.000	954.271
	17	Quick ratio	55.000	1009.271
	18	Leverage ratio	117.000	1126.271
	19	PS ratio	150.000	1276.271
	20	Analyst recommendations	-100.000	1176.271
	21	Short interest	300.000	1476.271
	22	Sales	-25.000	1451.271
	23	Earnings estimate	40.000	1491.271
	24	Growth estimate	-10.000	1481.271
	25	EPS estimate history	50.000	1531.271
	26	Profit margin	16.200	1547.471
	27	Operating margin	0.000	1547.471
	28	Gross margin	50.000	1597.471
	29	Return on assets	160.400	1757.871
	30	Return on equity	202.000	1959.871
	31	Return on capital	200.000	2159.871
	32	Receivable turnover	50.000	2209.871
	33	Inventory turnover	0.000	2209.871
	34	Asset turnover	52.800	2262.671
	35	Revenue per share	100.000	2362.671
	36	Revenue growth	0.000	2362.671
	37	Earnings growth	0.000	2362.671
	38	Net income avaiiable to common shares	-50.000	2312.671
	39	Total cash per share	40.100	2352.771
	40	Debt equity ratio	-68.650	2284.121
	41	Book value per share	0.350	2284.471
	42	Free cash flow	10.000	2294.471
Technical	43	Moving averages (50, 100, 200)	-135.000	2159.471
	44	RSI	0.000	2159.471
	45	Relative Strength	100.000	2259.471
	46	MFI	0.000	2259.471
	47	Bollinger bands	0.000	2259.471
	48	Williams %R	50.000	2309.471
	49	Price rate of change (ROC)	0.000	2309.471

Table 100: XJT Rating for June 8, 2004

NVDA	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	-14.950	185.050
	4	Monthly percentage change	-25.000	160.050
	5	Institutional transactions	181.400	341.450
	6	1 year target estimate	15.450	356.900
	7	Beta	50.000	406.900
	8	Yearly high/low	8.287	415.187
	9	52 week change relative to S&P 500	-12.580	402.607
	10	Market capitalization	20.000	422.607
	11	P/E ratio	120.081	542.688
	12	Forward P/E ratio	19.400	562.088
	13	PEG ratio	148.077	710.165
	14	PB ratio	79.850	790.015
	15	Price cashflow ratio	54.567	844.582
	16	Current ratio	-34.500	810.082
	17	Quick ratio	-38.000	772.082
	18	Leverage ratio	-18.500	753.582
	19	PS ratio	102.083	855.665
	20	Analyst recommendations	0.000	855.665
	21	Short interest	400.000	1255.665
	22	Sales	-25.000	1230.665
	23	Earnings estimate	60.000	1290.665
	24	Growth estimate	30.000	1320.665
	25	EPS estimate history	30.000	1350.665
	26	Profit margin	8.000	1358.665
	27	Operating margin	0.000	1358.665
	28	Gross margin	50.000	1408.665
	29	Return on assets	144.800	1553.465
	30	Return on equity	150.200	1703.665
	31	Return on capital	144.000	1847.665
	32	Receivable turnover	50.000	1897.665
	33	Inventory turnover	0.000	1897.665
	34	Asset turnover	61.200	1958.865
	35	Revenue per share	46.950	2005.815
	36	Revenue growth	0.000	2005.815
	37	Earnings growth	0.000	2005.815
	38	Net income available to common shares	-50.000	1955.815
	39	Total cash per share	39.600	1995.415
	40	Debt equity ratio	0.000	1995.415
	41	Book value per share	16.550	2011.965
	42	Free cash flow	-10.000	2001.965
Technical	43	Moving averages (50, 100, 200)	35.000	2036.965
	44	RSI	0.000	2036.965
	45	Relative Strength	200.000	2236.965

	46	MFI	0.000	2236.965
	47	Bollinger bands	0.000	2236.965
	48	Williams %R	50.000	2286.965
	49	Price rate of change (ROC)	0.000	2286.965

Table 101: NVDA Rating for June 8, 2004

Appendix C

Agent's Top Rated Stocks for June 15, 2004

NVDA	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	-11.380	188.620
	4	Monthly percentage change	-25.000	163.620
	5	Institutional transactions	181.400	345.020
	6	1 year target estimate	26.900	371.920
	7	Beta	50.000	421.920
	8	Yearly high/low	7.450	429.370
	9	52 week change relative to S&P 500	-11.455	417.915
	10	Market capitalization	20.000	437.915
	11	P/E ratio	121.142	559.057
	12	Forward P/E ratio	18.600	577.657
	13	PEG ratio	150.000	727.657
	14	PB ratio	81.446	809.103
	15	Price cashflow ratio	54.808	863.911
	16	Current ratio	-34.500	829.411
	17	Quick ratio	-38.000	791.411
	18	Leverage ratio	-18.500	772.911
	19	PS ratio	104.645	877.556
	20	Analyst recommendations	0.000	877.556
	21	Short interest	400.000	1277.556
	22	Sales	-25.000	1252.556
	23	Earnings estimate	60.000	1312.556
	24	Growth estimate	30.000	1342.556
	25	EPS estimate history	30.000	1372.556
	26	Profit margin	8.000	1380.556
	27	Operating margin	0.000	1380.556
	28	Gross margin	50.000	1430.556
	29	Return on assets	144.800	1575.356
	30	Return on equity	150.200	1725.556
	31	Return on capital	144.000	1869.556
	32	Receivable turnover	50.000	1919.556
	33	Inventory turnover	0.000	1919.556
	34	Asset turnover	51.200	1970.756
	35	Revenue per share	56.950	2027.706
	36	Revenue growth	0.000	2027.706
	37	Earnings growth	0.000	2027.706
	38	Net income available to common shares	-50.000	1977.706
	39	Total cash per share	39.600	2017.306
	40	Debt equity ratio	0.000	2017.306

	41	Book value per share	16.550	2033.856
	42	Free cash flow	-10.000	2023.856
Technical	43	Moving averages (50, 100, 200)	35.000	2058.856
	44	RSI	75.000	2133.856
	45	Relative Strength	200.000	2333.856
	46	MFI	75.000	2408.856
	47	Bollinger bands	0.000	2408.856
	48	Williams %R	50.000	2458.856
	49	Price rate of change (ROC)	50.000	2508.856

Table 102: NVDA Rating for June 15, 2004

CTSH				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	89.530	289.530
	4	Monthly percentage change	25.000	314.530
	5	Institutional transactions	238.400	552.930
	6	1 year target estimate	53.400	606.330
	7	Beta	50.000	656.330
	8	Yearly high/low	8.128	664.458
	9	52 week change relative to S&P 500	32.435	696.893
	10	Market capitalization	20.000	716.893
	11	P/E ratio	120.877	837.770
	12	Forward P/E ratio	10.300	848.070
	13	PEG ratio	142.373	990.443
	14	PB ratio	-14.796	975.647
	15	Price cashflow ratio	-22.305	953.342
	16	Current ratio	74.500	1027.842
	17	Quick ratio	72.500	1100.342
	18	Leverage ratio	56.500	1156.842
	19	PS ratio	-36.207	1120.635
	20	Analyst recommendations	0.000	1120.635
	21	Short interest	100.000	1220.635
	22	Sales	125.000	1345.635
	23	Earnings estimate	60.000	1405.635
	24	Growth estimate	30.000	1435.635
	25	EPS estimate history	50.000	1485.635
	26	Profit margin	32.600	1518.235
	27	Operating margin	0.000	1518.235
	28	Gross margin	50.000	1568.235
	29	Return on assets	195.600	1763.835
	30	Return on equity	210.000	1973.835
	31	Return on capital	210.000	2183.835
	32	Receivable turnover	50.000	2233.835

	33	Inventory turnover	0.000	2233.835
	34	Asset turnover	51.300	2285.135
	35	Revenue per share	31.700	2316.835
	36	Revenue growth	0.000	2316.835
	37	Earnings growth	0.000	2316.835
	38	Net income available to common shares	-50.000	2266.835
	39	Total cash per share	30.700	2297.535
	40	Debt equity ratio	0.000	2297.535
	41	Book value per share	4.690	2302.225
	42	Free cash flow	10.000	2312.225
Technical	43	Moving averages (50, 100, 200)	35.000	2347.225
	44	RSI	0.000	2347.225
	45	Relative Strength	100.000	2447.225
	46	MFI	0.000	2447.225
	47	Bollinger bands	0.000	2447.225
	48	Williams %R	50.000	2497.225
	49	Price rate of change (ROC)	0.000	2497.225

Table 103: CTSH Rating for June 15, 2004

CBK				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	25.000
	2	Purchasable shares	200.000	225.000
	3	52 week percentage change	-25.720	199.280
	4	Monthly percentage change	25.000	224.280
	5	Institutional transactions	230.600	454.880
	6	1 year target estimate	36.650	491.530
	7	Beta	50.000	541.530
	8	Yearly high/low	5.579	547.109
	9	52 week change relative to S&P 500	-16.640	530.469
	10	Market capitalization	10.000	540.469
	11	P/E ratio	160.241	700.710
	12	Forward P/E ratio	0.700	701.410
	13	PEG ratio	168.493	869.903
	14	PB ratio	2.855	872.758
	15	Price cashflow ratio	-17.063	855.695
	16	Current ratio	81.000	936.695
	17	Quick ratio	72.500	1009.195
	18	Leverage ratio	56.000	1065.195
	19	PS ratio	11.349	1076.544
	20	Analyst recommendations	-100.000	976.544
	21	Short interest	300.000	1276.544
	22	Sales	-25.000	1251.544
	23	Earnings estimate	40.000	1291.544
	24	Growth estimate	30.000	1321.544

	25	EPS estimate history	30.000	1351.544
	26	Profit margin	20.200	1371.744
	27	Operating margin	0.000	1371.744
	28	Gross margin	50.000	1421.744
	29	Return on assets	211.800	1633.544
	30	Return on equity	221.100	1854.644
	31	Return on capital	220.100	2074.744
	32	Receivable turnover	50.000	2124.744
	33	Inventory turnover	0.000	2124.744
	34	Asset turnover	52.100	2176.844
	35	Revenue per share	52.000	2228.844
	36	Revenue growth	0.000	2228.844
	37	Earnings growth	0.000	2228.844
	38	Net income available to common shares	-50.000	2178.844
	39	Total cash per share	23.600	2202.444
	40	Debt equity ratio	0.000	2202.444
	41	Book value per share	4.730	2207.174
	42	Free cash flow	10.000	2217.174
Technical	43	Moving averages (50, 100, 200)	-135.000	2082.174
	44	RSI	0.000	2082.174
	45	Relative Strength	200.000	2282.174
	46	MFI	75.000	2357.174
	47	Bollinger bands	0.000	2357.174
	48	Williams %R	50.000	2407.174
	49	Price rate of change (ROC)	50.000	2457.174

Table 104: CBK Rating for June 15, 2004

PIXR				
	Step	**Description**	**Numerical Change**	**Overall Rating**
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	11.810	211.810
	4	Monthly percentage change	25.000	236.810
	5	Institutional transactions	143.800	380.610
	6	1 year target estimate	17.950	398.560
	7	Beta	-50.000	348.560
	8	Yearly high/low	8.747	357.307
	9	52 week change relative to S&P 500	-1.370	355.937
	10	Market capitalization	20.000	375.937
	11	P/E ratio	137.594	513.531
	12	Forward P/E ratio	-18.300	495.231
	13	PEG ratio	130.488	625.719
	14	PB ratio	76.882	702.601
	15	Price cashflow ratio	55.154	757.755
	16	Current ratio	150.000	907.755

	17	Quick ratio	150.000	1057.755
	18	Leverage ratio	55.000	1112.755
	19	PS ratio	-41.993	1070.762
	20	Analyst recommendations	0.000	1070.762
	21	Short interest	300.000	1370.762
	22	Sales	125.000	1495.762
	23	Earnings estimate	40.000	1535.762
	24	Growth estimate	-10.000	1525.762
	25	EPS estimate history	50.000	1575.762
	26	Profit margin	50.000	1625.762
	27	Operating margin	0.000	1625.762
	28	Gross margin	0.000	1625.762
	29	Return on assets	167.500	1793.262
	30	Return on equity	69.000	1862.262
	31	Return on capital	169.000	2031.262
	32	Receivable turnover	-50.000	1981.262
	33	Inventory turnover	0.000	1981.262
	34	Asset turnover	-49.700	1931.562
	35	Revenue per share	26.450	1958.012
	36	Revenue growth	0.000	1958.012
	37	Earnings growth	0.000	1958.012
	38	Net income available to common shares	-50.000	1908.012
	39	Total cash per share	9.300	1917.312
	40	Debt equity ratio	0.000	1917.312
	41	Book value per share	27.750	1945.062
	42	Free cash flow	10.000	1955.062
Technical	43	Moving averages (50, 100, 200)	35.000	1990.062
	44	RSI	75.000	2065.062
	45	Relative Strength	200.000	2265.062
	46	MFI	0.000	2265.062
	47	Bollinger bands	0.000	2265.062
	48	Williams %R	50.000	2315.062
	49	Price rate of change (ROC)	0.000	2315.062

Table 105: PIXR Rating for June 15, 2004

ASF				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	76.490	276.490
	4	Monthly percentage change	25.000	301.490
	5	Institutional transactions	250.000	551.490
	6	1 year target estimate	15.350	566.840
	7	Beta	50.000	616.840
	8	Yearly high/low	8.862	625.702

	9	52 week change relative to S&P 500	29.260	654.962
	10	Market capitalization	10.000	664.962
	11	P/E ratio	161.350	826.312
	12	Forward P/E ratio	-11.100	815.212
	13	PEG ratio	135.211	950.423
	14	PB ratio	80.960	1031.383
	15	Price cashflow ratio	61.111	1092.494
	16	Current ratio	-43.500	1048.994
	17	Quick ratio	56.000	1104.994
	18	Leverage ratio	-11.000	1093.994
	19	PS ratio	150.000	1243.994
	20	Analyst recommendations	0.000	1243.994
	21	Short interest	300.000	1543.994
	22	Sales	-125.000	1418.994
	23	Earnings estimate	60.000	1478.994
	24	Growth estimate	10.000	1488.994
	25	EPS estimate history	50.000	1538.994
	26	Profit margin	5.600	1544.594
	27	Operating margin	0.000	1544.594
	28	Gross margin	46.400	1590.994
	29	Return on assets	136.870	1727.864
	30	Return on equity	175.030	1902.894
	31	Return on capital	159.700	2062.594
	32	Receivable turnover	50.000	2112.594
	33	Inventory turnover	0.000	2112.594
	34	Asset turnover	52.700	2165.294
	35	Revenue per share	100.000	2265.294
	36	Revenue growth	0.000	2265.294
	37	Earnings growth	0.000	2265.294
	38	Net income available to common shares	-50.000	2215.294
	39	Total cash per share	45.500	2260.794
	40	Debt equity ratio	-1.550	2259.244
	41	Book value per share	4.860	2264.104
	42	Free cash flow	10.000	2274.104
Technical	43	Moving averages (50, 100, 200)	-135.000	2139.104
	44	RSI	0.000	2139.104
	45	Relative Strength	100.000	2239.104
	46	MFI	0.000	2239.104
	47	Bollinger bands	0.000	2239.104
	48	Williams %R	50.000	2289.104
	49	Price rate of change (ROC)	0.000	2289.104

Table 106: ASF Rating for June 15, 2004

CSC	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	4.290	204.290
	4	Monthly percentage change	-25.000	179.290
	5	Institutional transactions	207.400	386.690
	6	1 year target estimate	39.450	426.140
	7	Beta	50.000	476.140
	8	Yearly high/low	9.103	485.243
	9	52 week change relative to S&P 500	-3.165	482.078
	10	Market capitalization	20.000	502.078
	11	P/E ratio	164.936	667.014
	12	Forward P/E ratio	0.400	667.414
	13	PEG ratio	143.103	810.517
	14	PB ratio	116.225	926.742
	15	Price cashflow ratio	68.868	995.610
	16	Current ratio	58.000	1053.610
	17	Quick ratio	57.000	1110.610
	18	Leverage ratio	60.500	1171.110
	19	PS ratio	150.000	1321.110
	20	Analyst recommendations	0.000	1321.110
	21	Short interest	0.000	1321.110
	22	Sales	125.000	1446.110
	23	Earnings estimate	60.000	1506.110
	24	Growth estimate	10.000	1516.110
	25	EPS estimate history	30.000	1546.110
	26	Profit margin	7.000	1553.110
	27	Operating margin	0.000	1553.110
	28	Gross margin	48.800	1601.910
	29	Return on assets	134.900	1736.810
	30	Return on equity	150.500	1887.310
	31	Return on capital	135.600	2022.910
	32	Receivable turnover	-50.000	1972.910
	33	Inventory turnover	0.000	1972.910
	34	Asset turnover	51.500	2024.410
	35	Revenue per share	100.000	2124.410
	36	Revenue growth	0.000	2124.410
	37	Earnings growth	0.000	2124.410
	38	Net income available to common shares	-50.000	2074.410
	39	Total cash per share	32.500	2106.910
	40	Debt equity ratio	-2.250	2104.660
	41	Book value per share	38.030	2142.690
	42	Free cash flow	10.000	2152.690
Technical	43	Moving averages (50, 100, 200)	-135.000	2017.690
	44	RSI	0.000	2017.690
	45	Relative Strength	200.000	2217.690

	46	MFI	0.000	2217.690
	47	Bollinger bands	0.000	2217.690
	48	Williams %R	50.000	2267.690
	49	Price rate of change (ROC)	0.000	2267.690

Table 107: CSC Rating for June 15, 2004

Appendix D

Agent's Top Rated Stocks for June 22, 2004

SAFM				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	25.000
	2	Purchasable shares	200.000	225.000
	3	52 week percentage change	100.000	325.000
	4	Monthly percentage change	-50.000	275.000
	5	Institutional transactions	136.600	411.600
	6	1 year target estimate	13.650	425.250
	7	Beta	50.000	475.250
	8	Yearly high/low	9.711	484.961
	9	52 week change relative to S&P 500	75.405	560.366
	10	Market capitalization	10.000	570.366
	11	P/E ratio	186.956	757.322
	12	Forward P/E ratio	0.000	757.322
	13	PEG ratio	146.729	904.051
	14	PB ratio	-0.247	903.804
	15	Price cashflow ratio	61.111	964.915
	16	Current ratio	65.500	1030.415
	17	Quick ratio	58.000	1088.415
	18	Leverage ratio	57.000	1145.415
	19	PS ratio	47.087	1192.502
	20	Analyst recommendations	0.000	1192.502
	21	Short interest	0.000	1192.502
	22	Sales	125.000	1317.502
	23	Earnings estimate	-20.000	1297.502
	24	Growth estimate	30.000	1327.502
	25	EPS estimate history	50.000	1377.502
	26	Profit margin	18.000	1395.502
	27	Operating margin	0.000	1395.502
	28	Gross margin	45.200	1440.702
	29	Return on assets	207.200	1647.902
	30	Return on equity	231.000	1878.902
	31	Return on capital	219.800	2098.702
	32	Receivable turnover	50.000	2148.702
	33	Inventory turnover	0.000	2148.702
	34	Asset turnover	53.100	2201.802
	35	Revenue per share	100.000	2301.802
	36	Revenue growth	0.000	2301.802
	37	Earnings growth	0.000	2301.802
	38	Net income available to common shares	-50.000	2251.802
	39	Total cash per share	25.800	2277.602

	40	Debt equity ratio	-0.300	2277.302
	41	Book value per share	22.700	2300.002
	42	Free cash flow	10.000	2310.002
Technical	43	Moving averages (50, 100, 200)	35.000	2345.002
	44	RSI	0.000	2345.002
	45	Relative Strength	200.000	2545.002
	46	MFI	0.000	2545.002
	47	Bollinger bands	75.000	2620.002
	48	Williams %R	50.000	2670.002
	49	Price rate of change (ROC)	-50.000	2620.002

Table 108: SAFM Rating for June 22, 2004

TECD				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	40.400	240.400
	4	Monthly percentage change	-50.000	190.400
	5	Institutional transactions	229.200	419.600
	6	1 year target estimate	36.250	455.850
	7	Beta	50.000	505.850
	8	Yearly high/low	8.919	514.769
	9	52 week change relative to S&P 500	10.965	525.734
	10	Market capitalization	20.000	545.734
	11	P/E ratio	153.191	698.925
	12	Forward P/E ratio	2.100	701.025
	13	PEG ratio	142.017	843.042
	14	PB ratio	124.627	967.669
	15	Price cashflow ratio	57.874	1025.543
	16	Current ratio	-41.500	984.043
	17	Quick ratio	-45.000	939.043
	18	Leverage ratio	-12.500	926.543
	19	PS ratio	150.000	1076.543
	20	Analyst recommendations	0.000	1076.543
	21	Short interest	400.000	1476.543
	22	Sales	125.000	1601.543
	23	Earnings estimate	60.000	1661.543
	24	Growth estimate	-10.000	1651.543
	25	EPS estimate history	10.000	1661.543
	26	Profit margin	1.200	1662.743
	27	Operating margin	0.000	1662.743
	28	Gross margin	12.000	1674.743
	29	Return on assets	118.400	1793.143
	30	Return on equity	131.300	1924.443
	31	Return on capital	125.600	2050.043

	32	Receivable turnover	-50.000	2000.043
	33	Inventory turnover	0.000	2000.043
	34	Asset turnover	54.600	2054.643
	35	Revenue per share	100.000	2154.643
	36	Revenue growth	0.000	2154.643
	37	Earnings growth	0.000	2154.643
	38	Net income available to common shares	-53.000	2101.643
	39	Total cash per share	20.700	2122.343
	40	Debt equity ratio	-0.950	2121.393
	41	Book value per share	38.360	2159.753
	42	Free cash flow	10.000	2169.753
Technical	43	Moving averages (50, 100, 200)	35.000	2204.753
	44	RSI	0.000	2204.753
	45	Relative Strength	100.000	2304.753
	46	MFI	0.000	2304.753
	47	Bollinger bands	0.000	2304.753
	48	Williams %R	50.000	2354.753
	49	Price rate of change (ROC)	50.000	2404.753

Table 109: TECD Rating for June 22, 2004

CCMP				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	-43.670	156.330
	4	Monthly percentage change	50.000	206.330
	5	Institutional transactions	250.000	456.330
	6	1 year target estimate	102.750	559.080
	7	Beta	50.000	609.080
	8	Yearly high/low	4.084	613.164
	9	52 week change relative to S&P 500	-25.295	587.869
	10	Market capitalization	10.000	597.869
	11	P/E ratio	158.480	756.349
	12	Forward P/E ratio	0.600	756.949
	13	PEG ratio	190.909	947.858
	14	PB ratio	18.103	965.961
	15	Price cashflow ratio	58.265	1024.226
	16	Current ratio	87.500	1111.726
	17	Quick ratio	82.000	1193.726
	18	Leverage ratio	55.500	1249.226
	19	PS ratio	-9.350	1239.876
	20	Analyst recommendations	0.000	1239.876
	21	Short interest	100.000	1339.876
	22	Sales	-25.000	1314.876
	23	Earnings estimate	60.000	1374.876

				Numerical Change	Overall Rating
	24	Growth estimate		30.000	1404.876
	25	EPS estimate history		-10.000	1394.876
	26	Profit margin		28.800	1423.676
	27	Operating margin		0.000	1423.676
	28	Gross margin		50.000	1473.676
	29	Return on assets		175.200	1648.876
	30	Return on equity		80.600	1729.476
	31	Return on capital		178.300	1907.776
	32	Receivable turnover		50.000	1957.776
	33	Inventory turnover		0.000	1957.776
	34	Asset turnover		-49.100	1908.676
	35	Revenue per share		56.800	1965.476
	36	Revenue growth		0.000	1965.476
	37	Earnings growth		0.000	1965.476
	38	Net income available to common shares		-50.000	1915.476
	39	Total cash per share		56.500	1971.976
	40	Debt equity ratio		-0.100	1971.876
	41	Book value per share		22.080	1993.956
	42	Free cash flow		10.000	2003.956
Technical	43	Moving averages (50, 100, 200)		-135.000	1868.956
	44	RSI		75.000	1943.956
	45	Relative Strength		200.000	2143.956
	46	MFI		75.000	2218.956
	47	Bollinger bands		75.000	2293.956
	48	Williams %R		50.000	2343.956
	49	Price rate of change (ROC)		50.000	2393.956

Table 110: CCMP Rating for June 22, 2004

ASF					
	Step	Description		Numerical Change	Overall Rating
Fundamental	1	Dividend		0.000	0.000
	2	Purchasable shares		200.000	200.000
	3	52 week percentage change		93.420	293.420
	4	Monthly percentage change		25.000	318.420
	5	Institutional transactions		250.000	568.420
	6	1 year target estimate		18.650	587.070
	7	Beta		50.000	637.070
	8	Yearly high/low		8.504	645.574
	9	52 week change relative to S&P 500		33.990	679.564
	10	Market capitalization		10.000	689.564
	11	P/E ratio		161.728	851.292
	12	Forward P/E ratio		-11.000	840.292
	13	PEG ratio		136.765	977.057
	14	PB ratio		81.250	1058.307
	15	Price cashflow ratio		61.236	1119.543

	16	Current ratio	-43.500	1076.043
	17	Quick ratio	56.000	1132.043
	18	Leverage ratio	-11.000	1121.043
	19	PS ratio	150.000	1271.043
	20	Analyst recommendations	0.000	1271.043
	21	Short interest	300.000	1571.043
	22	Sales	-125.000	1446.043
	23	Earnings estimate	60.000	1506.043
	24	Growth estimate	30.000	1536.043
	25	EPS estimate history	50.000	1586.043
	26	Profit margin	5.600	1591.643
	27	Operating margin	0.000	1591.643
	28	Gross margin	46.400	1638.043
	29	Return on assets	136.900	1774.943
	30	Return on equity	175.000	1949.943
	31	Return on capital	159.700	2109.643
	32	Receivable turnover	50.000	2159.643
	33	Inventory turnover	0.000	2159.643
	34	Asset turnover	52.700	2212.343
	35	Revenue per share	100.000	2312.343
	36	Revenue growth	0.000	2312.343
	37	Earnings growth	0.000	2312.343
	38	Net income available to common shares	-50.000	2262.343
	39	Total cash per share	45.500	2307.843
	40	Debt equity ratio	-1.550	2306.293
	41	Book value per share	4.860	2311.153
	42	Free cash flow	10.000	2321.153
Technical	43	Moving averages (50, 100, 200)	-135.000	2186.153
	44	RSI	0.000	2186.153
	45	Relative Strength	100.000	2286.153
	46	MFI	0.000	2286.153
	47	Bollinger bands	0.000	2286.153
	48	Williams %R	50.000	2336.153
	49	Price rate of change (ROC)	50.000	2386.153

Table 111: ASF Rating for June 22, 2004

STNR				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	38.850	238.850
	4	Monthly percentage change	-50.000	188.850
	5	Institutional transactions	191.800	380.650
	6	1 year target estimate	20.600	401.250
	7	Beta	-50.000	351.250

	8	Yearly high/low	9.622	360.872
	9	52 week change relative to S&P 500	10.295	371.167
	10	Market capitalization	10.000	381.167
	11	P/E ratio	173.529	554.696
	12	Forward P/E ratio	1.700	556.396
	13	PEG ratio	162.500	718.896
	14	PB ratio	81.746	800.642
	15	Price cashflow ratio	59.901	860.543
	16	Current ratio	57.000	917.543
	17	Quick ratio	54.000	971.543
	18	Leverage ratio	58.000	1029.543
	19	PS ratio	136.957	1166.500
	20	Analyst recommendations	-100.000	1066.500
	21	Short interest	-100.000	966.500
	22	Sales	125.000	1091.500
	23	Earnings estimate	60.000	1151.500
	24	Growth estimate	10.000	1161.500
	25	EPS estimate history	50.000	1211.500
	26	Profit margin	17.000	1228.500
	27	Operating margin	0.000	1228.500
	28	Gross margin	49.000	1277.500
	29	Return on assets	185.000	1462.500
	30	Return on equity	210.200	1672.700
	31	Return on capital	206.600	1879.300
	32	Receivable turnover	50.000	1929.300
	33	Inventory turnover	0.000	1929.300
	34	Asset turnover	51.800	1981.100
	35	Revenue per share	89.300	2070.400
	36	Revenue growth	0.000	2070.400
	37	Earnings growth	0.000	2070.400
	38	Net income available to common shares	-50.000	2020.400
	39	Total cash per share	11.600	2032.000
	40	Debt equity ratio	-0.700	2031.300
	41	Book value per share	6.520	2037.820
	42	Free cash flow	10.000	2047.820
Technical	43	Moving averages (50, 100, 200)	35.000	2082.820
	44	RSI	0.000	2082.820
	45	Relative Strength	200.000	2282.820
	46	MFI	0.000	2282.820
	47	Bollinger bands	0.000	2282.820
	48	Williams %R	50.000	2332.820
	49	Price rate of change (ROC)	0.000	2332.820

Table 112: STNR Rating for June 22, 2004

MXRE				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	25.000
	2	Purchasable shares	200.000	225.000
	3	52 week percentage change	27.090	252.090
	4	Monthly percentage change	-50.000	202.090
	5	Institutional transactions	120.800	322.890
	6	1 year target estimate	42.550	365.440
	7	Beta	50.000	415.440
	8	Yearly high/low	7.610	423.050
	9	52 week change relative to S&P 500	5.745	428.795
	10	Market capitalization	10.000	438.795
	11	P/E ratio	200.000	638.795
	12	Forward P/E ratio	-0.936	637.859
	13	PEG ratio	190.945	828.804
	14	PB ratio	150.000	978.804
	15	Price cashflow ratio	67.241	1046.045
	16	Current ratio	0.000	1046.045
	17	Quick ratio	0.000	1046.045
	18	Leverage ratio	72.500	1118.545
	19	PS ratio	150.000	1268.545
	20	Analyst recommendations	0.000	1268.545
	21	Short interest	200.000	1468.545
	22	Sales	125.000	1593.545
	23	Earnings estimate	60.000	1653.545
	24	Growth estimate	10.000	1663.545
	25	EPS estimate history	50.000	1713.545
	26	Profit margin	29.200	1742.745
	27	Operating margin	0.000	1742.745
	28	Gross margin	0.000	1742.745
	29	Return on assets	111.700	1854.445
	30	Return on equity	151.600	2006.045
	31	Return on capital	144.100	2150.145
	32	Receivable turnover	-50.000	2100.145
	33	Inventory turnover	0.000	2100.145
	34	Asset turnover	50.300	2150.445
	35	Revenue per share	100.000	2250.445
	36	Revenue growth	0.000	2250.445
	37	Earnings growth	0.000	2250.445
	38	Net income available to common shares	-50.000	2200.445
	39	Total cash per share	37.500	2237.945
	40	Debt equity ratio	-0.850	2237.095
	41	Book value per share	18.960	2256.055
	42	Free cash flow	-10.000	2246.055
Technical	43	Moving averages (50, 100, 200)	35.000	2281.055
	44	RSI	75.000	2356.055
	45	Relative Strength	-200.000	2156.055

	46	MFI	75.000	2231.055
	47	Bollinger bands	0.000	2231.055
	48	Williams %R	50.000	2281.055
	49	Price rate of change (ROC)	50.000	2331.055

Table 113: MXRE Rating for June 22, 2004

Appendix E

Agent's Top Rated Stocks for June 29, 2004

SAFM	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	25.000
	2	Purchasable shares	200.000	225.000
	3	52 week percentage change	100.000	325.000
	4	Monthly percentage change	-50.000	275.000
	5	Institutional transactions	136.600	411.600
	6	1 year target estimate	-2.850	408.750
	7	Beta	50.000	458.750
	8	Yearly high/low	9.916	468.666
	9	52 week change relative to S&P 500	76.670	545.336
	10	Market capitalization	10.000	555.336
	11	P/E ratio	182.645	737.981
	12	Forward P/E ratio	0.000	737.981
	13	PEG ratio	145.045	883.026
	14	PB ratio	-1.526	881.500
	15	Price cashflow ratio	60.526	942.026
	16	Current ratio	65.500	1007.526
	17	Quick ratio	58.000	1065.526
	18	Leverage ratio	57.000	1122.526
	19	PS ratio	41.744	1164.270
	20	Analyst recommendations	0.000	1164.270
	21	Short interest	0.000	1164.270
	22	Sales	125.000	1289.270
	23	Earnings estimate	-20.000	1269.270
	24	Growth estimate	30.000	1299.270
	25	EPS estimate history	50.000	1349.270
	26	Profit margin	18.000	1367.270
	27	Operating margin	0.000	1367.270
	28	Gross margin	45.200	1412.470
	29	Return on assets	207.200	1619.670
	30	Return on equity	231.000	1850.670
	31	Return on capital	219.800	2070.470
	32	Receivable turnover	50.000	2120.470
	33	Inventory turnover	0.000	2120.470
	34	Asset turnover	53.100	2173.570
	35	Revenue per share	100.000	2273.570
	36	Revenue growth	0.000	2273.570
	37	Earnings growth	0.000	2273.570
	38	Net income available to common shares	-50.000	2223.570
	39	Total cash per share	25.800	2249.370

	40	Debt equity ratio	-0.300	2249.070
	41	Book value per share	22.700	2271.770
	42	Free cash flow	10.000	2281.770
Technical	43	Moving averages (50, 100, 200)	35.000	2316.770
	44	RSI	0.000	2316.770
	45	Relative Strength	200.000	2516.770
	46	MFI	0.000	2516.770
	47	Bollinger bands	0.000	2516.770
	48	Williams %R	0.000	2516.770
	49	Price rate of change (ROC)	-50.000	2466.770

Table 114: SAFM Rating for June 29, 2004

BZH				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	25.000
	2	Purchasable shares	200.000	225.000
	3	52 week percentage change	17.510	242.510
	4	Monthly percentage change	-50.000	192.510
	5	Institutional transactions	250.000	442.510
	6	1 year target estimate	141.900	584.410
	7	Beta	50.000	634.410
	8	Yearly high/low	8.711	643.121
	9	52 week change relative to S&P 500	0.520	643.641
	10	Market capitalization	10.000	653.641
	11	P/E ratio	200.000	853.641
	12	Forward P/E ratio	0.500	854.141
	13	PEG ratio	221.951	1076.092
	14	PB ratio	131.301	1207.393
	15	Price cashflow ratio	65.625	1273.018
	16	Current ratio	128.000	1401.018
	17	Quick ratio	-45.500	1355.518
	18	Leverage ratio	62.500	1418.018
	19	PS ratio	150.000	1568.018
	20	Analyst recommendations	0.000	1568.018
	21	Short interest	0.000	1568.018
	22	Sales	-125.000	1443.018
	23	Earnings estimate	60.000	1503.018
	24	Growth estimate	-10.000	1493.018
	25	EPS estimate history	50.000	1543.018
	26	Profit margin	11.000	1554.018
	27	Operating margin	0.000	1554.018
	28	Gross margin	40.200	1594.218
	29	Return on assets	155.000	1749.218
	30	Return on equity	-12.900	1736.318
	31	Return on capital	146.500	1882.818

	32	Receivable turnover	50.000	1932.818
	33	Inventory turnover	0.000	1932.818
	34	Asset turnover	51.500	1984.318
	35	Revenue per share	100.000	2084.318
	36	Revenue growth	0.000	2084.318
	37	Earnings growth	0.000	2084.318
	38	Net income available to common shares	-50.000	2034.318
	39	Total cash per share	65.400	2099.718
	40	Debt equity ratio	-4.350	2095.368
	41	Book value per share	89.900	2185.268
	42	Free cash flow	-10.000	2175.268
Technical	43	Moving averages (50, 100, 200)	-135.000	2040.268
	44	RSI	0.000	2040.268
	45	Relative Strength	200.000	2240.268
	46	MFI	75.000	2315.268
	47	Bollinger bands	0.000	2315.268
	48	Williams %R	50.000	2365.268
	49	Price rate of change (ROC)	0.000	2365.268

Table 115: BZH Rating for June 29, 2004

NSIT				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	66.140	266.140
	4	Monthly percentage change	-50.000	216.140
	5	Institutional transactions	237.800	453.940
	6	1 year target estimate	38.850	492.790
	7	Beta	50.000	542.790
	8	Yearly high/low	7.501	550.291
	9	52 week change relative to S&P 500	21.485	571.776
	10	Market capitalization	10.000	581.776
	11	P/E ratio	159.172	740.948
	12	Forward P/E ratio	2.100	743.048
	13	PEG ratio	151.020	894.068
	14	PB ratio	108.480	1002.548
	15	Price cashflow ratio	59.259	1061.807
	16	Current ratio	60.000	1121.807
	17	Quick ratio	57.500	1179.307
	18	Leverage ratio	58.000	1237.307
	19	PS ratio	150.000	1387.307
	20	Analyst recommendations	-100.000	1287.307
	21	Short interest	200.000	1487.307
	22	Sales	-25.000	1462.307
	23	Earnings estimate	60.000	1522.307

	24	Growth estimate	10.000	1532.307
	25	EPS estimate history	50.000	1582.307
	26	Profit margin	3.200	1585.507
	27	Operating margin	0.000	1585.507
	28	Gross margin	26.400	1611.907
	29	Return on assets	133.100	1745.007
	30	Return on equity	144.500	1889.507
	31	Return on capital	142.900	2032.407
	32	Receivable turnover	-50.000	1982.407
	33	Inventory turnover	0.000	1982.407
	34	Asset turnover	53.900	2036.307
	35	Revenue per share	100.000	2136.307
	36	Revenue growth	0.000	2136.307
	37	Earnings growth	0.000	2136.307
	38	Net income available to common shares	-50.000	2086.307
	39	Total cash per share	9.100	2095.407
	40	Debt equity ratio	-0.100	2095.307
	41	Book value per share	19.870	2115.177
	42	Free cash flow	-10.000	2105.177
Technical	43	Moving averages (50, 100, 200)	35.000	2140.177
	44	RSI	0.000	2140.177
	45	Relative Strength	100.000	2240.177
	46	MFI	0.000	2240.177
	47	Bollinger bands	0.000	2240.177
	48	Williams %R	50.000	2290.177
	49	Price rate of change (ROC)	50.000	2340.177

Table 116: NSIT Rating for June 29, 2004

ADBE				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	25.000
	2	Purchasable shares	200.000	225.000
	3	52 week percentage change	36.780	261.780
	4	Monthly percentage change	25.000	286.780
	5	Institutional transactions	-208.800	77.980
	6	1 year target estimate	25.900	103.880
	7	Beta	50.000	153.880
	8	Yearly high/low	9.526	163.406
	9	52 week change relative to S&P 500	8.850	172.256
	10	Market capitalization	30.000	202.256
	11	P/E ratio	134.482	336.738
	12	Forward P/E ratio	1.200	337.938
	13	PEG ratio	127.323	465.261
	14	PB ratio	-13.559	451.702
	15	Price cashflow ratio	53.637	505.339

	16	Current ratio	66.500	571.839
	17	Quick ratio	66.000	637.839
	18	Leverage ratio	-18.000	619.839
	19	PS ratio	-35.796	584.043
	20	Analyst recommendations	-100.000	484.043
	21	Short interest	300.000	784.043
	22	Sales	25.000	809.043
	23	Earnings estimate	60.000	869.043
	24	Growth estimate	10.000	879.043
	25	EPS estimate history	50.000	929.043
	26	Profit margin	50.000	979.043
	27	Operating margin	0.000	979.043
	28	Gross margin	50.000	1029.043
	29	Return on assets	232.500	1261.543
	30	Return on equity	258.600	1520.143
	31	Return on capital	258.600	1778.743
	32	Receivable turnover	50.000	1828.743
	33	Inventory turnover	0.000	1828.743
	34	Asset turnover	51.100	1879.843
	35	Revenue per share	31.650	1911.493
	36	Revenue growth	0.000	1911.493
	37	Earnings growth	0.000	1911.493
	38	Net income available to common shares	-50.000	1861.493
	39	Total cash per share	53.700	1915.193
	40	Debt equity ratio	0.000	1915.193
	41	Book value per share	15.100	1930.293
	42	Free cash flow	10.000	1940.293
Technical	43	Moving averages (50, 100, 200)	35.000	1975.293
	44	RSI	75.000	2050.293
	45	Relative Strength	200.000	2250.293
	46	MFI	0.000	2250.293
	47	Bollinger bands	0.000	2250.293
	48	Williams %R	50.000	2300.293
	49	Price rate of change (ROC)	0.000	2300.293

Table 117: ADBE Rating for June 29, 2004

ASF				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	60.390	260.390
	4	Monthly percentage change	25.000	285.390
	5	Institutional transactions	250.000	535.390
	6	1 year target estimate	13.650	549.040
	7	Beta	50.000	599.040

	8	Yearly high/low	9.055	608.095
	9	52 week change relative to S&P 500	18.955	627.050
	10	Market capitalization	10.000	637.050
	11	P/E ratio	158.139	795.189
	12	Forward P/E ratio	-11.300	783.889
	13	PEG ratio	134.722	918.611
	14	PB ratio	79.412	998.023
	15	Price cashflow ratio	60.639	1058.662
	16	Current ratio	-43.500	1015.162
	17	Quick ratio	56.000	1071.162
	18	Leverage ratio	-11.000	1060.162
	19	PS ratio	150.000	1210.162
	20	Analyst recommendations	0.000	1210.162
	21	Short interest	300.000	1510.162
	22	Sales	-125.000	1385.162
	23	Earnings estimate	60.000	1445.162
	24	Growth estimate	30.000	1475.162
	25	EPS estimate history	50.000	1525.162
	26	Profit margin	5.600	1530.762
	27	Operating margin	0.000	1530.762
	28	Gross margin	46.400	1577.162
	29	Return on assets	136.900	1714.062
	30	Return on equity	175.000	1889.062
	31	Return on capital	159.700	2048.762
	32	Receivable turnover	50.000	2098.762
	33	Inventory turnover	0.000	2098.762
	34	Asset turnover	52.700	2151.462
	35	Revenue per share	100.000	2251.462
	36	Revenue growth	0.000	2251.462
	37	Earnings growth	0.000	2251.462
	38	Net income available to common shares	-50.000	2201.462
	39	Total cash per share	45.500	2246.962
	40	Debt equity ratio	-1.550	2245.412
	41	Book value per share	4.860	2250.272
	42	Free cash flow	10.000	2260.272
Technical	43	Moving averages (50, 100, 200)	-135.000	2125.272
	44	RSI	0.000	2125.272
	45	Relative Strength	100.000	2225.272
	46	MFI	0.000	2225.272
	47	Bollinger bands	0.000	2225.272
	48	Williams %R	0.000	2225.272
	49	Price rate of change (ROC)	0.000	2225.272

Table 118: ASF Rating for June 29, 2004

ABFS				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	25.000
	2	Purchasable shares	200.000	225.000
	3	52 week percentage change	31.350	256.350
	4	Monthly percentage change	25.000	281.350
	5	Institutional transactions	220.400	501.750
	6	1 year target estimate	-33.000	468.750
	7	Beta	-50.000	418.750
	8	Yearly high/low	9.332	428.082
	9	52 week change relative to S&P 500	6.515	434.597
	10	Market capitalization	10.000	444.597
	11	P/E ratio	162.893	607.490
	12	Forward P/E ratio	0.300	607.790
	13	PEG ratio	160.241	768.031
	14	PB ratio	100.000	868.031
	15	Price cashflow ratio	62.987	931.018
	16	Current ratio	-45.500	885.518
	17	Quick ratio	-46.500	839.018
	18	Leverage ratio	59.000	898.018
	19	PS ratio	150.000	1048.018
	20	Analyst recommendations	0.000	1048.018
	21	Short interest	400.000	1448.018
	22	Sales	-125.000	1323.018
	23	Earnings estimate	60.000	1383.018
	24	Growth estimate	-10.000	1373.018
	25	EPS estimate history	-30.000	1343.018
	26	Profit margin	6.600	1349.618
	27	Operating margin	0.000	1349.618
	28	Gross margin	50.000	1399.618
	29	Return on assets	153.700	1553.318
	30	Return on equity	170.200	1723.518
	31	Return on capital	162.000	1885.518
	32	Receivable turnover	50.000	1935.518
	33	Inventory turnover	0.000	1935.518
	34	Asset turnover	52.200	1987.718
	35	Revenue per share	100.000	2087.718
	36	Revenue growth	0.000	2087.718
	37	Earnings growth	0.000	2087.718
	38	Net income available to common shares	-50.000	2037.718
	39	Total cash per share	3.200	2040.918
	40	Debt equity ratio	0.000	2040.918
	41	Book value per share	26.000	2066.918
	42	Free cash flow	10.000	2076.918
Technical	43	Moving averages (50, 100, 200)	35.000	2111.918
	44	RSI	0.000	2111.918
	45	Relative Strength	100.000	2211.918

	46	MFI	0.000	2211.918
	47	Bollinger bands	0.000	2211.918
	48	Williams %R	0.000	2211.918
	49	Price rate of change (ROC)	0.000	2211.918

Table 119: ABFS Rating for June 29, 2004

Appendix F

Agent's Top Rated Stocks for July 6, 2004

CDWC	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	25.000
	2	Purchasable shares	200.000	225.000
	3	52 week percentage change	26.360	251.360
	4	Monthly percentage change	-50.000	201.360
	5	Institutional transactions	195.600	396.960
	6	1 year target estimate	79.000	475.960
	7	Beta	50.000	525.960
	8	Yearly high/low	8.233	534.193
	9	52 week change relative to S&P 500	5.335	539.528
	10	Market capitalization	20.000	559.528
	11	P/E ratio	135.587	695.115
	12	Forward P/E ratio	5.900	701.015
	13	PEG ratio	138.168	839.183
	14	PB ratio	-2.778	836.405
	15	Price cashflow ratio	53.968	890.373
	16	Current ratio	73.500	963.873
	17	Quick ratio	70.500	1034.373
	18	Leverage ratio	56.500	1090.873
	19	PS ratio	47.088	1137.961
	20	Analyst recommendations	-100.000	1037.961
	21	Short interest	400.000	1437.961
	22	Sales	125.000	1562.961
	23	Earnings estimate	60.000	1622.961
	24	Growth estimate	10.000	1632.961
	25	EPS estimate history	10.000	1642.961
	26	Profit margin	7.600	1650.561
	27	Operating margin	0.000	1650.561
	28	Gross margin	30.000	1680.561
	29	Return on assets	181.200	1861.761
	30	Return on equity	191.100	2052.861
	31	Return on capital	191.100	2243.961
	32	Receivable turnover	50.000	2293.961
	33	Inventory turnover	0.000	2293.961
	34	Asset turnover	-46.100	2247.861
	35	Revenue per share	100.000	2347.861
	36	Revenue growth	0.000	2347.861
	37	Earnings growth	0.000	2347.861
	38	Net income available to common shares	-50.000	2297.861
	39	Total cash per share	79.300	2377.161

	40	Debt equity ratio	0.000	2377.161
	41	Book value per share	23.560	2400.721
	42	Free cash flow	10.000	2410.721
Technical	43	Moving averages (50, 100, 200)	35.000	2445.721
	44	RSI	0.000	2445.721
	45	Relative Strength	-200.000	2245.721
	46	MFI	0.000	2245.721
	47	Bollinger bands	0.000	2245.721
	48	Williams %R	50.000	2295.721
	49	Price rate of change (ROC)	50.000	2345.721

Table 120: CDWC Rating for July 6, 2004

PDII				
	Step	**Description**	**Numerical Change**	**Overall Rating**
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	100.000	300.000
	4	Monthly percentage change	25.000	325.000
	5	Institutional transactions	158.000	483.000
	6	1 year target estimate	10.100	493.100
	7	Beta	50.000	543.100
	8	Yearly high/low	9.190	552.290
	9	52 week change relative to S&P 500	64.570	616.860
	10	Market capitalization	10.000	626.860
	11	P/E ratio	140.000	766.860
	12	Forward P/E ratio	2.300	769.160
	13	PEG ratio	143.859	913.019
	14	PB ratio	8.334	921.353
	15	Price cashflow ratio	-19.445	901.908
	16	Current ratio	61.500	963.408
	17	Quick ratio	60.000	1023.408
	18	Leverage ratio	58.000	1081.408
	19	PS ratio	127.520	1208.928
	20	Analyst recommendations	-100.000	1108.928
	21	Short interest	100.000	1208.928
	22	Sales	125.000	1333.928
	23	Earnings estimate	60.000	1393.928
	24	Growth estimate	10.000	1403.928
	25	EPS estimate history	30.000	1433.928
	26	Profit margin	10.400	1444.328
	27	Operating margin	0.000	1444.328
	28	Gross margin	50.000	1494.328
	29	Return on assets	131.300	1625.628
	30	Return on equity	44.200	1669.828
	31	Return on capital	144.200	1814.028

	32	Receivable turnover	50.000	1864.028
	33	Inventory turnover	0.000	1864.028
	34	. Asset turnover	51.600	1915.628
	35	Revenue per share	100.000	2015.628
	36	Revenue growth	0.000	2015.628
	37	Earnings growth	0.000	2015.628
	38	Net income available to common shares	-50.000	1965.628
	39	Total cash per share	81.600	2047.228
	40	Debt equity ratio	0.000	2047.228
	41	Book value per share	20.000	2067.228
	42	Free cash flow	10.000	2077.228
Technical	43	Moving averages (50, 100, 200)	35.000	2112.228
	44	RSI	0.000	2112.228
	45	Relative Strength	100.000	2212.228
	46	MFI	0.000	2212.228
	47	Bollinger bands	75.000	2287.228
	48	Williams %R	50.000	2337.228
	49	Price rate of change (ROC)	0.000	2337.228

Table 121: PDII Rating for July 6, 2004

BLTI				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	-1.670	198.330
	4	Monthly percentage change	25.000	223.330
	5	Institutional transactions	124.800	348.130
	6	1 year target estimate	60.200	408.330
	7	Beta	50.000	458.330
	8	Yearly high/low	6.149	464.479
	9	52 week change relative to S&P 500	-6.935	457.544
	10	Market capitalization	10.000	467.544
	11	P/E ratio	162.500	630.044
	12	Forward P/E ratio	-34.500	595.544
	13	PEG ratio	146.729	742.273
	14	PB ratio	73.753	816.026
	15	Price cashflow ratio	56.173	872.199
	16	Current ratio	91.500	963.699
	17	Quick ratio	87.500	1051.199
	18	Leverage ratio	55.500	1106.699
	19	PS ratio	-32.729	1073.970
	20	Analyst recommendations	-100.000	973.970
	21	Short interest	0.000	973.970
	22	Sales	125.000	1098.970
	23	Earnings estimate	60.000	1158.970

	24	Growth estimate	10.000	1168.970
	25	EPS estimate history	10.000	1178.970
	26	Profit margin	50.000	1228.970
	27	Operating margin	0.000	1228.970
	28	Gross margin	50.000	1278.970
	29	Return on assets	234.400	1513.370
	30	Return on equity	241.300	1754.670
	31	Return on capital	239.300	1993.970
	32	Receivable turnover	50.000	2043.970
	33	Inventory turnover	0.000	2043.970
	34	Asset turnover	51.100	2095.070
	35	Revenue per share	11.200	2106.270
	36	Revenue growth	0.000	2106.270
	37	Earnings growth	0.000	2106.270
	38	Net income available to common shares	-50.000	2056.270
	39	Total cash per share	20.600	2076.870
	40	Debt equity ratio	0.000	2076.870
	41	Book value per share	3.080	2079.950
	42	Free cash flow	10.000	2089.950
Technical	43	Moving averages (50, 100, 200)	35.000	2124.950
	44	RSI	0.000	2124.950
	45	Relative Strength	100.000	2224.950
	46	MFI	0.000	2224.950
	47	Bollinger bands	0.000	2224.950
	48	Williams %R	50.000	2274.950
	49	Price rate of change (ROC)	50.000	2324.950

Table 122: BLTI Rating for July 6, 2004

ABFS				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	25.000
	2	Purchasable shares	200.000	225.000
	3	52 week percentage change	33.440	258.440
	4	Monthly percentage change	25.000	283.440
	5	Institutional transactions	220.400	503.840
	6	1 year target estimate	10.700	514.540
	7	Beta	-50.000	464.540
	8	Yearly high/low	9.410	473.950
	9	52 week change relative to S&P 500	8.440	482.390
	10	Market capitalization	10.000	492.390
	11	P/E ratio	162.500	654.890
	12	Forward P/E ratio	0.200	655.090
	13	PEG ratio	161.728	816.818
	14	PB ratio	99.505	916.323
	15	Price cashflow ratio	62.987	979.310

	16	Current ratio	-45.500	933.810
	17	Quick ratio	-46.500	887.310
	18	Leverage ratio	59.000	946.310
	19	PS ratio	150.000	1096.310
	20	Analyst recommendations	0.000	1096.310
	21	Short interest	400.000	1496.310
	22	Sales	-125.000	1371.310
	23	Earnings estimate	60.000	1431.310
	24	Growth estimate	-10.000	1421.310
	25	EPS estimate history	-30.000	1391.310
	26	Profit margin	6.600	1397.910
	27	Operating margin	0.000	1397.910
	28	Gross margin	50.000	1447.910
	29	Return on assets	153.700	1601.610
	30	Return on equity	170.200	1771.810
	31	Return on capital	162.000	1933.810
	32	Receivable turnover	50.000	1983.810
	33	Inventory turnover	0.000	1983.810
	34	Asset turnover	52.200	2036.010
	35	Revenue per share	100.000	2136.010
	36	Revenue growth	0.000	2136.010
	37	Earnings growth	0.000	2136.010
	38	Net income available to common shares	-50.000	2086.010
	39	Total cash per share	3.200	2089.210
	40	Debt equity ratio	0.000	2089.210
	41	Book value per share	26.000	2115.210
	42	Free cash flow	10.000	2125.210
Technical	43	Moving averages (50, 100, 200)	35.000	2160.210
	44	RSI	0.000	2160.210
	45	Relative Strength	100.000	2260.210
	46	MFI	0.000	2260.210
	47	Bollinger bands	0.000	2260.210
	48	Williams %R	50.000	2310.210
	49	Price rate of change (ROC)	0.000	2310.210

Table 123: ABFS Rating for July 6, 2004

ANF				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	25.000
	2	Purchasable shares	200.000	225.000
	3	52 week percentage change	33.980	258.980
	4	Monthly percentage change	-50.000	208.980
	5	Institutional transactions	227.800	436.780
	6	1 year target estimate	4.450	441.230
	7	Beta	50.000	491.230

	8	Yearly high/low	9.585	500.815
	9	52 week change relative to S&P 500	8.675	509.490
	10	Market capitalization	20.000	529.490
	11	P/E ratio	156.497	685.987
	12	Forward P/E ratio	2.100	688.087
	13	PEG ratio	153.763	841.850
	14	PB ratio	-0.062	841.788
	15	Price cashflow ratio	-17.188	824.600
	16	Current ratio	64.500	889.100
	17	Quick ratio	61.000	950.100
	18	Leverage ratio	56.500	1006.600
	19	PS ratio	-0.248	1006.352
	20	Analyst recommendations	0.000	1006.352
	21	Short interest	400.000	1406.352
	22	Sales	125.000	1531.352
	23	Earnings estimate	60.000	1591.352
	24	Growth estimate	-10.000	1581.352
	25	EPS estimate history	10.000	1591.352
	26	Profit margin	23.600	1614.952
	27	Operating margin	0.000	1614.952
	28	Gross margin	50.000	1664.952
	29	Return on assets	212.200	1877.152
	30	Return on equity	230.200	2107.352
	31	Return on capital	230.200	2337.552
	32	Receivable turnover	50.000	2387.552
	33	Inventory turnover	0.000	2387.552
	34	Asset turnover	-48.400	2339.152
	35	Revenue per share	93.400	2432.552
	36	Revenue growth	0.000	2432.552
	37	Earnings growth	0.000	2432.552
	38	Net income available to common shares	-50.000	2382.552
	39	Total cash per share	56.600	2439.152
	40	Debt equity ratio	0.000	2439.152
	41	Book value per share	19.360	2458.512
	42	Free cash flow	10.000	2468.512
Technical	43	Moving averages (50, 100, 200)	-135.000	2333.512
	44	RSI	0.000	2333.512
	45	Relative Strength	-100.000	2233.512
	46	MFI	0.000	2233.512
	47	Bollinger bands	0.000	2233.512
	48	Williams %R	50.000	2283.512
	49	Price rate of change (ROC)	0.000	2283.512

Table 124: ANF Rating for July 6, 2004

AAP	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	40.650	240.650
	4	Monthly percentage change	25.000	265.650
	5	Institutional transactions	233.600	499.250
	6	1 year target estimate	36.550	535.800
	7	Beta	-50.000	485.800
	8	Yearly high/low	9.474	495.274
	9	52 week change relative to S&P 500	11.595	506.869
	10	Market capitalization	20.000	526.869
	11	P/E ratio	152.356	679.225
	12	Forward P/E ratio	2.300	681.525
	13	PEG ratio	159.524	841.049
	14	PB ratio	71.367	912.416
	15	Price cashflow ratio	58.475	970.891
	16	Current ratio	-43.000	927.891
	17	Quick ratio	-49.500	878.391
	18	Leverage ratio	65.000	943.391
	19	PS ratio	150.000	1093.391
	20	Analyst recommendations	0.000	1093.391
	21	Short interest	400.000	1493.391
	22	Sales	-25.000	1468.391
	23	Earnings estimate	60.000	1528.391
	24	Growth estimate	10.000	1538.391
	25	EPS estimate history	50.000	1588.391
	26	Profit margin	9.600	1597.991
	27	Operating margin	0.000	1597.991
	28	Gross margin	50.000	1647.991
	29	Return on assets	124.900	1772.891
	30	Return on equity	74.700	1847.591
	31	Return on capital	148.300	1995.891
	32	Receivable turnover	50.000	2045.891
	33	Inventory turnover	0.000	2045.891
	34	Asset turnover	51.800	2097.691
	35	Revenue per share	100.000	2197.691
	36	Revenue growth	0.000	2197.691
	37	Earnings growth	0.000	2197.691
	38	Net income available to common shares	-50.000	2147.691
	39	Total cash per share	1.700	2149.391
	40	Debt equity ratio	-2.700	2146.691
	41	Book value per share	19.290	2165.981
	42	Free cash flow	10.000	2175.981
Technical	43	Moving averages (50, 100, 200)	-135.000	2040.981
	44	RSI	75.000	2115.981
	45	Relative Strength	100.000	2215.981

	46	MFI	0.000	2215.981
	47	Bollinger bands	0.000	2215.981
	48	Williams %R	50.000	2265.981
	49	Price rate of change (ROC)	0.000	2265.981

Table 125: AAP Rating for July 6, 2004

Agent's Top Rated Stocks for July 13, 2004

NSIT	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	30.100	230.100
	4	Monthly percentage change	25.000	255.100
	5	Institutional transactions	240.000	495.100
	6	1 year target estimate	42.000	537.100
	7	Beta	50.000	587.100
	8	Yearly high/low	7.238	594.338
	9	52 week change relative to S&P 500	8.600	602.938
	10	Market capitalization	10.000	612.938
	11	P/E ratio	160.606	773.544
	12	Forward P/E ratio	2.100	775.644
	13	PEG ratio	152.632	928.276
	14	PB ratio	109.880	1038.156
	15	Price cashflow ratio	59.524	1097.680
	16	Current ratio	-40.000	1057.680
	17	Quick ratio	57.500	1115.180
	18	Leverage ratio	58.000	1173.180
	19	PS ratio	150.000	1323.180
	20	Analyst recommendations	-100.000	1223.180
	21	Short interest	400.000	1623.180
	22	Sales	-25.000	1598.180
	23	Earnings estimate	60.000	1658.180
	24	Growth estimate	10.000	1668.180
	25	EPS estimate history	50.000	1718.180
	26	Profit margin	3.200	1721.380
	27	Operating margin	0.000	1721.380
	28	Gross margin	26.400	1747.780
	29	Return on assets	133.100	1880.880
	30	Return on equity	144.500	2025.380
	31	Return on capital	142.900	2168.280
	32	Receivable turnover	-50.000	2118.280
	33	Inventory turnover	0.000	2118.280
	34	Asset turnover	53.900	2172.180
	35	Revenue per share	100.000	2272.180
	36	Revenue growth	0.000	2272.180
	37	Earnings growth	0.000	2272.180

	38	Net income available to common shares	-50.000	2222.180
	39	Total cash per share	9.100	2231.280
	40	Debt equity ratio	-0.100	2231.180
	41	Book value per share	19.870	2251.050
	42	Free cash flow	-10.000	2241.050
Technical	43	Moving averages (50, 100, 200)	35.000	2276.050
	44	RSI	0.000	2276.050
	45	Relative Strength	100.000	2376.050
	46	MFI	0.000	2376.050
	47	Bollinger bands	0.000	2376.050
	48	Williams %R	50.000	2426.050
	49	Price rate of change (ROC)	0.000	2426.050

Table 126: NSIT Rating for July 13, 2004

SAFM				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	25.000
	2	Purchasable shares	200.000	225.000
	3	52 week percentage change	100.000	325.000
	4	Monthly percentage change	-50.000	275.000
	5	Institutional transactions	137.800	412.800
	6	1 year target estimate	28.200	441.000
	7	Beta	50.000	491.000
	8	Yearly high/low	8.791	499.791
	9	52 week change relative to S&P 500	69.105	568.896
	10	Market capitalization	10.000	578.896
	11	P/E ratio	193.458	772.354
	12	Forward P/E ratio	0.000	772.354
	13	PEG ratio	149.505	921.859
	14	PB ratio	1.596	923.455
	15	Price cashflow ratio	61.905	985.360
	16	Current ratio	65.500	1050.860
	17	Quick ratio	58.000	1108.860
	18	Leverage ratio	57.000	1165.860
	19	PS ratio	50.000	1215.860
	20	Analyst recommendations	-100.000	1115.860
	21	Short interest	0.000	1115.860
	22	Sales	125.000	1240.860
	23	Earnings estimate	-20.000	1220.860
	24	Growth estimate	30.000	1250.860
	25	EPS estimate history	50.000	1300.860
	26	Profit margin	18.000	1318.860
	27	Operating margin	0.000	1318.860
	28	Gross margin	45.200	1364.060

	29	Return on assets	207.200	1571.260
	30	Return on equity	231.000	1802.260
	31	Return on capital	219.800	2022.060
	32	Receivable turnover	50.000	2072.060
	33	Inventory turnover	0.000	2072.060
	34	Asset turnover	53.100	2125.160
	35	Revenue per share	100.000	2225.160
	36	Revenue growth	0.000	2225.160
	37	Earnings growth	0.000	2225.160
	38	Net income available to common shares	-50.000	2175.160
	39	Total cash per share	25.800	2200.960
	40	Debt equity ratio	-0.300	2200.660
	41	Book value per share	22.700	2223.360
	42	Free cash flow	10.000	2233.360
Technical	43	Moving averages (50, 100, 200)	35.000	2268.360
	44	RSI	75.000	2343.360
	45	Relative Strength	-100.000	2243.360
	46	MFI	75.000	2318.360
	47	Bollinger bands	0.000	2318.360
	48	Williams %R	50.000	2368.360
	49	Price rate of change (ROC)	50.000	2418.360

Table 127: SAFM Rating for July 13, 2004

THQI				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000
	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	13.370	213.370
	4	Monthly percentage change	-50.000	163.370
	5	Institutional transactions	245.600	408.970
	6	1 year target estimate	9.450	418.420
	7	Beta	-50.000	368.420
	8	Yearly high/low	9.468	377.888
	9	52 week change relative to S&P 500	1.065	378.953
	10	Market capitalization	10.000	388.953
	11	P/E ratio	142.735	531.688
	12	Forward P/E ratio	3.200	534.888
	13	PEG ratio	136.496	671.384
	14	PB ratio	102.632	774.016
	15	Price cashflow ratio	70.408	844.424
	16	Current ratio	72.500	916.924
	17	Quick ratio	68.000	984.924
	18	Leverage ratio	56.000	1040.924
	19	PS ratio	126.923	1167.847

			Numerical Change	Overall Rating
	20	Analyst recommendations	0.000	1167.847
	21	Short interest	0.000	1167.847
	22	Sales	125.000	1292.847
	23	Earnings estimate	40.000	1332.847
	24	Growth estimate	10.000	1342.847
	25	EPS estimate history	30.000	1372.847
	26	Profit margin	11.200	1384.047
	27	Operating margin	0.000	1384.047
	28	Gross margin	50.000	1434.047
	29	Return on assets	138.600	1572.647
	30	Return on equity	-57.200	1515.447
	31	Return on capital	142.800	1658.247
	32	Receivable turnover	50.000	1708.247
	33	Inventory turnover	0.000	1708.247
	34	Asset turnover	50.000	1758.247
	35	Revenue per share	82.600	1840.847
	36	Revenue growth	0.000	1840.847
	37	Earnings growth	0.000	1840.847
	38	Net income available to common shares	-50.000	1790.847
	39	Total cash per share	65.200	1856.047
	40	Debt equity ratio	0.000	1856.047
	41	Book value per share	21.310	1877.357
	42	Free cash flow	10.000	1887.357
Technical	43	Moving averages (50, 100, 200)	35.000	1922.357
	44	RSI	75.000	1997.357
	45	Relative Strength	200.000	2197.357
	46	MFI	75.000	2272.357
	47	Bollinger bands	0.000	2272.357
	48	Williams %R	50.000	2322.357
	49	Price rate of change (ROC)	0.000	2322.357

Table 128: THQI Rating for July 13, 2004

WGO				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	25.000
	2	Purchasable shares	200.000	225.000
	3	52 week percentage change	71.150	296.150
	4	Monthly percentage change	25.000	321.150
	5	Institutional transactions	237.200	558.350
	6	1 year target estimate	36.050	594.400
	7	Beta	-50.000	544.400
	8	Yearly high/low	9.054	553.454
	9	52 week change relative to S&P 500	27.090	580.544
	10	Market capitalization	10.000	590.544

	11	P/E ratio	153.192	743.736
	12	Forward P/E ratio	2.400	746.136
	13	PEG ratio	143.478	889.614
	14	PB ratio	-8.389	881.225
	15	Price cashflow ratio	56.410	937.635
	16	Current ratio	61.500	999.135
	17	Quick ratio	-44.500	954.635
	18	Leverage ratio	-14.500	940.135
	19	PS ratio	142.593	1082.728
	20	Analyst recommendations	-100.000	982.728
	21	Short interest	100.000	1082.728
	22	Sales	125.000	1207.728
	23	Earnings estimate	60.000	1267.728
	24	Growth estimate	10.000	1277.728
	25	EPS estimate history	10.000	1287.728
	26	Profit margin	12.000	1299.728
	27	Operating margin	0.000	1299.728
	28	Gross margin	30.000	1329.728
	29	Return on assets	201.400	1531.128
	30	Return on equity	252.200	1783.328
	31	Return on capital	252.000	2035.328
	32	Receivable turnover	50.000	2085.328
	33	Inventory turnover	0.000	2085.328
	34	Asset turnover	49.800	2135.128
	35	Revenue per share	103.000	2238.128
	36	Revenue growth	0.000	2238.128
	37	Earnings growth	0.000	2238.128
	38	Net income available to common shares	-50.000	2188.128
	39	Total cash per share	28.400	2216.528
	40	Debt equity ratio	0.000	2216.528
	41	Book value per share	5.630	2222.158
	42	Free cash flow	10.000	2232.158
Technical	43	Moving averages (50, 100, 200)	-135.000	2097.158
	44	RSI	0.000	2097.158
	45	Relative Strength	100.000	2197.158
	46	MFI	0.000	2197.158
	47	Bollinger bands	0.000	2197.158
	48	Williams %R	50.000	2247.158
	49	Price rate of change (ROC)	50.000	2297.158

Table 129: WGO Rating for July 13, 2004

CSC				
	Step	Description	Numerical Change	Overall Rating
Fundamental	1	Dividend	0.000	0.000

	2	Purchasable shares	200.000	200.000
	3	52 week percentage change	11.370	211.370
	4	Monthly percentage change	25.000	236.370
	5	Institutional transactions	207.200	443.570
	6	1 year target estimate	28.650	472.220
	7	Beta	50.000	522.220
	8	Yearly high/low	9.623	531.843
	9	52 week change relative to S&P 500	-0.045	531.798
	10	Market capitalization	20.000	551.798
	11	P/E ratio	162.111	713.909
	12	Forward P/E ratio	2.000	715.909
	13	PEG ratio	141.667	857.576
	14	PB ratio	115.790	973.366
	15	Price cashflow ratio	68.518	1041.884
	16	Current ratio	57.500	1099.384
	17	Quick ratio	56.500	1155.884
	18	Leverage ratio	60.500	1216.384
	19	PS ratio	150.000	1366.384
	20	Analyst recommendations	-100.000	1266.384
	21	Short interest	0.000	1266.384
	22	Sales	125.000	1391.384
	23	Earnings estimate	60.000	1451.384
	24	Growth estimate	10.000	1461.384
	25	EPS estimate history	30.000	1491.384
	26	Profit margin	7.000	1498.384
	27	Operating margin	0.000	1498.384
	28	Gross margin	38.200	1536.584
	29	Return on assets	132.600	1669.184
	30	Return on equity	147.600	1816.784
	31	Return on capital	133.900	1950.684
	32	Receivable turnover	-50.000	1900.684
	33	Inventory turnover	0.000	1900.684
	34	Asset turnover	51.300	1951.984
	35	Revenue per share	100.000	2051.984
	36	Revenue growth	0.000	2051.984
	37	Earnings growth	0.000	2051.984
	38	Net income available to common shares	-50.000	2001.984
	39	Total cash per share	32.400	2034.384
	40	Debt equity ratio	-2.100	2032.284
	41	Book value per share	39.240	2071.524
	42	Free cash flow	10.000	2081.524
Technical	43	Moving averages (50, 100, 200)	-135.000	1946.524
	44	RSI	0.000	1946.524
	45	Relative Strength	200.000	2146.524
	46	MFI	0.000	2146.524
	47	Bollinger bands	0.000	2146.524
	48	Williams %R	50.000	2196.524

| | 49 | Price rate of change (ROC) | 0.000 | 2196.524 |

Table 130: CSC Rating for July 13, 2004

ABFS				
	Step	**Description**	**Numerical Change**	**Overall Rating**
Fundamental	1	Dividend	0.000	25.000
	2	Purchasable shares	200.000	225.000
	3	52 week percentage change	11.700	236.700
	4	Monthly percentage change	25.000	261.700
	5	Institutional transactions	-118.800	142.900
	6	1 year target estimate	20.200	163.100
	7	Beta	-50.000	113.100
	8	Yearly high/low	8.826	121.926
	9	52 week change relative to S&P 500	0.050	121.976
	10	Market capitalization	10.000	131.976
	11	P/E ratio	165.790	297.766
	12	Forward P/E ratio	0.300	298.066
	13	PEG ratio	164.102	462.168
	14	PB ratio	102.356	564.524
	15	Price cashflow ratio	63.699	628.223
	16	Current ratio	-45.500	582.723
	17	Quick ratio	-46.500	536.223
	18	Leverage ratio	59.000	595.223
	19	PS ratio	150.000	745.223
	20	Analyst recommendations	-100.000	645.223
	21	Short interest	400.000	1045.223
	22	Sales	-125.000	920.223
	23	Earnings estimate	60.000	980.223
	24	Growth estimate	-10.000	970.223
	25	EPS estimate history	-30.000	940.223
	26	Profit margin	6.600	946.823
	27	Operating margin	0.000	946.823
	28	Gross margin	50.000	996.823
	29	Return on assets	153.700	1150.523
	30	Return on equity	170.200	1320.723
	31	Return on capital	162.000	1482.723
	32	Receivable turnover	50.000	1532.723
	33	Inventory turnover	0.000	1532.723
	34	Asset turnover	52.200	1584.923
	35	Revenue per share	100.000	1684.923
	36	Revenue growth	0.000	1684.923
	37	Earnings growth	0.000	1684.923
	38	Net income available to common shares	-50.000	1634.923
	39	Total cash per share	3.200	1638.123

	40	Debt equity ratio	0.000	1638.123
	41	Book value per share	26.000	1664.123
	42	Free cash flow	10.000	1674.123
Technical	43	Moving averages (50, 100, 200)	35.000	1709.123
	44	RSI	0.000	1709.123
	45	Relative Strength	200.000	1909.123
	46	MFI	0.000	1909.123
	47	Bollinger bands	0.000	1909.123
	48	Williams %R	50.000	1959.123
	49	Price rate of change (ROC)	50.000	2009.123

Table 131: ABFS Rating for July 13, 2004

Appendix H

Main Database Structure

Field	Type	Description
stock_id	int	unique id given to each stock
symbol	text	stock symbol
exchange	text	exchange stock is traded on
status	text	status assigned by analysis agent
industry	text	industry of company
current_price	float	current share price
last_trade_time	datetime	last date and time stock was traded
previous_close	float	previous closing price
open	float	open price
bid_price	float	current bid price
ask_price	float	current ask price
gain_loss	float	the day's gain or loss value
percentage_gain_loss	float	the day's percentage gain or loss
day_low	float	the day's low price
day_high	float	the day's high price
volume	float	current volume
average_volume	float	average volume
percent_year_change	float	percentage change for the year
percent_year_change_relative_SAP	float	percentage change for the year relative S&P 500
market_cap	float	market capitalization
enterprise_value	float	enterprise value
dividend_per_share	float	dividend paid per share
EPS	float	earnings per share
percent_institutional_ownership	float	percent of stock owned by institutions
shares_outstanding	float	number of shares outstanding
beta	float	beta (volatility)
last_three_month_percentage_change	float	percentage price change in the last three months
last_six_month_percentage_change	float	percentage price change in the last six months
last_twelve_month_percentage_change	float	percentage price change in the last twelve months
last_three_month_relative_strength	float	relative strength for the last three months
last_six_month_relative_strength	float	relative strength for the last six months
last_twelve_month_relative_strength	float	relative strength for the last twelve months
next_earnings_release	date	date of next earnings release
debt_equity_ratio	float	debt/equity ratio
debt_equity_ratio_industry	float	debt/equity ratio industry
gross_margin	float	gross margin
gross_margin_industry	float	gross margin industry
profit_margin	float	profit margin
profit_margin_industry	float	profit margin industry
operating_margin	float	operating margin

pe_ratio	float	P/E ratio
forward_pe_ratio	float	P/E ratio based on future earnings estimates
pe_ratio_industry	float	industry average P/E ratio
peg_ratio	float	PEG ratio
peg_ratio_industry	float	industry average PEG ratio
ps_ratio	float	PS ratio
ps_ratio_industry	float	industry average PS ratio
pb_ratio	float	PB ratio
pb_ratio_industry	float	industry average PB ratio
price_cash_flow_ratio	float	price to cashflow ratio
price_cash_flow_ratio_industry	float	industry average price to cashflow ratio
current_ratio	float	current ratio
current_ratio_industry	float	industry average current ratio
quick_ratio	float	quick ratio
quick_ratio_industry	float	industry average quick ratio
leverage_ratio	float	leverage ratio
leverage_ratio_industry	float	industry average leverage ratio
book_value_per_share	float	book value per share
book_value_per_share_industry	float	industry average book value per share
return_on_equity	float	percentage return on equity
return_on_equity_industry	float	industry average percentage return on equity
return_on_equity_five_year	float	five year average return on equity
return_on_equity_five_year_industry	float	industry five year average return on equity
return_on_assets	float	percentage return on assets
return_on_assets_industry	float	industry average percentage return on assets
return_on_assets_five_year	float	five year average return on assets
return_on_assets_five_year_industry	float	industry five year average return on assets
return_on_capital	float	percentage return on capital
return_on_capital_industry	float	industry average percentage return on capital
return_on_capital_five_year	float	five year average return on capital
return_on_capital_five_year_industry	float	industry five year average return on capital
receivable_turnover	float	receivable turnover
receivable_turnover_industry	float	industry average receivable turnover
inventory_turnover	float	inventory turnover
inventory_turnover_industry	float	industry average inventory turnover
asset_turnover	float	asset turnover
asset_turnover_industry	float	industry average asset turnover
ownership_buyers	float	number of insider buyers
ownership_sellers	float	number of insider sellers
net_shares_purchased	float	number of shares purchased or sold
broker_recommendation_current	float	current broker recommendation
broker_recommendation_one_month_ago	float	broker recommendation one month ago
broker_recommendation_two_months_ago	float	broker recommendation two months ago
broker_recommendation_three_months_ago	float	broker recommendation three months ago
one_year_estimate	float	broker's one year target estimate
this_quarter_eps_estimate	float	current EPS estimate for this quarter
next_quarter_eps_estimate	float	current EPS estimate for next quarter

this_year_eps_estimate	float	current EPS estimate for this year
next_year_eps_estimate	float	current EPS estimate for next year
past_eps_estimate_one	float	historical EPS estimate one
past_eps_actual_one	float	actual EPS result one
past_eps_estimate_two	float	historical EPS estimate two
past_eps_actual_two	float	actual EPS result two
past_eps_estimate_three	float	historical EPS estimate three
past_eps_actual_three	float	actual EPS result three
past_eps_estimate_four	float	historical EPS estimate four
past_eps_actual_four	float	actual EPS result four
past_eps_estimate_five	float	historical EPS estimate five
past_eps_actual_five	float	actual EPS result five
this_year_growth_estimate	float	this year's growth estimate
this_year_growth_estimate_industry	float	industry average growth estimate for this year
next_year_growth_estimate	float	next year's growth estimate
next_year_growth_estimate_industry	float	industry average growth estimate for next year
sales_vs_year_ago	float	company sales vs. one year ago
sales_vs_year_ago_industry	float	industry average sales vs. one year ago
sales_five_year_average	float	company's sales average for five years
sales_five_year_average_industry	float	industry sales average for five years
revenue_per_share	float	revenue per share
percent_revenue_growth	float	percentage revenue growth
cash_per_share	float	total cash per share
free_cash_flow	float	free cashflow
short_interest_one_month_ago	float	short interest one month ago
short_interest_two_months_ago	float	short interest two months ago
short_interest_three_months_ago	float	short interest three months ago
short_interest_four_months_ago	float	short interest four months ago
short_interest_five_months_ago	float	short interest five months ago
short_interest_six_months_ago	float	short interest six months ago
short_interest_seven_months_ago	float	short interest seven months ago
short_interest_eight_months_ago	float	short interest eight months ago
short_interest_nine_months_ago	float	short interest nine months ago
short_interest_ten_months_ago	float	short interest ten months ago
short_interest_eleven_months_ago	float	short interest eleven months ago
short_ratio	float	short ratio
fifty_day_moving_average	float	fifty day moving average
one_hundred_day_moving_average	float	one-hundred day moving average
two_hundred_day_moving_average	float	two-hundred day moving average
fundamental_rating	float	current fundamental rating assigned by agent
technical_rating	float	current technical rating assigned by agent
overall_rating	float	current overall rating assigned by agent
year_high_flag	float	flag set if current price is a year high
year_low_flag	float	flag set if current price is a year low

Table 132: Main Database Structure

Appendix I

Historical Database Structure

Field	Type	Description
date	date	date for historical entry
open	float	day's open price
high	float	day's high
low	float	day's low
close	float	day's closing price
volume	int	day's volume
fundamental_rating	float	fundamental rating at the end of the day
technical_rating	float	technical rating at the end of the day
overall_rating	float	overall rating at the end of the day

Table 133: Historical Database Structure