

Characteristics of a Stock Market Winner

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Honors Thesis

Rutgers University-Camden

May 4, 2016

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Abstract

There are four main contributing factors that explain fluctuations in the stock prices over the long term. These are Market, Value, Size and Momentum (Fama and French, 1993; Carhart, 1997). However, these factors do not explain sharp short-term variations (3 to 12 months). The goal of my thesis is to determine if there is a way to predict large increases (above 100%) in stock prices before they happen, and if so, what the main determining factors are.

Literature Review

The purpose for this stage of my honors thesis is to explore prior academic research in order to make connections, draw conclusions, and expand the scope of prior findings. This section of my study took the first semester to complete. In order to gain the background necessary for me to answer my research question, “what factor drive extraordinary performance”, I read ten seminal academic research articles, summarized them, and compiled a list of methods, variables, and data samples used in each article. Each individual summary included answers to the following questions:

- What was the author’s research question?
- What were the tools that the author used to answer these questions (data samples, statistical tools, variables, etc.)?
- Did the author use some theory as a reference? If so, what theory?
- What were the research results?

I chose to begin my research with an article called *The Anatomy of a Stock Market Winner* by Marc R. Reinganum for three primary reasons. First, Reinganum was one of the first major practitioner research papers pertaining to the attributes of a successful stock. Secondly, by starting my research in the late 1980s, I set myself up to better understand historical market fluctuations, financial data, and the evolution of research methods. Lastly, this article is one of the most highly referenced essays among scholars and has been rewritten and revised by many to reflect the most current financial market data.

Although there have been many breakthrough methods formulated to help predict large increases in stock prices since the 1980s, Reinganum's research serves as a platform for much of today's research in the financial market field. He takes many factors into consideration and tests a large range of data with his Nine-Screen and Four-Screen strategies. His main criterion set is as follows: price-to-book ratio is less than 1.0, five-year growth rate based on quarterly earnings is positive, quarterly earnings are accelerating, pretax profit margins are positive, fewer than 20 million common shares outstanding, relative-strength rank is at least 70 and is greater than the rank in the previous quarter, has an O'Neil Datagraph rating of at least 70, and is selling within 15% of its maximum price during the previous two years. He found that stocks that met his entire criterion were extremely successful and that the more factors taken into consideration, the better the stock is likely to perform.

After reading Reinganum's article, I went to scholar.google.com and found that 75 articles had cited Reinganum's "The Anatomy of a Stock Market Winner." I decided

that because Reinganum's research set the standard for this useful stock market data, the articles that cited his article were also likely to use similar research strategies and be more modern.

Over the next 20+ years, many scholars have added value to Reinganum's research by posing new questions, testing new variables and filling a lot of the gray area. Analyzing this academic research will help me to formulate a strategy pioneered toward short-term, sharp stock price variations.

After reading each article and summarizing it based on the bulleted list of questions above, I wrote an overall summary of my findings, which includes a list of variables I found to be most frequently referenced. From this list, I chose the variables that I thought would be most useful in my research in order to formulate my hypothesis.

I found that there are many similarities between the characteristics of extreme stock market winners and losers, such as being relatively new, small capitalization firms with low-priced stock. This, in part, pertains to the risk-reward concept; investing a minimal amount of money per share in a new company that ends up being successful reaps tremendous rewards. On the other hand, if this promising new company ends up failing, one could potentially lose their entire investment. One factor that often indicates a potential large stock price increase or decrease is the cost-effectiveness of research and development. R&D is extremely crucial in a rapidly increasing technology-driven world; the top performing stocks in this decade have proven time and time again to be the pharmaceutical, health care and technology industries. The R&D concept is a double-edged dagger: if firms avoid

it, they will be unable to keep up with rapidly advancing technology, and if it is not cost-effective, they are sure to fail.

However, there are some key differences between extreme winners and losers that are worth noting. As mentioned in all ten of the articles that I've analyzed, accounting data and financial ratios are very critical to stock market success. I've perceived the book-to-market ratio as being among the most important, considering that it measures *value* instead of price. The discrepancy between the book value and market value says a great deal about a company's financial health and potential. Other key financial indicators include book-to-price, sales-to-price, and debt-to-price ratios. Undoubtedly, factors such as increased sales and trading volume are also likely to be good indicators of effective trading strategies.

Many of the articles that I've analyzed take upwards of 20 variables, both fundamental and market-based, into consideration. It was organizationally beneficial for some of these authors to break down the variables into cohesive groups. Common groups include firm characteristics, trading characteristics, market multiples and fundamental variables. I find this approach to be one of the most intuitive testing methods, considering that the more variables taken into consideration, the harder they will be to track and maintain.

I found Foerster's article, "Double then Nothing: Why Stock Investments Relying on Simple Heuristics May Disappoint," to have a particularly interesting point. He notes Reinganum's description of a successful stock as "those that have doubled within a calendar year," (Foerster, 116) but adds emphasis on the importance of the "*degree* of rapid price changing" (Foerster, 121). Foerster explains

that, “underperformance is more severe for stocks that have doubled faster” (Foerster, 137). Therefore, a company’s stock that increases very rapidly in a short-term period is not likely to be able to maintain its market value for very long. Therefore, these types of stocks may be a good option for day traders to consider buying and selling, but a bad option for long-term investors.

Another more recently discussed idea is stock volatility. Jones and Winters note that, “abnormal returns are in part due to the pricing inefficiency or delayed reaction” (Jones and Winters, 38). This concept, if mastered, could also be extremely beneficial to day traders. On the flip side, when “firms predicted to have extreme future price changes [were excluded], day-to-day portfolio variation is significantly lowered without sacrificing return levels, and portfolio betas are reduced” (Fodor, Krieger, Mauck, Stevenson, 491). Deciding how much risk and volatility one is willing to take on is an important determinant regarding the ways that they should invest. For the purposes of my research paper, watching the market very closely and being willing to accept a high level of risk is the only way to achieve the highest level of short-term stock profits.

The financial ratios that will be useful in predetermining stocks that will likely have extreme returns can be broken down into five main categories: valuation, leverage, liquidity, profitability and efficiency. Based on the research articles that I’ve analyzed, the list below contains the most commonly cited ratios and data that I think will be useful in my project:

- Market-to-book ratio
- Earnings-to-price ratio

- Sales-to-price ratio
- Debt-to-price ratio
- R&D expense
- Age of firm
- Size of market capitalization
- Price
- Trading volume / Number of shares outstanding
- Year-over-year net income changes
- Earnings surprise
- Average daily turnover
- Change in sales
- Change in gross margin
- Implied volatility

Hypothesis

The goal of my thesis is to answer the following questions: Is there a way to predict explosive growth in stock prices before they happen? If so, what are the main determining factors?

A successful stock on the cusp of a price explosion will likely be a young firm, recently out of IPO, because these companies have substantial room for growth, especially if they are introducing a new product to the market. Correspondingly, a stock market winner will likely be low-priced because in order to attain a larger amount of capital, the stock has to provide incentives to investors. Furthermore, a

successful stock will have a low market-to-book ratio (under 1.0); this indicates that the company has room for growth. Additionally, a stock market winner will have accelerating quarterly earnings, which indicates that the firm is growing more rapidly than average. Lastly, a successful stock will have cost-effective R&D.

Methods

Step 1: Identify 10 or more stocks (and their ticker symbols) that had the largest share price percentage increases in each of the last ten years (100 or more total) according the Russell 3000 index on Bloomberg Terminal.

Once Bloomberg Terminal is open, press the “F8 Equity” button on the keyboard and then “Enter” to look at the main menu of Bloomberg functions regarding equity. To view the various securities, type “SECF” (abbreviation for security finder) in the box located at the top of the screen or simply clicks on the link in the main menu. To view the World Equity indexes, type “WEI” in the search bar and then hit the “Enter” key. Click on the “Americas” heading (which is the first header in the list) and the first header on the next screen will be the United States. You can right click on each index and choose the “Description” or “Desc” option to find out more information on each index and can view the next or previous page by clicking the “Pg Up” and “Pg Down” buttons.

After reading all of the index descriptions, I determined that the best one to base my research on is the Russell 3000 Index because it represents the largest portion of the market indexes, giving us the most stocks to base my research on. See

Appendix 1 for a screenshot of the Russell 3000 Index Information from Bloomberg Terminal and a guide describing each section.

By typing in "HMOV" (abbreviation for Historical Equity Index Movers) in the search bar located at the top of the screen, you can view market data from as early as 1/31/1995 within any date range and can sort this data based on metric (I used option 2: "Percent Change), represented in the order of your choice (I used option 2: Descending). Because I am researching the top 10 stocks per year, I entered the date ranges for each year starting with the first trading day of the year and ending with the last trading day of that same year. Clicking the grey "1) Generate Report" option on the current screen. By typing "RPT" (abbreviation for Report) and then "Enter", you will be able to view the progress of your report and retrieve it once it is complete. When your report is complete, you can click on it to view that year's leaders and laggards based on percentage change. I followed these same steps for every year between 2005 and 2014. An example for the most recent year of available data (2014) can be found in Appendix 2.

To compile all of the most valuable information from these reports, I needed to export the data into Excel by first opening a blank Excel file on the second monitor and then clicking on the "Bloomberg" tab in the top right corner. You can then drag the information into the document by clicking the icon near the top right of the Bloomberg screen that looks like two sheets of paper with a green arrow pointing downward and dragging it into Excel.

Step 2: I used the Compustat database to input the top 10 performing stocks' ticker symbols for each year (2005-2014) with a filter on the variables that I chose in my hypothesis. I exported the data into 10 separate Excel spreadsheets and then compiled all of the data into 1 Excel spread sheet with 10 separate tabs.

Step 3: Using the Compustat data that I collected in Step 4, I calculated the earnings per share of the current year's 4th quarter vs. the prior 4th quarter as well as the EPS for the current 4th quarter vs. the current 3rd quarter for each company selected as a stock market winner. I also calculated the price-to-book ratios, R&D growth over a one-year period (current Q4 compared to prior Q4), and market value for each stock indicated as a winner. I found the number of shares for the specific dates via Bloomberg terminal. For each of the preselected winning stocks, I further noted the share price from the prior year's end, the industries of the firms and the IPO dates; all of this information was extracted from the Compustat database.

Step 4: I combined all of my result data into one spreadsheet and updated the format so that every cell contained a numerical value. I changed the IPO date to the age of the stock and changed the NAIC code into specific sector codes. The other dependent variables included the earnings ratio between Q4 and Q3, the earnings ratio between Q4 and Q4t-1, the price-to-book ratio, the change in R&D between Q4 and Q4t-1 and the market value of the stock. I also added in a column for the percentage change in earnings between the year in which a stock was classified as a winner and the prior year.

The percentage change in earnings is my independent variable in this study. I made a histogram to represent the original distribution of this data and found it to be too skewed to the right (see Panel A). Then, I calculated the log transformation for each stock and made a new histogram, this time utilizing the log transformation as the independent variable (see Panel B). This information was more normally distributed, so I used the log transform as the independent variable in performing regression analyses in Excel.

Step 5: To analyze the results of the regression analysis, I created three separate tables. In the first table, descriptive statistics, I determined the mean, median, standard deviation and number of observations for each variable. In my second table, I determined the correlations between the variables. In the last table, I included coefficients and P-Values. The three tables are shown below.

Step 6: In this step, I made a table to industry analysis. I classified the industries of each of the stock market winners. The industries include advertisement, automotive, biotechnology, commodities, communications, consumer products, global internet media, health care, industrial products, pharma, real estate, retail, service providers, software, solar energy and technology. I further classified these into four sectors consisting of sector 1: medical (pharma, health care and biotechnology), sector 2: consumer products and services (retail, commodities, automotive, global Internet media and industrial products), sector 3: technology/software, and sector 4: other (advertisement, communications, real

estate and solar energy). I calculated the percentages of each of the four sectors as well as the industry leaders' percentage of the total sample. Please see the table below.

Step 7: Since I did not have enough time to do the same processes as mentioned throughout this paper for a sample of 100 stocks chosen at random to compare to the selected winners, I referred to the Russell 3000 Index in Bloomberg Terminal. I found the average percent change in earnings for the 3000 stocks within the index for the 2005-2014 time frame, as well as the average change in earnings in Q4 and Q4t-1, the average change in earnings between Q4 and Q3, the average price-to-book ratio and the average annual change in R&D. These numbers can be found in the Correlations Table above. These ratios assisted me in comparing the stock market winners to an average stock.

Empirical Results

Table 1, descriptive statistics, provides information regarding the mean, median, standard deviation and number of observations of the following variables: Percentage change in earnings (independent variable), log transform, Q4 earnings v Q4t-1 earnings, Q4 v Q3 earnings, price-to-book ratio, the change in R&D expense between Q4 and Q4t-1, market value (listed in billions), as well as age of the firm. A more detailed description of each of these variables can be found in Table 1. The results provided in this table help to paint a picture of the attributes of the average

stock market winner and the amount by which the data is dispersed from the mean (i.e. outliers).

The percentage change in earnings (independent variable) shows the highest level of standard deviation (350.85), which makes sense because the stocks have a spread of percent change in earnings from approximately 100% to 2,300%. The log transformation helps to make this data more normally distributed (0.27 standard deviation). The age an annual change in earnings seem to be the most unpredictable according to the standard deviation, followed by the market value of those firms. It is also important to note the relationship between the mean and the median. The closer these two statistics are, the more reliable the variables become.

Table 2, the correlation of coefficients, provides information regarding the relationship between the aforementioned stock market winner variables with one another. The last row indicates the average of some of the variables for the Russell 3000 Index. When comparing of several of the ratios of the winning stocks to an average stock in the Russell 3000 index, I found that the winners were likely to have a much larger change in earnings in Q4 and Q4t-1 (91% and 7.86% respectively) and a larger change in Q4 and Q3 (14.3% and 7.9% respectively).

Table 3, multivariate regression, includes coefficients and p-values. This data comes directly from the regression analysis and is the core of my findings. The p-values are the probability of getting coefficient if there is no relationship between variables; the smaller the value, the more valuable and significant it is. If it is high, it is not very important. Because of the small size of the sample, I determined that any variable with a p-value of less than 20% is important. This led to our finding that

although the stock market winners are generally younger firms, the highest achieving firms of the classified stock market winners are slightly older. Older age was positively correlated with higher returns (p-value of 18.82%). The next closely related variable was R&D expense in Q4 v Q4t-1 (p-value of 36.38%). However, it was above the 20% threshold, so it is still deemed as insignificant. The rest of the variables also turned out to be insignificant. The price-to-book ratio was 51.57%; the market value was 57.05%; the Q4 v Q3 earnings was 71.19% and the Q4 v Q4t-1 earnings was 88.67%. The annual change in earnings is the least statistically significant variable in this study. The results of the regression analysis suggest that once we identify the stock market winner, any further prediction as to how far the stock price will run is unexplained by the traditional accounting variables and the only variable that might do that is age of the firm.

Table 4 includes an industry analysis. Because I was not satisfied with the limited results that I found from tables 1-3, I decided to take note of the various industries that the 103 stock market winners were comprised of. I found that sector one, which I had created and includes pharmaceutical, health care and biotechnology companies, were the most highly correlated with the sample of stock market winners, comprising 44% of the total. Sector one was followed by sector 2: consumer products and services (35%), and sectors 3: technology/software and 4: other (11% each). A more detailed description of each sector can be found in table 4.

I found Pharmaceutical companies to be the industry leaders, comprising 24% of the total sample, followed by biotech (12%), retail (9%) and health care (8%). I found it to be surprising that technology and software companies weren't

higher on the list of stock market success and was surprised to find that approximately $\frac{1}{4}$ of the winners fell in the pharmaceutical industry.

Conclusion

After completing all of the steps above, I found that most of the accounting variables among the 103 stock market winners were not statistically significant in predicting the differences among the top performers. Out of all of the variables, I found age to be the most highly correlated with level of stock performance among the winners. Although it was observed that stock market winners are typically relatively new firms, the winners with the largest percent increase in earnings among the 103 observed in my study were slightly older than the other stocks. The least correlated variables were the change in earnings in Q4 and Q4t-1 and the change in earnings between Q4 and Q3. Price-to-book ratio, R&D expense and market value of the firms also seemed to be relatively uncorrelated with stock market success once a high level of return has been achieved.

Analyzing the correlation and statistics between the highest performing stocks for each year presents one obstacle. It is not surprising that none of the accounting variables I chose would be statistically significant; they would be much more likely to show significance when compared to an average stock. Therefore, I realize that my analyses would be more complete if a matching sample of 100 stocks were chosen at random from the Russell 3000 Index was used. This would also allow us to compare the characteristics that are important in selecting stock

market winners versus an average stock. If I had the sufficient time or were to pursue this study further, I would add these additional steps to provide more in depth results.

There are a few groups of people that could benefit from my research findings and the additional research that can be done regarding this topic in the future. Mutual funds that invest in growth stocks could find value in my research. Also, individual investors who want to take their financial future in their own hands could benefit from my study, as it will help them to maximize the probability of finding stock market winners.

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Figure 1: Frequency distribution of the main variable (% change in stock price over the previous year).

Panel A shows the distribution of the unmodified variable. Panel B shows the distribution after the log transformation.

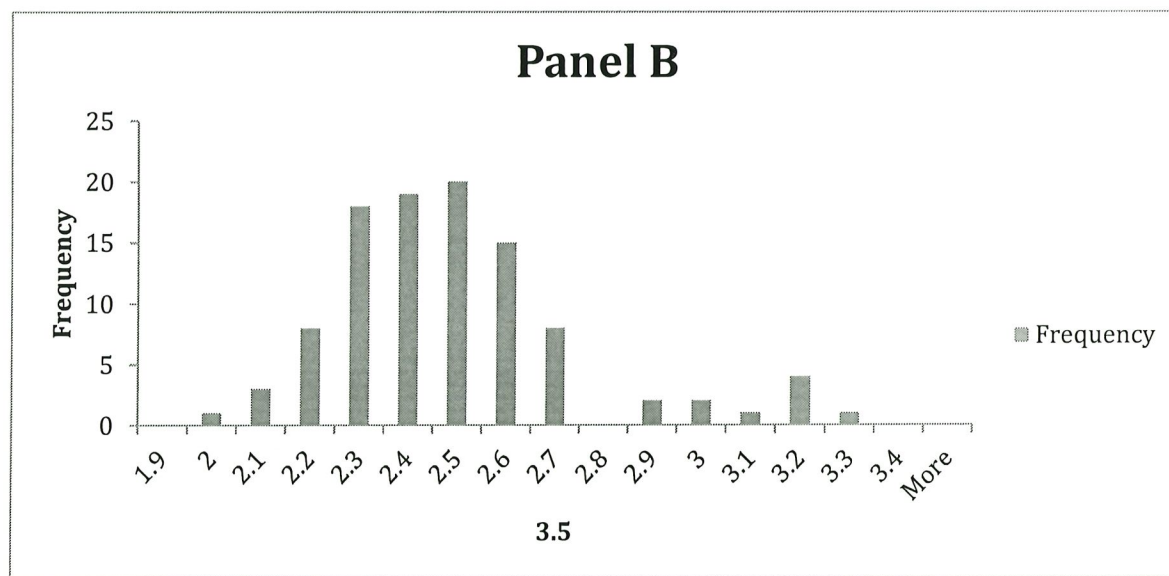
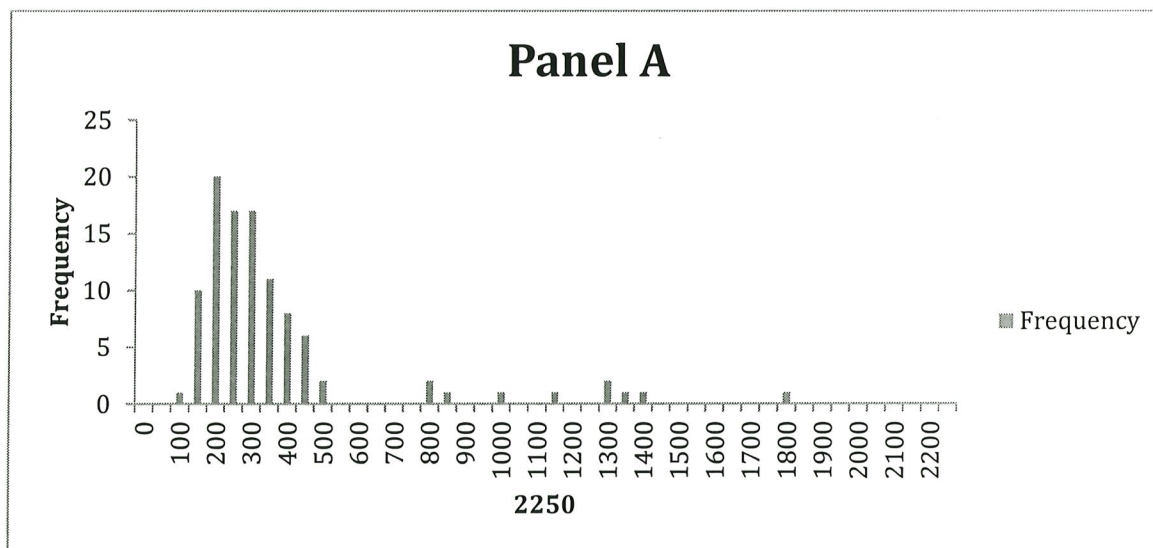


Table 1: Descriptive Statistics

% Change: Percentage change in earnings (the original independent variable)

Log Transform: The logarithm of the percentage change utilized to help show a normal distribution of data (the revised independent variable)

Q4 v Prior Q4 Earnings: The change in earnings between the end of the fiscal year in which the stock was identified as a winner and the end of the prior year (12 month differential)

Q4 v Q3 Earnings: The change in earnings between the end of the fiscal year in which the stock was identified as a winner and the end of the prior quarter (3 month differential)

Price-to-book Ratio: Compares the market value of the firm (market shares outstanding * share price) to the book value of the firm

R&D Q4 v Prior Q4: The change in research and development expense between the end of the fiscal year in which the stock was identified as a winner and the end of the prior year (12 month differential)

Market Value, Billions: The number of market shares outstanding multiplied by the share price

Age: The number of years between the IPO date and the date at which the stock was identified as a winner

Variable	Mean	Median	Standard Deviation	N (number of observations)
% Chg	363.09	264.94	350.85	103
Log Transform	2.45	2.42	0.27	103
Q4 v Prior Q4 Earnings	1.14	-0.05	6.97	101
Q4 v Q3 Earnings	-0.56	0.00	2.79	97
Price-to-book Ratio	0.34	0.12	3.58	102
R&D Q4 v prior Q4	0.47	0.00	2.08	70
Market Value, Billions	1.41	0.31	4.63	103
Age	17.69	16.31	9.77	103

Table 2. Correlation Coefficients

	% Chg	Log Transform	Q4 v Prior Q4 Earnings	Q4 v Q3 Earnings	Price-to- book Ratio	R&D Q4 v prior Q4	Market Value, Billions	Age
% Chg	1.00	0.91	-0.09	-0.01	-0.05	-0.09	-0.08	0.23
Log Transform		1.00	0.91	-0.09	-0.01	-0.05	-0.09	-0.08
Q4 v Prior Q4 Earnings			1.00	0.14	0.02	-0.01	0.08	-0.13
Q4 v Q3 Earnings				1.00	0.04	0.01	0.06	0.01
Price-to- book Ratio					1.00	-0.11	0.03	-0.07
R&D Q4 v prior Q4						1.00	-0.04	-0.01
Market Value, Billions							1.00	-0.08
Age								1.00
Russel 3000 Index Average	0.76		0.079	0.079	0.027	0.0202		

Table 3. Multivariate Regression

Variable	Coefficient	P-Values
Intercept	2.93	0.00%
Q4 v Prior Q4 Earnings	0.00	88.67%
Q4 v Q3 Earnings	0.00	71.19%
Price-to-book Ratio	0.00	51.57%
R&D Q4 v prior Q4	-0.01	36.38%
Market Value	0.00	57.05%
Age	0.00	18.82%

Table 4. Industry Analysis

Sector 1: Medical (pharma, health care and biotechnology)

Sector 2: Consumer Products and Services (retail, commodities, automotive, global Internet media and industrial products)

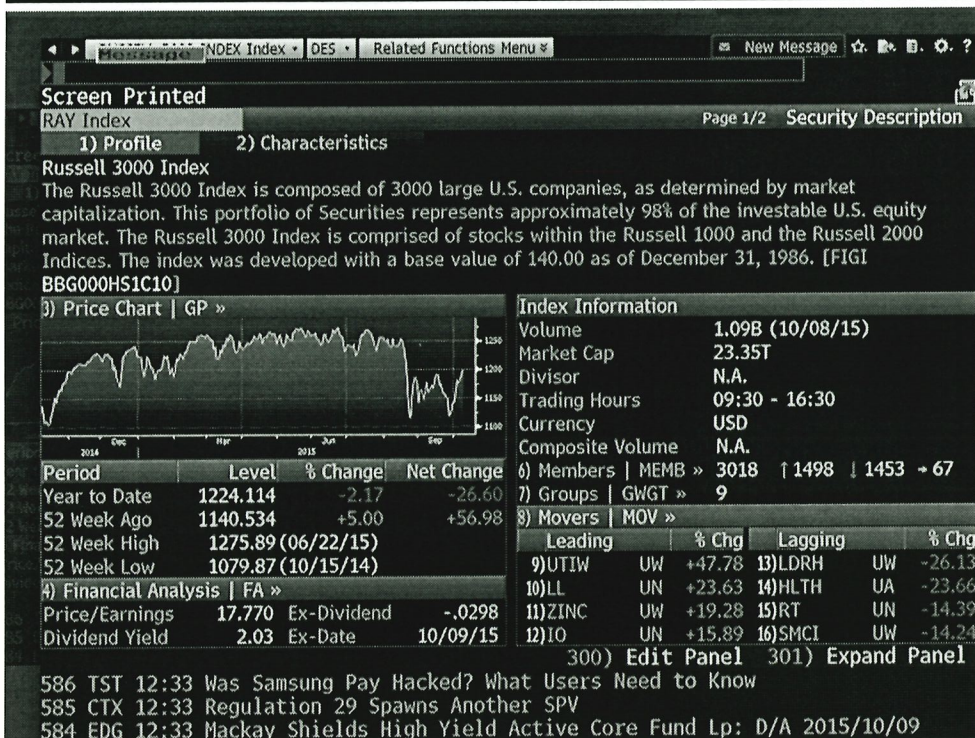
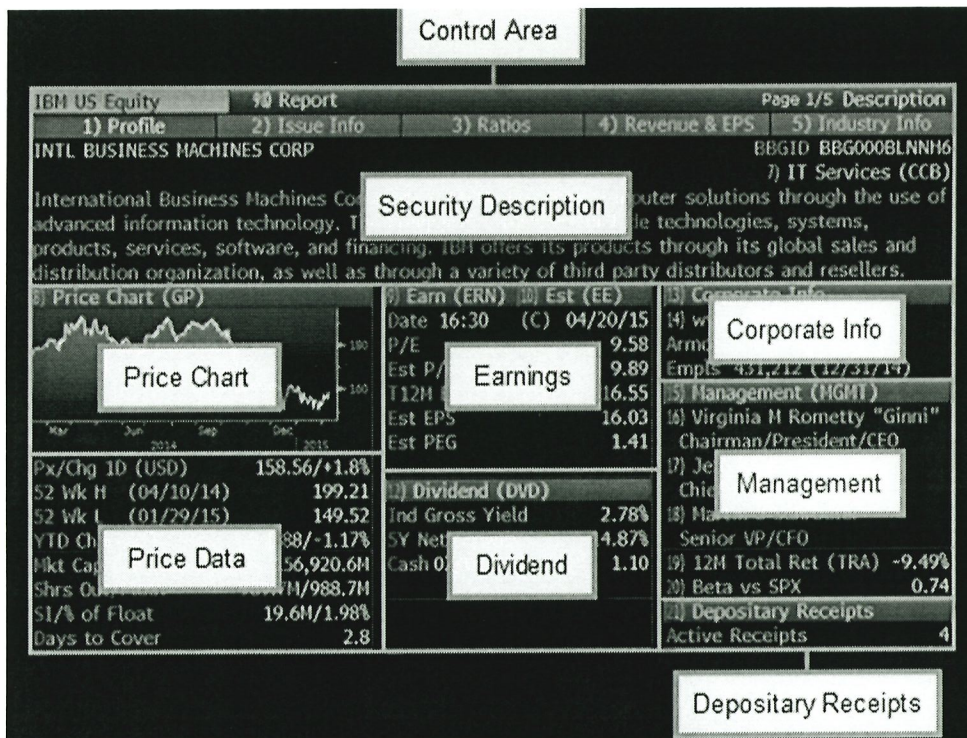
Sector 3: Technology/Software

Sector 4: Other (advertisement, communications, real estate and solar energy)

Sector		% of Sample	
	1	0.44	
	2	0.35	
	3	0.11	
	4	0.11	
Industry Leaders		% of Sample	
	Pharma	0.24	
	Biotech	0.12	
	Retail	0.09	
	Health Care	0.08	
	Commodities	0.07	
	Industrial Products	0.07	
	Service Providers	0.06	
	Technology	0.06	
	Software	0.05	

Appendix 1.

Below are screenshots from the Bloomberg Terminal. The first screenshot was taken to describe the sections of data available for various market indexes. The second screenshot shows specific information regarding the security description, price chart, earnings, corporate information, price data, dividends and depositary receipts for the Russell 3000 index.



Appendix 2.

Below is an example of one year's data for leaders and laggards based on percentage change for the Russell 3000 Index (2014).

