THE RISK OF ABANDONING FUNDAMENTAL VALUATION

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Abstract

The Dot-Com bubble of the late 1990s offers insight into the mentality of investors and money managers. The goal of this paper is to design a model utilizing fundamental valuation variables and determine its effectiveness at predicting price changes in U.S. equities during the 1996-2000 Dot-Com bubble. A successful model will provide insight into how investors can best navigate the turbulent financial waters brought on by the boom of a financial bubble and the following decline once the bubble has burst.

KEYWORDS: (Investing, Bubble, Internet, Fundamental Valuation, Finance)

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ON MY HONOR, I HAVE NEITHER GIVEN NOR RECEIVED
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CHAPTER I

INTRODUCTION

The purpose of this paper is to analyze a specific bubble, the Dot-Com bubble of the late 1990s, to see if there were any warning signs available to investors of the period, which could have predicted the subsequent price adjustment. This paper will also focus on how an investor could have optimized their return during the period with the hope of providing insight into how these volatile markets can more safely be approached. Although studies on financial bubbles are nothing new, few papers have attempted to turn back the clock using only data available during the time period, and available from a source used by investors, both institutional and private around the world.

"I am hard-pressed to recall when any sort of bubble was accurately identified in real time on the cover of a major media publication. If anything the opposite is true;" (Ritholtz, 2013) CEO and finance writer Barry Ritholtz wrote these words in late 2013 for Bloomberg magazine. Ritholtz's view is similar to that of a majority of both economists and investors alike. As the world continues to pull itself out of the economic wreckage caused by the 2008 global financial crisis, investor's focus has once again shifted towards attempting to understand what causes

financial bubbles, with a goal of recognizing and preventing their growth prior to the financial dislocations resulting from a "pop" (Ritholtz, 2013).

Economic bubbles appear everywhere; one only needs to pick up a newspaper or watch a financial television program to be warned of the risk facing investors. In reality many of these reported bubbles will result in only minor losses suffered by a small group of unfortunate investors. A true financial bubble, one that alters the financial landscape, is an uncommon occurrence. Due to their relatively rare nature, these events are often referred to as "black swans". Throughout history "black swan" events have occurred in a variety of industries, from tulip bulbs to the U.S. housing market. Financial bubbles have left their mark not only in the field of finance but on history as well (Ritholtz, 2013).

This paper will focus on the three parts of the Dot-Com bubble, the period prior to its inflation, its growth and it's pop. It will cover the time period between 1993 and 2001 in order to provide an accurate analysis.

The following sections will cover the history of financial bubbles; theories on what investors and economists believe cause these events, the Dot-Com bubble and the financial climate of the time. The subsequent section will provide insight into the methods and results found from this study. This thesis will attempt to analyze if investors of the period could have seen the bubble coming. As such, all information, aside from knowledge of the affected industries and the time period of the bubble's collapse was available in the stated time period.

The analysis of the data set shows that the percent change in share price does not correlate with fundamental financial values. Although all of the selected

independent variables were significant at the 90% level their effect on the dependent variable was minor. If fundamental valuation cannot be used as an indication for the rapid increase in share prices other factors, such as irrational investor behavior and momentum trading must be analyzed.

CHAPTER II

LITERATURE REVIEW

This chapter will cover basic investment theory and how it pertains to financial bubbles. It will also cover the history of past bubbles, including the Dot-Com bubble, as well as factors economists and investors believe cause these events.

Differences between Fundamental Analysis and Technical Analysis

Predicting of economic bubbles has been difficult for economists and investors to achieve due to the variety of issues that cause them. This results from the inherent complexity of financial markets. When analyzing equity markets there are two core strategies that are used by both institutional and private investors in an attempt to achieve a return on investment (ROI) higher than their benchmark. This better return or spread, is referred to as alpha. These two "camps" are called fundamental and technical investing (Koller, 2010).

Fundamental investing, also known as fundamental analysis, is a tool used to determine the intrinsic value of a security, meaning that a potential investor will look at all aspects of the firm, both tangible and intangible. The end result will lead the investor to a value, which could be greater or less than the current market price. Once a value for the firm is determined, investors can take a position based on their findings (Investopedia).

The ideals of modern day fundamental investing are credited to Benjamin Graham and David Dodd, who used fundamental theory and developed it into an investment strategy known today as value investing. Their work during their time at Columbia Business School resulted in the publication of Security Analysis in 1934. This text, greatly affected by the massive Wall Street losses and economic downturn of the 1930s, is one of the early examples of investors attempting to rationalize and learn from financial bubbles. The theories presented by Graham and Dodd act as a part of the foundation for security valuation and for financial bubble analysis as well (Graham, 1934).

In contrast, technical investing, also known as technical analysis, evaluates securities through the statistical analysis of market activity, such as past prices and trade volume of the firm. Technical analysis does not attempt to measure the intrinsic value of a firm; but rather uses stock charts from previous trades and market movement to locate patterns and trends, which could suggest the future movement of the securities price (Investopedia). Interviews with analysts and portfolio managers call technical analysis' credibility into question. Andy Murray an equity analyst at Becker Capital Management located in Portland, Oregon spoke on the matter saying, "Technical investing is like trying to read tea leaves". Due to the ongoing debate, this paper will not focus on the strategies implemented by technical investors due to its perceived inability to generate consistent results over a long-standing period of time. Opponents of technical theory cite the use of historical data as its Achilles heel.

> Technical lore has it that if the price of a stock rose yesterday it is more likely to rise today. It turns out that the correlation of past price movements with present and future price movements is close to zero. Last week's price change bears little relationship to the price change this week, and so forth. (Malkiel, 1973)

Technical investors focus on the rearview mirror instead of the road ahead, resulting in securities with historically weak performance being written off in favor of ones, which have been historically strong. To the extent that technical analysis leads to momentum following, it can encourage investments in over-priced securities and result in poor performance when historical trends fail.

Can Investors Consistently "Beat the Market"

The goal of these two valuation strategies is to provide insight into securities prior to investment in an attempt to beat the market, the driving force behind any active investors' decision-making process. But the ability to generate alpha over the long term is an area of contention for economists and investors. The Princeton economist Burton Malkiel wrote on this debate in his book A Random Walk Down Wall Street. Malkiel's work supports the efficient-market hypothesis, which states that markets correct themselves at such an efficient rate that one cannot consistently achieve alpha on a risk-adjusted basis. This is due to the randomness of financial markets and the ability of the market to efficiently incorporate news into security prices. As a result, the ability for everyday investors to consistently achieve above average returns with information available at the time, without partaking in illegal practices or increasing risk is impossible (Malkiel, 1973).

> Common sense attests that some people can and do beat the market…Many academics agree; but the method of beating the market, they say, is not to exercise superior clairvoyance but rather to assume greater risk. Risk, and risk alone, determines the degree to which returns will be above or below average. (Malkiel, 1973)

However this hypothesis is still debated by members of the financial community.

A number of investors, the most well-known being Warren Buffett, a student and protégé of Graham, have called Malkiel's stance on financial markets into question. Buffett, widely considered one of history's greatest investors, spoke against Malkiel's work in his 1984 speech at Columbia Business School. During his speech Buffett reiterated the value of searching for market discrepancies illustrated by Graham and Dodd and investing based on these findings (Buffett, 1984). As financial bubbles are considered a discrepancy, fundamental evaluation should, in theory, be able to detect these events, allowing investors to take positions based on fundamental findings. Buffett has in fact made a fortune by taking positions based on financial discrepancies, his search for value or deep value companies has allowed him to make safer bets on companies that provide strong risk adjusted returns in the long run. One such example was his purchase of Bank of America shares at $7.14 in 2011 (Stitt, 2011) while the economy was still deep in the recession, today Bank of America shares are currently valued around $17 per share (Bloomberg Terminal, 2014).

What are Financial bubbles?

At its core, a financial bubble is the result of speculative trading which creates an increased volume of trades at prices, which exceed the intrinsic value of

the firm, industry or market. Due to the inherent difficulties that come with financial prediction, bubbles are almost always identified in hindsight. In many occurrences the variables that go into a financial bubble remain unchanged yet the bubble's industry and its overall effect on financial markets can be difficult to predict**.** These financial events are only truly considered a bubble in hindsight, after they have popped resulting in losses for investors and potential damage to world markets (Koller, 2010).

Financial bubbles are the byproduct of two aspects of the economy called the short-term and long-term debt cycles. Short-term debt provides a way for individuals to generate greater returns through leveraging. When a worker or investor approaches a creditor to gain access to capital on credit, they are essentially borrowing money from their future self. By gaining a higher level of capital at an earlier period of time people can invest this money toward items that will make them richer in the long run, such as business investments. This borrowed money must then be paid back, plus a premium to the creditor resulting in a cycle of increased and decreased capital as debts are taken out and then repaid. As people become wealthier due to the increased income generated by leveraged assets, inflation rises resulting in higher interest rates mandated by the Federal Reserve. Borrowing is discouraged and inflation is dampened. Once prices have leveled out the Federal Reserve will lower interest rates again and borrowing will increase, this is referred to as the short-term debt cycle (Economic Principals, 2014).

Credit becomes riskier when it is used irresponsibly, to fund the purchasing of products that have limited ability to generate capital. This results in the long-term

debt cycle. As individuals and companies take on increased debt for longer periods of time their ability to pay back their lenders becomes less likely. Fooled by the economic boom fueled by credit, lending continues until borrowers are unable to pay. When enough borrowers are forced to default on their loans widespread panic results, as investors pull out their money from banking institutions and sell securities exacerbating already poor financial conditions. This economic downturn is accentuated as asset prices drop and credit becomes less available. This harsh economic time is the result of a popped bubble and requires deleveraging to return debt to net income ratios to reasonable levels (Economic Principals, 2014) .

History of Financial Bubbles

In theory an unregulated free market should prevent economic bubbles, due to financial markets correcting discrepancies, yet the randomness of people's actions primarily driven by greed or a lack of foresight create an environment in which financial bubbles are created (Koller, 2010).

Bubbles have the ability to appear in all areas of traded goods. Yet some bubbles become larger, resulting in a greater effect on the market following a "pop". These large bubbles and their negative effect on markets have driven economists, governments and investors alike to search for similarities between these event, with the hope of providing more insight into future investments and to curb a bubbles growth in order to mitigate the damage inflicted (Koller, 2010).

The Dutch tulip bubble, which occurred in the early part of the 17th century, is an example of how easily a bubble can be created. Following their introduction to Europe, tulips were in wide spread demand throughout the continent due to their

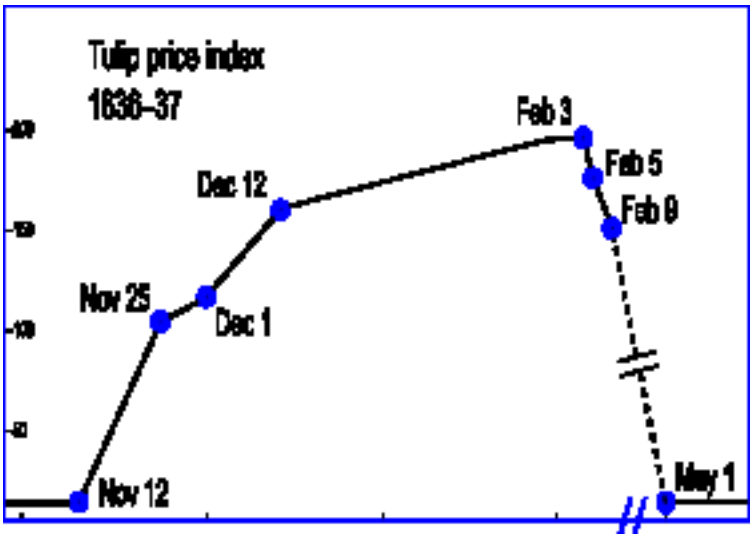
position as a status symbol. This high demand lead to the rapid inflation of tulip prices, although financial data for the time period is relatively scarce, a book published by Johann Beckman in 1797 claims that a basket of goods valued at approximately 2,500 Francs (~$30,000) was traded for a single Viceroy tulip (Thompson, 2007). For a short period of time, the increased demand lead to an economic boom for Dutch traders in the East Indies who saw a rapid increase in returns.

Pushed by anticipation of increasing demand, traders continued to gather tulip bulbs in favor of other goods. This financial bubble came to an abrupt end in February of 1637 when buyers did not appear for a routine bulb auction. Although the reason for the ultimate decline is left to conjecture, the effect that this bubble had is well recorded. Demand for bulbs quickly faded, investors who had speculated incorrectly on the continual increase in value of their investment were left with few options other than selling their goods at less than their purchase price. (Garber, 2001)

The tulip bubble is a classic example of the greater fool theory, the idea that the price of a good is not worth its intrinsic value, but rather the highest price that a person is willing to pay for it. The sharp price adjustment is shown in (Fig 2.1) below. The abandonment of fundamental financial valuation is at the core of many financial bubbles and continues to appear throughout history.

FIGURE 2.1

TULIP PRICE INDEX 1636-1637



Source: Thompson, 2007

The Roaring 20's

Arguably the most well-known black swan event in western economic history occurred in the early 1920's. During this time period a majority of the western world saw a wide spread increase in prosperity and rising standards of living. The introduction of new technologies such as automobiles, the home radio and a growing real estate bubble, spurred newfound wealth. Investors became over-confident as to the direction that the market was heading, resulting in naive investors continuing to pour capital into securities and real estate (Koller, 2010).

For a short period, securities and real estate alike saw massive increases in growth resulting in a period later referred to as the "Roaring '20s". Yet this bubble eventually popped, a result of poor investor foresight, bringing this period of economic prosperity to an abrupt end (Western, 2004).

On October 29, 1929, later known as Black Tuesday, the stock market crashed with a single day loss of over $8 billion in 1929 dollars in the United States alone. (Taylor, 2008) This financial downturn aided in driving the United States and a portion of the western world into an economic depression. It would take over a decade, one World War, and a near complete overhaul of the economic systems for the United States and the rest of the western world to recover (Western, 2004).

Over the past thirty years there have been at least three large bubbles in United States markets, each resulting in massive shareholder losses. These three bubbles, October 19, 1987 more commonly referred to as Black Monday, The Dot Com bubble of 2000 and the more recent housing bubble of 2008 have each disrupted the financial landscape. It is important to note that shareholders are not the only ones affected by a financial bubble. As seen in the recent Housing Bubble of 2008 entire economies can suffer from the effects of overzealous investing, resulting in unemployment and financial distress for even the poorest citizens (Koller, 2010).

The ability to understand and predict what drives financial bubbles has become more important not only to prevent the financial wounds inflicted in the country of origin but also to soften the blow these black swan events have on the global economy. The dangers that economic bubbles present to world economies have grown as financial markets have changed and become more interdependent (Koller, 2010). Current markets are driven by globalization, which has brought an unprecedented increase in prosperity as economies are linked. Trade has become cheaper and more accessible. An unfortunate side effect of these connected markets is the susceptibility to financial shocks. Connected markets do not provide the

economic padding that isolated markets give (Koller, 2010). It is now more important for economists, governments and investors to attempt to recognize and prevent bubbles in order to maintain a stable world economy and continue growth (Koller, 2010).

What Causes Bubbles

At their core, financial bubbles are generated by irrational trading. Galbraith-Kindleberger viewed bubbles from a Keynesian viewpoint.

> The vested interests in euphoria leads men and women, individuals and institutions to believe that all will be better, that they are meant to be richer and to dismiss the notion as intellectually deficient what is in conflict with that conviction. (Galbraith, 1998)

The drive to buy stocks when the economy is healthy not only raises share prices past reasonable values but leads to an increase of other poor financial practices (Galbraith, 1998).

These practices include but are not limited to, banks making risky loans, investors failing to diversify and increasing their position in more volatile securities. When looking at the causes that lead to financial bubbles economists view investor overconfidence as the driving force behind a bubble's inflation (Western, 2004).

Although black swan events are not new to financial markets, the relative interest of what cause them and how they can be prevented has recently emerged as an important subject. The Yale professor Robert Shiller is well known for his research in the field of economic bubbles. Shiller discusses the idea of a herd mentality which results in a "loop" where investors chose to invest in a company based on its current performance without taking into account the intrinsic value,

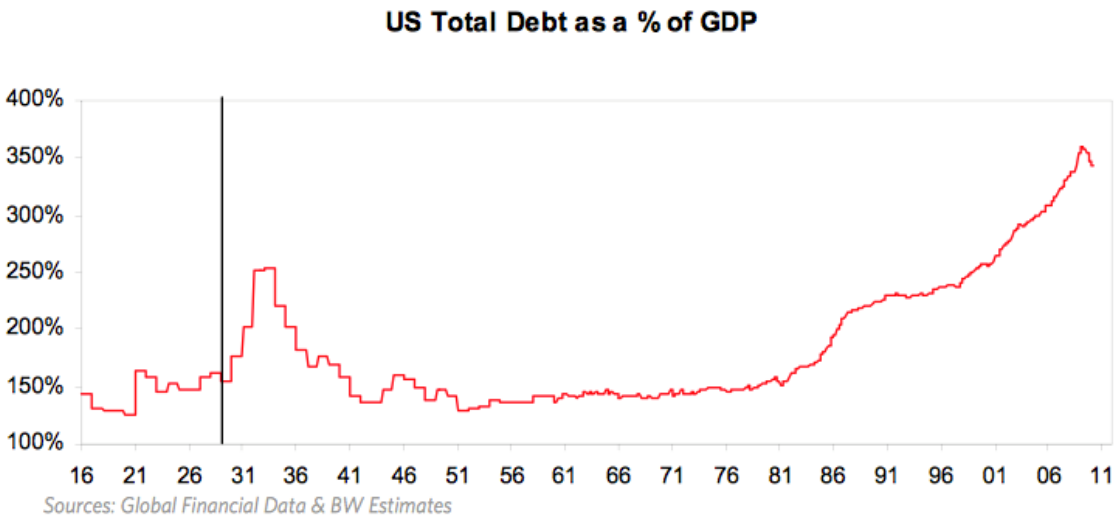
this results in the increase of share prices, drawing more investors in and inflating prices further, finally to unsustainable levels. (Shiller, 2009) The bubble continues to inflate until evidence for overvaluation is so blatant that investors have no choice but to come to their senses, causing a volatile readjustment. Shiller goes on to talk about the animal spirits of investors; (Shiller, 2009) a term coined by the economist John Maynard Keynes, and how their irrational practices brought on by emotion can lead to financial instability (Keynes, 1936).

The Dot-Com Bubble

Financial bubbles differ from one another in a variety of ways making their predictability difficult. Factors, present in a bubble the Dot-Com bubble of the early millennium differ from those of the current housing bubble. Furthermore, the fallout and economic reconstruction phase following a "pop" vary (Koller, 2010). When looking at the Dot-Com crisis and comparing it to the far more damaging 2008 housing bubble differences lie in the issuing and availability of credit during the two time periods. Although credit was widely available during the mid-1990's it pales in comparison to the amount of credit issued during the first decade of the new millennium. By looking at the increase in percentage of United States private debt to GDP (Fig 2.2) we can see that there was an increase of roughly 25-40% over the seven-year time period between 1993 and 2000, which is not uncommon for a "boom." Yet when comparing this to two other financial crises, the bubble of 1929 and 2008, we see that the percent change in debt to GDP is much smaller during the 1990's. This means that the use of credit was not as significant to the 1990's Dot-Com bubble.

FIGURE 2.2

US TOTAL PRIVATE DEBT TO GDP



Source: Economic Principals, 2014

In this paper, the focus will be on the Dot Com bubble, which took place during the late 1990's. As use and issuing of credit has been shown (Fig 1.2) to be as loss of a factor in the inflation of the Dot-Com bubble when compared to the 2008 crisis, other factors common in past bubbles must be analyzed.

During this Dot-Com period, investors saw the opportunity to generate large gains in a new field, the Internet. Many investors correctly believed that the Internet would revolutionize the way that people live. Fueled by this potential world changing technology, investors threw capital into companies, which in hindsight did not possess a sustainable business model (Koller, 2010). Similar to the investment strategy in place during the 1920s, the craze to invest in these companies was so strong that years of fundamental investing knowledge and understanding of historic trends were thrown out in favor of new ways of measuring companies' earning potential. One such valuation tactic outlined by interviewed investors from the

period was looking at the number of clicks, or visits a webpage received in a period of time. This form of valuation muddied the waters for investors making it difficult for them to determine the value of the company, resulting in blind investing in companies that would normally have been seen as penny stocks (Koller, 2010).

The abandonment of traditional valuation was accelerated by the need for institutional and private investors alike to beat their benchmark. Benchmarks are a chosen index investors use to measure their performance as compared to the market, the S&P 500 and Russell 1000 are examples. Prior to the Dot-Com period, the volatility of individual company share prices led institutional investors to have well diversified portfolios in order to diminish massive losses in a market downturn. Similar to the 1920s, investors began to chase short-term gains rather than abiding by long-term growth strategies. Institutional investors of the Dot-Com period stated that they found themselves in a difficult position, should they maintain their current strategy of diversification, and allow for large gains to pass them by, or invest heavily in an emerging sector with seemly endless upside.

Emerging sectors can offer higher expected returns due to their potential for growth. Ultimately a company's growth and size are constrained by the demand for their product. This glass ceiling drives companies to search for new markets to capitalize on, providing future growth and innovation (Koller, 2010).

Yet some companies can grow faster than others, especially when they enjoy strong demand for their product and relatively low expansion costs, in money and time. Dot-Com stocks were fortunate enough to require very little monetary investment, aside from the purchase of new servers and required very little time to

expand. Growth, however, is difficult for any firm to maintain. Eventually as a company matures, and competition emerges. Slower growth and a downturn in investor focus ensue (Koller, 2010). As the Chinese philosopher Laozi said "The flame that burns twice as bright burns half as long". When looking at industry compound annual growth rate (CAGR) from 1987-1997 and 1997-2007, CAGR for the software industry went from 19% to 10%, IT services 14% to 8% and computers and peripherals 14% to 2%. (Apx 6.2) CAGR describes the average rate of an investor's return over a given period (Koller, 2010). Despite this indication that these industries faced a sharp downturn in the near future, investors chose to believe that they could continue to enjoy gains and exit prior to the experiencing the industries losses (Koller, 2010).

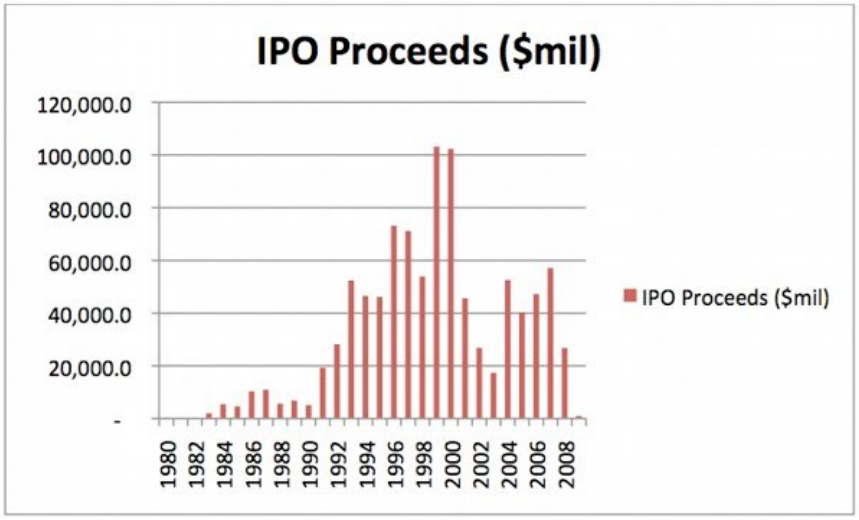
Pushed by the need to beat their benchmarks managers decided to forgo diversification and place increasing amounts of capital into rapidly growing tech stocks. Looking at share prices for these stocks during the 1990s a rapid increase can be noted, as more investors attempted to capitalize on the growing industry. With the positive feedback loop established, tech stocks continued to grow far past their intrinsic value resulting in a bubble (Koller, 2010). This can be seen when looking at the total value of Initial Public Offerings (IPO) of companies at the time of the Internet bubble (Fig 2.3). During the period between 1995 and 2000 over 4,700 companies went public in the United States and Europe, many with billion-dollar-plus market caps (Koller, 2010).

As a company's strength and potential for future growth is based on its competitive advantage the sheer number of firms attempting to break into a single

industry should have set off alarm bells for investors far before the bubble's collapse. Competitive advantage, regardless of the firm's industry, is eventually eroded away, forcing the firm to search for new sources of revenue. This concept was coupled with another economic theory, increasing returns to scale, which states that in rare occurrences, as companies become larger, they can earn higher margins and ROIC (Return on Invested Capital) because their product becomes more valuable with each new customer (Koller, 2010). Again competition should erode away competitive advantage from the firm, however larger firms can simply lower prices for the contested product, baring entry and increasing their consumer base further. Based on interviews conducted with portfolio managers and analysts from the time period we can conclude that some investors and managers began to bet on Internet and technology companies achieving increasing scales of return rather than looking at their potential for steady growth (Koller, 2010).

FIGURE 2.3

IPO PROCEEDS 1980-2008



Source: Thomson Reuters

Source: Political Calculations, 2010

The relaxation of rules put in place to protect investors is often a warning sign that financial markets are getting out of hand; it was present in the 1920s, 1990s and early 2000's. In hindsight, it is clear that investor and manager allocation of their portfolio holdings during these time periods were flawed. One of the earliest warning signs that tech stocks were overvalued was the difference between Internet stock's ROIC, a calculation used to assess a firms efficiency at allocating its capital into profitable investments, compared to the share price value of these popular stocks (Koller, 2010). An example can be seen in the IPO and eventual failure of the company Pets.com, which went public in February of 2000 for $11 per share despite having an ROIC of zero. Less than a year later Pets.com had a share price of $0.19 and was liquidated (Koller, 2010).

During the Dot-Com bubble managers and investors lost sight of what drove ROIC. While this era saw the birth of enduring companies such as Yahoo!, Amazon, Priceline and eBay, for every successful company there were dozens of companies which lacked a sustainable business model in either the short or the long term. This did little to scare away investors who preferred to take out a higher risk rather than miss out on the "next big thing."(Koller, 2010)

Despite the missteps taken by investors during the time period, a bubble cannot become large without the proper economic climate. Evidence points to the passing of the Taxpayer Relief Act of 1997 (TRA97) for continuing to inflate the Dot-Com bubble. The TRA97 lowered the maximum tax rate on capital gains for individual investors from 28% to 20% for assets held for more than 18 months (Dai, 2008). The TRA97 left dividend tax rates unchanged, at the same rate as regular income tax in the United States. This provided an incentive for investors to treat stocks with a high dividend payout and those without differently, resulting in investors moving away from high dividend stocks (Dai, 2008).

The passing of the TRA97 led investors toward the fields of computer and Internet companies, which, as growth companies, did not pay significant dividends and had the potential for large growth over a short period of time. These incentives further inflated a growing bubble, generating increased trade volume and return, luring more investors into the field (Dai, 2008).

Blame can also be passed to executives of certain Internet and tech companies, who fell prey to the same temptations as investors. In an attempt to capitalize on the buzz of Internet stocks, these select companies partook in creative

accounting practices to generate the illusion of increased value (Koller, 2010). This deviated from the guiding principle of conservation of value, which states, anything that doesn't increase cash flow doesn't create value. By generating artificial value investor's confidence was boosted and the company was able to distinguish itself for a short time from its competitors (Koller, 2010).

CONCLUSION

Analyzing historical data has shown that financial bubbles have warning signs, which vary in their blatancy. The common factors of herd behavior and speculation lay the groundwork for poor financial practices and give the illusion of strong market performance. It is important for investors to put aside their emotional attachment to securities, in favor of using conservative practices. By deemphasizing the importance that investors attach to short-term earnings, security volatility will decline, and financial bubble's presence in world markets will fade. However the temptation of increased personal wealth will continue to draw investors into practices with high risk and equally high-expected returns. In the end the decision of how to invest is dependent on the goals of the investor. Black swan events such as the Dot-Com bubble become dangerous when the illusion of safety is present, luring in investors who believe they are making conservative investments. History has shown that investors can obtain incredible gains, in excess to the market, but these winners are few and far between.

The Dot-Com bubble provides insight into the thought process of managers and private investors; it is a rare occurrence where the simple abandonment of fundamental valuation led to an economic downturn. Unlike the bubbles that

occurred during 1929 and 2007, which were fueled largely on credit, leading to an imbalance between debt and net income, the Dot-Com bubbles misstep falls on investor greed. Thus there should, in theory, be clear signs during the time period that certain firms were overvalued (Economic Principals, 2014).

CHAPTER III

THEORY

Fundamental analysis provides insight into securities for investors. By implementing this knowledge, investors can take an educated position rather than investing blindly. In this study three independent variables were selected; return on invested capital, enterprise value to trailing 12 month EBITDA and sales to revenue turnover. These fundamental values used to measure a company's potential for future growth and expected returns.

Fundamental analysis' ability to provide above benchmark returns over a long-term period is a matter of contention amongst investors and economists. Investors believe that fundamental theory can be used as a means to protect themselves from low return securities, while highlighting securities that will tend to outperform financial indexes or other stocks in the industry. To study the strengths of fundamental investment theory an outlying event was selected. History has shown that while the warnings signs for these black swan events exist some investors do not alter their behavior while in a bubble. Further analysis shows that ignoring fundamental valuation will allow these bubbles to grow to levels that can endanger financial markets and private portfolios alike. If fundamental investing is an accurate tool at predicting company's expected return, it should, in theory be

able to detect unreasonable changes in prices. A large proportion of unreasonably priced companies may indicate a bubble in an industry or market.

Return on Invested Capital

Return on invested capital is a widely used fundamental equation, which has been cited as an indication that equity's shares are over or under valued. ROIC provides insight into the firms' efficiency at allocating the capital under its control toward profitable investments. These profitable investments include buildings, machinery, employees and other companies (Koller, 2010).

$$ROIC = (NI - D)/C \quad (3.1)$$

Where:NI is net income,
D is dividends,
C is total capital

Previous work focusing on the Dot-Com bubble (Garber, 2001 Koller, 2010 Western, 2004) has shown a strong relationship between low return on invested capital and low returns. This is a result of two factors, the first being that startup companies are far more likely to fail and thus do not have significant capital to allocate toward their company after operating costs. The second is that companies, which do not allocate capital efficiently, are incapable of growing and are eventually passed by their competitors (Investopedia).

Sales Revenue to Turnover

Sales revenue to turnover is a fundamental equation used to illustrate the summation of price of units sold divided by the number of units sold. This equation varies by industry due to the cost of a single unit on the consumer market and the demand for the product. Industries such as the auto, technology, computer and

pharmaceutical industry all maintain relatively high sales revenue to turnover due to the high cost of their product offsetting the number of products sold on the consumer market (Koller, 2010).

$$S/TN \tag{3.2}$$

S is sales,
TN is number of units sold,

Enterprise Value to 12 Month EBITDA

$$EV/TEBITDA \tag{3.3}$$

Where: EV is enterprise value,
TEBITDA is twelve month trailing earnings before interest, taxes, depreciation and amortization,

This equation derived from two other key fundamental equations, Enterprise Value,

$$EV = EMV + D + I + E + L - C - A - I \tag{3.4}$$

Where:EV is enterprise value,
EMV is market value,
D is debt at market value,
I is minority interest at market value,
E is preferred equity at market value,
L is unfunded personal liabilities other debt-deemed provisions,
C is cash and cash equivalents,
A is "extra assets" not required to run a business,
I is investments in associated companies at market value,

and EBITDA,

$$EBITDA = EBIT + D + A \tag{3.5}$$

Where:EBITDA is earnings before interest, taxes, depreciation and amortization,
EBIT is earnings before interest and taxes,
D is depreciation,
A is amortization,

This metric shows investors how well the company is generating earnings based on the firm's amount of capital. In theory, investors are looking for companies with a low EV to EBITDA value, due to its indication that the company is generating large amounts of earnings over the period compared to its capital under management. Investors analyze a company's growth from period to period using this measure, indicating that the company is managing its capital well and growing. Due to EV to EBITDA differing throughout industries, it is commonly used to evaluate companies within the same industry, however enterprise value to EBITDA can show if certain industries are growing faster compared to others (Koller, 2010).

Inclusion into the Standard & Poor's 500

The inclusion of a company into the S&P 500 is a large step for any company to make. Not only does inclusion into the S&P 500 indicate that investors believe the firm is a stable, long term investment, it is also increases the focus of investors on these companies and their incorporation into investment portfolios due to the fact that many investors use the S&P 500 as a benchmark (Koller, 2010). Many companies in the S&P have been time tested, which brings with it survivor bias, the exclusion of failed companies, when comparing S&P firms to firms not in the index. A dummy variable was implemented to separate companies within the S&P 500 from those outside. Due to the longevity and size of these firms, S&P 500 companies often do not see the rapid growth nor the losses that younger and smaller companies provide. Yet the lack of relative volatility from these stocks offer a far more stable expected ROI (Koller, 2010). As historical data and past works have shown, the S&P 500 has been able to generate consistent real annual returns over

the long run of approximately 8-10% (Davidson, 2012). This is dwarfed by the large returns that younger companies generate, an example of increased risk being required for increased returns (Malkiel, 1973).

Firm Industry

Due to this paper's focus on the Dot-Com bubble, a dummy variable was inserted into the model to differentiate from equities issued by a firm with a primary focus on computer technology or Internet industries and those that were not. The variation between industries in context to the Dot-Com bubble is especially important in this paper due to the bubble occurring in a select few industries, and then rippling out into other sectors (Koller, 2010).

TABLE 3.1

VARIABLE EXPLANATIONS

Variable	**Definition**	**Predicted Sign Quantity**
sp500	S&P 500 membership	+
firmindustry	Firm's industry Technology or Non-Tech	+
sales_rev_turn	Firm's sales/turnover	-
return_on_inv_cap	Firms Return on Invested Capital	+
ev_to_t12m_EBITDA	Enterprise value/ 12 month trailing earnings before interest, taxes, depreciation and amortization	-

CHAPTER IV

DATA AND METHODS

Methods

The purpose of this chapter is to describe the data set that will be used to test the theory outline in the previous chapter. The first section of this chapter will explain the independent variables and dependent variables that will be used in my regression model. Following this, the decision to select an Ordinary Least Squares (OLS) regression will be explained.

Data and its Sources

The data includes information from equities both in the Standard and Poor's 500 (S&P 500) as well as fifteen stocks selected due to their industry. In order for a security to be designated a tech stock, the firm's main industry had to fall into the production of software, hardware or specialize in online services. Data was drawn from the period of 1993-2001 in order to provide a data set that did not begin during the inflation period of the Dot-Com bubble. Data was pulled off a Bloomberg terminal located at Becker Capital Management in Portland, Oregon over a period from January 7th through February 28th 2014. Because of the inconsistency of information available for the date, data was truncated to 2834 observations, compared to approximately 8,000 observations available. The independent

variables selected are three values, which are used to determine a company's strength via fundamental analysis. These variables are, sales revenue to turn over, return on invested capital and enterprise value to trailing twelve-month earnings before interest taxes amortization and depreciation. The dependent variable selected was the percent change in price. Eighteen dummy variables were also incorporated into the model; S&P 500 membership, if the firm was a technology stock and a dummy variable for each six-month period, 1-16.

Independent Variables

Sales revenue turnover also known, as the asset turnover ratio, is a calculation that measures the amount of sales generated per dollar of assets. It is defined in Bloomberg as the total of operating revenues less various adjustments to Gross Sales. This formula provides a measure of the firms' efficiency of asset deployment. Despite the use of asset turnover as a measure of a company's strength it is relatively ineffective at valuing firms from different industries (Investopedia).

ROIC was selected for this model due to it being cited in previous texts on the Dot-Com bubble as a clear indicator that companies share prices were out of sync with the companies' profitability and chance for continual growth. However ROIC falls short in valuing companies due to its inability to diagnose where earnings are coming from. Thus a company's ROIC can fluctuate greatly from one fiscal quarter to another (Koller, 2010).

Enterprise value to trailing twelve month EBITDA, also known as the enterprise multiple, combine's two important measures of companies' valuation, enterprise value, which is an indication of companies theoretical takeover price and

EBITDA. Enterprise value provides a clearer way for analysts to value a firm due to the incorporation of the firms' debt into the equation. Enterprise value is then divided by the firms EBITDA to achieve the enterprise multiple. The enterprise multiple indicates if a firm is undervalued, the lower the valuation the more undervalued the firm is (Investopedia).

Dependent Variable

Percent change in earnings per share was selected as the dependent variable due to its ability to show shareholder earnings growth regardless of the shares' price. It was calculated by collecting price data from sixteen, six-month periods, from 1993-2001. The percent change in price was calculated by subtracting the more recent price from the older price, then dividing the sum by the old price. This dependent variable provides insight into the returns or losses achieved by investors during the individual periods.

Dummy Variables

Three dummy variables were selected for the equation, S&P 500 membership, firm industry and period. The S&P 500 membership dummy variable was input to indicate if the firm was a current member of the S&P 500 during the selected period. A firm industry dummy variable was input to differentiate between stocks issued by a firm whose main industry dealt with computer technology or internet products. Finally a period dummy variable was input to separate the data into 16 individual six-month periods beginning on 6/30/1993 and ending on 12/31/2001. The decision to divide the data into 16 individual periods was made to provide insight into investor return prior, during and after the bubbles.

Ordinary Least Squares (OLS)

To examine the effectiveness of fundamental valuations on the percent change in price for a security, the data was regressed using an ordinary least squares model (OLS). OLS provides a method of estimation for the unknown parameters in a linear regression. Due to the complexity of financial markets and the large number of theoretical independent variables that come with equity prediction, this form of regression was selected. In order to preemptively correct for heteroscedasticity, a robust OLS regression was selected, to analyze the data set. The following equation was estimated using Stata 13. The model measures the percentage change price for shares over the selected period.

$$\begin{aligned} \boldsymbol{PCNGP} = {} & \boldsymbol{\beta sales\_rev\_turn} + \boldsymbol{\beta return\_on\_inv\_capital} \\ & + \boldsymbol{\beta ev\_to\_t12m\_ebitda} + \boldsymbol{\beta sp500} + \boldsymbol{\beta firmindustry} \\ & + \boldsymbol{\beta perioddummies} + \boldsymbol{e} \end{aligned} \tag{4.1}$$

Where:PCNGP is percent change in price,
sales_rev_turn is sales rev to turnover,
return_on_inv_capital is return on invested capital,
ev_to_t12m_ebitda is enterprise value to trailing 12 month EBITDA,
sp500 is a dummy assigned to membership in the Standard & Poor's 500,
firmindustry is a dummy firms in the technology or Internet industry,
perioddummies is a dummy assigned to 6 month periods, 1993-2001,

CHAPTER V

RESULTS & CONCLUSION

Regression Analysis

To analyze the effectiveness of fundamental valuation at predicting percent change in price during the Dot-Com bubble, 5 individual regressions were run with a variety of independent variables. These regressions were then tested for multicollinearity resulting in a number of variables being eliminated. The remaining variables being, sp500, firmindustry, sales_rev_turn, return_on_inv_cap and ev_to_t12m_EBITDA. A six-month rolling time period was used to isolate individual periods during the Dot-Com bubble to provide further insight into the optimum times to invest.

TABLE 5.1

DISCRIPTIVE STATISTICS

Variable	Obs	Mean	Std. Dev.	Min	Max
change	2834	0.0993813	0.4319824	-0.9153578	10.86059
sp500	2834	0.0366972	0.1880506	0	1
firmindustry	2834	0.0790402	0.2698491	0	1
sales_rev_turn	2834	2722.672	4725.813	15.74	69103
retun_on_inv_capital	2834	12.6591	18.15745	-84.8949	623.9627
ev_trail_12m_ebitda	2834	1383.161	2133.173	-76.705	25179

TABLE 5.2

ROBUST REGRESSION RESULTS

Variable	Coef	t-stat
sp500	0.1739299	*2.10
firmindustry	0.0643884	1.04
sales_rev_turn	0.00000373	-1.87
return_on_inv_capital	0.00069	1.89
ev_to_t12m_ebitda	-0.0006685	-1.90
19931231_19940630	-0.0986896	*-5.69
19940630_19941231	-0.0185584	-1.10
19941231_19950630	0.1082282	*7.13
19950630_19951231	0.0424746	*2.47
19951231_19960630	0.019571	1.17
19960630_19961231	0.0264542	1.52
19961231_19970630	0.089394	*5.17
19970630_19971231	0.0266244	1.39
19971231_19980630	0.0285312	1.39
19980630_19981231	-0.0067774	-0.24
19981231_19990630	0.0589094	*2.64
19990630_19991231	-0.0653759	*-2.29
19991231_20000630	-0.0825672	*-3.58
20000630_20001231	0.0699205	*2.34
20001231_20010630	0.3277144	*3.40

Note: *represents significance at 95% level

The following table compares the predicted signs compared to the actual signs produced by the robust OLS regression.

Table 5.3

VARIABLE EXPLANATIONS

Variable	**Definition**	**Predicted Sign**	**Estimated Sign**
Sp500	S&P 500 membership	+	+
firmindustry	Firm's industry Technology or Non-Tech	+	+
sales_rev_turn	Firm's sales/turnover	-	-
return_on_inv_cap	Firm's Return on Invested Capital	+	+
Ev_t12m_EBITDA	Enterprise value/ 12 month trailing earnings before interest, taxes, depreciation and amortization	-	_

Results

The objective of this study was to determine if investors during the time period of the Dot-Com bubble could have known, using the set of variables selected, that they were in a black swan event. If investors understand the conditions, which lead financial markets astray, the can achieve a more realistic view of risk and reward.

This analysis uncovered a few interesting and important findings. First the model's signs agreed with the predicted signs (Table 5.3), an indication that fundamental analysis from the time period held true. ROIC was shown to increase percent change in price by .0006% per 1 percent increase in ROIC. Although this seems like a minute factor when we analyze the range of ROIC from the data (Table 5.1) this small change can add up over time. When taking the mean of ROIC and multiplying it by the coefficient of ROIC the result is approximately 8.7% change in share price making ROIC the second strongest variable for price change. The S&P 500 variable fit past research findings, which have shown that the S&P 500 and other indexes are the safest bet for investors seeking long term growth.

The model resulted in an r^2 value of 0.0652, which is to be expected when predicting financial markets; the model generated a high F-statistic of 15.63, which shows that the null hypothesis, which states that there is no relationship between the dependent and independent variables, can be rejected. These two values indicate that although the model is only able to explain less than 7% of the variation in the dependent variable the model is significant. Although none of the fundamental evaluation methods were statistically significant at the 95% level ($|t| > 1.93$) the dummy variable for S&P 500 membership (sp500) was. This is to be expected for the model and fits with past works, which have stated that in turbulent markets, the safest bet for investors is to place a majority of their portfolio holdings in an index. As stated earlier, these indexes, due to the firms that comprise it, offer investors the ability to maximize returns for a given level of risk over the long run. The positive coefficient for share price associated with S&P membership seen in

table (5.2) supports Malkiels Random Walk Theory. Multicollinearity was also found between the variables sp500 and firmindustry (Apx 6.1), which is to be expected when considering that tech stocks are present in both the S&P 500. The data set selected also contained outlier equities as seen in (Apx 6.3)**.** Upon further inspection of these outliers, a few were companies which created technology products but were not deemed technology companies due to their presence in other industries. When analyzing the residual values, an even spread was noted between stocks which were predicted to underperform and those that were predicted to over perform. Indicating that the model predicted that half of the securities would achieve positive returns and half would achieve negative returns.

Sales Revenue to Turnover

Sales revenue to turnover was found to be statistically significant at the 90% level although its effect on percent change in price was marginal. The negative effect of sales revenue to turnover was predicted and confirmed by the regression. This result follows fundamental investment theory, which states that high sales revenue to turnover is the result of firms producing expensive goods for the consumer market (sales revenue), or not selling a high amount of units (turnover). The negative effect is likely due to three important factors. The first being that firms with high sales revenue to turn over include companies in the technology industry, the following being that other industries with high sales revenue to turnover include expensive products like the automotive industry, which may come under increased pressure following a bubbles end, a result of consumer belt tightening. The final being that firms with high sales revenue to turnover may not be selling enough of

their product on the consumer market. Yet the coefficient value for sales revenue to turnover is marginal at best, thus this form of fundamental analysis could not have provided a clear sign to investors that Dot-Com shares were overvalued.

Return on Invested Capital

Previous works cite return on invested capital as the clearest indication that share prices during the Dot-Com bubble were overvalued. Although ROIC was not statistically significant at the 95% level it was at the 90% level. As predicted firms with a higher ROIC generate a higher percent change in share price. This is due to the importance of ROIC as a measure for investors to analyze a firm's capital allocation into profitable ventures. If a firm has a high ROIC it means that they are placing excess capital into areas that will aid the company in the long run. It is important to note that during the time period of the Dot-Com bubble many of the more famous failure companies did not have time to generate a ROIC, thus Bloomberg was unable to collect data on the firm eliminating them from the data set, Pets.com being an example. It is for this reason that ROIC could in theory present a much stronger indication of a company's overvaluation than the data indicates.

Enterprise Value to Trailing 12 Month EBITDA

As expected, the coefficient for enterprise value to trailing 12 month EBITDA was negative. The reasons behind this are apparent when analyzing the two parts that make up this fundamental valuation equation. Enterprise value, or a measure of the cost of buying out the valued firm, including its debt; divided by, EBITDA, a measure of company's earnings before interest, taxes, depreciation and

amortization. As theorized a firm with a high enterprise value to EBITDA indicates, the firm is highly valued but is earning low earnings. As previously stated the lack of earnings is an indication that the company is no longer growing and does not offer a strong opportunity for increased expected returns.

Firm Industry

As predicted, equities issued by a firm designated to be focused in the technology or Internet sector had a positive coefficient. The positive sign indicates that investing into this sector over the long run did yield a positive return for investors. Although the coefficient was relatively high in comparison to the other variables selected this dummy variable failed to be statistically significant. This could be a result of multicollinearity with sp500, pulling the t-statistic down. It should also be noted that the return of approximately 6.5% is far lower than the S&P return of 17.4% (Table 5.2), indicating that investors were taking out unnecessary risk.

Conclusion

While past studies have looked at bubbles in hindsight, it is far more important to analyze how these events could be detected prior to their burst. By doing this, investors can avoid making mistakes which will negatively affect their portfolios return.

Future research could build upon the findings presented in this analysis in a number of ways. In any statistical test an increase in observations provides greater clarity. Additionally, it would be interesting to see how other fundamental valuation methods such as free cash flow (FCF) predict the dependent variable. Although data

on FCF was not available through Bloomberg for the chosen time frame it may provide insight into later financial periods. This data might also be possible to obtain from other sources.

These results do not uncover a fundamental metric that describes the rapid increase in share prices. The findings of this study indicate that investors should avoid initiating a position or initiate positions against companies if equity prices are grossly higher than those found through fundamental valuation. Given the results its can be concluded that the Dot-Com bubble could have been detected by the dramatic changes in price not correlating with fundamental values. Ultimately the decision making process of investors will vary depending on the investor's goal. Bubbles will continue to appear in financial markets due to the unpredictability of investors, it is in these investors best interest to avoid hyped securities and fully educate themselves on firm's fundamental values prior to entering into a position to avoid higher than expected losses (Koller, 2010).

Works Consulted

Bloomberg Terminal. (2014) Firm Share Price. *Becker Capital Management.* Location: Portland, OR

Economic Principals. (2014). Retrieved from http://bwater.com/Uploads/FileManager/research/how-the-economic-machine-works/ray_dalio__how_the_economic_machine_works__leveragings_and_deleveragings.pdf

Investopedia. (n.d.). Retrieved from http://www.investopedia.com/terms/r/returnoninvestmentcapital.asp

Investopedia. (n.d.). Retrieved from http://www.investopedia.com/terms/e/ev-ebitda.asp

What Cause the Dot Com Bubble to Begin and What Caused it to End?. (2010, 12 15). *Political Calculations*, Retrieved from http://politicalcalculations.blogspot.com/2010/12/what-caused-dot-com-bubble-to-begin-and.html

Buffett, W. (2013). *The Essays of Warren Buffett: Lessons for Corporate America*. (3rd ed.). Durham , NC : Carolina Academic Press.

Buffett, W. (1984). The Super Investors. *Columbia Business School Magazine*, Retrieved from http://www4.gsb.columbia.edu/null?&exclusive=filemgr.download&file_id=522

Dai, Z. (2008). Capital gains taxes and stock return volatility: Evidence from the Taxpayer Relief Act of 1997. *University of Texas at Dallas*, Retrieved from http://w4.stern.nyu.edu/emplibrary/CapitalGainsTaxes.pdf

Damodaran, A. (2007). *Return on Capital (ROC), Return on Invested Capital (ROIC) and Return on Equity (ROE): Measurement and Implications*. (Master's thesis, Stern School of Business)Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1105499

Davidson, L. (2012, 08 20). Why Your Investment Returns Could Be Lower Than You Think. *Forbes*, Retrieved from http://www.forbes.com/sites/financialfinesse/2012/06/20/why-your-investment-returns-could-be-lower-than-you-think/

Ferson, W. (1999). Conditioning Variables and the Cross Section of Stock Returns. *The Journal of Finance*, *LIV*(4), 1325-1359. Retrieved from http://www-bcf.usc.edu/~ferson/papers/ZDOFF.PDF

Galbraith, J. (1998). *The Affluent Society*. (1st ed.). Boston, MA: Houghton Mifflin Harcourt.

Graham, D. (1934). *Security Analysis: Sixth Edition, Foreword by Warren Buffett*. (6th ed.). New York, NY: McGraw-Hill.

Garber, P. (2001). Famous First Bubbles: The Fundamentals of Early Manias. *Chicago Journals*, *109*(5), 1150-1154. Retrieved from http://www.jstor.org/discover/10.1086/322834?uid=3739568&uid=2129&uid=2&uid=70&uid=4&uid=3739256&sid=21103920375303

Keynes, J. (1936). *The General Theory of Employment, Interest, and Money*. CreateSpace Independent Publishing Platform.

Koller, T. (2010). *Valuation: Measuring and Managing the Value of Companies*. (5th ed.). Mississauga, ON: John Wiley & Sons Canada.

Malkiel, B. (1973). *A Random Walk Down Wall Street: The Time-Tested Strategy for Successful Investing* . (11th ed.). New York, NY: W. W. Norton & Company.

Ritholtz, B. (2013, 11 19). The Bubble in Bubbles. *Bloomberg*, Retrieved from http://www.bloomberg.com/news/2013-11-19/the-bubble-in-bubbles.html

Shiller, R. (2009). *Animal Spirits: How Human Psychology Drives the Economy, and Why It Matters for Global Capitalism*. (1st ed.). Princeton, NJ: Princeton University Press.

Stitt, K. (2011, 08 25). *Berkshire Hathaway to Invest $5 billion in Bank of America*. Retrieved from http://investor.bankofamerica.com/phoenix.zhtml?c=71595&p=irol-newsArticle&ID=1600359

Taylor, N. (2008). A Short History of the Great Depression. *New York Times*. Retrieved from http://topics.nytimes.com/top/reference/timestopics/subjects/g/great_depression_1930s/

Thompson, E. (2007). tulip mania: Fact or artifact?. Retrieved from http://www.econ.ucla.edu/thompson/Document97.pdf

Torous, W. (2004). On Predicting Stock Returns with Nearly Integrated Explanatory Variables. *Chicago Journals*, *77*(4), 937-966. Retrieved from http://econpapers.repec.org/article/ucpjnlbus/v_3a77_3ay_3a2004_3ai_3a4_3ap_3a937-966.htm

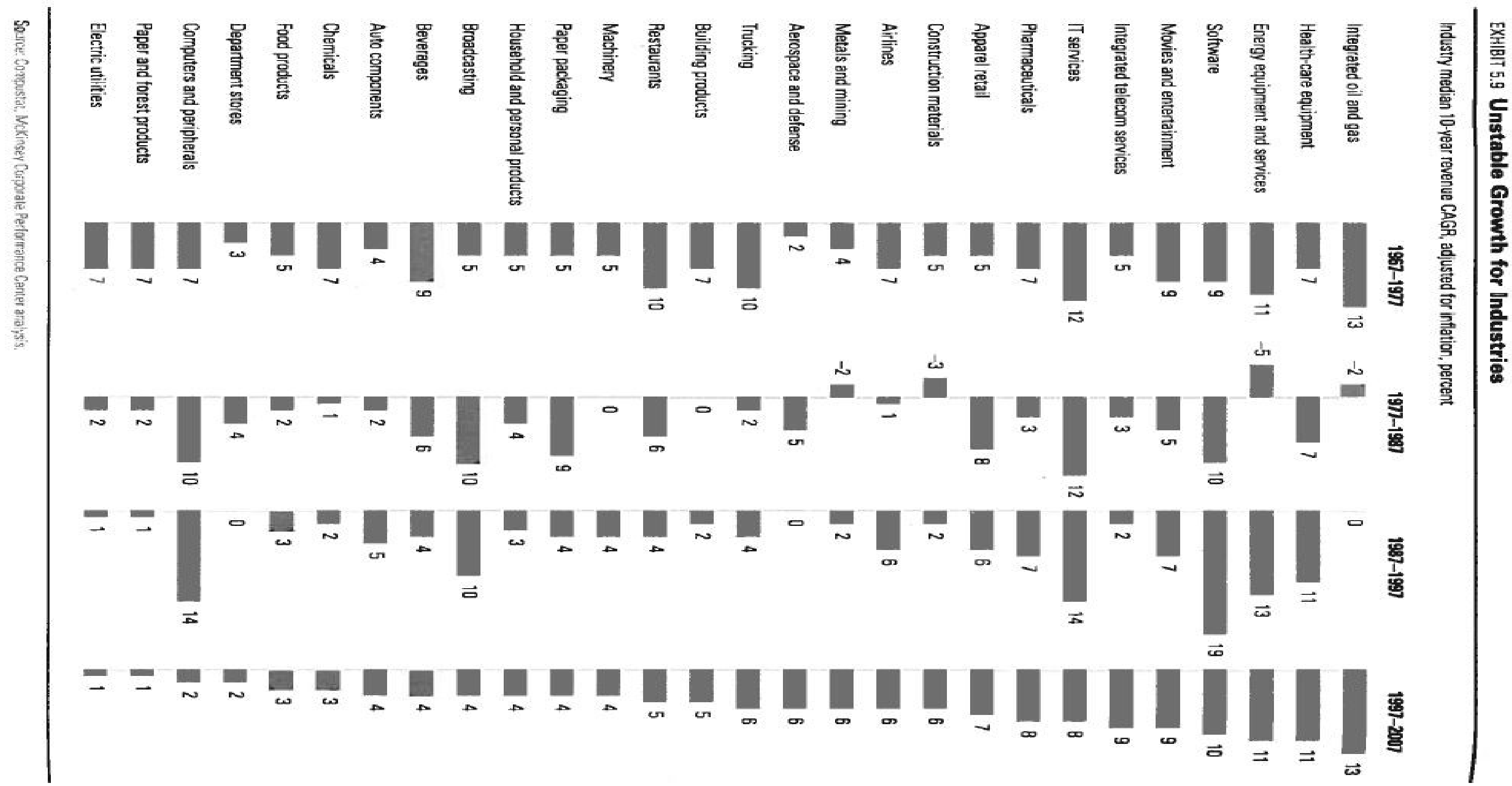
Western, D. (2004). *Booms, Bubbles, and Busts in US Stock Markets*. London, England: Routledge. Retrieved from http://books.google.com/books?id=JCoNimrSR6sC&pg=PA169&lpg=PA169&dq

APPENDIX

6.1

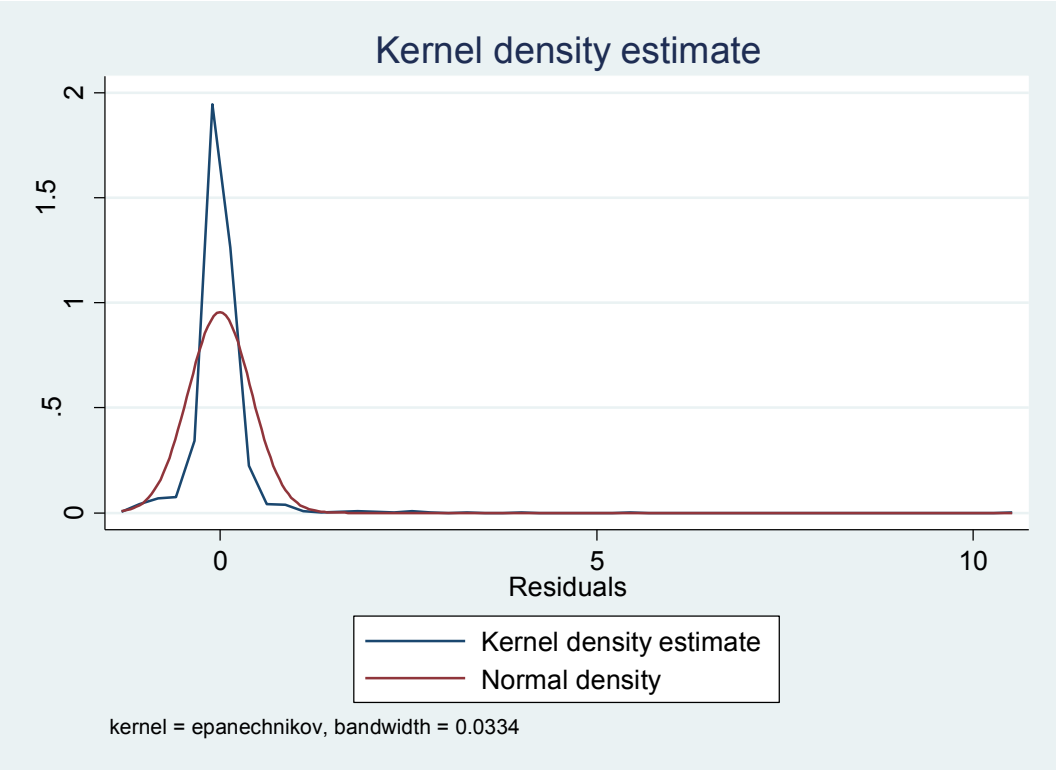
	sp500	firmindustry	sales_rev_turn	return_on_inv_capital	ev_to_t12m_ebitda
sp500	1				
firmindustry	0.6662	1			
sales_rev_turn	-0.036	0.0358	1		
return_on_inv_capital	0.1505	0.1534	-0.0556	1	
ev_to_t12m_ebitda	0.1778	0.1825	-0.0094	0.016	1

6.2



Source: (Koller, 2010 p. 94)

6.3


Kernel density estimate
0
.5
1
1.5
2
0
5
10
Residuals
Kernel density estimate
Normal density
kernel = epanechnikov, bandwidth = 0.0334