THE PENNSYLVANIA STATE UNIVERSITY
SCHREYER HONORS COLLEGE

DEPARTMENT OF FINANCE

EXAMINING THE IMPACTS OF REGULATION ON LONG-TERM EARNINGS GROWTH FORECASTS

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SPRING 2015

A thesis
submitted in partial fulfillment
of the requirements
for a baccalaureate degree
in Finance
with honors in Finance

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ABSTRACT

The following study analyzes the accuracy and bias of sell-side equity analyst's long-term earnings per share growth forecasts. Having a firm understanding of the accuracy of analyst's long-term earnings per share estimates is vital for any professionals using such forecasts when performing financial valuation, estimating cost of capital, and making investment decisions. By comparing long-term earnings per share growth rate estimates to actual earnings per share growth rates observed, both the accuracy and bias of forecasts were evaluated.

Specifically, this study was focused on discovering whether analysts' estimates have improved over time. Even with the implementation of recent regulatory reforms aimed to improve the bias and inaccuracy of analyst forecasts, this study found no significant evidence that such changes have been helpful in improving the accuracy or continued upward bias that exists in long-term earnings per share growth rate estimates. Recognition of this persistent bias and inaccuracy of long-term earnings per share growth rate estimates is vital for all market participants to understand and take into consideration in order to make prudent investment decisions.

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ACKNOWLEDGEMENTS

I would like to thank Dr. Woolridge for being an extremely helpful mentor throughout my undergraduate career at Penn State. The guidance and insight that he provided throughout my tenure within the Nittany Lion Fund and the completion of my thesis project will persist with me as I enter the professional world.

I would also like to thank both the Smeal College of Business and the Schreyer Honors College for preparing me to pursue my professional goals in the next steps of my life. The resources and individuals that have been available for me to leverage at this great institution have helped me find success.

Lastly, I would like to thank my family and fellow Penn State alumni, Bob, Diane, and Sami Salvatora, as well as my girlfriend Eleni Mermigas for all of the support and guidance.

Chapter 1

Introduction

This study focuses on the impacts of recent regulatory changes on the accuracy and bias present in sell-side analyst's long-term earnings per share growth rate forecasts. It is important to understand the accuracy in long-term earnings per share growth forecasts in order to make prudent investment decisions. The basis for many valuation techniques is based upon the present value of future cash flow streams. The growth estimates used in such valuation techniques can have a significant impact on valuation as the majority of the present value is based upon long-term growth projections.

An overoptimistic bias in analyst's long-term earnings per share growth forecasts has been studied and documented in research for quite some time. However, since the early 2000s, many new financial regulations have been implemented, which focused on improving the validity of published research, the accuracy of earnings reporting, and crisis management. These regulatory changes were aimed at eradicating the conflicts of interest present in sell-side research and improving the bias of such estimates. Thus, it is important to once again examine the accuracy of such long-term growth estimates in order to best understand the impact of such regulatory changes related to the current level of accuracy and legitimacy of estimates.

Chapter 2

Literature Review

While analyst estimates continue to be such important factors used in financial valuation, the accuracy of such forecasts continues to be weak and significantly upward biased. There is a long history of studies that evaluate how well analysts forecast near-term earnings per share estimates and long-term earnings per share growth rates. Most of these studies have evaluated the accuracy of analysts' short-term earnings forecasts (for the current quarter or year), showing analyst forecasts to be overly optimistic. For example, Barefield and Comiskey (1975), DeBondt and Thaler (1990), Butler and Lang (1991), Abarbanell (1991), Brown (1997), Chopra (1998), and O'Brien (1998) have all shown evidence of a persistent and significantly over-optimistic bias that is present in analysts forecast errors. While this fact is widely researched and known, changes and a decrease in the significant upward bias has yet to be documented or seen in research.

Cragg and Malkiel (1968) studied analysts' long-term earnings per share growth rate forecasts made in 1962 and 1963 by five brokerage houses for 185 firms. They concluded that analysts' long-term earnings growth forecasts are no more accurate than naive forecasts based on past earnings growth. Harris (1999) evaluated the accuracy of analysts' long-term earnings forecasts over the 1982-1997 time period, using a sample of 7,002 firm-year observations. Harris concluded the following: (1) the accuracy of analysts' long-term earnings per share forecasts is very low; (2) a superior long-run method to forecast long-term earnings per share growth is to assume that all companies will have an earnings growth rate equal to historic GDP growth; and (3) analysts' long-term earnings per share forecasts are significantly upwardly biased. In his study, Harris saw forecasted earnings growth exceed actual earnings growth by

7% per annum. Subsequent studies by DeChow et al. (2000), and Chan et al. (2003) also conclude that analysts' long-term earnings per share growth rate forecasts are overly optimistic and upwardly biased. Chan et al. (2003) evaluated the accuracy of analysts' long-term earnings per share growth rate forecasts from 1982-1992. They reported a median growth forecast of 14.5%, versus a median realized five-year growth rate of about 9%. They also found that forecasts beyond two years are inaccurate. They concluded the following: "Over long horizons… there is little forecastability in earnings, and analysts' estimates tend to be overly optimistic."

More recent studies have shown that the optimistic bias tends to be larger for longer-term forecasts and smaller for forecasts made nearer to the earnings announcement date. Richardson et al. (2004) reports that the upward bias in earnings growth rates declines in the quarters leading up to the earnings announcement date. They refer to this result as the "Walkdown Trend" to beatable analyst forecasts. They hypothesize that the Walkdown Trend might be driven by the earnings guidance, as analysts give optimistic forecasts at the start of a fiscal year and revise their estimates downwards until the firm can beat the forecasts on the earnings announcement date.

As one would be led to believe, many scholars have attempted to explain why such a bias would exist. Chan, Karceski, Lakonishok (2007), Hong and Kubik (2003), Carleton (1998) and Lin and McNichols (1997) all studied the impacts of investment banking conflicts of interest on analyst biases. Prior to regulatory reforms, implemented over the years of 2000 – 2003, analysts at sell-side financial institutions had large incentives to inflate earnings estimates and stock recommendations. Analysts who had inflated forecasts and recommendations were awarded with increased compensation on an individual level, and they would be potentially helping other

facets of the business win potential underwriting and advisory business in the future due to strong relationships with management teams resulting from the favorable projections (Carleton 1998; Chan et al. 2003; Kadan 2009).

Even with such incentives to inflate estimates in the past, the average forecast error has been so high; however, it has been shown that some analysts are better at forecasting than others (Chan et al. 2008). Even though some analysts may produce more accurate forecasts than others, the average estimates continue to be unrealistically high. Arnott (2004) suggests that long-term earnings-per share growth rates must be below the level of sustainable growth in economic productivity. Through his research, Arnott shows this long-term economic productivity level to be close to 7%, as evidenced by the U.S. GDP growth rates over time. Additionally, Ibbottson and Cheng (2003) showed that economic productivity and earnings per share growth has a positive correlation.

It is widely understood that GDP growth has been essentially ignored by analysts as an upside limit for long-term earnings per share estimates, the accuracy of long-term earnings per share growth forecasts are extremely low, and some analysts forecast more accurately than others. As a result of such issues present in sell-side equity research, regulatory entities have implemented several major reforms over the past decade in efforts to mitigate such issues present in the capital markets and regain confidence from investors. It has been shown that countries with legal frameworks and regulatory environments that are focused on protecting the average investor's rights tend to result in higher analyst coverage and forecast accuracy in estimates (Hope et al. 2003; Kwag 2006). Specifically, Higgins (1998) studied the impact on accounting disclosures on the accuracy of analyst estimates. Higgins found that higher accounting disclosures do in fact lead to higher forecast accuracy and lower optimism in biases. With the

implementation of Regulation Fair Disclosure, Regulation Analyst Certification, the Global Analyst Research Settlement, and the 2002 Sarbanes Oxley Act, such accuracy and forecast biases should have improved due to the stringent disclosure and accounting regulations.

In fact, Barber (2005) and Kadan (2009) explored the bias in analyst recommendation following the Global Analyst Research Settlement. Both Barber and Kadan found a significant decrease in the over-optimistic bias present in recommendations; however, this was mainly attributable to the change of rating systems put into practice by most Wall Street firms. As a result of the regulatory changes, many firms changed their rating systems from the traditional 5-tier rating system typically including "Strong Buy," "Buy," "Hold," "Sell," and "Strong Sell" ratings, to a less informative 3-tier rating system typically including "Buy," "Hold," and "Sell" ratings. Additionally, scholars have been especially interested in studying analyst estimates in the post-Regulation Fair Disclosure environment. This is driven mainly by the need to disclose any and all discussions between company management teams and institutional investors or analysts. As such DeJong and Apilado (2009), Hope et al. (2008) and Hovakimian (2010) have all shown significant evidence to support the idea that the motives to inflate analyst's long-term earnings growth forecasts due to conflicts of interest have been essentially eradicated due to the result of recently implemented regulatory reforms.

However, it must be noted that these studies focus solely on analyst's shorter-term earnings forecasts. Hovakimian (2010) focused on the longest tenured forecasts, allowing some forecasts in his study of up to 24 months prior to the actual earnings announcement. While his study has shown strong evidence that Regulation Fair Disclosure and the Global Analyst Research Settlement has significantly reduced the bias of analyst earnings per share forecasts, this particular study included estimates that were as recent as one month prior to the actual

earnings announcement. Richardson et al. (2004) showed evidence that earnings accuracy improves and biases significantly decrease the closer and closer the time gets to the actual earnings announcement. The "Walkdown Trend" has been proven time and time again and makes logical sense due to the increased amount of information that continues to be discovered as time progresses. Thus, it is plausible that Hovakimian's study was skewed due to the Walkdown Trend.

Furthermore, long-term earnings per share growth estimates (3-5 year forecasts) are more important to financial valuation than shorter-term estimates. As a result, it is surprising that long-term analyst earnings estimates have been researched much less frequently than shorter-term estimates a result. Using these estimates as inputs within discounted cash flow models, as predicted future growth rates, will provide an overstated cost of equity. On this issue, a study by Easton and Sommers (2007) found that optimism in analysts' growth rate forecasts leads to an upward bias in estimates of the cost of equity of almost 3.0 percentage points. There have been very few studies regarding the accuracy of analysts' long-term EPS growth rate forecasts; however, most all of the studies have concluded that analysts' long-term earnings growth rate forecasts should be used with caution as inputs for valuation and cost of capital purposes.

Discounted cash flow models, cost of capital evaluations, and even trading multiples are based upon these estimates that are used for predicting long-term earnings growth. It is unfortunate however, that it is widely understood that as the forecast period increases, estimates tend to become less accurate. Long-term earnings growth forecasts have been shown to be the least accurate and most difficult to predict by Harris (1999), Chan et al. (2003), and Lacina et al. (2011).

Lacina, Lee, and Xu (2011) evaluated the accuracy of analysts' long-term earnings growth rate forecasts over the 1983-2003 time period, showing that analysts' long-term earnings growth rate forecasts are no more accurate at forecasting future earnings than naïve random walk forecasts of future earnings. Employing data over a twenty-year period, they demonstrate that using the most recent year's EPS figure to forecast EPS in the next 3-5 years can be proved to be just as accurate as using the EPS estimates from analysts' long-term earnings growth rate forecasts. Additionally, they found that a random walk model with a GDP growth rate drift incorporated into the forecasts performs better than the pure random walk model. However, it is most important to note that both models perform as well as analysts in forecasting long-term EPS, once again discovering an optimistic bias in analysts' long-term EPS forecasts.

Understanding the overly optimistic nature and lack of accuracy present in analysts' long-term earnings per share growth forecasts, recent regulatory reforms have been focused on improving the accuracy and the biases found in such analyst estimates. As a result, it is surprising that the difficulties and accuracy of long-term growth estimates has been yet to be sufficiently researched following such changes. This study aims to examine the effectiveness of recent regulatory reforms in improving the bias and lack of accuracy seen in long-term analyst earnings per share growth forecasts.

Chapter 3

Regulatory History

In an effort to restore public confidence in the U.S. financial markets, regulatory entities implemented several transformational reforms. Insider trading scandals and favoritism by sell-side financial institutions served as the main catalysts in passing regulation. From 2000-2003, Regulation Fair Disclosure, the Global Analyst Research Settlement, the Sarbanes Oxley Act, and Regulation Analyst Certification would forever change the landscape for research analysts.

The first major regulatory reform, Regulation Fair Disclosure (Reg FD), came into effect on October 23, 2000. Reg FD aimed to solve the issues related to the selective disclosure of private information disclosed by publicly traded companies. Prior to Reg FD, nonpublic information could be discussed freely with equity analysts and other market professionals. This would greatly increase the incentive for analysts to maintain close and friendly relationships with management teams in order to gain access to the newest important information. As a result, the incentive for inflated optimistic reports on covered companies was extremely high. Reg FD addressed this issue by requiring publicly traded companies to disclose all new insider information to the broader market when conversing with any potential investors or sell-side research analysts.

While the legitimacy and accuracy of analyst forecast accuracy was of specific concern by regulators, just as important was the validity of accounting information reported by publicly traded firms and issuers. Encouraged by a few headline accounting scandals in the late 1990s and early 2000s, the Sarbanes-Oxley Act of 2002 (SOX) was signed into place on July 30, 2002.

Through the creation of the Public Company Accounting Oversight Board, SOX primarily aimed to combat the prevalence of corporate accounting and financial fraud. In addition, corporate responsibility and auditing mandates were put into practice. While SOX was important in instilling confidence in the capital markets for investors, it also would later help enforce the separation of investment banking and research activities by providing whistleblower protection to research analysts in a position to criticize Wall Street investment firms' investment banking clients as illegitimate.

Following SOX, the SEC enacted Regulation Analyst Certification (Reg AC) on April 14, 2003. Reg AC was aimed to increase investor confidence in sell-side research reports and improve the integrity related to such publications. Reg AC made it a legal requirement for research analysts to include certifications within research reports that the information presented accurately reflects their personal views. Additionally, it became a requirement to disclose whether or not the research analyst's compensation was based upon specific recommendations or estimates included within reports. As a result, investors would be better educated and better understand the potential agent problems that might be present in such research reports.

Lastly, the Global Analyst Settlement (GARS) was reached on April 28, 2003 between ten of the largest financial institutions and the Securities Exchange Commission (SEC) New York Stock Exchange (NYSE), NASD Incorporate (NASD), the New York Attorney General (NYAG), and other state regulators. GARS was driven by the conflict of interest that exists between investment banking revenues and analyst research departments at large financial institutions. Much like Reg FD, regulators wanted to be sure that the incentive to boost forecasts and recommendations in efforts to win future business for the banks would be greatly diminished. The settlement included fines for inflated research reports intended to increase the

interest in underwritten Initial Public Offerings (IPOs) by the same institution, as well as for receiving under-the-table payments for research by covered firms. Included in the settlement were $875 million of fines, structural reform guidelines, enhanced disclosures measures, and a framework for sharing independent research with banking clients. The most drastic reform was the separation of the investment banking and research departments at financial institutions. Not only would the departments now be disconnected, but also any communication between investment bankers and research analysts would be blocked by what is now commonly known as the "Chinese Wall." Furthermore, structural changes to research analysts' compensation were made. No longer would compensation include any direct or indirect investment banking revenues, rather compensation would be based on the quality and accuracy of such reports issued by analysts; essentially eliminating the agency problem that existed and which was highly documented by Carleton (1998).

Chapter 4

Research Methodology

In order to observe the overly optimistic nature and accuracy of analyst's projected long-term EPS growth rates, we compare the actual EPS growth rates to the respective analyst consensus estimates. By using the I/B/E/S database, both consensus estimates and actual EPS data can be pulled and analyzed.

There are several databases that are well renowned and track Wall Street security analyst's EPS estimates. Ultimately, the decision to use I/B/E/S came down to the vast variety and amount of Wall Street estimates that is included within the database. Not only are high-profile firms such as Goldman Sachs, Bank of America Merrill Lynch, JPMorgan, and Citigroup analysts included, but also I/B/E/S also includes many other smaller elite shops that publish analyst estimates. Since partnering alongside Thomson Reuters in 2000, I/B/E/S has become the industry standard for consensus estimates with a "70:1 advantage of media citations, [being] relied upon by over 70% of the top US and European asset managers" (Thomson Reuters). Currently I/B/E/S and Thomson include "consensus company earnings forecasts and stock recommendations on 22,000 companies, from 850 contributors around the globe, across over 100 developed and emerging markets" (Thomson Reuters).

Analysts Long-Term EPS Growth Rate Forecasts

Using the I/B/E/S Summary History tab for analysts' long-term growth rate estimates, many important summary statistics can be found. For instance, the number of analysts covering a firm, mean short-term earnings per share growth estimates, as well as mean long-term EPS growth estimates. It is important to note, I/B/E/S considers long-term earnings per share growth

estimates to have a forecast period somewhere between 3-5 years. As a result, it is presumed that the projected period for these EPS growth estimates is to be 4 years on average.

In order to compare the actual long-term EPS growth rates to the respective analyst forecasts, we needed to obtain two different sets of data from the I/B/E/S database. First, we obtained actual quarterly earnings data for the base year and annualized each firm's earnings for the trailing-twelve months period [EPS(t)]. Next, by using the Summary History tab, the respective firm's mean 3-5 year EPS growth estimates (g) can be found. Below is an example of how the data would be cleaned for a hypothetical company in the fourth quarter of 2009.

2009

Q1	Q2	Q3	Q4	Annual EPS (t)	I/B/E/S Projected Mean EPS Growth
.20	**.10**	**.30**	**.40**	**1.00**	**15%**

Next, the annualized base year EPS [EPS(t)] must be projected out to see the hypothetical actual EPS four years into the future. An example can be found below.

Projected EPS (t+4) = [EPS (t) * (1+ *g*)^(4)]

In this example, the company's projected EPS is:

Projected EPS (t+4) = [1.00 * (1.15)^(4)] = $1.75.

It is important to note that any companies with negative Annual EPS(t) were not used in this process. It is not possible to project out compounding earnings growth for a company with a negative base-year EPS, and thus these were disregarded. Additionally, firms that did not survive or report earnings each and every quarter throughout the projection period observed were

not included in our data. With this survivorship bias, the data has the potential so show a slight positive upside skewness.

This hypothetical actual annual EPS in the future is then compared to the actual growth achieved by the respective firm in the coming 4-year period (in this example 2009-2013). The actual EPS growth rate (*G*) is then calculated; using the same annualized techniques that are used to calculate the base year. An example can be found below.

2013

Q1	Q2	Q3	Q4	Annual EPS(t+4)	Actual EPS Growth "*G*" (2009-2013)
.35	.20	.35	.50	1.40	8.78%

***G* = [[EPS(t+4) / EPS(t)] ^ (1/4)] - 1**

***G* = [1.40 / 1]^(1/4)] - 1 = 8.78%**

In this instance, the analysts forecasted EPs growth of 15% over the projection period, whereas, the actual growth experienced was 8.78%. This method was repeated each quarter from Q1 1984 through Q2 2010, inclusive of all firms in the I/B/E/S database.

Forecast Error

In order to view positive or negative biases in the mean long-term EPS growth forecasts, we observed each firm's forecast error by taking the difference in the mean EPS estimate and the Actual EPS Growth as a percentage of the absolute value of the Actual EPS Growth. An example can be seen below.

Forecast Error = (*g*-*G*) / |*G*|

Forecast Error = (15% - 8.78%) / |8.78%| = 70.84%

A positive forecast error indicates and upward bias, while a negative forecast error indicates downward bias.

By implementing both the absolute differences in actual long-term EPS growth and the mean long-term EPS growth forecasts with the forecast error, the level of inaccuracy and the severity of biases in forecasts can be quickly observed. Unlike previous studies, we specifically are focused on investigating improvements in the accuracy and changes in the level of biases in long-run EPS growth forecasts following the implementation of various regulatory reforms aimed to mitigate foul analyst behavior and to restore public confidence in the equity markets. The most important and relevant regulatory reforms that continue to have a strong effect on analyst forecasts began to be implemented in October of 2000 and were completed in February of 2003. Thus we will compare the data from Q1 1984 through Q3 2000 to the data ranging from Q1 2003 through Q2 2010.

GDP Growth Calculation

In order to calculate the long-term and one-year growth rate in GDP, we used data from the Federal Reserve Economic Data website (FRED). The FRED database compiles over 247,000 US and international time series economic data. By pulling quarterly US GDP levels from FRED, we were able to compute both four-year and one-year GDP growth rates. Both one-year and four-year GDP growth rates were observed due to the nature of this study. As 4-year analyst earnings per share growth forecasts were observed in this study, it makes sense to compare with the 4-year average GDP growth rate to see whether or not long-term growth rates have improved over time in relation to the upper constraint of total economic productivity as discussed by Arnott (2004). Additionally, one-year GDP was also observed due to the ability to

more easily identify large economic shocks over shorter time periods. As prior research has showed that analysts tend to overreact to new information, these shorter-term shocks were observed to examine whether analysts have improved in their overreactions over time. An example for each calculation can be found below.

GDP 4-year Growth Rate = [GDP(t) – GDP(t-16)] / GDP(t-16)

t = current quarter GDP level

t-16 = 16 quarters prior (4 years) GDP Level

GDP 1-year Growth Rate = [GDP(t) – GDP(t-4)] / GDP(t-4)

t = current quarter GDP level

t-4 = 4 quarters prior (1 year) GDP Level

Chapter 5

Data Analysis

Data Commentary

Throughout the collection of actual earnings per share data from the I/B/E/S database, several different classifications of data needed to be removed before analysis. I excluded any tickers that were comprised solely of numbers due to the fact that the majority of these countries report earnings on a semi-annual basis. As this study analyzes earnings per share data on a quarterly basis, such semi-annual actual data was irrelevant to this exploration.

By comparing the actual compounding growth rates over a four-year period to the analyst projections for compounding growth, the sample size was decreased. This study excluded any firms with base year earnings data less than or equal to zero due to the fact that it simply does not make sense to project out a negative number at a positive growth rate. Most analyst estimates would account for some "normalized" earnings data; however, this study focuses solely on long-term growth rates calculated from quarterly data. Additionally, any final year earnings per share data that was less than zero were excluded. With compounding growth rates, any positive base period data with a growth rate greater than -100% will be bound by a zero lower bound. As a result, this data was eliminated in order to most accurately represent the actual growth rates experienced throughout 1984-2010. Lastly, any firms that did not survive the four-year projection period or any firm that failed to report quarterly earnings data for any of the quarters in the projection period were not included in the study. It is important to note that by excluding

such data, the study will have a slight upward bias to the actual earnings per share growth by implementing a survivorship bias and eliminating extreme negative growth rates.

As a result, this study included an average of 1415 companies per quarter with 5 analysts covering each. It is easy to see in the stacked line graph below the trends of the number of firms included as well as the average number of analyst estimates. The highest number of firms included in the study was seen in Q1 2008 at 2272, while the low was in Q1 1984 at 824. This can be attributed to the increasing number of firms covered by I/B/E/S as well as the increase in earnings quality leading up to the 2008 recession. Contrary to the gradual increase in the number of firms examined, a drastic decrease in the average number of analysts covering each firm was experienced. While the highest average of 6.50 analysts were covering each name in Q3 1985, the low fell to an average of 2.57 analysts in Q1 2009. This can be attributed to the number of smaller firms included in the study or may be a result of regulatory changes. Summary statistics for the study can be seen below.

Statistic Measured	Average
Mean Actual Long-Term EPS Growth Rate	9.45%
Mean Forecasted Long-Term EPS Growth Rate	15.05%
Mean Forecast Error	117.55%
Median of the Mean Forecast Error	114.94%
Avg. Median Forecasted Long-term EPS Growth Rate	14.86%
Median Forecast Error	104.47%
Number of Companies	1414.90
Average Number of Analyst Estimates	5.32
4 Yr GDP Growth	12.36%
1 Yr GDP Growth	3.20%

Table 1 – Summary Statistics

Analysis of Forecast Errors

After compiling the necessary datasets and analyzing the accompanying forecast errors, there were a few areas of specific interest to be found. Out of the 106 total quarterly forecast periods analyzed, 88 forecasts errors were positive, while only 18 were negative.

A positive forecast error represents an upward bias in analyst expectations. On the other hand, a negative forecast error represents a downward bias in a situation where the actual results exceeded expectations. The 18 negative periods of forecast errors fell within three specific time periods; Q3 1995- Q1 1997, Q1 2006 – Q4 2007, and Q2 2013 – Q4 2013. These time periods lasted an average of 6 quarters or 1.5 years and were all preceded by a recession or significant decline in the growth of the U.S. GDP. On average, it was found that the forecast errors became negative 4 periods after a significant low point in U.S. GDP growth. It can be seen that analyst expectations fall while earnings growth tends to accelerate in a period of economic recovery. On the next page, it is easy to see the points of significant shocks to GDP (red circles) and the areas with negative forecast errors (represented by green squares).

Additionally, throughout this study, considerable interest was in the effectiveness of the regulatory implementations of GARS, Reg-FD, SOX, and Rec-AC. While it is difficult to specifically target each regulatory change on its own, due to the close timing of regulatory change and the compounding factors relating to each additional regulatory change, a broader time period of pre and post-regulatory implementation was needed in order to best analyze the effects of such changes. Thus, while comparing the forecast error in the period from Q1 1984 until Q3 1996 (Pre Reg-FD implementation in estimates and actuals) to the forecast error in the periods from Q2 2003 through Q2 2010, no improvement in forecast errors was recorded. In the period prior to new regulation, the median forecast error observed at 108.95% while post

regulatory implementation average forecast error was observed at 206.37%. Unusually low earnings and the shock felt throughout the economy as a result of the 2008 financial crisis could have skewed this data significantly; however, there is still no evidence to show that recent regulatory implementations have been effective in improving the forecast error and upward biases in sell-side analyst's long-term earning per share growth forecasts.

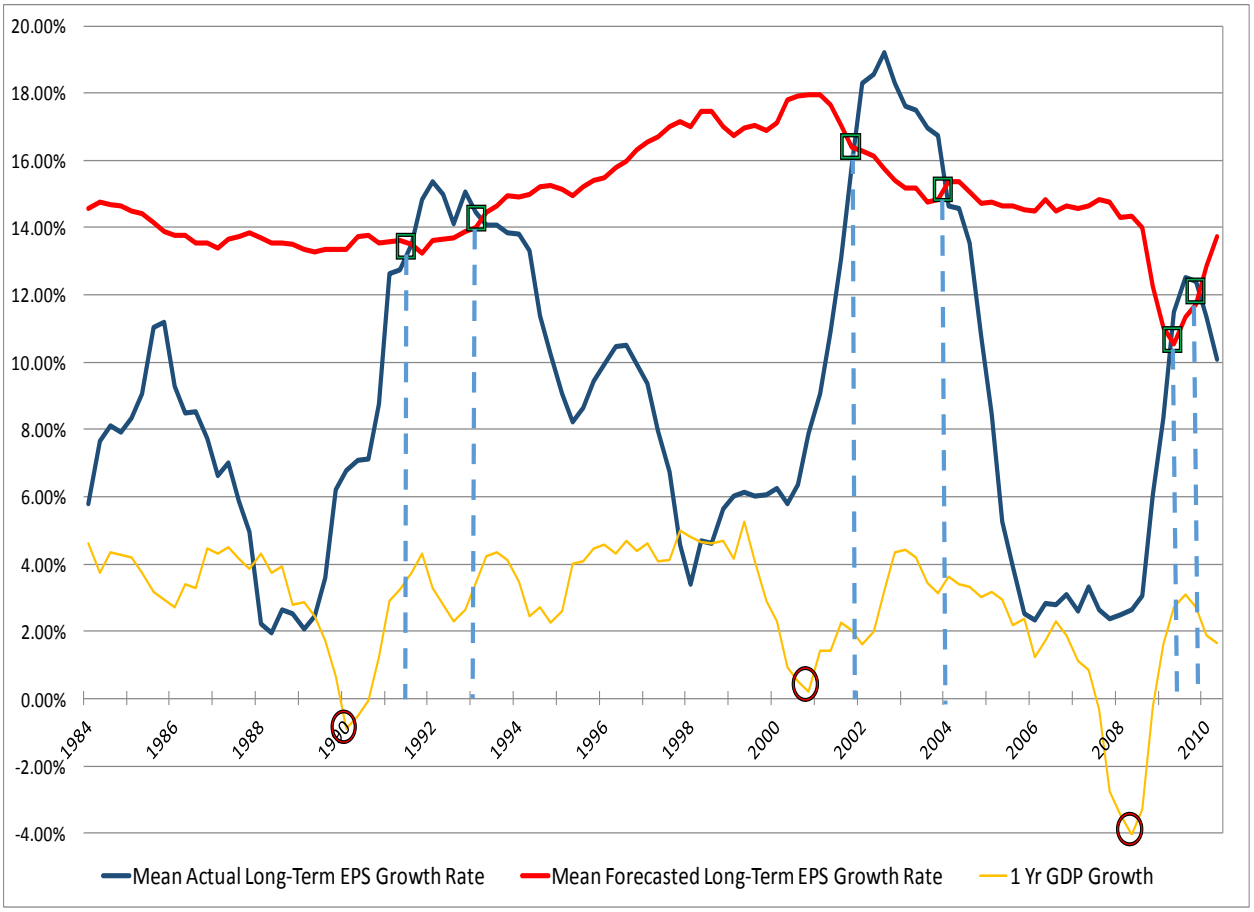

Figure 1 – Forecasts vs. Actual vs. GDP

Analysis of Analyst Actual Forecasts

Over the period from 1984 through Q2 2010, the average of analyst's long-term earnings growth forecast observed was 15.05% while the average 4-year GDP growth rate was 12.36%. It

is quite surprising to see the number so high, especially with what has been found (Arnott 2004; Brown 2003) showing evidence that over the long-run earnings cannot exceed the overall productivity of the country, as calculated by long-term GDP growth.

When comparing the average analyst forecasts prior to and following regulatory changes, there is no significant difference observed (14.09% prior vs. 14.04% post). As a result, there is no evidence to suggest that analyst's long-term growth forecasts were made more realistic and less biased as a result of recent regulatory implementations.

Analysis of Analyst Coverage

Over the period observed throughout this study, the significant decline in the number of analysts covering each position on average was quite astounding. It is quite plausible to explain this decline by the increase in the number of firms covered and included in the I/B/E/S database; however, the number of analysts covering each position could also have been affected by the increase of regulation. By examining the correlation between the number of firms observed each period and the average number of analysts covering each firm before and after the implementation of new regulation, one can see evidence suggesting that such increased measures for analysts were helpful in decreasing the number of analysts covering each firm. Prior to regulatory improvements, I recorded a -0.88 correlation; however, after regulatory implementation, this number dropped significantly to -0.66. The average correlation between these two variables throughout the study was -0.87. A graph showing the large decrease in the average number estimates per covered firm (orange) and the large increase in the number of firms included (blue) can be seen on the next page.

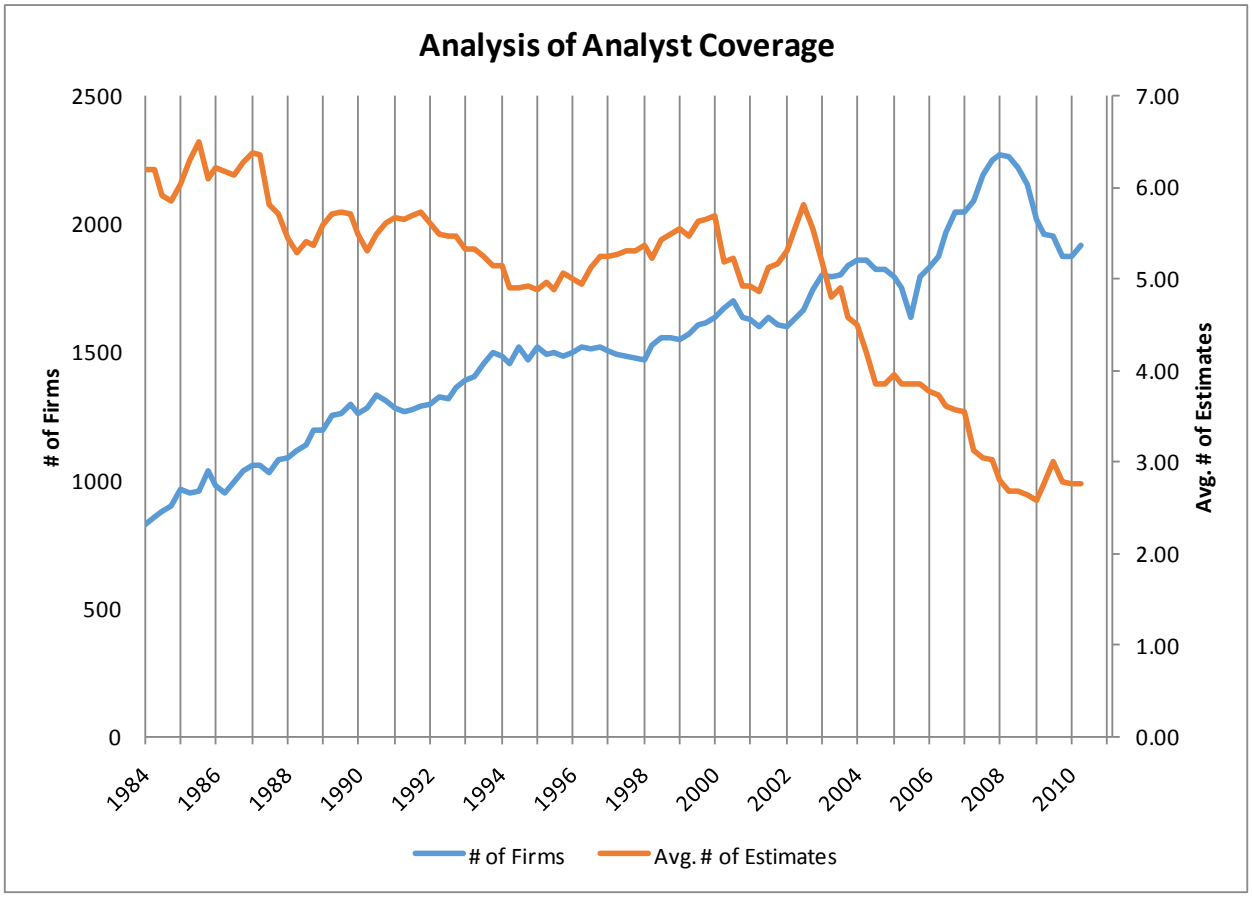

Figure 2 – Analysis of Analyst Coverage

While recent regulatory improvement may not have assisted in decreasing the upward bias or accuracy of long-term analyst forecasts, it may have assisted in decreasing the number of analysts present in forecasting long-term growth rate forecasts due to the difficulty and the high expenses associated with such work. Sidhu et. Al (2011) argues that analysts practicing after the most recent financial crisis were among those whom published the most accurate forecasts prior to the financial crisis, and perhaps regulatory implementations also assisted in slimming down the number of sell-side analysts publishing research.

Long-term Earnings Growth Estimates vs. Long-term GDP Growth Rate

By observing the comparison over analyst's long-term earnings growth rates versus the actual 4-year GDP growth rate over the period examined in this study, it is again extremely surprising to see the continued upward bias present in estimates. In only 34 of the 108 periods observed did the US GDP 4-year growth rate exceed that of the consensus analyst growth rates on average. It is worth noting that the actual GDP growth was below that of the average consensus long-term analyst earnings growth estimates each and every period after 2Q 2001. Thus, we can be led to assume that analyst's long-term growth estimates have not improved in the upward bias present compared to that against the longer term economic productivity, as measured by GDP. The comparison of 4-year actual GDP growth to the consensus analyst forecasts can be seen in the graph below. The GDP growth rate is shown in green, and the average consensus earnings growth estimates are shown in red.

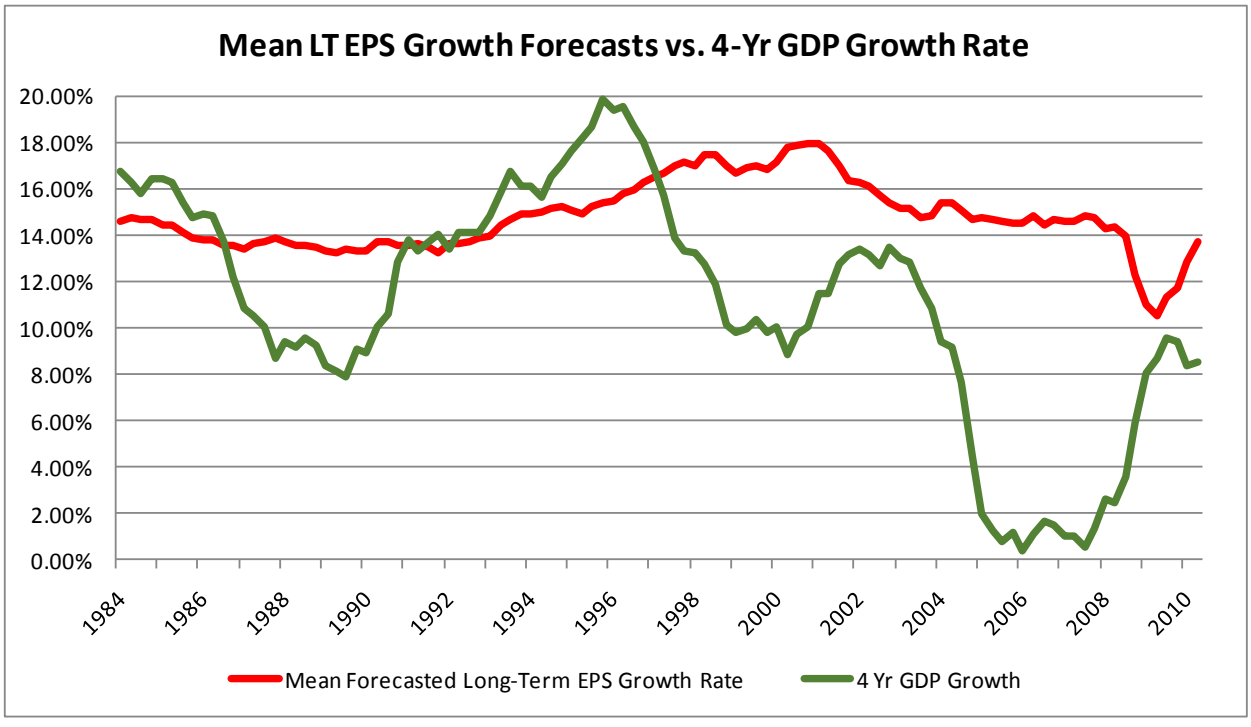

Figure 3 – Long-term Forecasts vs. Long-term GDP

Chapter 6

Conclusion

Throughout this study, the accuracy and biases present in analyst's earning per share growth estimates following the implementation of recent regulatory changes was observed. Contrary to previous research completed on post-regulatory estimate accuracy, this study focused on long-term earnings per share growth rate estimates. Over the 108 quarters observed, no significant improvement in the accuracy and bias present in long-term analyst forecasts was found. While previous research cited improvements in analyst estimates following the implementation of regulatory changes, no such improvement was seen related to long-term growth estimates. Long-term growth estimates are among the most time consuming and difficult forecasts to predict, and even with the implementation of regulatory changes, such research may simply be beyond most analysts' ability to accurately predict.

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EDUCATION

The Pennsylvania State University — **University Park, PA**
The Schreyer Honors College, Smeal College of Business — *Class of 2015*
Bachelor of Science, Finance, Economics Minor

PROFESSIONAL EXPERIENCE

Bank of America Merrill Lynch — **Charlotte, NC**
Investment Banking Summer Analyst, Leveraged Finance — *Jun 2014 – Aug 2014*

- Helped lead Compressco Partners' $825MM acquisition of Compressor Systems, Inc., underwriting a $400MM Revolver, $350MM of Senior Notes, and a $175MM GP Term Loan
- Created pitch books, sales force memos, and management presentations with extensive research and valuation
- Performed comprehensive credit analysis by creating three statement models, comparables, and capitalization tables

Nittany Lion Fund, LLC — **University Park, PA**
Lead Fund Manager, Industrials Sector — *Jan 2014 – Dec 2014*

- Outperformed the S&P 500 Industrials benchmark by 11.13% relatively, returning 19.58% in the 2014 fiscal year
- Promoted to manage the $600,000 Industrials sector in efforts to improve performance in the 2014 fiscal year
- Researched and conducted valuation using the DCF model, comparable and ratio analyses, and other techniques

Fund Manager, Financials Sector — *Dec 2012 – Dec 2013*

- Outperformed the S&P 500 Financials benchmark by 1.50% relatively, returning 35.20% in the 2013 fiscal year

Federated Investors, Inc. — **Pittsburgh, PA**
Investment Management Analyst, Growth & Income Equity — *May 2013 – Aug 2013*

- Maintained coverage of the funds' positions across several sectors while assisting analysts with equity research
- Improved group's sell side report by analyzing metrics and highlighting the funds' relative strengths to competitors
- Designed Bloomberg enabled spreadsheets to provide portfolio managers an easier way to update valuation models

Lindy Paving Company — **Pittsburgh, PA**
Finance and Accounting Intern — *May 2012 – Jul 2012*

- Worked directly for controller managing $100MM of annual sales volume while prospecting acquisitions
- Created a new ledger to record the company's day-to-day sales on a weekly basis to consolidate accounting practices
- Conducted campaign to collect tax rebates from short term employees, resulting in over $500,000 of tax credit

Incline Equity Partners, LP — **Pittsburgh, PA**
Externship — *Aug 2012, Aug 2013*

- Participated in board meeting regarding merger and acquisition of $20MM deal
- Reviewed 90-day plan with newly appointed CEO of recently acquired company during quarterly board meeting

LEADERSHIP

Beta Theta Pi Fraternity — **University Park, PA**
Social Relations and Public Relations Chairman — *Sept 2011 – Dec 2014*

- Established networks and relationships with other Greek and philanthropic associations on campus
- Composed monthly newsletters to alumni to provide information on current affairs at the house
- Managed multiple community involvement events such as the Rob DelFranco Dinner, raising over $2,500 for cancer

Sapphire Leadership Program — **University Park, PA**
Member — *Aug 2011 – Present*

- Recruited to apply and accepted to an 80-member cohort, representing top 8% of Smeal's incoming class
- Completed professional and leadership development, fundraising, and community service events every semester

National Multiple Sclerosis Society — **Pittsburgh, PA**
MS-150 Charity Ride Fundraiser, P.J. Dick Team — *Jun 2012 – Present*

- Raised over $3,000 individually and helped the P.J. Dick team raise over $23,000 in 2013

OTHER ACHIEVEMENTS

- Ryan Newman Honors Scholarship, Don Abbey Scholarship, Beta Gamma Sigma, North Allegheny HS Top Scholar
- IM Tennis Champ, IM Racquetball Champ, IM Squash Champ, Leaders in IBanking, Bloomberg Certified