Are Analysts Still Optimistic?

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Abstract

We document a systematic decrease in analyst forecast optimism over the past three decades. The average analyst forecasts went from strongly optimistic in the pre-2000 period to slightly pessimistic in the post-2000 period. The dynamics underlying the trend in the average analyst forecast optimism are different in these two periods. Before 2000, the overall decline in optimism was largely driven by a decrease in negative forecast errors and the growing phenomenon of firms just meeting or beating analyst estimates by small amounts. After 2000, however, the trend of firms just meeting or beating estimates begins to reverse, with considerable increases in large positive errors. We perform several robustness tests to show that the decline in optimism is not driven by specific subsamples. It is also not part of a broader trend of declining optimism in macroeconomic forecasts.
1 Introduction

One of the most well-documented empirical regularities about analyst earnings forecasts is that they tend to be overly-optimistic (De Bondt and Thaler, 1990; Easterwood and Nutt, 1999). In his survey paper, Bradshaw (2011) puts it rather forcefully: “of all the regularities regarding sell-side analysts, the understanding that analysts’ forecasts are routinely optimistic is the most pervasive”. It has been argued that overly optimistic analyst forecasts and the importance for the firms to meet the consensus earnings forecasts can lead to myopic behaviors on the part of managers (e.g., Jensen, 2005). This concern is also shared by political and financial practitioners. For example, Hillary Clinton used the term “quarterly capitalism” to describe the myopic behavior (such as earnings manipulation) of managers who are excessively focused on meeting quarterly consensus earnings estimates. An important component of this concern is placed on analyst optimism, which often creates unrealistic expectations and an adverse business condition. In this paper, we show that sell-side financial analysts have become less optimistic over time. On average, analysts have been pessimistic since the year 2000, a period in which both analysts and public companies faced increasing regulatory scrutiny.

We first show that the landscape of analyst forecasts has changed drastically over the past three decades. Compared to pre-2000 era, the entire distribution of analyst forecast errors has shifted to the right, suggesting that analysts have become less optimistic in all dimensions. These results hold true using both raw and scaled analyst forecast errors. We then plot average analyst forecast errors over time. We find that analyst forecast errors were consistently negative before 2000. However, average analyst forecast errors have been consistently positive since the early-2000s. The only exception is the 2008 financial crisis, where average analyst forecast errors turned negative but quickly recovered afterwards. These results show that, although analysts were overly optimistic before 2000s, they overcorrected and became excessively pessimistic starting in the early-2000s.

The changes in analyst forecast errors are attributable to two different episodes: pre-2000 and post-2000. In the pre-2000 episode, changes in analyst forecast errors were driven by a shift of highly negative forecast errors to the “just meet or beat” level. The proportion of large positive forecast errors was stable over this period. In the post-2000 episode, the gradual increases in analyst forecast errors were driven by the decreases of firms just meeting or beating analyst expectations. Both
the fraction of negative forecast errors and the fraction of large positive forecast errors increased over the post-2000 period, but the increase in the fraction of large positive forecast errors outpaced the increase in the fraction of negative forecast errors. These findings suggest that the underlying drivers of the decline in analyst forecast optimism during the pre-2000 period are different from the underlying drivers that maintained the level of overall pessimism after 2000. Next, we discuss changes in the regulatory landscape that occurred during the early 2000s, which drastically changed the structure of the sell-side analyst market, and discuss the relationships between these changes and the more pervasive pessimistic view of sell-side analysts today.

In response to the crash of technology stocks around 2000, and corporate accounting scandals in 2001-2002, regulators enacted several rules and regulations to restore investor confidence. Most of these rules aim to address bias in analysts’ earnings forecasts and concerns relating to their conflicts of interest, as analysts’ overly optimistic forecasts were criticized as a key factor leading to the run up of security prices and corporate scandals in the late 1990s. Three major regulations were enacted into play in the early 2000s—Regulation Fair Disclosure (Reg FD), the Sarbanes–Oxley Act (SOX), and the Global Analyst Research Settlement (GARS).

The Securities and Exchange Commission (SEC) issued Reg FD in October 2000 in order to prohibit public companies from disclosing previously nonpublic, material information to certain parties (such as analysts) unless the information is simultaneously distributed to the public first. SOX was passed by the United States Congress in July 2002, and it aimed to restore market confidence by improving the accuracy and reliability of corporate disclosure. The rules and amendments in SOX limit interactions and information flow between analysts and investment banking, and forbid analysts from earning compensation based on investment banking transactions. GARS was announced on December 20, 2002 and enforced in April 2003. As part of this settlement, the New York Stock Exchange (NYSE) and ten of the United States’ largest investment banks addressed issues of conflicts of interest of financial analysts in producing earnings forecasts and stock recommendations. In particular, GARS limits relationships between research departments and investment banking departments and imposes stringent disclosure requirements on conflicts of interest.

We further test whether the results are driven by changes in analyst career concerns. Hong and Kubik (2003) find that prior to 2000, more optimistic analysts tend to move up to higher status brokerage houses, providing them incentives to offer overly optimistic forecasts. It is possible
that analysts are no longer rewarded for providing optimistic forecasts and thus one of their key incentives for optimistic forecasts no longer exists. Consistent with the increases of regulations of financial analysts, we find that, in the post-2000 period, there is no evidence that high forecast optimism is associated with rewards in terms of moving up to a higher-status brokerage house.

Additionally, we show that these changes in analyst forecast errors are systematic, and not driven by a small subset of firms. We show that the changes are present for firms in different size groups, firms with different levels of analyst coverage, and firms of different cohorts. The results of declining analyst forecast optimism are also robust under different benchmarks, suggesting that the findings cannot be explained by forecast walk-downs.

Finally, we evaluate alternative explanations of the findings. First, we examine whether the results are driven by changes in analyst forecast biases. The sell-side analyst literature has documented various biases in analyst forecasts (e.g., De Bondt and Thaler, 1990; Lys and Sohn, 1990; Abarbanell, 1991; Mendenhall, 1991; Abarbanell and Bernard, 1992). We tease out the common analyst biases documented in the literature and show that the residuals still exhibit a decline in optimism. We also investigate trends in forecasts of macroeconomic data from the Society of Professional Forecasters, to examine whether the decreased levels of optimism reflect broader trends in economic forecast more generally (Bordalo et al., 2018). We find that professional forecasts of macroeconomic variables do not follow any systematic pattern, and we do not observe any decline in optimism in macroeconomic forecasts of the sort observed in analyst forecasts.

This paper contributes to several strands of literature. Firstly, we contribute to the literature examining patterns of analyst forecasts by documenting that analyst forecast optimism has declined steadily since the year 2000.

Secondly, we contribute to the literature examining the incentives of sell-side analysts, which has generally focused on analyst forecast optimism in the context of analysts’ relationships with their investment banks and the firms that such analysts cover (McNichols and O’Brien, 1997; Lin and McNichols, 1998; O’Brien et al., 2005).

Thirdly, we contribute to the literature that examines the various regulatory changes occurring around the 2000-2003 time period. We show that this period marked a fundamental shift in the nature and optimism of analyst forecasts, complementing findings in Koh et al. (2008), who note that the market rewards to meeting or beating analyst forecasts diminished after the passage of
the Sarbanes-Oxley Act.

The rest of the paper is structured as follows. Section 2 introduces the data used in this paper. Section 3 documents the main findings. Section 5 explores possible mechanism underlying the main findings. Section 4 tests the robustness of the results. Finally, Section 6 concludes the paper.

2 Data

2.1 Analyst Forecast Data

The I/B/E/S data sample consists of all firm-quarters. The data is from the I/B/E/S Unadjusted summary file within the 90 days prior to the earnings announcement dates. We use the unadjusted summary file because the I/B/E/S Adjusted file reflects earnings estimates that are retroactively adjusted for stock splits (Payne and Thomas, 2003; So, 2013), which tend to follow strong firm performance and result in look-ahead bias.

The raw analyst forecast errors are calculated as the different between the actual earnings per share and the mean of the analyst forecasts:

\[ FE_{i,t} = E_{i,t} - F_{t-1}^{i} \]  

(1)

The scaled analyst forecast errors are scaled by total assets per share at the time of the forecasts:

\[ Scaled \ FE_{i,t} = \frac{E_{i,t} - F_{t-1}^{i}}{TA_{i,t}} \]  

(2)

In later tests, we examine whether analyst career concerns have changed over the course of our sample period, and whether this might have any influence on the properties of analyst forecasts. Hong and Kubik (2003) observe that more accurate analysts, as well as more optimistic analysts (controlling for accuracy) are more likely to experience a favorable career outcome in terms of moving up to a higher-status brokerage house. We examine whether these patterns have persisted or changed during the more recent time period, as a potential explanation of our observed patterns in analyst forecast optimism decline.
While Hong and Kubik (2003) measure brokerage house hierarchy via Institutional Investor Top 10 rankings and use the I/B/E/S broker translation file to identify individual analyst affiliation during their sample period. However, I/B/E/S no longer provides the analyst translation file, so we employ an alternate measure of brokerage house ranking used by Hong and Kubik (2003). Specifically, we rank each brokerage each year based on the number of analysts employed by the brokerage during the year (measured as the number of unique analysts who provided an EPS forecast while affiliated with that brokerage during the year). We consider the top 10 brokerage houses, in terms of number of analysts, to be higher-status brokerage houses, and we consider an analyst to have "moved up" to a higher-status brokerage house in year \( t \) if the analyst provided was working for a lower-status brokerage at the beginning of year \( t \) and at some point during that year, provided an earnings forecast while with the new brokerage house. An analyst "moving down" is defined in an analogous fashion. Note that the analyst must have actually changed brokers in order to be classified as moving up or moving down—an analyst’s is not considered to have moved up or down simply because his or her brokerage moved into or fell out of the top 10 list.

2.2 Financial Statement Data

Information on firm financial and accounting data is from Compustat. Stock returns are from CRSP. We discuss specific measurements of firm level and market level variables later in each relevant test. Unless otherwise specified, we remove financial firms (SIC 6000–6999) from the main tests. To make the results comparable across different test samples, we use firms listed on major U.S. stock exchanges. We require firm-year observations to have the necessary control variables for the main test sample. All continuous variables are winsorized at the 1st and 99th percentiles to mitigate the influence of outliers.

2.3 Macroeconomic Forecasts

We also in later tests examine professional forecasting activity in settings outside of corporate earnings, to examine their influence (if any) on analysts’ corporate earnings forecasts. In particular, we examine professional forecasts of macroeconomic and financial variables that reflect broader economic activity. Similar to Bordalo et al. (2018), we collect macroeconomic and financial data from the Survey of Professional Forecasters (SPF), which is a quarterly survey of professional
forecasters administered by the Federal Reserve Bank of Philadelphia.

During the second month of each calendar quarter, the SPF collects anonymized forecasts from approximately 40 professional forecasters on a variety of macroeconomic and financial variables, such as gross domestic product, housing starts, industrial production, Treasury bill rates, among others. Forecasters are asked to provide forecasts for the current quarter and for each of the subsequent four quarters. The SPF provides both individual forecasts and consensus summaries (mean and median), as well as forecast errors when actual values of each variable are released. We describe the individual variables used as the are introduced in our later macroeconomic forecasting tests in Section 4.2.

3 Trend & Mechanism

In this section, we document the decline in analyst optimism and discuss the underlying mechanism behind the changes in forecast errors.

3.1 Pre- and Post-2000

Panel A of Figure 1 shows the distribution of earnings forecast errors for pre- and post-2000. Panel B shows the distribution of earnings forecast errors scaled by asset per share for pre- and post-2000. For each figure, the blue bars represent the distribution pre-2000 while the white bars represent the distribution post-2000.

Panel A shows that the distributions of unscaled earnings forecast errors shift to the right from pre-2000 to post-2000. For every single interval smaller than or equal to zero, the blue bars are higher than the white bars. The blue bars are lower than the white bars for all intervals larger than zero. There is a clear discontinuity in the scaled analyst forecast error distribution but not in the unscaled analyst forecast error distribution, which is highlighted by the high bar in Panel B.

3.2 Analyst Forecast Errors by Year

Although Figure 1 shows clearly that the distribution of analyst forecast errors have shifted to the right from pre-2000 to post-2000, we cannot conclude from the figure that the analyst forecast pessimism has been increasing over time. To provide additional detail of the variations in the
analyst forecast errors, we partition the full sample into quarterly subsamples. We continue our analysis with the exploration of the average analyst forecast errors over time. Figure 2 presents the average of the analyst forecast errors from the first quarter of 1984 to the last quarter of 2017.

Descriptive statistics in Table 2 show that the average analyst forecast errors are increasing in the past three decades.

[Table 2 about here]

[Figure 2 about here]

Then, we investigate whether the decreasing optimism of analyst forecasts is driven by a few industries. Table 3 shows the difference in the average analyst forecast errors in each Fama-French 30 industry from 1984 to 2017. Panel A of Table 3 reports the results based on the raw analyst forecast errors and Panel B of Table 3 reports the results based on the scaled analyst forecast errors. Panel A shows that the average analyst forecast errors in 2017 are larger than those in 1984 for all of the 30 Fama-French industries. Panel B gives a similar message using the scaled analyst forecast errors. The analysts are less optimistic in all but three of the 30 Fama-French industries based on the scaled measures.

[Table 3 about here]

### 3.3 Composition of Analyst Forecast Errors over Time

So far, we have shown that the analysts gradually become less optimistic over the years. In this section, we decompose the analyst forecast errors. In particular, we categorize each analyst forecast error into one of three groups: negative forecast errors, just meets or beats, and large positive forecast errors (> 2 cents). The just meet or beat category is of interests because of the prevalent belief that these just met or beat firms are especially vulnerable to earnings manipulations (e.g. Bartov et al., 2002; Bhojraj et al., 2009). Examining the distribution of the analyst forecast errors can potentially help us understand the underlying changes of the average trend.

Figure 3 presents the results of the decomposition. The red, blue, and green lines represent the fractions of forecasts that falls under the negative forecast error group, the just meet or beat group, and the large positive forecast error (>2 cents) group, respectively. Before 2000, there is a
apparent increase in the share of the just meet or beat group, which starts from about 10 percent in 1984 to about 40 percent in 2000. That is, in the year 2000, the reported earnings for about 40 percent of the firms just met or beat the analyst consensus by less than 2 cents. The increase in the share of just meet or beat group is coupled with a marked decline of the negative forecast error group, which starts from about 60 percent in 1984 to less than 30 percent in 2000. The green line, or the share of the large positive forecast error (>2 cents) group, remains fairly stable during this period of time. In other words, the distribution of analyst forecast errors shifted from the negative forecast error group to the just meet or beat group. This phenomenon suggests that the prevalent of earnings management may contribute the the pre-2000 change in the landscape of the earnings forecast errors.

However, the blue line, or the share of the just meet or beat group, starts to decline since 2000. The share declines from its peak of about 40 percent in 2000 to less than 20 percent in 2017. During the post-2000 period, both the red and the green lines witnessed increases in their shares. The share of large positive analyst forecast error (>2 cent) group grows faster than that of the negative forecast error group. The timing of the decline of the share of the just meet or beat group coincides with reforms of the early 2000s. We explore the relationship between the changes in analyst earnings forecast and the regulatory reforms during the 2000s next.

3.4 Regulation

To investigate factors that drive the time trend of analyst forecast bias, we explore the roles played by related regulations. Several studies have examined the impacts of regulations that are relevant to sell-side analysts (e.g., Barniv et al., 2009; Chen and Chen, 2009; Hovakimian and Saenayasiri, 2010). A general conclusion is that these regulations have collectively reduce the influence of analysts’ personal conflicts of interest on their analyses. However, the impact of each individual rule is unclear (Bradshaw, 2009). In this section, we examine three major regulations and their relations with the analysts’ forecast behavior.

In response to the corporate scandals and crash of technology stocks around 2000, regulators enacted several rules and regulations to restore investor confidence. Most of the rules thus aim
to address bias in analysts’ earnings forecasts and concerns of their conflicts of interest because analysts’ overly optimistic forecasts were criticized as a key factor leading to the run up of security prices and corporate scandals in the late 1990s. Analysts have conflicts of interest when they are incentivized to provide favorable research reports to maintain investment banking business for their brokerage firms. Three major ones came into play in the early 2000s -- the Regulation Fair Disclosure (Reg FD), the Sarbanes–Oxley Act (SOX), and the Global Analyst Research Settlement (GARS).

The Securities and Exchange Commission (SEC) issued Reg FD in October 2000 to prohibit public companies from disclosing previously nonpublic, material information to certain parties unless the information is distributed to the public first or simultaneously. Reg FD aims to level the playing field so that market participants have equal access to material information released by management. In prohibiting companies from selectively disclosing private information to analysts, Reg FD may eliminate analysts’ incentives to inflate their earnings forecasts for insider information and thus reduce their forecast bias. There is mixed empirical evidence regarding the possible effects of Reg FD on analysts’ earnings forecast bias. Herrmann et al. (2008) find that the reform reduced analysts’ incentives to provide optimistically biased forecasts. Some studies suggest that forecast accuracy decreases and forecast dispersion increases following Reg FD (e.g., Bailey et al., 2003; Agrawal et al., 2006).

SOX was passed by the Congress in July 2002 and it aims to restore market confidence by improving the accuracy and reliability of corporate disclosure. Among other things, Section 501 of SOX gave the NYSE and the National Association of Securities Dealers (NASD) one year to adopt rules that addressed analyst conflicts of interest. NASD Rule 2711 (Research Analysts and Research Reports) and the amended NYSE Rule 472 (Communications with the Public) were issued in late 2002. These rules and the amendments limit interactions and information flow between analysts and the investment banking and forbid analysts from earning compensation based on investment banking transactions.

GARS was announced on December 20, 2002 and enforced in April 2003. It was an enforcement agreement between the SEC, Financial Industry Regulatory Authority (NASD), New York Stock Exchange (NYSE), and ten of the United States’s largest investment firms to address issues of conflicts of interest of financial analysts in producing earnings forecasts and stock recommendations.
In particular, GARS limits relationships between research departments and investment banking departments and impose stringent disclosure requirements. Several studies find supporting evidence that the Global Settlement reduce optimistic bias in analyst forecasts and recommendations (e.g., Barber et al., 2006; Kadan et al., 2008).

3.5 Analyst Career Concerns

In this section, we examine whether analyst career concerns and their relationship with forecast optimism, as documented in Hong and Kubik (2003), extend into our sample period. Hong and Kubik (2003) find that during 1983 through 2000, more optimistic analysts tend to move up to higher-status brokerage houses. However, since the end of that period, Regulation FD (2000) has limited analysts’ contact and communication with management at the firms they cover, while the 2002 Global Research Analyst Settlement—and related stock exchange rule changes such as NASD Rule 2711 and NYSE Rule 472—has limited analysts’ communications with the investment banking divisions of their brokerages, and required brokerages to publicly disseminate the distribution of their stock recommendations. Barber et al. (2006) and Kadan et al. (2009) find that after the Global Settlement, analysts’ "buy" recommendations become less frequent and more informative (in terms of market reaction), while "hold" and "sell" recommendations display the opposite pattern.

To the extent that these regulations have made individual analysts’ career advancement less dependent on their forecast optimism, this may be a partial explanation of the decreased analyst earnings forecast optimism that we document in this study. We begin our analysis in 2001, immediately after the end of Hong and Kubik (2003) sample period. As described earlier, we rank brokerage houses based on the number of analysts employed by the firm, and track the forecast optimism of analysts that move up and down the brokerage hierarchy. Consistent with Hong and Kubik (2003), we measure an analyst’s forecast optimism relative to the overall level of optimism of his or her peers, to account for any consensus optimism bias. For each year (t) and firm (i) that an analyst (j) follows, we obtain the most recent forecast of firm-year i,t earnings per share made during the first six months of year t. We designate that particular forecast as "optimistic" (and assign it a dummy value of 1) if it is higher than the mean of the last EPS forecast made by all other analysts (using the same six-month window) for firm-year i,t. We then take a three-year average of this "optimism" dummy over year t and the previous two years. Each analyst is then
Table 9 presents the results when we logistically regress dummy variables representing moves up to a higher-status brokerage house (or moves down to a lower-status brokerage house) on relative optimism. Similar to Hong and Kubik (2003), we control for three-year relative forecast accuracy (measured in a similar fashion), the three-year mean level of analyst coverage of firm i, the three-year mean number of firms that analyst j covers, and the number of years’ experience of analyst j as of year t.

In Panel A, we use dummy variables representing those analysts who were in the top 10% and bottom 10% of three-year forecast optimism for year t. In contrast to Hong and Kubik (2003) in the [1983, 2000] period, we find no evidence that since 2000, high forecast optimism or is associated with moving up to a higher-status brokerage (column 3). In fact, we find that the most optimistic 10% of analysts are more likely to move down to a lower status brokerage (column 1). Meanwhile, especially high levels of pessimism (i.e., the bottom 10% in terms of optimism) are not associated with moves up to higher-status brokerages or moves down to lower-status brokerages.

In Panel B, we replace the top and bottom 10% indicators with a [0,1] scaled percentile ranking of the three-year optimism ranking of analyst j during year t. We find that this overall ranking of relative analyst optimism is not significantly associated with moves up to higher-status brokerages or moves down to lower-status brokerages. Overall, the results suggest that, alongside the increases in regulations of financial analysts, the brokerage houses no longer provide incentives for analysts to offer optimistic forecasts.

4 Robustness

In this section, we test the robustness of the main phenomenon: the decreasing optimism of analyst forecasts. In particular, we examine the time trends of the average analyst forecast errors of different size groups, firms’ analyst coverage, cohorts, and benchmarks. Overall, we find that the phenomenon is prevalent across all the subsamples.
4.1 Size

In this section, we test whether the phenomenon of decreasing optimism of analyst forecasts is sensitive to different size groups. Each quarter, we split our sample into two subsamples based on the market capitalization of the firms. The large firm subsample consists of the firms with above median market capitalization, while the small firm subsample consists of the firms with below median market capitalization. Table 4 documents the average analyst forecast errors over time by the size subsamples, and Figure 4 gives a visual representation of the results.

The analysts provide more optimistic forecasts for small firms compared to large firms, judging from both the unscaled and scaled results. This can be seen from Figure 4: The red line, or the average forecast errors for small firms, is consistently below the blue line, or the average forecast errors for large firms. In terms of time trend, the phenomenon of decreasing optimism of analyst forecasts is present for both the large and small subsamples. For the large firm subsample, the average forecast errors are consistently positive after 2000, suggesting that the analysts are on average pessimistic during this period of time for the large firms. For the small firms, the average forecast errors hover around zero after 2000.

4.2 Analyst Coverage

In this section, we test whether the phenomenon of decreasing optimism of analyst forecasts is sensitive to firms’ analyst coverage. Each quarter, we split our sample into two subsamples based on the firms’ analyst coverage. The large firm subsample consists of the firms with above median number of analyst coverage, while the small firm subsample consists of the firms with below median number of analyst coverage. Table 4 documents the average analyst forecast errors over time by the analyst coverage subsamples, and Figure 4 gives a visual representation of the results.

The analysts provide more optimistic forecasts for the firms with low analyst coverage compared to the firms with high analyst coverage, judging from both the unscaled and scaled results. This can be seen from Figure 4: The red line, or the average forecast errors for the firms with low analyst coverage, is consistently below the blue line, or the average forecast errors for the firms
with high analyst coverage. In terms of time trend, the phenomenon of decreasing optimism of analyst forecasts is present for both the two subsamples. For the high analyst coverage subsample, the average forecast errors are consistently positive after 2000, suggesting that the analysts are on average pessimistic during this period of time for the firms with high analyst coverage. For the firms with low analyst coverage, the average forecast errors hover around zero after 2000.

[Table 5 about here]

[Figure 5 about here]

### 4.3 Different Cohorts

In this section, we test whether the phenomenon of decreasing optimism of analyst forecasts is sensitive to the cohorts of the firms. Because we examine a long time series, it is possible that our sample had changed significantly over the years. For example, Srivastava (2014) shows that the changes in the properties of earnings in the time series documented in the prior research are mostly driven by the integration of cohorts of newly listed firms, because each new cohort of listed firms exhibit lower earnings quality than its predecessors. He documents that the lower quality of new cohorts is due to higher intangible intensity of newly listed firms. The growth of firms with considerable investments in intangible assets may contribute to the decreasing optimism of analyst forecast errors if analysts treat intangible investments differently from other components of earnings. To test the effect of the sample composition of introduced by cohort changes, we follow the methodology in Srivastava (2014) of separating the sample into successive listing cohorts by the first year the firms are available in Compustat. The firms with a listing year before 1990 are categorized as pre-1990, and the other firms in the Compustat sample listed in a common decade are classified to the cohorts of firms newly listed in the 1990s and 2000s.

Table 6 presents the average of analyst forecast errors over time by different cohorts, and Figure 6 provides a visual representation of the cohort results. In Figure 6, the blue line, red line, and green line show the results based on the pre-1990 cohort, 1990s cohort, and the 2000s cohort, respectively. There are clear upward trends for the pre-1990 and 1990s cohorts for both the unscaled and scaled analyst forecast error results. For the 2000s cohort, there is a upward trend for the unscaled analyst forecast error result, while the trend for the scaled analyst forecast error result is less clear. Overall,
we conclude that the decreasing optimism phenomenon is unlikely to be driven by cohort effects.

[Table 6 about here]

[Figure 6 about here]

4.4 Different Benchmarks

In this section, we test whether the phenomenon of decreasing optimism of analyst forecasts is sensitive to the analyst forecast consensus we use. The literature of analyst forecasts has documented a robust finding that the analysts tend to walk down their forecasts approaching the earnings announcement date. One plausible explanation for our finding is that the degree of the walk down changed over time and that analysts are more aggressive in walking down their forecasts in recent years.

For our baseline analyses, we use the most recent analyst forecasts, relative to the announcement date, to calculate the consensus. In this section, we use an alternative way to calculate analyst consensus. We use the analyst forecasts that are at least 90 days before the announcement date to calculate analyst consensus. Table 7 documents the results using the alternative benchmark and Figure 7 provides a visual representation of the results.

In Figure 7, we plot the results using the alternative benchmark against those using our baseline benchmark. The red line plots the results using the alternative benchmark and the blue line plots the results using the baseline benchmark. Consistent with the prior literature, we find that the analyst forecast errors are more negative using the alternative benchmark compared to using our baseline benchmark. This can be seen from the fact that the red line is consistently below the blue line, suggesting that the analysts appear to be more optimistic using the alternative benchmark. In terms of time trend, there is a clear upward trend for the red lines for both the unscaled and scaled versions of the results, suggesting that the walk down phenomenon documented in the previous literature cannot account for the decreasing optimism of analyst forecasts over time that we document in this paper.

[Table 7 about here]

[Figure 7 about here]
Overall, in this section, we show that the phenomenon of decreasing optimism of analyst forecasts over time is robust to subsamples of size, firms’ analyst coverage, and cohorts. The phenomenon is also distinct from the walk down phenomenon shown in the previous literature.

5 Biases, Career Concerns, and Macro Forecasters

We showed that analysts are consistently pessimistic since the mid-1990s. Specifically, the analyst forecast errors have turned positive since then. We link the changes in analyst forecasts to the regulatory reforms happened during the 2000s. In this section, we explore alternative explanations of the systematic changes in analyst forecasts.

5.1 Biases in Analyst Forecasts

The prior literature has documented various biases in analyst forecasts, or in other words, analyst forecasts are not efficient. De Bondt and Thaler (1990) document that analysts tend to overreact to past earnings changes. Lys and Sohn (1990) and Abarbanell (1991) show that analysts’ forecasts underreact to information in prior stock price changes. Mendenhall (1991) and Abarbanell and Bernard (1992) find that analysts underestimate the serial correlation in quarterly earnings. The inefficiency in analyst forecasts may contribute to the phenomenon of decreasing optimism in analyst forecasts. For example, De Bondt and Thaler (1990) show that analysts overreact to past earnings changes, leading to a negative relationship between past earnings changes and analyst forecast errors. If firms’ earnings changes have decreased over time, we would expect to find a decrease in analyst optimism. In this section, we test whether changes in firm characteristics can account for the phenomenon of decreasing optimism in analyst forecasts.

The methodology we employ is similar to the one that studies credit rating standards over time (e.g. Blume et al., 1998; Alp, 2013; Baghai et al., 2014). We model firm-level analyst forecast errors as a function of firm characteristics and year indicator variables. Subsequently, the year indicators are used to capture the analyst optimism, above and beyond the analyst biases, relative to the omitted year, which is the first year of the sample. The assumption of the methodology is that the coefficient estimates of analyst forecast errors on firm characteristics are stable over time. If the assumption is valid, then the method correctly measures the trends in analyst optimism.
However, if the coefficient estimates are time-varying, the model would be misclassified. Therefore, in order to address this potential issue, we also measure the time trend allowing the coefficients to be time-varying. Effectively, we estimate the cross-sectional model each year and document the intercept terms. Our baseline specification is:

\[
\text{Scaled } FE_{i,t} = \alpha_t + \beta' X_{i,t} + \epsilon_{i,t}
\]

where the matrix \( X_{i,t} \) contains columns with explanatory variables and \( \epsilon_{i,t} \) is the error term. \( \alpha_t \) are the year indicator variables.

We use the following firm characteristics as explanatory variables in our baseline model: size, past earnings change, previous cumulative six month return, and previous analyst forecast error. We define the variables in the Appendix.

Table 8 documents the regression results and Figure 8 plots the year indicator variables alongside with the raw average. Table 8 shows that the directions of the coefficients on size, past earnings change, previous cumulative six month return, and previous analyst forecast error are consistent with the prior literature. All the coefficients on firm characteristics are statistically significant at the 5 percent level. Consistent with So (2013), firm size is positively correlated with the firm’s analyst forecast error. Firms’ past earnings changes are negatively correlated with firms’ analyst forecast errors, suggesting that analysts overreact to past earnings changes (e.g. De Bondt and Thaler, 1990). Firms’ previous cumulative six month returns are positive correlated with firms’ analyst forecast errors, which suggests that analysts underreact to information in prior stock returns (See Lys and Sohn, 1990; Abarbanell, 1991; So, 2013). Firms’ previous analyst forecast errors are positively related to firms’ current analyst forecast errors. In other words, firms’ analyst forecast errors are autocorrelated. This is consistent with findings in Mendenhall (1991) and Abarbanell and Bernard (1992).

Figure 8 plots the time trend of the time trends using different models. For all the models, we normalize the beginning of the sample (year 1984) to zero. The blue line shows the unadjusted scaled average forecast errors over time. The red and green lines show the time trends of using the panel regression model and the year-by-year regression model described above, respectively. The underlying model of the red line only allows for time-varying firm characteristics and assumes
that the analyst biases are stable over time. The red line is consistently below the blue line, or the unadjusted scaled average forecast errors. This result suggests that the changes in firm characteristics accounts for a part of the phenomenon of decreasing optimism. However, it falls short of explaining the magnitude of the phenomenon, because there is still a large run-up for the red line. The underlying model of the green line allows both time-varying firm characteristics and analyst biases. The green line is largely above the blue line, or the unadjusted scaled average forecast errors. This result suggests that the combination of time-varying firm characteristics and analyst biases suggest a more dramatic decrease in analyst optimism, compared to the unadjusted benchmark.

5.2 Macro Forecast

It is possible that the decline in analyst earnings forecast optimism is part of a broader trend of lower optimism in economic forecasting in general. To investigate this, we examine patterns of macroeconomic and financial forecasts and their relative degree of optimism. As described earlier, we obtain forecasts from the quarterly Survey of Professional Forecasters (SPF) administered by the Federal Reserve Bank of Philadelphia. We examine concurrent quarter forecasts of nominal gross domestic product (NGDP), industrial production (INDPROD), housing starts (HOUSING), and the civilian unemployment rate (UNEMP), and compare the mean consensus forecast for each of these variables to their actual values. To measure relative forecasting optimism for levels of NGDP, INDPROD, and HOUSING, we take the actual value and subtract the consensus forecast, and scale this difference by the actual value. Because UMEMP is a forecast of a percentage, we measure forecast optimism as simply the difference between the forecasted amount and the actual value, without scaling.

Figures # through # display the trend of forecast optimism for each of these four variables. In each plot, the blue line represents the level of forecast optimism for that quarter, while the red line

\footnote{The Survey of Professional Forecasters computes the mean and median consensus forecasts for the concurrent quarter and each of the following four quarters. Our results are generally similar when examining alternate forecasting horizons and mean vs. median consensus measures.}
is the 8-quarter moving average of the level of optimism.

For three of the four macroeconomic variables we examine—NGDP, INDPROD, and UNEMP—we observe no general and systematic change in the level of forecast optimism over our time period. For HOUSING, the level of optimism increases during the 1990s, going from on average pessimistic to on average optimistic, and the level of optimism peaks near at height of the housing bubble in 2005. Since then, the average level of optimism has declined. While this seems to fit our general pattern of movements observed for analyst forecast optimism, the fact that we do not observe these patterns for other, non-housing related variables, suggest that this pattern is likely specific to the housing bubble and subsequent financial crisis.

In untabulated analyses, we run a time series regression of the level of forecast optimism. For each of the four macroeconomic variables, we regress the level of forecast optimism on a count variable which is simply the number of quarters elapsed since 1968Q3. We find results consistent with the plotted figures—the count variable loads insignificantly when NGDP, INDPROD, and UNEMP are the dependent variables, and significantly negative (at the 5% level) when HOUSING is the dependent variable.\(^2\)

6 Conclusion

In this paper, we show that the sell-side financial analysts have become less optimistic over time. Since the year 2000, the sell-side financial analysts have been pessimistic on average. The decrease in analyst optimism over time is robust to different subsamples, and is not driven by entry/exit of firms. We show that the increases in regulatory scrutiny leads to the change in landscapes. Following the many regulations that took placed around the year 2000, we also find that the brokerage houses no longer provide incentives for their financial analysts to offer optimistic forecasts.

\(^2\)We also examine other macroeconomic variables examined in Bordalo et al. (2018), including real consumption, Treasury rates, and components of GDP. Our results are qualitatively similar to our non-housing related variable results in that we do not find any significant and systematic change in optimism over our sample period.
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Figures & Tables

Figure 1: Distribution of Forecast Errors

This graph plots the distributions of analyst forecast errors for the pre-2000 subsample and the post-2000 subsample. Panel A shows the results based on raw analyst forecast errors. Panel B shows the results based on scaled analyst forecast errors.
Figure 2: Forecast Error Over Time

This figure plots the mean of analyst forecast errors over time. Panel A shows the results based on raw analyst forecast errors. Panel B shows the results based on scaled analyst forecast errors.
Figure 3: Composition

This figure shows the fractions of analyst forecast errors that are less than 0, meet or just beat, and greater than 2 cents over time. The red line represents the fraction of analyst forecast errors that are less than 0. The blue line represents the fraction of analyst forecast errors that are meet or just beat. The green line represents the fraction of analyst forecast errors that are greater than 2 cents.
Figure 4: Forecast Error by Firm Size

This figure plots the mean of analyst forecast errors over time by size group. Panel A shows the results based on raw analyst forecast errors. Panel B shows the results based on scaled analyst forecast errors.
Figure 5: Forecast Error by Analyst Coverage

This figure plots the mean of analyst forecast errors over time by analyst coverage group. Panel A shows the results based on raw analyst forecast errors. Panel B shows the results based on scaled analyst forecast errors.
Figure 6: Forecast Error by Cohort

This figure plots the mean of analyst forecast errors over time by cohort. Panel A shows the results based on raw analyst forecast errors. Panel B shows the results based on scaled analyst forecast errors.
Figure 7: Different Benchmarks

This figure plots the mean of analyst forecast errors over time under different benchmarks. Panel A shows the results based on raw analyst forecast errors. Panel B shows the results based on scaled analyst forecast errors.
Figure 8: Different Models

This figure plots the mean of analyst forecast errors over time adjusting for different model.
Figure 9: Macro Forecast Trend

This figure plots the mean of macro forecast errors over time.
Table 1: Summary Statistics

Panel A: Descriptive Statistics

|       | Mean | Std. Dev. | 10%  | 25%  | Median | 75%  | 90%  |
|-------|------|-----------|------|------|--------|------|------|
| EPS   | 0.28 | 0.51      | -0.21| 0.02 | 0.21   | 0.48 | 0.87 |
| FPS   | 0.28 | 0.46      | -0.17| 0.02 | 0.21   | 0.47 | 0.83 |
| FE    | -0.00| 0.15      | -0.11| -0.02| 0.01   | 0.04 | 0.11 |
| TA    | 3475.34 | 8968.13  | 50.42| 138.81| 529.95 | 2192.10| 8281.00|
| Scaled FE | -0.05 | 1.46 | -0.81| -0.14| 0.04 | 0.26 | 0.76 |

Panel B: Correlation Matrix for Key Variables

|       | EPS | FPS | FE  | TA  | Scaled FE |
|-------|-----|-----|-----|-----|-----------|
| EPS   | 1.00|     |     |     |           |
| FPS   | 0.94| 1.00|     |     |           |
| FE    | 0.39| 0.09| 1.00|     |           |
| TA    | 0.31| 0.33| 0.05| 1.00|           |
| Scaled FE | 0.24| 0.04| 0.62| 0.02| 1.00     |
Table 2: Forecast Error by Year

This table shows the mean of analyst forecast errors over time. Panel A shows the results based on raw analyst forecast errors. Panel B shows the results based on scaled analyst forecast errors.

| Year | Mean   | T-Stat | Sign | Year | Mean   | T-Stat | Sign |
|------|--------|--------|------|------|--------|--------|------|
| 1983 | -0.038*** | (-3.18) | -    | 2001 | 0.004*** | (3.55) | +    |
| 1984 | -0.044*** | (-8.36) | -    | 2002 | 0.010*** | (9.94) | +    |
| 1985 | -0.072*** | (-16.99) | -   | 2003 | 0.009*** | (9.33) | +    |
| 1986 | -0.057*** | (-15.72) | -   | 2004 | 0.011*** | (10.19) | +    |
| 1987 | -0.031*** | (-9.71) | -    | 2005 | 0.010*** | (8.58) | +    |
| 1988 | -0.025*** | (-9.05) | -    | 2006 | 0.010*** | (8.02) | +    |
| 1989 | -0.045*** | (-18.47) | -    | 2007 | 0.001   | (0.90) | +    |
| 1990 | -0.040*** | (-18.49) | -    | 2008 | -0.002  | (-1.27) | -    |
| 1991 | -0.033*** | (-17.76) | -    | 2009 | 0.016*** | (9.90) | +    |
| 1992 | -0.023*** | (-14.66) | -    | 2010 | 0.020*** | (14.61) | +    |
| 1993 | -0.018*** | (-12.56) | -    | 2011 | 0.012*** | (9.28) | +    |
| 1994 | -0.002**  | (-2.01) | -    | 2012 | 0.010*** | (6.76) | +    |
| 1995 | -0.004*** | (-4.02) | -    | 2013 | 0.004*** | (2.89) | +    |
| 1996 | -0.001    | (-0.93) | -    | 2014 | 0.007*** | (4.66) | +    |
| 1997 | 0.001     | (1.04)  | +    | 2015 | 0.010*** | (6.57) | +    |
| 1998 | -0.003*** | (-3.08) | -    | 2016 | 0.012*** | (7.36) | +    |
| 1999 | 0.005***  | (4.75)  | +    | 2017 | 0.015*** | (8.83) | +    |
| 2000 | 0.008***  | (7.55)  | +    | 2018 | 0.020*** | (9.88) | +    |
### Panel B: Scaled Forecast Error

| Year | Mean   | T-Stat | Sign | Year | Mean   | T-Stat | Sign |
|------|--------|--------|------|------|--------|--------|------|
| 1983 | -0.270*** | (-4.15) | -    | 2001 | 0.034*** | (2.75) | +    |
| 1984 | -0.240*** | (-7.35) | -    | 2002 | 0.057*** | (4.81) | +    |
| 1985 | -0.396*** | (-14.11) | -    | 2003 | 0.046*** | (3.90) | +    |
| 1986 | -0.312*** | (-13.88) | -    | 2004 | 0.031**  | (2.58) | +    |
| 1987 | -0.243*** | (-11.38) | -    | 2005 | 0.038*** | (3.05) | +    |
| 1988 | -0.212*** | (-11.45) | -    | 2006 | 0.022    | (1.62) | +    |
| 1989 | -0.291*** | (-16.46) | -    | 2007 | -0.049*** | (-3.32) | -    |
| 1990 | -0.245*** | (-16.79) | -    | 2008 | -0.117*** | (-7.37) | -    |
| 1991 | -0.207*** | (-15.91) | -    | 2009 | 0.045*** | (2.97) | +    |
| 1992 | -0.160*** | (-13.00) | -    | 2010 | 0.068*** | (4.76) | +    |
| 1993 | -0.178*** | (-13.50) | -    | 2011 | 0.037*** | (2.69) | +    |
| 1994 | -0.069*** | (-5.77)  | -    | 2012 | 0.012    | (0.82) | +    |
| 1995 | -0.067*** | (-5.64)  | -    | 2013 | -0.065*** | (-4.07) | -    |
| 1996 | -0.056*** | (-4.86)  | -    | 2014 | -0.036**  | (-2.26) | -    |
| 1997 | -0.046*** | (-3.98)  | -    | 2015 | -0.011    | (-0.66) | -    |
| 1998 | -0.059*** | (-5.01)  | -    | 2016 | 0.007    | (0.43) | +    |
| 1999 | 0.038**   | (2.80)   | +    | 2017 | -0.023    | (-1.24) | -    |
| 2000 | 0.095***  | (7.03)   | +    | 2018 | -0.022    | (-1.00) | -    |

### Panel C: Regression Results for Time Trends

\[
FE = b_0 + b_1 \times \text{Time} + \epsilon
\]

| Regression          | \(b_0\)     | \(b_1\)    | \(R^2\) |
|---------------------|-------------|-------------|---------|
| Raw Forecast Error  | -0.043***   | 0.001***    | 0.626   |
|                     | (-15.79)    | (15.30)     |         |
| Scaled Forecast Error | -0.245***   | 0.002***    | 0.506   |
|                     | (-15.06)    | (11.97)     |         |

34
Table 3: Forecast Error Difference by Industry

This table shows the mean of analyst forecast errors by industry group. Panel A shows the results based on raw analyst forecast errors. Panel B shows the results based on scaled analyst forecast errors.

| Panel A: Raw Forecast Error | Panel B: Scaled Forecast Error |
|-----------------------------|-------------------------------|
| Fama French Industries      | 2017 – 1984                   | Fama French Industries      | 2017 – 1984                   |
| Utilities                   | 0.00                          | Utilities                   | -0.09                         |
| Electrical Equipment        | 0.00                          | Utilities                   | -0.03                         |
| Everything Else             | 0.02                          | Everything Else             | -0.02                         |
| Communication               | 0.02                          | Electrical Equipment        | 0.02                          |
| Retail                      | 0.03                          | Food Products               | 0.03                          |
| Restaraunts, Hotels, Motels | 0.03                          | Retail                      | 0.03                          |
| Healthcare, Medical, Pharmaceutical | 0.04                  | Healthcare, Medical, Pharmaceutical | 0.05                      |
| Recreation                  | 0.04                          | Fabricated Products and Machinery | 0.06                   |
| Wholesale                   | 0.04                          | Communication               | 0.07                          |
| Food Products               | 0.05                          | Restaraunts, Hotels, Motels | 0.09                          |
| Textiles                    | 0.06                          | Chemicals                   | 0.12                          |
| Fabricated Products and Machinery | 0.06                  | Wholesale                    | 0.12                          |
| Construction and Construction Materials | 0.06            | Transportation               | 0.19                          |
| Aircraft, ships, and railroad equipment | 0.06            | Aircraft, ships, and railroad equipment | 0.20                      |
| Petroleum and Natural Gas   | 0.07                          | Tobacco Products            | 0.21                          |
| Personal and Business Services | 0.07                   | Construction and Construction Materials | 0.24                   |
| Business Equipment          | 0.07                          | Automobiles and Trucks      | 0.28                          |
| Printing and Publishing     | 0.08                          | Business Supplies and Shipping Containers | 0.35             |
| Chemicals                   | 0.09                          | Textiles                    | 0.41                          |
| Business Supplies and Shipping Containers | 0.09            | Business Equipment           | 0.43                          |
| Transportation              | 0.10                          | Petroleum and Natural Gas   | 0.43                          |
| Metal Mining                | 0.11                          | Personal and Business Services | 0.51                      |
| Beer & Liquor               | 0.12                          | Printing and Publishing     | 0.53                          |
| Automobiles and Trucks      | 0.12                          | Consumer Goods              | 0.53                          |
| Consumer Goods              | 0.14                          | Recreation                  | 0.57                          |
| Tobacco Products            | 0.17                          | Steel Works Etc             | 0.64                          |
| Steel Works Etc             | 0.18                          | Metal Mining                | 0.85                          |
| Apparel                     | 0.23                          | Apparel                     | 1.22                          |
| Coal                        | 0.24                          | Coal                        | 2.13                          |
Table 4: Forecast Error by Firm Size

This table shows the mean of analyst forecast errors over time of different size groups.

| Year | Raw Forecast Error Large Size | Raw Forecast Error Small Size | Scaled Forecast Error Large Size | Scaled Forecast Error Small Size |
|------|-------------------------------|-------------------------------|----------------------------------|----------------------------------|
| 1983 | -0.021 (-1.17)                | -0.055*** (-3.48)             | -0.145** (-2.01)                | -0.396*** (-3.66)               |
| 1984 | -0.043*** (-5.39)             | -0.043*** (-6.41)             | -0.133*** (-3.77)               | -0.348*** (-6.33)               |
| 1985 | -0.085*** (-12.83)            | -0.060*** (-11.34)            | -0.318*** (-9.62)               | -0.472*** (-10.47)              |
| 1986 | -0.056*** (-10.03)            | -0.058*** (-12.71)            | -0.167*** (-7.79)               | -0.457*** (-11.64)              |
| 1987 | -0.027*** (-5.40)             | -0.036*** (-9.14)             | -0.110*** (-5.28)               | -0.377*** (-10.14)              |
| 1988 | -0.017*** (-3.70)             | -0.032*** (-10.13)            | -0.076*** (-4.14)               | -0.347*** (-10.90)              |
| 1989 | -0.045*** (-11.90)            | -0.044*** (-14.55)            | -0.145*** (-9.28)               | -0.437*** (-13.87)              |
| 1990 | -0.042*** (-12.19)            | -0.037*** (-14.51)            | -0.124*** (-10.28)              | -0.366*** (-13.87)              |
| 1991 | -0.036*** (-11.98)            | -0.029*** (-13.94)            | -0.107*** (-9.95)               | -0.306*** (-13.02)              |
| 1992 | -0.026*** (-9.95)             | -0.019*** (-10.95)            | -0.074*** (-7.26)               | -0.245*** (-11.03)              |
| 1993 | -0.019*** (-7.98)             | -0.017*** (-10.27)            | -0.077*** (-8.11)               | -0.280*** (-11.38)              |
| 1994 | 0.003 (1.60)                  | -0.007*** (-4.99)             | 0.000 (-0.86)                   | -0.130*** (-5.83)               |
| 1995 | 0.001 (0.36)                  | -0.010*** (-7.17)             | -0.018** (-2.37)                | -0.116*** (-5.16)               |
| 1996 | 0.005*** (3.43)               | -0.006*** (-4.94)             | 0.003 (0.41)                    | -0.115*** (-5.21)               |
| 1997 | 0.005*** (3.98)               | -0.003*** (-2.77)             | 0.010* (1.67)                   | -0.102*** (-4.56)               |
| 1998 | 0.002 (1.34)                  | -0.007*** (-5.69)             | -0.001 (-0.20)                  | -0.116*** (-5.20)               |
| 1999 | 0.010*** (7.25)               | -0.001 (-0.62)                | 0.043*** (6.31)                 | 0.033 (1.25)                    |
| 2000 | 0.011*** (7.09)               | 0.005*** (3.38)               | 0.061*** (7.46)                 | 0.130*** (5.04)                 |
| 2001 | 0.006*** (3.63)               | 0.002 (1.19)                  | 0.020** (2.45)                  | 0.048** (2.05)                  |
| 2002 | 0.015*** (9.51)               | 0.005*** (4.15)               | 0.055*** (6.98)                 | 0.059*** (2.68)                 |
| 2003 | 0.015*** (9.46)               | 0.004*** (3.17)               | 0.063*** (10.17)                | 0.030 (1.32)                    |
| 2004 | 0.018*** (10.51)              | 0.004*** (3.33)               | 0.060*** (8.02)                 | 0.001 (0.07)                    |
| 2005 | 0.017*** (9.25)               | 0.003** (2.21)                | 0.059*** (7.41)                 | 0.018 (0.76)                    |
| 2006 | 0.017*** (9.05)               | 0.003* (1.73)                 | 0.073*** (9.71)                 | -0.028 (-1.06)                  |
| 2007 | 0.008*** (3.92)               | -0.006*** (-3.60)             | 0.015 (1.51)                    | -0.112*** (-4.09)               |
| 2008 | 0.003 (1.24)                  | -0.007*** (-3.85)             | -0.030** (-2.29)                | -0.205*** (-7.07)               |
| 2009 | 0.029*** (11.97)              | 0.003 (1.40)                  | 0.093*** (8.63)                 | -0.002 (-0.07)                  |
| 2010 | 0.031*** (15.24)              | 0.008*** (4.65)               | 0.093*** (10.77)                | 0.043 (1.58)                    |
| 2011 | 0.019*** (9.31)               | 0.005*** (3.20)               | 0.046** (5.41)                  | 0.027 (1.03)                    |
| 2012 | 0.015*** (6.95)               | 0.004** (2.17)                | 0.045** (4.85)                  | -0.021 (-0.74)                  |
| 2013 | 0.011*** (4.99)               | -0.003 (-1.54)                | 0.024** (2.49)                  | -0.155*** (-5.09)               |
| 2014 | 0.017*** (7.70)               | -0.004** (-2.00)              | 0.051*** (5.25)                 | -0.126*** (-4.06)               |
| 2015 | 0.020*** (8.43)               | 0.001 (0.31)                  | 0.045** (3.85)                  | -0.067** (-2.17)                |
| 2016 | 0.020*** (8.61)               | 0.004* (1.71)                 | 0.058** (5.36)                  | -0.043 (-1.32)                  |
| 2017 | 0.027*** (11.07)              | 0.003 (1.14)                  | 0.074*** (6.72)                 | -0.121*** (-3.41)               |
| 2018 | 0.037*** (12.83)              | 0.003 (1.10)                  | 0.084*** (6.99)                 | -0.129*** (-3.07)               |
Panel B: Regression Results for Time Trends

\[ FE = b_0 + b_1 \times \text{Time} + \epsilon \]

|                     | \( b_0 \)   | \( b_1 \)   | \( R^2 \) |
|---------------------|-------------|-------------|-----------|
| **Large Size**      |             |             |           |
| Raw Forecast Error  | -0.045***   | 0.001***    | 0.621     |
|                     | (-13.69)    | (15.14)     |           |
| Scaled Forecast Error | -0.152***   | 0.002***    | 0.569     |
|                     | (-12.90)    | (13.60)     |           |
| **Small Size**      |             |             |           |
| Raw Forecast Error  | -0.038***   | 0.000***    | 0.617     |
|                     | (-18.23)    | (14.97)     |           |
| Scaled Forecast Error | -0.335***   | 0.003***    | 0.386     |
|                     | (-13.75)    | (9.34)      |           |
Table 5: Forecast Error by Analyst Coverage

This table shows the mean of analyst forecast errors over time of different analyst coverage groups.

| Year | Raw Forecast Error | Scaled Forecast Error |
|------|---------------------|-----------------------|
|      | High Coverage       | Low Coverage          | High Coverage       | Low Coverage |
| 1983 | -0.034*** (-2.05)   | -0.042** (-2.43)      | -0.188*** (-2.79)  | -0.347*** (-3.17) |
| 1984 | -0.056*** (-6.95)   | -0.034*** (-4.98)     | -0.173*** (-4.63)  | -0.292*** (-5.81) |
| 1985 | -0.070*** (-11.77)  | -0.073*** (-12.26)    | -0.303*** (-9.68)  | -0.483*** (-10.56) |
| 1986 | -0.045*** (-8.36)   | -0.065*** (-13.43)    | -0.144*** (-6.23)  | -0.431*** (-12.48) |
| 1987 | -0.021*** (-4.87)   | -0.040*** (-8.63)     | -0.115*** (-5.25)  | -0.360*** (-10.15) |
| 1988 | -0.017*** (-3.75)   | -0.030*** (-8.73)     | -0.094*** (-4.69)  | -0.293*** (-10.48) |
| 1989 | -0.041*** (-11.59)  | -0.048*** (-14.38)    | -0.167*** (-10.03) | -0.382*** (-13.63) |
| 1990 | -0.034*** (-10.63)  | -0.044*** (-15.27)    | -0.137*** (-9.78)  | -0.331*** (-14.02) |
| 1991 | -0.029*** (-10.45)  | -0.035*** (-14.45)    | -0.108*** (-8.48)  | -0.284*** (-13.63) |
| 1992 | -0.022*** (-8.18)   | -0.024*** (-12.39)    | -0.067*** (-5.39)  | -0.223*** (-11.87) |
| 1993 | -0.012*** (-4.96)   | -0.022*** (-12.19)    | -0.057*** (-4.34)  | -0.252*** (-12.85) |
| 1994 | 0.005*** (2.65)     | -0.007*** (-4.53)     | 0.000 (0.02)       | -0.112*** (-6.22)  |
| 1995 | 0.003* (1.65)       | -0.009*** (-6.15)     | -0.005 (-0.49)     | -0.106*** (-5.86)  |
| 1996 | 0.005*** (4.32)     | -0.006*** (-4.44)     | 0.013 (1.26)       | -0.120*** (-5.93)  |
| 1997 | 0.008*** (7.50)     | -0.005*** (-4.04)     | 0.035*** (3.77)    | -0.122*** (-5.90)  |
| 1998 | 0.003** (2.08)      | -0.006*** (-4.89)     | 0.020** (2.02)     | -0.111*** (-6.04)  |
| 1999 | 0.015*** (11.90)    | -0.002 (-1.64)        | 0.109*** (9.10)    | -0.014 (-0.62)     |
| 2000 | 0.018*** (12.19)    | 0.001 (0.76)          | 0.157*** (11.73)   | 0.052** (2.45)     |
| 2001 | 0.011*** (8.00)     | -0.002 (-1.25)        | 0.084*** (9.43)    | -0.012 (-0.55)     |
| 2002 | 0.015*** (12.50)    | 0.005*** (3.20)       | 0.091*** (9.28)    | 0.023 (1.09)       |
| 2003 | 0.015*** (12.35)    | 0.004** (2.56)        | 0.101*** (10.19)   | -0.004 (-0.20)     |
| 2004 | 0.018*** (13.19)    | 0.005*** (2.67)       | 0.093** (8.80)     | -0.031 (-1.48)     |
| 2005 | 0.016*** (10.60)    | 0.005*** (3.24)       | 0.108*** (10.09)   | -0.015 (-0.71)     |
| 2006 | 0.020*** (12.56)    | 0.002 (1.29)          | 0.123*** (10.03)   | -0.056*** (-2.50)  |
| 2007 | 0.013*** (6.99)     | -0.008*** (-3.96)     | 0.076*** (5.77)    | -0.152*** (-6.24)  |
| 2008 | 0.010*** (4.61)     | -0.013*** (-5.53)     | 0.001 (0.06)       | -0.230*** (-8.41)  |
| 2009 | 0.029*** (13.98)    | 0.003 (1.47)          | 0.143*** (10.86)   | -0.044* (-1.65)    |
| 2010 | 0.031*** (17.49)    | 0.009*** (4.54)       | 0.121*** (9.88)    | 0.017 (0.65)       |
| 2011 | 0.023*** (11.90)    | 0.004*** (2.06)       | 0.079*** (6.55)    | 0.002 (0.10)       |
| 2012 | 0.017*** (8.49)     | 0.004* (1.82)         | 0.069*** (4.87)    | -0.033 (-1.37)     |
| 2013 | 0.016*** (7.82)     | -0.005** (-2.36)      | 0.064*** (5.10)    | -0.168*** (-6.26)  |
| 2014 | 0.023*** (11.10)    | -0.005** (-2.54)      | 0.087*** (6.98)    | -0.131*** (-4.88)  |
| 2015 | 0.023*** (10.59)    | 0.000 (0.11)          | 0.071*** (5.24)    | -0.076*** (-2.76)  |
| 2016 | 0.024*** (11.75)    | -0.000 (-0.06)        | 0.088*** (6.51)    | -0.072** (-2.31)   |
| 2017 | 0.028*** (13.14)    | 0.002 (0.69)          | 0.106*** (7.41)    | -0.149*** (-4.43)  |
| 2018 | 0.042*** (15.65)    | 0.002 (0.81)          | 0.114*** (6.46)    | -0.129*** (-3.58)  |
Panel B: Regression Results for Time Trends

\[ FE = b_0 + b_1 \times Time + \epsilon \]

| High Coverage       | \( b_0 \)     | \( b_1 \)     | \( R^2 \) |
|---------------------|----------------|----------------|-----------|
| Raw Forecast Error  | -0.040***      | 0.001***       | 0.702     |
|                     | (-15.15)       | (18.16)        |           |
| Scaled Forecast Error | -0.141***      | 0.002***       | 0.605     |
|                     | (-11.40)       | (14.65)        |           |

| Low Coverage        | \( b_0 \)     | \( b_1 \)     | \( R^2 \) |
|---------------------|----------------|----------------|-----------|
| Raw Forecast Error  | -0.045***      | 0.000***       | 0.481     |
|                     | (-14.27)       | (11.38)        |           |
| Scaled Forecast Error | -0.322***      | 0.002***       | 0.355     |
|                     | (-14.39)       | (8.78)         |           |
Table 6: Forecast Error by Cohort

This table shows the mean of analyst forecast errors over time by cohorts.

Panel A: Raw Forecast Error

| Year | Pre-1990 | 1990s | 2000s | 2010s |
|------|----------|-------|-------|-------|
| 1983 | -0.038*** (-3.18) |       |       |       |
| 1984 | -0.044*** (-8.36)  |       |       |       |
| 1985 | -0.072*** (-16.99) |       |       |       |
| 1986 | -0.057*** (-15.72) |       |       |       |
| 1987 | -0.031*** (-9.71)  |       |       |       |
| 1988 | -0.025*** (-9.05)  |       |       |       |
| 1989 | -0.045*** (-18.47) |       |       |       |
| 1990 | -0.041*** (-18.23) | -0.020*** (-3.34) |       |       |
| 1991 | -0.035*** (-16.67) | -0.021*** (-16.17)|       |       |
| 1992 | -0.026*** (-12.90) | -0.016*** (-7.00) |       |       |
| 1993 | -0.021*** (-10.49) | -0.013*** (-6.93) |       |       |
| 1994 | 0.003* (1.88)       | -0.008*** (-4.90) |       |       |
| 1995 | -0.001 (-0.51)      | -0.008*** (-5.27) |       |       |
| 1996 | 0.006*** (3.81)     | -0.005*** (-4.40) |       |       |
| 1997 | 0.005*** (3.45)     | -0.001 (-1.22)    |       |       |
| 1998 | 0.005*** (3.49)     | -0.007*** (-5.90) |       |       |
| 1999 | 0.012*** (7.65)     | 0.001 (1.05)      |       |       |
| 2000 | 0.008*** (4.38)     | 0.007*** (4.84)   | 0.017*** (5.00) |       |
| 2001 | 0.008*** (4.07)     | 0.002 (1.14)      | 0.003 (1.23) |       |
| 2002 | 0.017*** (10.38)    | 0.006*** (4.54)   | 0.007** (2.51) |       |
| 2003 | 0.014*** (7.27)     | 0.007*** (5.59)   | 0.007*** (2.80) |       |
| 2004 | 0.022*** (11.14)    | 0.008*** (5.30)   | 0.002 (0.94) |       |
| 2005 | 0.018*** (8.99)     | 0.010*** (6.02)   | -0.000 (-0.21)|       |
| 2006 | 0.017*** (7.41)     | 0.010*** (5.20)   | 0.003 (1.56) |       |
| 2007 | 0.009*** (3.15)     | 0.004* (1.66)     | -0.006*** (-2.90)|       |
| 2008 | 0.002 (0.49)        | 0.002 (0.71)      | -0.008*** (-2.96)|       |
| 2009 | 0.027*** (8.64)     | 0.018*** (6.82)   | 0.006** (2.43) |       |
| 2010 | 0.038*** (14.87)    | 0.024*** (9.84)   | 0.007*** (3.09) | -0.000 (-0.02)|
| 2011 | 0.021*** (7.95)     | 0.016*** (6.93)   | 0.005** (2.22) | 0.003 (0.77)|
| 2012 | 0.021*** (7.83)     | 0.013*** (5.13)   | 0.001 (0.47) | 0.002 (0.57)|
| 2013 | 0.015*** (5.27)     | 0.010*** (3.73)   | -0.001 (-0.29) | -0.009** (-2.24)|
| 2014 | 0.023*** (8.29)     | 0.013*** (4.75)   | 0.006** (2.06) | -0.011*** (-3.41)|
| 2015 | 0.027*** (9.13)     | 0.019*** (6.50)   | -0.002 (-0.61) | 0.002 (0.72)|
| 2016 | 0.028*** (10.10)    | 0.017*** (5.31)   | 0.007** (2.03) | 0.001 (0.37)|
| 2017 | 0.036*** (10.96)    | 0.026*** (7.86)   | 0.010*** (2.72) | -0.000 (-0.11)|
| 2018 | 0.040*** (10.19)    | 0.039*** (9.43)   | 0.019*** (4.20) | 0.001 (0.21)|
### Panel B: Scaled Forecast Error

| Year | Pre-1990 | 1990s | 2000s | 2010s |
|------|----------|-------|-------|-------|
| 1983 | -0.270*** (-4.15) |       |       |       |
| 1984 | -0.240*** (-7.35)  |       |       |       |
| 1985 | -0.396*** (-14.11) |       |       |       |
| 1986 | -0.312*** (-13.88) |       |       |       |
| 1987 | -0.243*** (-11.38) |       |       |       |
| 1988 | -0.212*** (-11.45) |       |       |       |
| 1989 | -0.291*** (-16.46) |       |       |       |
| 1990 | -0.242*** (-16.82) | -0.280*** (-3.69) |       |       |
| 1991 | -0.194*** (-14.75) | -0.266*** (-6.53) |       |       |
| 1992 | -0.132*** (-11.12) | -0.225*** (-7.43) |       |       |
| 1993 | -0.138*** (-10.88) | -0.243*** (-8.74) |       |       |
| 1994 | -0.035*** (-3.21)  | -0.107*** (-4.83) |       |       |
| 1995 | -0.039*** (-3.57)  | -0.093*** (-4.53) |       |       |
| 1996 | -0.013 (-1.31)      | -0.087*** (-4.72) |       |       |
| 1997 | 0.001 (0.06)        | -0.074*** (-4.19) |       |       |
| 1998 | 0.001 (0.08)        | -0.091*** (-5.25) |       |       |
| 1999 | 0.046*** (5.10)     | 0.034* (1.67)     |       |       |
| 2000 | 0.031*** (2.95)     | 0.086*** (4.66)   | 0.419*** (4.86) |       |
| 2001 | 0.016 (1.51)        | 0.009 (0.45)      | 0.185*** (4.34) |       |
| 2002 | 0.056*** (5.68)     | 0.036** (2.00)    | 0.132*** (3.10) |       |
| 2003 | 0.030*** (2.77)     | 0.051*** (2.84)   | 0.063 (1.55)    |       |
| 2004 | 0.073*** (7.66)     | 0.026 (1.48)      | -0.021 (-0.57)  |       |
| 2005 | 0.057*** (5.27)     | 0.061*** (3.30)   | -0.019 (-0.54)  |       |
| 2006 | 0.044*** (3.51)     | 0.063*** (3.14)   | -0.050 (-1.49)  |       |
| 2007 | 0.018 (1.15)        | -0.015 (-0.70)    | -0.130*** (-4.19)|       |
| 2008 | -0.045** (-2.47)    | -0.051** (-2.08)  | -0.224*** (-7.05)|       |
| 2009 | 0.061*** (3.40)     | 0.087*** (3.65)   | -0.002 (-0.05)  |       |
| 2010 | 0.117*** (7.55)     | 0.106*** (4.59)   | 0.026 (0.94)    | -0.146 (-1.09)|
| 2011 | 0.056*** (4.83)     | 0.042* (1.90)     | 0.054** (2.00)  | -0.104 (-1.42)|
| 2012 | 0.064*** (5.28)     | 0.016 (0.70)      | -0.043 (-1.44)  | 0.048 (0.79) |
| 2013 | 0.024* (1.86)       | 0.007 (0.29)      | -0.103*** (-3.19)| -0.227*** (-4.09)|
| 2014 | 0.051*** (4.66)     | -0.004 (-0.19)    | -0.022 (-0.69)  | -0.157*** (-3.34)|
| 2015 | 0.039*** (2.98)     | 0.037 (1.56)      | -0.067* (-1.91) | -0.036 (-0.90) |
| 2016 | 0.078*** (7.04)     | 0.062** (2.33)    | -0.006 (-0.15)  | -0.065* (-1.67) |
| 2017 | 0.085*** (6.54)     | 0.100*** (3.98)   | -0.080** (-2.07) | -0.121*** (-2.91) |
| 2018 | 0.082*** (6.11)     | 0.093*** (3.37)   | 0.037 (0.81)    | -0.160*** (-3.44) |
Table 7: Forecast Error Different Benchmark

This table shows the mean of analyst forecast errors over time under different benchmarks.

| Year | Mean    | T-Stat | Sign | Year | Mean    | T-Stat | Sign |
|------|---------|--------|------|------|---------|--------|------|
| 1983 | -0.060*** (0.021) | -      |      | 2001 | -0.033*** (0.002) | -      |      |
| 1984 | -0.055*** (0.007)  | -      |      | 2002 | -0.007*** (0.002)  | -      |      |
| 1985 | -0.119*** (0.007)  | -      |      | 2003 | 0.000     (0.002)   | +      |      |
| 1986 | -0.091*** (0.006)  | -      |      | 2004 | 0.005*** (0.002)   | +      |      |
| 1987 | -0.061*** (0.005)  | -      |      | 2005 | 0.003     (0.002)   | +      |      |
| 1988 | -0.039*** (0.005)  | -      |      | 2006 | -0.004**  (0.002)   | -      |      |
| 1989 | -0.087*** (0.005)  | -      |      | 2007 | -0.013*** (0.002)  | -      |      |
| 1990 | -0.068*** (0.004)  | -      |      | 2008 | -0.037*** (0.002)  | -      |      |
| 1991 | -0.068*** (0.004)  | -      |      | 2009 | 0.002     (0.002)   | +      |      |
| 1992 | -0.049*** (0.003)  | -      |      | 2010 | 0.016*** (0.002)   | +      |      |
| 1993 | -0.042*** (0.002)  | -      |      | 2011 | -0.003    (0.002)   | -      |      |
| 1994 | -0.018*** (0.002)  | -      |      | 2012 | -0.008*** (0.002)  | -      |      |
| 1995 | -0.026*** (0.002)  | -      |      | 2013 | -0.008*** (0.002)  | -      |      |
| 1996 | -0.023*** (0.002)  | -      |      | 2014 | -0.005**  (0.002)   | -      |      |
| 1997 | -0.018*** (0.001)  | -      |      | 2015 | -0.007*** (0.002)  | -      |      |
| 1998 | -0.033*** (0.002)  | -      |      | 2016 | 0.001     (0.002)   | +      |      |
| 1999 | -0.017*** (0.002)  | -      |      | 2017 | 0.011*** (0.002)   | +      |      |
| 2000 | -0.018*** (0.002)  | -      |      | 2018 | 0.020*** (0.003)   | +      |      |
### Panel B: Scaled Forecast Error

| Year | Mean   | T-Stat | Sign | Year | Mean   | T-Stat | Sign |
|------|--------|--------|------|------|--------|--------|------|
| 1983 | -0.340*** | (0.097) | -    | 2001 | -0.262*** | (0.020) | -    |
| 1984 | -0.293*** | (0.038) | -    | 2002 | -0.085*** | (0.018) | -    |
| 1985 | -0.502*** | (0.040) | -    | 2003 | -0.038**  | (0.017) | -    |
| 1986 | -0.437*** | (0.033) | -    | 2004 | -0.039**  | (0.016) | -    |
| 1987 | -0.384*** | (0.033) | -    | 2005 | -0.040**  | (0.017) | -    |
| 1988 | -0.291*** | (0.032) | -    | 2006 | -0.086*** | (0.018) | -    |
| 1989 | -0.509*** | (0.030) | -    | 2007 | -0.156*** | (0.020) | -    |
| 1990 | -0.442*** | (0.028) | -    | 2008 | -0.341*** | (0.023) | -    |
| 1991 | -0.348*** | (0.021) | -    | 2009 | -0.040*   | (0.021) | -    |
| 1992 | -0.301*** | (0.022) | -    | 2010 | 0.057***  | (0.018) | -    |
| 1993 | -0.350*** | (0.021) | -    | 2011 | -0.057*** | (0.018) | -    |
| 1994 | -0.214*** | (0.019) | -    | 2012 | -0.047**  | (0.019) | -    |
| 1995 | -0.252*** | (0.018) | -    | 2013 | -0.103*** | (0.020) | -    |
| 1996 | -0.254*** | (0.018) | -    | 2014 | -0.072*** | (0.020) | -    |
| 1997 | -0.240*** | (0.018) | -    | 2015 | -0.068*** | (0.021) | -    |
| 1998 | -0.315*** | (0.019) | -    | 2016 | 0.014     | (0.021) | +    |
| 1999 | -0.193*** | (0.018) | -    | 2017 | 0.005     | (0.023) | +    |
| 2000 | -0.137*** | (0.019) | -    | 2018 | -0.002    | (0.027) | -    |

### Panel C: Regression Results for Time Trends

\[
FE = b_0 + b_1 \times Time + \epsilon
\]

| Regression         | \(b_0\)     | \(b_1\)     | \(R^2\) |
|--------------------|-------------|-------------|---------|
| Raw Forecast Error | -0.730***   | 0.001***    | 0.582   |
|                    | (-18.85)    | (13.92)     |         |
| Scaled Forecast Error | -0.430***  | 0.003***    | 0.581   |
|                    | (-22.25)    | (13.88)     |         |
Table 8: Biases in Forecasts and the Trend

| Panel Regression with Time Fixed Effects |  |  |  |  |
|----------------------------------------|---|---|---|---|
| lag_analyst_error2_at | 0.174*** | (17.55) | 1994 | 0.166*** | (72.32) | 2007 | 0.143*** | (46.67) |
| lag_act_change | -0.018*** | (-6.59) | 1995 | 0.142*** | (48.10) | 2008 | 0.113*** | (71.12) |
| mom | 0.166*** | (8.74) | 1996 | 0.149*** | (59.60) | 2009 | 0.238*** | (109.61) |
| size | 0.036*** | (10.89) | 1997 | 0.165*** | (61.59) | 2010 | 0.230*** | (56.15) |
| 1985 | -0.092*** | (-37.11) | 1998 | 0.170*** | (88.48) | 2011 | 0.194*** | (44.09) |
| 1986 | -0.065*** | (-22.15) | 1999 | 0.215*** | (85.67) | 2012 | 0.179*** | (51.99) |
| 1987 | 0.001 | (0.19) | 2000 | 0.233*** | (59.26) | 2013 | 0.126*** | (26.50) |
| 1988 | 0.056*** | (37.23) | 2001 | 0.242*** | (132.82) | 2014 | 0.160*** | (40.16) |
| 1989 | -0.020*** | (-9.12) | 2002 | 0.241*** | (118.21) | 2015 | 0.190*** | (72.28) |
| 1990 | 0.019*** | (8.10) | 2003 | 0.217*** | (48.37) | 2016 | 0.200*** | (65.40) |
| 1991 | 0.027*** | (9.58) | 2004 | 0.213*** | (49.51) | 2017 | 0.180*** | (43.20) |
| 1992 | 0.078*** | (40.22) | 2005 | 0.230*** | (79.81) | Constant | -0.433*** | (-20.49) |
| 1993 | 0.061*** | (23.78) | 2006 | 0.208*** | (75.96) | Observations | 292,210 | 0.036 |
Table 9: Analyst Career Concerns and the Trend

Panel A: Using indicators for top 10% and bottom 10% of optimism

| Year ≤ 2000 | Year > 2000 |
|-------------|-------------|
| Down        | Down        | Up  | Up  | Down | Down | Up  | Up  |
| Intercept   | -4.467***   | -4.544*** | -3.996*** | -3.807*** | -5.600*** | -5.486*** | -5.888*** | -5.833*** |
|             | (-16.02)    | (-17.65)  | (-16.04)  | (-16.63)  | (-17.57)  | (-17.28)  | (-14.54)  | (-14.60)  |
| Top 10% optimism | -0.169      | 0.288*    | 0.404**   | -0.036    |          |          |          |
|             | (-0.92)     | (1.94)    | (2.00)    | (-0.12)   |          |          |          |
| Bottom 10% optimism | 0.321**   | -0.059    | 0.155     | -0.373    |          |          |          |
|             | (2.08)      | (-0.35)   | (0.74)    | (-1.18)   |          |          |          |
| 3-year relative accuracy | -0.004     | -0.005   | -0.011*** | -0.013*** | -0.006    | -0.006    | -0.005    | -0.005    |
|             | (-0.99)     | (-1.17)   | (-2.76)   | (-3.39)   | (-1.07)   | (-1.21)   | (-0.70)   | (-0.71)   |
| 3-year avg. total coverage | 0.027***   | 0.026***  | 0.024***  | 0.024***  | 0.019**   | 0.018**   | 0.019*    | 0.019*    |
|             | (3.91)      | (3.86)    | (3.79)    | (3.74)    | (2.19)    | (2.12)    | (1.76)    | (1.77)    |
| 3-year # firms covered | -0.022***  | -0.019*** | -0.013*** | -0.015*** | 0.008     | 0.005     | 0.005     | 0.003     |
|             | (-4.17)     | (-3.63)   | (-2.89)   | (-3.27)   | (1.09)    | (0.77)    | (0.55)    | (0.37)    |
| Experience  | 0.033***    | 0.034***  | 0.013     | 0.012     | 0.012     | 0.012     | 0.003     | 0.002     |
|             | (2.68)      | (2.79)    | (1.09)    | (1.01)    | (1.55)    | (1.51)    | (0.25)    | (0.24)    |

Panel B: Using [0,1] percentile rank of optimism

| Year ≤ 2000 | Year > 2000 |
|-------------|-------------|
| Down        | Up          | Down | Up  |
| Intercept   | -4.239***   | -4.003*** | -5.496*** | -5.900*** |
|             | -13.80      | -14.17    | -16.17    | -13.88    |
| 3-year optimism [0,1] percentile | -0.351*    | 0.209     | 0.078     | 0.002     |
|             | -1.90       | 1.20      | 0.35      | 0.01      |
| 3-year relative accuracy | -0.006     | -0.012*** | -0.006    | -0.005    |
|             | -1.38       | -2.84     | -1.21     | -0.69     |
| 3-year avg. total coverage | 0.026***   | 0.024***  | 0.018**   | 0.019*    |
|             | 3.83        | 3.78      | 2.13      | 1.76      |
| 3-year # firms covered | -0.021***  | -0.015*** | 0.005     | 0.005     |
|             | -4.01       | -3.30     | 0.66      | 0.59      |
| Experience  | 0.033***    | 0.012     | 0.012     | 0.003     |
|             | 2.70        | 1.03      | 1.49      | 0.26      |
### Table A.1: Relationship with Business Cycles

#### Panel A: Raw Forecast Error

| Regression | 1     | 2     | 3     | 4     | 5     | 6     |
|------------|-------|-------|-------|-------|-------|-------|
| PD         | 0.001*** (7.06) |       |       |       |       | 0.000*** (5.72) |
| PE         | 0.000* (1.78) |       |       |       |       | 0.000*** (2.97) |
| DEF        | -0.013*** (-2.82) |     |       |       |       | -0.012** (-2.47) |
| TERM       | -0.000 (-0.26) |       |       |       |       | 0.002** (2.04) |
| TB         |       |       |       |       | 0.009 (1.48) | 0.004 (0.80) |
| Time       | 0.000*** (10.51) | 0.000*** (10.51) | 0.001*** (10.39) | 0.001*** (10.20) | 0.000*** (9.90) | 0.000*** (9.83) |
| Cons       | -0.063*** (-10.22) | -0.047*** (-8.55) | -0.030*** (-5.57) | -0.042*** (-8.28) | -0.042*** (-8.93) | -0.056*** (-7.76) |

\( R^2 \) 0.721 0.640 0.658 0.626 0.638 0.755

#### Panel A: Scaled Forecast Error

| Regression | 1     | 2     | 3     | 4     | 5     | 6     |
|------------|-------|-------|-------|-------|-------|-------|
| PD         | 0.004*** (10.16) |       |       |       |       | 0.004*** (8.27) |
| PE         | 0.002* (1.70) |       |       |       |       | 0.001* (1.89) |
| DEF        | -0.065** (-2.47) |     |       |       |       | -0.030 (-1.02) |
| TERM       | -0.005 (-0.51) |       |       |       |       | 0.015** (2.30) |
| TB         |       |       |       |       | 0.038 (1.39) | 0.016 (0.82) |
| Time       | 0.001*** (6.99) | 0.002*** (9.05) | 0.002*** (9.20) | 0.002*** (9.10) | 0.002*** (9.30) | 0.001*** (6.57) |
| Cons       | -0.396*** (-15.89) | -0.275*** (-9.87) | -0.177*** (-5.79) | -0.235*** (-7.83) | -0.240*** (-11.89) | -0.411*** (-9.96) |

\( R^2 \) 0.710 0.533 0.538 0.508 0.515 0.739