The analyst report's forecast horizon and bias

Andreas Charitou[a], Nikolaos Floropoulos[a], Irene Karamanou[a], M. H. Franco Wong[b]

[a] University of Cyprus, Nicosia, Cyprus

[b] Rotman School of Management, University of Toronto, Toronto, Canada

Abstract

We extend the literature on the role of institutional investors in capital markets by examining whether their investment strategy affects the horizon and bias of analyst earnings forecasts. First, we provide evidence that ownership by investors with a long-term investment horizon (LT Investors) incentivizes analysts to increase their forecasts' horizon. On the contrary, ownership by investors with a short-term investment horizon (ST Investors) is associated with shorter forecast horizons in the analyst reports. Second, we show that the walk down of analyst forecast bias starts three years before the earnings announcement and that LT and ST Investors influence this walk down in different directions. LT Investors decrease the positively biased forecasts, mitigating the difference with the actual value of future earnings, whereas ST Investors slow down the walk down process by increasing bias. Our results suggest that analysts adjust their forecast horizon and bias based on the firm's ownership structure, taking into account both the level and changes of institutional ownership. Furthermore, we find that LT and ST Investors affect both forecast properties of analyst reports in opposing directions. A longer forecast horizon increases the amount of available information in the market about the firms' longer-term prospects, whereas a change in bias affects the market's expectations. Thus, our study provides evidence that institutional investors affect both the quantity and quality of available information in the market through their influence on analyst research.

JEL: G14, G17, G23, G24

Keywords: Earnings forecasts, horizon, institutional investors, financial analysts, forecast bias.

1. Introduction

Analysts facilitate the distribution of financial information and, thus, influence stock prices, which makes them significant market participants (Lys and Sohn, 1990; Frankel, Kothari, and Weber, 2006; Brauer and Wiersema, 2018). Evidence also shows that analyst research and its products are affected by the firm's institutional ownership (Ljungqvist, Marston, Starks, Wei, and Yan, 2007; Gu, Li, and Yang, 2012), making these investors conspicuous partakers in the capital markets.

We extend the literature on the role of institutional investors in the capital markets by examining two characteristics of analyst research, the horizon and bias of earnings forecasts. We study these characteristics, because they have an important effect on stock valuation. Forecasts with a longer horizon are a significant source of information for the firm's longer-term performance, whereas forecast bias affects the market's expectations about future earnings and, consequently, the stock price. When we explore the investors' effect on the two earnings' forecast characteristics, we consider ownership by institutions with different investment horizons independently, because investment horizon significantly influences institutional investors' role in the capital markets (Bushee, 2001; Gaspar, Massa, and Matos, 2005; Bushee, Goodman, and Sunder, 2018).

First, we posit that the longer the owners' investment horizon in a stock, the greater the earnings' forecast horizon will be. We argue that longer investment horizons increase the demand for long-term information and, subsequently, analysts address this demand with the supply of forecasts with longer horizons.

Second, we examine how institutional investors' horizon affects forecast bias. Ljungqvist et al. (2007) provide evidence that institutional ownership negatively affects analyst recommendation bias, concluding that institutions play a monitoring role in analyst research. On the contrary, Bilinski, Cumming, Hass, Stathopoulos, and Walker (2018) find that institutional investors with a short-term horizon (ST Investors) provide incentives to analysts to increase target price bias. Motivated by the above research, we argue that the mitigation of bias observed in analyst research products, stems from institutional investors with a long-term horizon (LT Investors). In other words, we support that analysts adjust forecast bias according to the investment horizon of the firm's institutional owners.

Furthermore, we study the relative strength of the association between institutional ownership and forecast bias in different forecast horizons. Richardson, Teoh, and Wysocki (1999) provide evidence that earnings' forecasts follow a pattern of decreasing analyst bias during the year prior to the announcement. In this 12-month period, analysts gradually reduce their forecasts from an optimistically biased estimate at the start of the year to a slightly pessimistic figure in the last month before the announcement date, a process called the "walk down" of analyst forecasts. We argue that the walk down of analyst forecasts limits upward adjustments of bias, because if analysts increase their optimism during the year, they have to make larger adjustments on their future revisions (to reach the slightly pessimistic value at their last forecast before the announcement). On the other hand, analysts can more easily adjust their forecasts downward, because that would make the future adjustments smaller. Nevertheless, analysts can make larger adjustments, both upwards and downwards, in larger forecast horizons, because they have more time to make revisions. To study how the association between institutional ownership and forecast bias changes in different forecast horizons, our dataset incorporates earnings' forecasts for periods longer than the current fiscal year, which is the norm in prior studies.

Our dataset consists of analyst annual earnings' forecasts with a horizon of up to three years, over the period 2004-2017. Consistent with Bushee (1998), we divide institutional investors into three categories, transient, quasi-indexer and dedicated institutions. The transient institutions are classified as ST Investors, the dedicated as LT Investors, whereas the quasi-indexers are a control subsample.

Consistent with our expectations, we provide evidence that, analysts respond to LT Investors' demand for longer-term information about the firms' prospects by increasing the analyst reports' horizon through the disclosure of longer-term earnings' forecasts. We also find that ST Investors affect the reports' horizon in the opposite direction. Although we do not provide any expectations regarding the effect derived from ST Investors' ownership, this result is an indication that when LT Investors' ownership becomes less important in a firm, analyst incentives to provide longer-term forecasts also weaken.

Regarding analyst bias, we extend the findings of Richardson et al. (1999) by showing that the gradual decrease of forecast bias starts three years before the earnings announcement date. We also expand the literature that examines the factors that influence the walk down to beatable forecasts (Richardson, Teoh, and Wysocki, 2004), by providing evidence that the investment horizon of the firms' institutional owners influences this three-year walk down. These results are consistent with our expectations, which indicate that LT Investors mitigate, whereas ST Investors increase analyst bias. In summary, our study contributes by providing additional evidence about the influence institutional investors exert in capital markets and expands extant literature related to how heterogeneous types of investors affect the markets in opposing ways.

The remainder of this paper is organized as follows. The next section discusses prior literature and section 3 develops the hypotheses. The empirical models are presented in section 4 and the dataset in section 5. The results are discussed in section 6. Section 7 concludes the study.

2. Literature review

Analysts provide important information to the market that helps investors to assess future stock performance. Thus, the release of analyst research reports elicits significant market reaction (Francis and Soffer, 1997; Park and Stice, 2000; Merkley, Michaely, and Pacelli, 2017; Loh and Stulz, 2018). Stock price changes are associated with the analyst reports' content and especially with earnings forecasts, recommendations and target prices (Beyer, Cohen, Lys, and Walther, 2010).

2.1. The importance of institutional investors for analysts

Institutional investors can significantly affect the quality of analyst research in two important ways. First, because they vote for the best analysts in the Institutional Investor magazine all-star poll and a high ranking in this poll has a direct effect on the analysts' remuneration and career prospects. Therefore, institutional investors can significantly affect analyst reputation and their stock ownership is positively associated with analyst research quality (Ljungqvist et al., 2007).

Second, institutional investors pay indirectly for sell-side research through their trading commissions. This indirect payment, known as "soft dollars", provides sell-

side analysts with an additional financial incentive to follow stocks that are of interest to institutional investors (Blume, 1993). Casavecchia and Tiwari (2016) show that more than 80% of mutual fund advisers engage in soft dollar arrangements. Irvine (2000) analyzes the mechanism that connects soft dollars with the analyst's pocket and he provides evidence that sell-side analysts' decisions as to which firm to cover are influenced by the potential commission revenue. Furthermore, he shows in three steps how analysts increase their personal revenues when they provide high quality analyst research. First, analyst research is useful to brokerage clients, because trading on analyst recommendations creates abnormal profits. Second, the clients reward the brokers who employ analysts who provide excellent services by directing more trades to these brokers in the subsequent period. Third, this increase in trades is translated in increased earnings for analysts, as brokerage firms compensate analysts on the commission revenue that is generated by the stocks they follow.

2.2. Investment horizon and forecast horizon

The aforementioned discussion suggests that analysts face significant incentives to respond to institutional investors' needs due to the importance of institutional investors for the analysts' remuneration, career advancement and reputation. However, not all institutional investors are the same. Bushee (1998) creates a classification system of institutional investors that is based on various investors' characteristics and classifies institutions into three types: transient, quasi-indexer and dedicated institutions. Transient institutions have a short-term investment horizon, hold small amounts of stocks in many firms and trade frequently. On the contrary, dedicated institutions have a long-term horizon with large holdings in a limited number of firms. The quasi-indexers have a passive strategy of following the index and their portfolios are highly diversified with low turnover. For this reason, Bushee (1998) does not classify quasi-indexer institutions as neither long-term, nor short-term investors, but he uses them as a control subsample for the total institutional ownership.

The fact that institutional investors have different investment horizons and the existence of various forecast horizons in sell-side analyst research, combined with the documented influence of institutional investors on analyst research, creates the logical question as to whether the two horizons are related. To the best of our knowledge,

extant literature has not examined this issue yet. However, the disclosure of forecasts for a longer period alters the information available in the market and the expectations about future firm earnings. Therefore, this disclosure also affects stock prices and, thus, the question whether the investment horizon of institutional investors drives the analysts' decision to disclose forecasts for more or less periods is worthy of investigation.

2.3. The bias in analyst research

2.3.1. Why and when is analyst research biased?

Another important characteristic of analyst research is bias. Analyst bias affects the market's expectations about the future earnings' forecasts and, thus, it changes stock prices. Prior literature provides evidence that various factors influence analyst bias either upwards or downwards.

Several conflicts of interest drive brokerage analysts to issue optimistically biased research reports. Lin and McNichols (1998) provide evidence that affiliated analysts issue more favorable recommendations than non-affiliated analysts do. Lim (2001) shows that analysts increase their reports' bias to improve their relations with the firm's management. Hong and Kubik (2003) find that optimistic analysts are more likely to experience favorable job changes and this is an incentive to increase the bias in their research. Cowen, Groysberg, and Healy (2006) indicate that positively biased reports increase trading volume, also increasing the brokerage firm's commissions. Lourie (2018) provides evidence that analysts in their last year of employment as analysts issue optimistic reports about the firms that, subsequently, become their employers.

Although conflicts of interest are associated with optimistically biased analyst research, there is also evidence that analysts mitigate bias for various reasons. Analysts decrease the positive bias of their forecasts as the announcement date of the actual earnings approaches and they tend to provide negatively biased forecasts in the last days before the announcement (Richardson et al., 1999). Chan, Karceski, and Lakonishok (2007) affirm that positive earnings' surprises, which are a product of pessimism in the last analyst forecast before the earnings' announcement, are more likely than negative ones. Analyst competition at both firm and industry level is negatively associated to optimism in bias (Hong and Kacperczyk, 2010; Merkley et

al., 2017). Evidence also shows that analysts that provide less biased forecasts have higher market influence (Keskek and Tse, 2016).

Jackson (2005) provides further evidence that analysts face mixed incentives regarding bias. He finds that better reputation generates higher commissions for the analyst's brokerage firm and this urges analysts to issue unbiased research to build their reputation. However, optimistic analysts also increase their firms' trade and this incentivizes analysts to issue biased research. He concludes that these opposing incentives make analysts to trade off reputation loss with the benefit of higher short-term trading commissions.

The mixed incentives found in literature regarding analyst bias, raises the question as to whether analyst research is mainly optimistic or pessimistic. Prior literature provides evidence that analyst research is on average positively biased. Beyer and Guttman (2011) show that analysts are more likely to bias forecasts upwards than downwards and this makes the average analyst forecast optimistic. Richardson et al. (1999) show that the analyst earnings forecasts are positively biased at the start of the year preceding the annual earnings announcements, but this optimism decreases gradually as the year passes, becoming negative at the end of the year. The change from positive to negative bias takes place in the last month before the earnings announcement date and, thus, the forecasts are favorable in the largest part of the year and on average.

2.3.2. The institutional investors' effect on analyst bias

Extant evidence on the effect of institutional investors on analyst bias has been inconclusive. On one hand, Ljungqvist et al. (2007) find that higher institutional investor ownership moderates the potential conflicts of interest that the analysts face, reducing the optimism in their recommendations. On the other hand, Gu et al. (2012) find that for stocks in which fund companies have taken large positions, analysts issue optimistic recommendations due to the increased commissions brokerages receive from these funds. Bilinski et al. (2018) associate the distinct monitoring effects of institutional investors with their investment horizon. They provide evidence that analysts produce more biased forecasts for the target prices of stocks with high short-term institutional ownership, when they examine whether this effect also exists in earnings forecasts, but they do not find significant results. They explain this

inconsistency by positing that the bias in earnings forecasts is more evident, and thus more detrimental to analyst reputation, than the bias in target prices. They conclude that analysts provide optimistic target prices to cater to investors with a short-term horizon and they identify the investment horizon of the firm's owners as a source of analyst conflicts.

3. Hypotheses Development

We first examine whether the institutional investor horizon is associated with the horizon of earnings' forecasts in analyst reports. We argue that institutions with a long-term investment horizon (LT Investors) are more interested in the long-term performance of the firm than institutions with a short-term horizon (ST Investors). For this reason, when LT Investors invest in a stock, there is an increase in the demand for information about the firm's long-term performance.

Literature shows that analysts respond to the demand by institutional investors with the supply of relevant information. Boone and White (2005) argue that ownership by institutional investors affects the demand for information production. They provide evidence that analysts respond to this demand by finding a positive association between the firm's institutional ownership and the number of analysts that follow the firm. Brown, Call, Clement, and Sharp (2015) survey 365 analysts about the drivers of analyst research. The analysts reply that their clients' demand is the major determinant in their decision to cover a company, the principal reason for making profitable stock recommendations and one of the two main drivers for providing accurate earnings forecasts. Furthermore, more than 80% of the analysts answer that hedge funds and mutual funds are very important clients, with the rest of the institutional investors following in importance, whereas less than 20% give the same response for high net worth individuals and retail clients. As a total, the survey's findings show that the analysts answer that they aim to cater to the needs of their clients, with the most important clients being the institutional investors.

Given that the demand from institutional investors is the most important determinant of analyst research products, we argue that analysts respond to LT Investors' demand for longer-term information by issuing reports that evaluate firm performance for a longer period. For this reason, we expect that increases in LT Investors' ownership are associated with the disclosure of information for a longer horizon.

Hypothesis 1: LT Investors' ownership changes are positively associated with analyst reports' horizon changes.

We next examine whether the institutional investment horizon is related to the analyst forecast bias. Analyst research incorporates estimates of different horizons with the use of earnings' forecasts and the forecast horizon is considered a significant factor that greatly affects bias (Richardson et al., 1999; Ke and Yu, 2006). We can exploit this association between forecast horizon and bias to examine whether the possible relation between the investors' horizon and bias is equally significant for forecasts with different horizons. To study this additional research question, first we need to investigate if the forecasts with a horizon less than a year are equally biased to those with larger horizons.

Richardson et al. (1999) study the bias in earnings' forecasts with a horizon up to one year. They show that analysts issue optimistic forecasts at the start of the fiscal year, which they decrease to a beatable target before the earnings announcements. They call this the "walk down" of forecast bias and argue that this pattern takes place, because analysts have to balance between their need for a good relationship with the firm's management and their aim to provide accurate forecasts. They achieve this dual role with an adjustment of bias within the year. At the start of the fiscal year, they provide positively biased forecasts to please the management. As the forecast horizon diminishes and the disclosure of the actual value comes closer, the need to provide an accurate forecast becomes greater. This makes analysts to gradually reduce their forecasts' optimism. At the end of the year, managers want to avoid a negative earnings surprise. The analysts' incentives to please the management combined with the managers' need to beat the market, result in the disclosure of pessimistic analyst forecasts in the last month before the earnings announcement. Due to the analysts' need for accuracy, these pessimistic forecasts are very close to the actual value and this is why the analysts' final forecast is a figure slightly below the earnings announced by the firm. Ke and Yu (2006) find additional positive externalities for analysts that provide optimistic forecasts at the start of the year and then revise them to a pessimistic figure before the earnings announcement. They document that the analysts that follow this strategy issue forecasts that are more accurate and are less likely to lose their jobs. Their conclusions reconfirm that this behavior aims at a good relationship with the firm's management.

Consistent with the reasoning of Richardson et al. (1999), we support that the larger horizon further weakens the analysts' incentives to provide accurate forecasts and increases the importance of conflicts of interest, such as pleasing the firm's management. For this reason, we expect a further increase of the mean value of bias for longer horizons. Such a finding would provide evidence that the walk down of analyst forecast bias, that prior studies find in earnings' forecasts with a horizon up to one year, starts three years before the earnings' announcement date.

Hypothesis 2a: The forecast horizon is positively associated with forecast bias.

We proceed by studying the effect of the institutional owners' horizon on bias. As mentioned above, we also examine whether this effect differs between shorter and longer forecast horizons. Bilinski et al. (2018) provide evidence that ST Investors' ownership is positively associated with target price bias, but they do not find an effect of ST Investors' ownership on current year's earnings forecasts. They argue that the results for the two measures differ, because the reputational cost for optimistically biased earnings forecasts is higher than that for target prices. Consistent to this reputational cost analysis, we posit that increasing bias above the values predicted by the walk down hypothesis is a risky analyst strategy. However, we argue that the risk associated with increased bias decreases in larger forecast horizons. If the analysts provide optimistic forecasts in their last forecast before the earnings' announcement, then the manager will not beat the forecast and this will jeopardize the analysts' access to the management's private information. Furthermore, if the analysts increase their already positively biased estimates in earlier forecasts, then, in the following forecast revisions, the analysts will have to increase the amount or the extent of their adjustments. If the forecast has a short horizon, increasing the forecast adjustments also increases the analysts' reputational costs. However, a longer forecast horizon provides more time to the analyst for future adjustments, making revisions less frequent or smaller in extent, thus, decreasing reputational costs. Consequently, given a larger horizon, analysts can increase forecast bias further, giving them the opportunity to please the firm's management without damaging their reputation. For this reason, we expect the analysts to be able to increase the forecast bias when they provide forecasts for a horizon sufficiently larger than a year. Thus, ST Investors' ownership changes will be positively associated to forecast bias changes in longer-term horizons.

Hypothesis 2b: ST Investors' ownership changes are positively associated with forecast bias changes of longer-term periods.

Contrary to the study of Bilinski et al. (2018) which links ST Investors with increased analyst optimism, Ljungqvist et al. (2007), who study institutional investors as a homogeneous group, show that the institutional investors' presence is associated with lower recommendation bias and, thus, they have a monitoring role. Therefore, we argue that the monitoring effect of institutional investors stems from the LT Investors. As mentioned above, when analysts have high forecast bias, they subsequently have to make larger forecast revisions and this has adverse effects on their reputation. However, if the analysts reduce their optimism, then they also decrease the extent of future revisions needed to reach the target of providing a slightly pessimistic forecast at the end of the year. This means that mitigating bias is a strategy that has no reputational costs for the analysts. As there are no reputational costs, the analyst can implement this strategy for all forecasts, even when the horizon is short. Thus, we expect LT Investors' ownership changes to be negatively associated to forecast bias changes regardless of the forecast horizon.

Hypothesis 2c: LT Investors' ownership changes are negatively associated with forecast bias changes.

4. Empirical models

4.1. Forecast horizon

To test our first hypothesis, which states that LT Investors' ownership changes are positively associated with analyst reports' horizon, we will use earnings forecasts, because their horizon is at the analysts' discretion.[1] Analysts usually forecast earnings on an annual and a quarterly basis. However, their primary product is annual forecasts and, for this reason, quarterly forecasts are not included in all reports.[2] Analysts issue

[1] The most important products of analyst research are earnings' forecasts, stock recommendations and target prices. Analysts do not provide a horizon for stock recommendations. Target prices are horizon-specific, but, although a very limited amount of exceptions exists, the vast majority of target price forecasts has a 12-month horizon. We downloaded target prices from I/B/E/S for the period 2004-2017 to examine the differences in target price horizons. Target prices with a 12-month horizon constituted approximately 98.5% of the sample. 1.2% of the sample had a 6-month horizon and the remaining 0.3% was divided in various horizons ranging from 3 months to 3 years.

[2] To examine how often analysts disclose quarterly and semi-annual earnings forecasts, we downloaded from I/B/E/S all forecasts for the years 2004-2017. According to this sample, 74% of

annual earnings forecasts for the current fiscal year only or the current year plus additional years into the future (see Table 1). The analysts' decision on the number of years for which they provide forecasts in the report indicates if they focus on evaluating only the short-term performance of the firm or their goal is to estimate firm performance for a longer period. This makes annual forecasts an appropriate venue to study if an analyst responds to the demand for information by LT Investors.

To examine how institutional ownership changes are associated with the likelihood of disclosing earnings forecasts for additional fiscal years we use the following model:

$$Report\ horizon\ change = \beta_0 + \sum_{i=1}^{3} \beta_i\ Institutional\ ownership\ change + \sum_{j=1}^{3} \beta_j\ Institutional\ ownership + \sum_{k=1}^{11} \beta_k\ Other\ Controls + \varepsilon \quad (1)$$

where the *Report horizon change* is one of *ΔRHorizon* and *ΔLH Reports%*. The first variable, *ΔRHorizon* is the change between quarter q and quarter q-1 in the report's forecast horizon for analyst y and firm k. The report's horizon is the number of annual periods for which the analyst report provides earnings forecasts. As we can observe in Table 1, Panel A, analyst reports contain annual earnings forecasts for different numbers of years, ranging from a minimum of one year to a maximum of nine years. To create the second variable we classify analyst reports in two categories, Short-Horizon Reports (SH Reports) and Long-Horizon Reports (LH Reports). Although the reports' horizons differ significantly, the most important distinction is between the ones issuing forecasts for two years (approximately 50% of the sample) and those that also provide a third year (23%). Thus, we define SH Reports as these that include one or two annual forecasts and LH Reports as those that disclose three or more annual forecasts. This classification creates two subsamples with the SH Reports being approximately 71% of our sample and the LH Reports 29%. *ΔLH Reports%* is the change in the LH Reports percentage between quarter q and quarter q-1 for firm k .

The *Institutional ownership change* is the ownership percentage change during quarter q-1 for firm k, which we define as the difference of institutional ownership

reports with annual forecasts also comprise quarterly predictions, whereas only 0.02% include semi-annual forecasts.

between the end of quarter q-1 and q-2. To test our hypotheses we disaggregate institutional ownership into investors with a short-term and a long-term horizon. Consistent with the classification by Bushee (1998), we use ownership by transient institutions (*TRA*) as our proxy for ST Investors, dedicated (*DED*) institutions for LT Investors and we include in the analysis the quasi-indexers (*QIX*) to control for the remaining institutional ownership. We calculate the total ownership for each investor type by adding the ownership percentages by the owners of the respective type. The variables *ΔTRA*, *ΔQIX* and *ΔDED* measure the percentage ownership changes for firm k during quarter q-1 in transient, quasi-indexer and dedicated institutions, respectively.

Consistent with related prior studies, we control for characteristics that affect analyst forecasts. The controls are divided into two main categories: a) the analyst and forecast characteristics and b) the firm and stock characteristics. The analyst and forecast characteristics are *Horizon*, *Firm Experience* and *Total Experience*. Collected data of these three characteristics are specific for the individual forecast or analyst, whereas our models require observations on a firm-quarter basis. We calculate the mean value of these characteristics on a firm-quarter level from the collected data to create the observations for the three variables that we use in our models. Analysts issue optimistic annual earnings forecasts at the start of the fiscal year and, as the forecast horizon becomes shorter, the bias diminishes until it becomes negative during the last month before the earnings announcement (Richardson et al., 1999; Richardson et al., 2004; Bradshaw, Lee, and Peterson, 2016). We control for this optimism differential with *Horizon*. We first measure the forecast horizon as the natural logarithm of one plus the difference in days between the date of the each analyst's last forecast in calendar quarter q for firm k and the firm earnings' announcement date. We then define *Horizon* as the mean value of all forecast horizons for firm k in quarter q. Following prior literature that examines analyst bias and analyst research in general, we include in our model two variables that measure analyst experience (Lim, 2001; Ljungqvist et al., 2007; Green, Jame, Markov, and Subasi, 2014). *Firm Experience (Total Experience)* measures the mean value of the analysts' firm specific (total) experience for firm k in quarter q. Each analyst's experience is calculated as the logarithm of one plus the number of quarters that the analyst covers the firm (is present in I/B/E/S) until the current quarter.

Our control variables for firm and stock characteristics include *Analyst Following*, *Market Value*, *Market Risk*, *Momentum*, *Book-to-Market*, *ROE*, *Loss* and *Leverage*. Our variables also control for analyst competition, firm size, stock market risk, stock market momentum, growth, profitability and fundamental risk, characteristics which are also controlled for in prior literature when assessing analyst forecasts (Das, Levine, and Sivaramakrishnan, 1998; Lim, 2001; Hong and Kacperczyk, 2010; Merkley et al. 2017). All firm and stock variables are measured during or at the end of calendar quarter q-1, except for *Analyst Following*, which is calculated in calendar quarter q. We define *Analyst Following* as the logarithm of one plus the number of analysts disclosing at least one earnings forecast of the specific annual forecast period for firm k during quarter q. We distinguish between the analysts following the firm based on the forecast horizon, because past literature uses this variable as a proxy for analyst competition (Hong and Kacperczyk, 2010). When analysts disclose a forecast for a long-term horizon, the issued forecast competes mainly with other estimates forecasting the same fiscal year, because a firm's earnings can differ significantly from one year to another. Thus, the competition in a forecast for the year t consists of all the analysts disclosing a forecast for the specific period. We use *Market Value* as a proxy for firm size, defined as the natural logarithm of one plus the product of the common shares outstanding and the stock price of the firm. *Market Risk* is defined as the standard deviation of the stock's price in quarter q-1, divided by the mean stock price. *Momentum* is the buy-and-hold return of the stock during the preceding calendar quarter. *Book-to-Market* is the logarithm of one plus the ratio of common equity divided by the product of common shares outstanding multiplied with the firm stock price. We use two variables to control for profitability, *ROE* (return on equity) and *Loss*. *ROE* is the ratio of the net income divided by the total common equity, whereas *Loss* is an indicator variable where the value 1 is assigned if the quarterly net income is negative and 0 otherwise. *Leverage* shows the firm's fundamental risk and is the ratio of total liabilities divided by total assets.

We use firm fixed effects and clustered errors to control for firm specific differences. We also observe in Figure 1 that the reports' horizon has changed significantly during our sample period. Between the years 2004 and 2017, the mean forecast horizon increases approximately by half a year and the reports disclosing forecasts for three or

more years triple. We control for this with year fixed effects. In addition, we winsorize all continuous variables at the 1% and 99% levels.

4.2. Forecast bias

We first examine whether there is a walk down of the forecast bias in forecasts with a horizon longer than one year with the following model:

$$FB = \beta_0 + \sum_{i=1}^{3} \beta_i \, Horizon\, Variables \; + \sum_{k=1}^{10} \beta_j \, Controls + \varepsilon \quad (2)$$

where *FB* is the forecast bias in quarter q. We define the forecast bias, consistent with Merkley et al. (2017), as the difference between the value of the consensus earnings' forecast for firm k and fiscal year t and the firm's earnings for that year, divided by the absolute value of the consensus forecast. To calculate the consensus earnings forecast for the firm's annual earnings, we use the last forecast of each analyst in calendar quarter q. Following Merkley et al. (2017), we exclude firms with absolute values of the consensus forecast that are less than 10 cents per share to avoid statistical issues due to small scalars.

We create three specifications of model (2) with each specification examining hypothesis 2a with different *Horizon Variables*. Specification (1) uses the variable *Horizon*, used also in model (1) to assess the validity of our hypothesis with a continuous variable. In the second specification, we use the ordinal variable *FY*. It takes the value 1 if the forecast refers to the earnings for the current year (year t), 2 if it estimates the following year's earnings (year t+1) and 3 if it is an earnings' forecast for the year after the following (year t+2). Instead of one ordinal variable, we use two indicator variables in the third specification. We assign the value *FY2* (*FY3*) to the forecasts of the year t+1 (t+2) and 0 otherwise.

The controlling variables of model (2) are the same as in model (1), with the exception of *Horizon*, which is substituted in specifications (2) and (3) as explained above. All continuous variables are winsorized, as in the first model, in the 1% and 99% levels. Furthermore, we use the fixed effects and clustered errors of the previous model, but we also add fiscal quarter fixed effects to control for the walk down effect of forecast bias within the year.

We then investigate whether institutional ownership is associated with forecast bias with the following model:

$$\Delta FB = \beta_0 + \sum_{i=1}^{3} \beta_i \, Institutional\ ownership\ change + \sum_{j=1}^{3} \beta_j \, Institutional\ ownership + \sum_{k=1}^{11} \beta_k \, Other\ Controls + \varepsilon \quad (3)$$

where ΔFB is the change in the forecast bias between quarter q and quarter q-1. The independent variables of model (3) are the same as in model (1). All continuous variables are winsorized, as in the preceding models, in the 1% and 99% levels. Furthermore, we use the fixed effects and clustered errors of the previous model.

5. Data

We download analyst annual earnings forecasts for all NYSE/NASDAQ/AMEX firms from I/B/E/S. Our sample period comprises the years 2004-2017. We start from the year 2004, because it is the first year after the Global Analyst Research Settlement of April 28, 2003. The Settlement aimed to address conflicts of interest between research and investment banking.[3] Thus, we exclude the period before 2004 to avoid issues related to conflicts of interest that the Settlement successfully addressed and do not affect analyst research thereafter. The sample period ends at the year 2017, which is the latest available data year that is provided by Bushee.

In the regression models, we use the forecasts of the first three annual forecast horizon periods (FY1-FY3).[4] We also use the observations of the fourth forecast year when they are needed to create forecast bias differences for the third year and those of longer annual periods to calculate the analyst reports' forecast horizon.

To find the report's horizon, we downloaded all annual earnings' forecast observations for our sample period. Given that analysts do not issue more than one report in any given day, we assume that all the observations that are disclosed in the same date and have different horizons belong to the same analyst report. These

[3] http://www.finra.org/industry/2003-global-settlement.

[4] For the remainder of the study we use interchangeably the term "forecast year 1" and its abbreviation "FY1" for a forecast made for the current fiscal year. In an analogous way, we use "forecast year 2" and "FY2" for a forecast about the year following the current, whereas "forecast year 3" and "FY3" indicate the year after the following.

observations comprise forecasts with a forecast horizon between one and up to nine years. We define the report's horizon as the forecast with the largest horizon for a specific date. Measuring our observations in the analyst report level, our sample consists of 1,158,266 reports. For our multivariate models, we create the mean values of our variables on the firm-quarter level, leading to a sample of 137,659 observations.

I/B/E/S data are used for the calculation of all analyst related variables. We download the stock holdings' data from Thomson Reuters. We combine these data with institutional investor classification data, which is available online from Bushee, Wharton School, to calculate stock ownership by the three institutional investor types: transient, quasi-indexer and dedicated.[5] To create firm fundamental variables, such as *ROE* and *Leverage*, we use data from COMPUSTAT. For stock market related variables, such as *Market Risk* and *Momentum*, the source is CRSP.

6. Results

Sample and variable statistics

Table 1 presents the forecast horizon frequencies. Panel A shows the statistics on the analyst report level, whereas Panel B on the firm-quarter basis. The vast majority of analyst reports (approximately 94%) disclose earnings forecasts for up to three years, with 21% providing estimates only for the current year, 50% for two annual periods and 23% for three years. Only 6% of the reports estimate longer periods, between four and nine years, with only a limited number of those providing forecasts for more than five years. When we examine the distribution of forecast horizons on a firm-quarter level, we observe that for 52% of the firm-quarters the mean horizon is two years or less. The remaining 48% of the firm-quarters have a mean forecast horizon over 2 years, which means that at least one of the analysts forecasting firm k in quarter q provides a forecast report with a horizon of three years or more. The results in both panels indicate that the main distinction among analyst report horizons is between reports providing forecasts for two years or less and those estimating a longer period of three years or more.

Table 2 presents descriptive statistics for all variables used in our multivariate models. Both variables that measure changes in the reports' horizon, *ΔRHorizon* and *ΔLH*

[5] http://acct.wharton.upenn.edu/faculty/bushee/IIclass.html.

Reports%, have a median value of zero and negative mean values. The mean decrease of the report's horizon is 0.08 years, whereas the reports changing from LH Reports in quarter q-1 to SH Reports in quarter q are 3% more than the ones making the change from a short horizon to a long one.[6] The forecast bias has a median value 1.64% and a mean value 14.28%, while the change in forecast bias is negative with a median value -0.07% and a mean value -1.13%. These figures are consistent with the findings of prior literature, i.e. the existence of a positive mean bias and the walk down of earnings' forecasts. The changes in the three institutional investor types are the main independent variables in two of our models. The mean values of these variables show that all three investor types increase their ownership during our sample period. We also observe that the presence of dedicated owners increases more than that of transient institutions during our sample period, although the former have fewer holdings than the latter. This means that LT Investors gain importance through our sample period and this finding can be a possible reason why, in Figure 1, we observe an increase in the reports' horizon during the period 2004-2017.

Table 3 presents Pearson correlations for all dependent and the main independent variables included in our models. We observe that both the changes in the analyst report's horizon and the changes in the LH Reports' percentage are positively associated with the changes in ownership by dedicated institutions, who are LT Investors. On the contrary, the relation between both variables that measure report horizon changes and ST Investors' ownership changes are negative, as depicted by transient investors. The quasi-indexers behave in a similar way to the LT Investors, having a positive correlation to both variables measuring changes in the report's horizon. These results are consistent with our first hypothesis that analysts adjust the report's horizon to cater to the demand by LT Investors for forecasts of longer horizons. Furthermore, results in this table show that the correlations between transient ownership changes and changes in forecast bias are positive, whereas the

[6] Although these negative differences are not consistent with the increase in the reports' horizon that we observe in Figure 1, a possible explanation for these different findings is that when analysts start covering a firm, their report has a longer horizon than when they drop coverage. There are several reasons why this might happen. For example, the firm's performance and analyst competition can be contributing factors to such a behavior. Analysts tend to start covering firms with good financial performance and, thus, are able to forecast long periods. On the other hand, they tend to drop poor performing firms and have to drop firms failed firms. These firms are risky and it is a rational strategy for the analyst to avoid proving estimates for the long-term. In addition, an analyst who enters the market has incentives to provide more information than the competitors do, because this increase the changes of attracting clients. This can be achieved through longer horizon forecasts.

forecast bias changes for dedicated investors are negatively correlated to ownership changes. For quasi-indexers the correlation is positive. These results are consistent, for both ST and LT Investors, with our hypothesis that analysts adjust the forecast bias in a favorable way to the needs of investors based on the investors' horizon. The correlation table as a total provides preliminary evidence in favor of the hypothesis that analysts adjust both the horizon and the bias of their forecasts to cater to institutional investors' different needs.

The earnings' forecast horizon of analyst reports

In Table 4, we empirically test our first hypothesis. We expect that the LT Investors' ownership changes affect the demand for longer-term information, incentivizing the analysts to provide earnings' forecasts for a longer horizon. The dependent variable in specification (1) is *ΔRHorizon*, while in (2) *ΔLH Reports%*. Consistent to our expectations, the coefficients of the percentage changes in LT Investors' ownership, which is measured by *ΔDED*, are positive and statistically significant at the 1% level in both specifications. This suggests that LT Investors' ownership changes in quarter q-1 are positively associated to changes in the analyst reports' horizon in the following quarter. In addition, the positive coefficient of *DED*, shows that a high dedicated ownership level strengthens the effect of LT Investors on the report's horizon. Interestingly, the coefficient of *ΔTRA* is negative in both specifications of Table 4. These findings indicate that changes in ST Investors' ownership are negatively associated with the reports' horizon. In addition, the coefficients of *TRA* are also negative, showing that for larger ST Investors' ownership the forecast horizon is smaller. Results for ST Investors suggest that when they gain importance in the firm ownership structure, the analyst forecast horizon diminishes. The positive and significant coefficient on *ΔQIX* indicates that increases in the holdings of quasi-indexer institutions are also associated with greater horizon forecasts. Furthermore, we observe that *Firm Experience*, *Analyst Following*, *Book-to-Market* and *Leverage* are positively associated to forecast horizon, whereas *Market Risk* and *Loss* are inversely related to forecast horizon. In summary, the evidence presented in Table 4 supports our first hypothesis that LT Investors' ownership changes are positively associated with analyst reports' horizon changes. These results are in favor of our hypothesis that analysts increase their earnings' forecast horizon to satisfy LT Investors' demand for information about the firm's longer-term prospects. With the

finding that analysts adjust their forecast horizon based on the institutional investors' horizon to cater to specific investors' needs, we proceed to examine whether they follow the same strategy with forecast bias.

The earnings' forecast bias

In Table 5 we test hypothesis 2a, where we investigate whether the walk down of forecast bias, documented by Richardson et al. (1999) for estimates issued in the last year before the earnings announcement, is part of a walk down that takes place for a longer period. We examine this issue for forecasts announced in the last three years before the earnings announcement.[7] We expect the forecast bias to increase as we get further away from the announcement date or, in other words, we expect that the walk down of forecast bias starts three years before the announcement and continues in the same direction until the end of this period. To test this hypothesis, we pooled the observations of all three annual forecast horizons and, thus, we have a much larger sample size. The three specifications presented in Table 5 use different variables to measure the forecast horizon. Specification (1) uses the variable *Horizon,* a continuous variable. In specification (2), we substitute the continuous measure with *FY*, an ordinal variable that takes the values 1 to 3 for the corresponding annual periods. In the last specification we use two variables, *FY2* and *FY3*, which are indicator variables for earnings' estimates forecasting the following year and the year after the following, respectively.

In specification (1) of Table 5, consistent to our expectations, we observe that *Horizon* is positively associated with forecast bias. This suggests that there is a walk down of forecast bias for the entire three-year period. The coefficient of *FY* in specification (2) is positive and significant. The coefficient is over 10 and indicates that the mean forecast is approximately 10.3% more positively biased when it estimates the fiscal year t+1 (t+2) compared to year t (t+1). In specification (3), both coefficients of *FY2* and *FY3* are positive and significant. They show that a forecast for the fiscal year t+1 is 13% more biased than a forecast for the year t, whereas the bias difference increases to 19.6% between year t+2 and year t. Furthermore, the F-test between the two coefficients (not tabularized) is 182.32 and the p-value 0, showing that the difference between the years t+1 and t+2 is also statistically significant. Other

[7] We stop our analysis at FY3, because, as shown in Table 1, Panel A, approximately 94% of analyst reports provide forecasts for up to three years.

factors affecting the forecast bias are *Market Value*, *Market Risk*, *Momentum*, *Book-to-Market*, *ROE* and *Loss*. The results in Table 5 indicate that the walk down of forecast bias starts (at least) three years before the earnings' announcement and is not only a characteristic of the last year. These findings provide evidence that when analysts disclose forecasts for a period which is longer than a year, their estimates are much more biased than these of the current year are. Therefore, forecasts for the following years do not reflect the true expectations about the firms' earnings, but show a beautified image of future firm performance.

In Table 6, we present results related to hypotheses 2b and 2c. We study how institutional ownership changes are associated with the consensus forecast bias' changes in three different annual horizons. The first column reports the results for the current year's forecasts (FY1), the second for the following year's (FY2) and the third of the forecasts for the year after the following (FY3). We expect LT Investors to exert the opposite effects than ST Investors, with the former mitigating bias and the latter increasing it. We also expect LT Investors to affect bias in all horizons (FY1-FY3), while ST Investors to have limited influence on bias for longer horizons. We observe that transient ownership changes do not affect the consensus bias of the forecasts for FY1 and FY2, but they are positively associated with changes in forecast bias of the year after the following. However, this association is only significant at the 10% significance level. Although these results suggest that ST Investors' ownership changes have an insignificant effect on forecast bias, their presence is significant. The coefficients of *TRA* are significant at the 5% level or higher for all three forecast periods, indicating that high ST Investors' ownership increases bias, effectively slowing down the walk down of forecast bias. These findings support hypothesis 2b that ST Investors are positively associated with forecast bias, but they show that this effect is derived mainly from ST Investors' ownership levels. Dedicated ownership changes, on the other hand, are negatively linked to the consensus bias changes for all three periods, with FY1 being significant at the 10% level, whereas for both FY2 and FY3 the significance level is 1%. The sign of the coefficients of ΔDED are consistent with hypothesis 2c, showing that increases in LT Investors' ownership are associated with decreases in forecast bias. *Market Value*, *Momentum*, *Book-to-Market*, *ROE* and *Loss* are also associated in the majority of forecast periods with forecast bias changes. As a whole, the results presented in Table 6 support our hypotheses that LT Investors

decrease bias, whereas ST Investors increase it. These results show that institutional investors affect analyst bias, but the direction of this effect depends on their investment horizon.

In summary, results presented in Tables 4, 5 and 6 provide evidence that analysts adjust the earnings' forecast horizon and bias based on the investors' horizon to cater to investors' needs. They also suggest that the effect of LT Investors is different from that of ST Investors for both forecast characteristics.

7. Conclusions

We examine how the institutions' investment horizon influences the horizon and bias of analyst earnings' forecasts. Regarding the forecast horizon, our results are consistent with our first hypothesis that investors with a long-term investment horizon (LT Investors) increase the demand for longer-term earnings forecasts, thus, increasing the horizon of the analyst reports. On the contrary, we find a negative association between investors with a short-term investment horizon (ST Investors) and the reports' horizon. The institutional investors' influence on the forecast horizon indicates that these institutions affect the quantity of available information in the market about the firms' longer-term earnings. We also provide evidence that the investment horizon of institutional investors is associated with the analyst forecast bias. Consistent to our second hypothesis, we show that LT Investors' ownership changes mitigate bias, whereas the ST Investors' presence increases bias. These results indicate that institutional investors affect the market's expectations for the firms' future prospects through their influence in analyst research.

We extend the research of Richardson et al. (1999), who find a walk down of forecast bias during the last year before the earnings announcement, with our finding that the walk down starts three years before the announcement. We document that long-term forecasts are significantly more biased than short-term forecasts. We also examine the institutional investors' influence on earnings' forecast bias in the three annual periods and we show that the effect of both LT and ST Investors on forecast bias varies in significance depending on the forecast horizon.

Our findings indicate that analysts simultaneously adjust the horizon and the bias of their reports and that these changes are associated with changes in institutional ownership that took place in the preceding quarter. Furthermore, results show that LT

and ST Investors affect both forecast characteristics in different ways. LT Investors' ownership incentivizes analysts to increase their earnings' forecast horizon and mitigate bias. On the contrary, ST Investors are associated with shorter horizons and a strong presence by this type of institutions slows down the walk down of analyst forecast bias.

References

Beyer, A., Cohen, D. A., Lys, T. Z., and Walther, B. R. (2010). The financial reporting environment: Review of the recent literature. *Journal of accounting and economics, 50*(2), 296-343.

Beyer, A., & Guttman, I. (2011). The effect of trading volume on analysts' forecast bias. *The Accounting Review, 86*(2), 451-481.

Bilinski, P., Cumming, D., Hass, L., Stathopoulos, K., and Walker, M. (2018). Strategic distortions in analyst forecasts in the presence of short-term institutional investors. *Accounting and Business Research*, 1-37.

Blume, M. E. (1993). Soft dollars and the brokerage industry. *Financial Analysts Journal, 49*(2), 36-44.

Boone, A. L., & White, J. T. (2015). The effect of institutional ownership on firm transparency and information production. *Journal of Financial Economics, 117*(3), 508-533.

Bradshaw, M. T., Lee, L. F., and Peterson, K. (2016). The interactive role of difficulty and incentives in explaining the annual earnings forecast walkdown. *The Accounting Review, 91*(4), 995-1021.

Brauer, M., & Wiersema, M. (2018). Analyzing analyst research: a review of past coverage and recommendations for future research. Journal of Management, 44(1), 218-248.

Brown, L. D., Call, A. C., Clement, M. B., and Sharp, N. Y. (2015). Inside the "black box" of sell-side financial analysts. *Journal of Accounting Research, 53*(1), 1-47.

Bushee, B. J. (1998). The influence of institutional investors on myopic RandD investment behavior. *Accounting review*, 305-333.

Bushee, B. J. (2001). Do institutional investors prefer near-term earnings over long-run value?. *Contemporary Accounting Research, 18*(2), 207-246.

Bushee, B. J., Goodman, T. H., & Sunder, S. V. (2018). Financial Reporting Quality, Investment Horizon, and Institutional Investor Trading Strategies. *The Accounting Review*.

Casavecchia, L., and Tiwari, A. (2016). Cross trading by investment advisers: Implications for mutual fund performance. *Journal of Financial Intermediation, 25*, 99-130.

Chan, L. K., Karceski, J., and Lakonishok, J. (2007). Analysts' conflicts of interest and biases in earnings forecasts. *Journal of Financial and Quantitative Analysis, 42*(4), 893-913.

Cowen, A., Groysberg, B., and Healy, P. (2006). Which types of analyst firms are more optimistic?. *Journal of Accounting and Economics, 41*(1-2), 119-146.

Das, S., Levine, C. B., and Sivaramakrishnan, K. (1998). Earnings predictability and bias in analysts' earnings forecasts. *Accounting Review*, 277-294.

Francis, J., and Soffer, L. (1997). The relative informativeness of analysts' stock recommendations and earnings forecast revisions. *Journal of Accounting Research, 35*(2), 193-211.

Frankel, R., Kothari, S. P., and Weber, J. (2006). Determinants of the informativeness of analyst research. *Journal of Accounting and Economics, 41*(1), 29-54.

Gaspar, J. M., Massa, M., & Matos, P. (2005). Shareholder investment horizons and the market for corporate control. *Journal of financial economics, 76*(1), 135-165.

Green, T. C., Jame, R., Markov, S., and Subasi, M. (2014). Access to management and the informativeness of analyst research. *Journal of Financial Economics, 114*(2), 239-255.

Gu, Z., Li, Z., & Yang, Y. G. (2012). Monitors or predators: The influence of institutional investors on sell-side analysts. *The Accounting Review, 88*(1), 137-169.

Hong, H., and Kacperczyk, M. (2010). Competition and bias. *The Quarterly Journal of Economics, 125*(4), 1683-1725.

Hong, H., and Kubik, J. D. (2003). Analyzing the analysts: Career concerns and biased earnings forecasts. *Journal of Finance*, 313-351.

Irvine, P. J. (2000). Do analysts generate trade for their firms? Evidence from the Toronto stock exchange. *Journal of Accounting and Economics, 30*(2), 209-226.

Jackson, A. R. (2005). Trade generation, reputation, and sell-side analysts. The *Journal of Finance, 60*(2), 673-717.

Ke, B., & Yu, Y. (2006). The effect of issuing biased earnings forecasts on analysts' access to management and survival. *Journal of Accounting Research, 44*(5), 965-999.

Keskek, S., & Tse, S. Y. (2016). Does Forecast Bias Affect Financial Analysts' Market Influence?. *Journal of Accounting, Auditing & Finance*, 0148558X16665965.

Lim, T. (2001). Rationality and analysts' forecast bias. *The Journal of Finance, 56*(1), 369-385.

Lin, H. W., and McNichols, M. F. (1998). Underwriting relationships, analysts' earnings forecasts and investment recommendations. *Journal of Accounting and Economics, 25*(1), 101-127.

Ljungqvist, A., Marston, F., Starks, L. T., Wei, K. D., and Yan, H. (2007). Conflicts of interest in sell-side research and the moderating role of institutional investors. *Journal of Financial Economics, 85*(2), 420-456.

Loh, R. K., and Stulz, R. M. (2018). Is Sell-Side Research More Valuable in Bad Times?. *The Journal of Finance, 73*(3), 959-1013.

Lourie, B. (2018). The Revolving-Door of Sell-Side Analysts. *The Accounting Review. Forthcoming*

Lys, T., and Sohn, S. (1990). The association between revisions of financial analysts' earnings forecasts and security-price changes. *Journal of Accounting and Economics, 13*(4), 341-363.

Merkley, K., Michaely, R., and Pacelli, J. (2017). Does the scope of the sell-side analyst industry matter? An examination of bias, accuracy, and information content of analyst reports. *The Journal of Finance, 72*(3), 1285-1334.

Park, C. W., and Stice, E. K. (2000). Analyst forecasting ability and the stock price reaction to forecast revisions. *Review of Accounting Studies, 5*(3), 259-272.

Richardson, S., Teoh, S. H., and Wysocki, P. (1999). Tracking analysts' forecasts over the annual earnings horizon: Are analysts' forecasts optimistic or pessimistic?.

Richardson, S., Teoh, S. H., and Wysocki, P. D. (2004). The walk-down to beatable analyst forecasts: The role of equity issuance and insider trading incentives. *Contemporary accounting research, 21*(4), 885-924.

Appendix: Variable definitions

Variable	*Definition*
Main variables	
ΔRHorizon	Change in Reports' Horizon. The difference between quarter q and quarter q-1 in the mean value of the reports' forecast horizon for firm k, calculated from all analysts that disclosed annual earnings forecasts in both quarters. The report's horizon is the number of annual periods for which the analyst report provides earnings forecasts.
ΔLH Reports%	Change in Long-Horizon Reports' percentage. The percentage difference of LH Reports between quarter q and quarter q-1 for firm k, calculated from all analysts that disclosed annual earnings forecasts in both quarters. LH Reports are the reports that disclose forecasts for three or more annual periods.
FB	Forecast Bias. The difference between the analyst consensus earnings' forecast for firm k and fiscal year t (or t+1 or t+2) in calendar quarter q and the actual value of earnings, divided by the former. The consensus earnings forecast is the mean value of analysts' last forecast in quarter q.
ΔFB	Change in Forecast Bias. The percentage difference of the forecast bias between quarter q and quarter q-1 for firm k and fiscal year t (or t+1 or t+2).
TRA	The percentage of the firm's stock ownership that is held by transient owners, as they are defined in Bushee (1998).
QIX	The percentage of the firm's stock ownership that is held by quasi-indexer owners, as they are defined in Bushee (1998).
DED	The percentage of the firm's stock ownership that is held by dedicated owners, as they are defined in Bushee (1998).
ΔTRA / ΔQIX / ΔDED	The difference of the firm's institutional ownership between quarter q and quarter q-1 by transient / quasi-indexer / dedicated institutions, respectively.
Analyst and Forecast variables	
Horizon	The mean value of the forecast horizons for firm k in quarter q. The forecast horizon is the natural logarithm of one plus the difference in days between the date of analysts' last forecast in calendar quarter q for firm k and the firm earnings' announcement date.

Analyst Following	The natural logarithm of one plus the number of analysts issuing at least one annual earnings' forecast in calendar quarter q about firm k and fiscal year t.
Firm Experience	The mean value of the natural logarithm of one plus the total number of quarters for which an analyst has issued earnings' forecasts for firm k until quarter q.
Total Experience	The mean value of the natural logarithm of one plus the total number of quarters for which an analyst has issued earnings' forecasts for any firm until quarter q.
FY	Forecast Year. It takes the value 1 if the forecast refers to the earnings for the current year (year t). We assign the value 2 for earnings' forecasts of the year t+1 and 3 for the year t+2.
FY2	Forecast Year 2. *FY2* is assigned the value 1 if it is an earnings' forecast of the year t+1 and 0 otherwise.
FY3	Forecast Year 3. *FY2* is assigned the value 1 if it is an earnings' forecast of the year t+2 and 0 otherwise.
Firm and stock variables	
Market Value	The natural logarithm of one plus the product of the common shares outstanding multiplied by the stock price of the firm, both measured in quarter q-1.
Market Risk	The quarterly standard deviation of the firm's stock price divided by the mean stock price in quarter q-1.
Momentum	The buy-and-hold return of the stock during the calendar quarter q-1. It is defined as the stock price at the last day of quarter q-1 minus that in quarter q-2, scaled by the latter.
Book-to-Market	The natural logarithm of one plus the ratio of the firm book value divided by the market value on the last trading day of quarter q-1.
ROE	Return on equity. The ratio of the quarterly net income divided by the total common equity on the last trading day of quarter q-1.
Loss	Indicator variable where we assign the value 1 if the quarterly net income is negative and 0 otherwise.
Leverage	The ratio of total liabilities divided by total assets on the last trading day of quarter q-1.

Figure 1: The analyst Report's earnings forecast horizon in the years 2004-2017

Figure 1 presents earnings' forecast horizon statistics by year. Figure 1a shows the mean forecast horizon of analyst reports measured in years. The analyst report's horizon is defined as the horizon of the longest-term annual earnings forecast provided by the analyst in the specific report. Figure 1b presents the percentage of Long-Horizon Reports, which are the reports with a horizon of 3 years or more.

Figure 1a

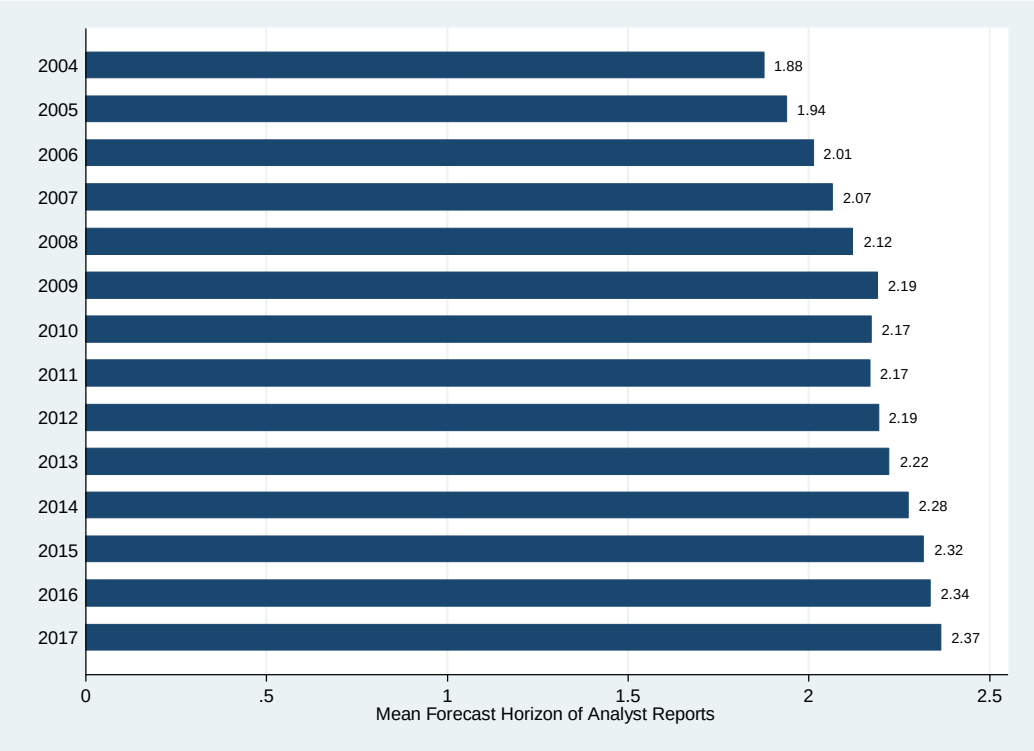

Figure 1b

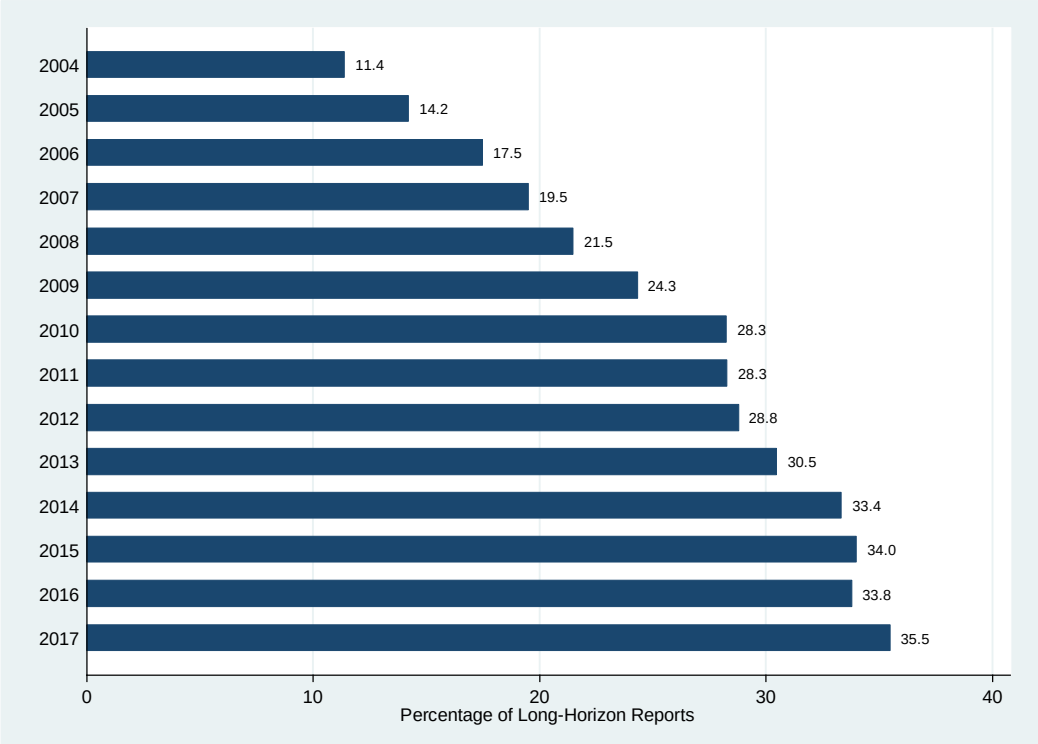

Table 1: The Horizon of the Analysts' Earnings Forecasts

This table presents the earnings' forecast horizon frequencies of our sample. It includes earnings forecasts disclosed over the period 2004-2017. Panel A shows the analyst report's horizon, which is the horizon, measured in years, of the longest-term annual forecast provided by the analyst in the specific report. Panel B shows the horizon for each Firm-Quarter, defined as the mean value of the analyst reports' horizons issued in quarter q for firm k by any analyst.

Panel A

Analyst Report's Forecast Horizon	Number of observations	Percentage	Cumulative percentage
1 year (current year)	242,572	20.94	20.94
2 years	582,610	50.30	71.24
3 years	263,247	22.73	93.97
4 years	26,840	2.32	96.29
5 years	38,373	3.31	99.60
6 years	3,480	0.30	99.90
7 years	1,069	0.09	99.99
8 years	73	0.01	100.00
9 years	2	0.00	100.00
Total	1,158,266	100.00	

Panel B

Mean Horizon Per Firm-Quarter	Number of observations	Percentage	Cumulative percentage
1 year	3,996	2.90	2.90
1-2 years	39,575	28.75	31.65
2 years	27,869	20.24	51.90
2-3 years	54,105	39.30	91.20
3 years	5,095	3.70	94.90
Over 3 years	7,019	5.10	100.00
Total	137,659	100.00	

Table 2: Descriptive statistics

Table 2 presents the descriptive statistics for the variables used in multivariate models. The results present the observations of all three annual forecast periods. Observations are in a Firm-Quarter-Forecast Year basis. Each observation refers to the mean value of all analyst reports for firm k and fiscal year t or t+1 or t+2 in quarter q.

Variable	Number of Observations	Mean	Standard Deviation	Min	Q1	Median	Q3	Max
ΔRHorizon	312,281	-0.08	0.49	-8	-0.25	0	0.06	6
ΔLH Reports%	312,281	-2.97	27.83	-100	0	0	0	100
FB	295,151	14.33	73.13	-196.14	-8.97	1.64	24.3	418.37
ΔFB	275,218	-1.11	34.4	-191.79	-5.32	-0.07	4.47	154.59
ΔTRA	312,281	0.03	5.01	-17.6	-1.78	-0.02	1.79	17.72
ΔQIX	312,281	0.34	6.30	-19.57	-2.12	0.23	2.73	23.13
ΔDED	312,281	0.13	2.47	-15.32	0	0	0.14	12.22
TRA	312,281	15.38	10.17	0	7.61	13.63	21.2	52.5
QIX	312,281	46.68	20.71	0.65	31.9	48.39	61.99	87.36
DED	312,281	4.49	7.32	0	0	0.41	6.42	43.68
Horizon	312,281	5.94	0.74	3.81	5.43	6.14	6.51	6.96
FY	312,281	1.76	0.76	1	1	2	2	3
FY2	312,281	0.36	0.48	0	0	0	1	1
FY3	312,281	0.20	0.40	0	0	0	0	1
Firm Experience	312,281	2.23	0.57	0.74	1.83	2.26	2.63	4.68
Total Experience	312,281	3.22	0.52	0.9	2.95	3.28	3.56	4.91
Analyst Following	312,281	2.34	0.73	0.69	1.79	2.4	2.89	4.25
Market Value	312,281	7.32	1.74	3.12	6.07	7.24	8.44	11.47
Market Risk	312,281	0.07	0.05	0.01	0.04	0.06	0.09	0.33
Momentum	312,281	0.03	0.21	-0.54	-0.09	0.02	0.13	0.89
Book-to-Market	312,281	0.41	0.23	0.04	0.24	0.38	0.55	1.14
ROE	312,281	0.01	0.09	-0.51	0.01	0.02	0.04	0.27
Loss	312,281	0.21	0.41	0	0	0	0	1
Leverage	312,281	0.53	0.24	0.06	0.35	0.53	0.71	1.05

Table 3: Correlation Analysis

This table shows the Pearson correlation coefficients of the main variables used in our models from our dataset over the period 2004-2017. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

	ΔRHorizon	*ΔLH Reports%*	*FB*	*ΔFB*	*ΔTRA*	*ΔQIX*	*ΔDED*	*TRA*	*QIX*
ΔLH Reports%	0.752***								
FB	-0.013***	-0.019***							
ΔFB	-0.002	0.000	0.112***						
ΔTRA	-0.015***	-0.016***	-0.014***	0.016***					
ΔQIX	0.024***	0.020***	0.004	0.011***	-0.352***				
ΔDED	0.009***	0.013***	-0.009***	-0.009***	0.032***	-0.214***			
TRA	-0.011***	-0.018***	-0.039***	0.028***	0.239***	-0.069***	0.029***		
QIX	0.010***	0.008***	-0.024***	0.010***	-0.084***	0.135***	-0.029***	0.214***	
DED	0.014***	0.015***	-0.014***	-0.003	-0.031***	-0.047***	0.213***	0.041***	-0.072***

Table 4: Institutional ownership and forecast horizon

This table examines how institutional ownership affects the number of periods for which the analysts disclose annual earnings' forecasts in their reports. ΔRHorizon is the change in the mean reports' horizon for firm k between quarter q and quarter q-1, whereas ΔLH Reports% is the change in the percentage of Long-Horizon Reports. ΔTRA / ΔQIX / ΔDED is the change in percentage ownership by transient / quasi-indexer / dedicated owners for firm k between quarter q and quarter q-1. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

	(1)	(2)
VARIABLES	ΔRHorizon	ΔLH Reports%
ΔTRA	-0.001**	-0.054***
	(0.026)	(0.001)
ΔQIX	0.002***	0.095***
	(0.000)	(0.000)
ΔDED	0.002***	0.160***
	(0.000)	(0.000)
TRA	-0.001***	-0.028***
	(0.001)	(0.004)
QIX	0.000	0.002
	(0.720)	(0.769)
DED	0.001***	0.087***
	(0.007)	(0.000)
Horizon	-0.233***	-15.440***
	(0.000)	(0.000)
Firm Experience	0.066***	3.243***
	(0.000)	(0.000)
Total Experience	-0.000	-0.260
	(0.973)	(0.336)
Analyst Following	0.018***	0.629**
	(0.003)	(0.025)
Market Value	0.004	0.018
	(0.406)	(0.923)
Market Risk	-0.250***	-14.569***
	(0.000)	(0.000)
Momentum	-0.011	-1.486***
	(0.203)	(0.000)
Book-to-Market	0.024*	1.719***
	(0.085)	(0.008)
ROE	0.014	0.239
	(0.615)	(0.843)
Loss	-0.011*	-1.160***
	(0.056)	(0.000)
Leverage	0.048***	2.205***
	(0.004)	(0.002)
Constant	0.901***	71.223***
	(0.000)	(0.000)
Observations	137,659	137,659
R-squared	0.054	0.097
Number of Firms	5,918	5,918
Year & Firm Fixed Effects	Yes	Yes
Firm Clust. Errors	Yes	Yes

Table 5: The 3-year walk down of forecast bias

This table presents the effect of the horizon on forecast bias. Column (1) shows how the *Horizon*, measured in calendar days, affects forecast bias. Column (2) presents the results when we use *FY*, an ordinal variable that takes the value 1 for the current year's forecasts, 2 for the following year and 3 for the year after the following. Column (3) presents differences among the three forecast years with the use of two indicator variables FY2 and FY3. FY2 is 1 if the forecast provides an estimate for the following year's earnings and 0 otherwise. We assign the value 1 to FY3 when the forecast responds to the year after the following and the value 0 if it does not. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

	(1)	(2)	(3)
VARIABLES	FB	FB	FB
Horizon	11.110***		
	(0.000)		
FY		10.286***	
		(0.000)	
FY2			13.005***
			(0.000)
FY3			19.574***
			(0.000)
Firm Experience	-0.645	-0.513	-0.509
	(0.435)	(0.534)	(0.537)
Total Experience	0.720	0.896	0.819
	(0.393)	(0.289)	(0.332)
Analyst Following	1.424	1.413	1.452
	(0.334)	(0.337)	(0.324)
Market Value	25.313***	25.166***	25.193***
	(0.000)	(0.000)	(0.000)
Market Risk	9.921*	9.752*	9.743*
	(0.063)	(0.067)	(0.068)
Momentum	-12.751***	-12.686***	-12.697***
	(0.000)	(0.000)	(0.000)
Book-to-Market	56.226***	56.123***	56.193***
	(0.000)	(0.000)	(0.000)
ROE	29.286***	29.550***	29.492***
	(0.000)	(0.000)	(0.000)
Loss	7.802***	7.720***	7.732***
	(0.000)	(0.000)	(0.000)
Leverage	-3.649	-3.566	-3.558
	(0.427)	(0.438)	(0.439)
Constant	-265.316***	-214.146***	-204.942***
	(0.000)	(0.000)	(0.000)
Observations	295,151	295,151	295,151
R-squared	0.055	0.055	0.055
Number of Firms	5,827	5,827	5,827
Fiscal Quarter, Year & Firm Fixed Effects	Yes	Yes	Yes
Firm Clust. Errors	Yes	Yes	Yes

Table 6: Institutional ownership and forecast bias

This table presents the effect of the investors' horizon on the analyst consensus earnings' forecast bias. Column (1) presents the results for forecasts of the current year's earnings (FY1), column (2) for earnings of the following year (FY2) and column (3) for the year after the following (FY3). ΔFB is the change in forecast bias for firm k between quarter q and quarter q-1. ΔTRA / ΔQIX / ΔDED is the change in percentage ownership by transient / quasi-indexer / dedicated owners for firm k between quarter q and quarter q-1. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

	(1)	(2)	(3)
	FY1	FY2	FY3
VARIABLES	ΔFB	ΔFB	ΔFB
ΔTRA	0.039	0.022	0.083*
	(0.116)	(0.414)	(0.055)
ΔQIX	0.006	0.029	0.046
	(0.766)	(0.179)	(0.185)
ΔDED	-0.081*	-0.154***	-0.316***
	(0.090)	(0.001)	(0.000)
TRA	0.048***	0.050**	0.087***
	(0.007)	(0.023)	(0.009)
QIX	-0.033***	-0.020	-0.031
	(0.007)	(0.122)	(0.123)
DED	-0.012	0.035	0.087*
	(0.647)	(0.269)	(0.069)
Horizon	-0.637*	0.325	5.484
	(0.098)	(0.855)	(0.117)
Firm Experience	0.447	0.504	-0.229
	(0.209)	(0.193)	(0.642)
Total Experience	0.087	-0.083	0.497
	(0.817)	(0.835)	(0.350)
Analyst Following	-0.414	-0.620	-0.796
	(0.379)	(0.258)	(0.412)
Market Value	-4.192***	-2.404***	-1.244
	(0.000)	(0.000)	(0.134)
Market Risk	-2.136	6.994**	-8.045
	(0.525)	(0.048)	(0.175)
Momentum	14.276***	13.949***	13.494***
	(0.000)	(0.000)	(0.000)
Book-to-Market	-13.522***	-5.862***	-5.840*
	(0.000)	(0.002)	(0.050)
ROE	45.770***	17.915***	12.880***
	(0.000)	(0.000)	(0.008)
Loss	-16.351***	-2.836***	-1.439
	(0.000)	(0.000)	(0.131)
Leverage	3.496**	0.329	0.207
	(0.019)	(0.843)	(0.947)
Constant	39.884***	19.765	-20.347
	(0.000)	(0.110)	(0.425)
Observations	124,926	99,440	50,852
R-squared	0.054	0.016	0.015
Number of Firms	5,782	5,006	3,857
Fiscal Quarter, Year & Firm Fixed Effects	Yes	Yes	Yes
Firm Clust. Errors	Yes	Yes	Yes