The informativeness of short-term and long-term annual analyst forecasts

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Abstract

This study answers two interrelated questions. Why do analysts disclose analyst reports that include forecasts for different amounts of years and how do investors use information from these reports with distinct horizons to make trading decisions. To answer these questions, I study the informativeness of one-year-ahead and longer-term annual forecasts and the frequency of disclosure of three-year-ahead predictions. Results suggest that investors take into account all available information in analyst reports. Main findings also show that when the analysts provide forecasts for at least two annual periods, the market response is similar for comparable information regardless of the amount of forecasts included in the report, indicating that investors extrapolate information for longer-term periods from the estimates provided and that they respond as if these reports included information for all future periods. On the contrary, when reports include only one annual earnings prediction the market response is significantly smaller. Analysts are more likely to disclose forecasts for more periods when the firms' future performance is not clearly positive or clearly negative to provide more detailed information. My findings expand our knowledge regarding the investors' use of analyst forecasts as inputs in their empirical stock valuation models and the analysts' decision process about the horizon of their reports' predictions.

JEL: G12, G17, G24

Keywords: Informativeness, financial analysts, earnings forecasts, reports' horizon.

Acknowledgements:

I thank the financial support from Comunidad de Madrid (Programa Excelencia para el Profesorado Universitario, convenio con Universidad Carlos III de Madrid, V Plan Regional de Investigación Científica e Innovación Tecnológica, EPUC3M12).

1. Introduction

Sell-side analysts are important intermediaries of information and their research is informative of future stock returns (Brav and Lehavy, 2003; Frankel, Kothari, and Weber, 2006; Green, Jame, Markov, and Subasi, 2014; Brauer and Wiersema, 2018). Analysts disclose their expectations about future firm performance in their reports and investors use this information to make trading decisions (Irvine, 2000; Brown, Call, Clement, and Sharp, 2015). The financial theory defines that the firm's value is equal to the discounted cash flows that the investors expect to receive in the infinite future, but analyst research does not provide predictions up to infinity.[1] Therefore, investors have to estimate firm values in their empirical models based on information provided by the analysts using data for finite future periods, instead of infinite periods' proceeds as in the theoretical valuation models.

Analyst earnings forecasts are an appropriate instrument for firm valuation and investors can better assess firm value by using models incorporating these estimates compared to alternatives, such as discounted dividend or free cash flows models (Frankel and Lee, 1998; Francis, Olsson and Oswald, 2000; Bach and Christensen, 2016; Ho, Lee, Lin and Yu, 2017). Furthermore, comparing the two most prominent analyst research products, Bradshaw (2004) provides evidence that investors can gain higher returns by using analyst earnings forecasts in present value models than by relying on analyst recommendations. Despite their extensive use and utility, the amount of future earnings predictions disclosed is not the same in all reports. Analysts always provide one-year-ahead forecasts, but the issuance of forecasts for longer periods than one year (hereafter, long-term forecasts) is entirely optional and varies among reports. The most common option is to provide estimates for two annual fiscal periods. However, the reports that comprise forecasts for only one or three years are also usual, whereas those with predictions for four or more years are rare. Although several studies examine the informativeness of analyst research, it remains unknown how investors

[1] Analyst reports can contain a long-term earnings growth forecast, which predicts the firm's earnings growth up to infinity, but these estimates are rarely disclosed. Therefore, in the majority of cases, analysts provide predictions for a finite future period. Furthermore, the frequency of long-term growth predictions' disclosure is decreasing (Jung, Keeley and Ronen, 2019), and they are overly optimistic (Dechow, Hutton and Sloan, 2000; Chan, Karceski and Lakonishok, 2003), which makes their use even more unlikely for valuation purposes.

assess, compare and use the information in reports with different numbers of earnings forecasts.

The primary goal of this paper is to understand how investors use earnings forecasts of different future periods to make trading decisions. To elaborate this investigation, first I examine the association between the reports' informativeness and the horizon of the longest-term annual forecast included in it (hereafter, the reports' horizon). In more detail, I study how the disclosure of more periods' estimates in a report changes informativeness, regardless of the longer-term forecast revision sign and when the sign is the same as the shorter-term predictions' changes. These tests provide evidence about how useful the disclosure of specific periods' estimates is for the market. Second, I study the sign and extent of the market response in reports with contrasting revisions, i.e. when some forecasts are revised upwards and others downwards. These tests increase the understanding regarding the relative importance of each period's predictions in the investors' empirical model.

I posit that investors use empirical stock valuation models with lower weights for longer-term periods compared to the theoretical discounted cash flow model, and higher for shorter-term, for two reasons. First, the unavailability of information for infinity, forces investors to use only earnings expectations' information for the years that were included in analyst predictions. Therefore, their empirical models can only include a limited number of periods up to the reports' horizon. Second, longer-term predictions are associated with lower accuracy (Richardson, Teoh and Wysocki, 2004; Bradshaw, Drake, Myers, and Myers, 2012), and higher uncertainty (Yeung, 2009). This reduced accuracy and increased uncertainty may lead investors to use shorter-term estimates to assess longer-term firm performance even when longer-term predictions are available and this decrease in forecast informativeness should be larger for longer horizons. However, long-term estimates should still be useful, even in a smaller degree, until a point in the horizon where inaccuracy and uncertainty become too large, because the announcement of these estimates provides more information and allows investors to better assess the firm's future performance. Therefore, I expect that long-term forecast disclosure increases informativeness, but the marginal gain is smaller for each year added and it can be as low as zero for some longer-term horizons, which results in a positive, but non-linear relation between the reports' horizon and informativeness.

I find that the reports that include long-term forecasts are more informative than those disclosing only one-year-ahead predictions with the two-year-horizon reports being the most informative. In the full sample, the informativeness of two-year-horizon reports is 0.42% followed by that of reports with more long-term estimates (0.35%-0.36%), while one-year-horizon reports are the least informative (0.30%). These results provide evidence that, consistent with my expectations, the association between the reports' horizon and informativeness is positive and non-linear, because all analyst reports with long-term predictions are more informative than those with one-year horizons and the gain in informativeness is not stable for all future periods' estimates. Nevertheless, the decrease in informativeness for reports with three-year or longer horizons, contradicts my predictions of a marginal increase or stability. This suggests that the disclosure of three-year-ahead (hereafter, also forecast year 3 or FY3) forecasts probably serves other purposes than that of two-year-ahead (FY2) estimates, which I investigate with the examination of the informativeness of reports' subsamples based on various scenarios of upward and downward revisions for forecasts of different future periods' earnings.

Similar to the results for the full sample, when all the forecasts that are included in a report are revised in the same direction, reports with horizons of three or more years are more informative than those comprising only one-year-ahead (FY1) forecasts, but less than two-year-horizon reports. In this case, the abnormal returns of reports with two-year horizons are almost the double than those with predictions for only one years' earnings. This provides additional evidence suggesting that when reports deliver news with a clear positive or negative message about future firm performance, investors view two-year-horizon reports as having complete information and, for this reason, longer-term disclosures do not further increase informativeness. Furthermore, the comparison between reports with upwards and downwards revisions shows that the disclosure of predictions for three or more years is associated with asymmetrical market responses that result in more favorable abnormal returns for the firm. Therefore, FY3 disclosures are more likely to be provided by analysts when these announcements offer positive news for the future firm performance, a finding that suggests the existence of analyst bias and, given that the investors do not discount this bias, also market inefficiency. To increase the understanding of how the earnings forecast revisions of different periods aid investors to assess future firm performance and to examine if there are other cases where analyst estimates are associated with asymmetrical market responses, I examine

the abnormal returns of reports with contrasting revisions, in other words, of the reports where some forecasts are revised upwards and others downwards.

Examining reports where forecast values are changed in contrasting directions, I find that in all cases where two-year-ahead forecasts are revised in one direction and some estimates of other periods' earnings in the opposite, the stock return always either follows the sign of the FY2 expectations' change or is statistically insignificant. The high importance of FY2 revisions shows that investors value more this period's estimates than those of FY3 or longer predictions and is consistent with my expectations that there is a point in the horizon further than which the decreased accuracy and increased uncertainty reduces the influence of long-term forecasts in investors' empirical models. In addition, the two-year-ahead revisions are more important for the market than FY1 value changes, which indicates that investors view two-year-ahead predictions as the most characteristic of the future firm performance and explains why reports with two-year horizons are the most informative. Results also show that there are several scenarios of contrasting reports where FY3 and FY4 value changes can increase (mitigate) the market response when these forecasts are revised in the same (opposite) direction as the FY2 estimate. This suggests that when earnings' news for the following two fiscal periods do not provide a clear message regarding future firm performance, then the disclosure of FY3 and longer-term predictions can offer information that investors find useful for their trading decisions. Furthermore, similar to what I observed with matching revisions, when there are contrasting revisions, it is more likely that reports with horizons of three years or longer will have a positive significant market response than a negative. However, the same asymmetry is observed in two-year-horizon reports when the FY1 and FY2 predictions are revised in opposite directions, indicating that contrasting revisions are associated with favorable news for the firm regardless of the reports' horizon and providing further evidence of analyst disclosures with positive bias. To sum up, after examining various scenarios of reports with matching and contrasting forecast revisions of different future periods, results suggest that investors mainly base their trading decisions on two-year-ahead news, while reports with three-year or longer horizons can be informative when they clarify future firm performance. When the news is mixed, i.e. without a clearly positive or negative message, analysts are more likely to provide favorable news.

The finding that reports with three-year or longer horizons can increase informativeness when more information is needed to clarify the news, indicates that analysts may use three-year-ahead forecasts to provide more information that augments their reports' informativeness in other occasions, which leads me to the following additional test. Analyst ability is positively associated with informativeness (Park and Stice, 2000; Hilary and Hsu, 2013), thus, analysts with low skill provide reports with lower market response. Ertimur, Mayew and Stubben (2011) find that when low skill analysts issue more detailed earnings information in the form disaggregated earnings, their reports have a higher market impact. Moreover, concurrent papers find that low ability analysts are more likely to announce longer-term forecasts than their higher skill colleagues (Balashov and Pisciotta, 2020; Gibbons, Iliev and Kalodimos, 2021). Therefore, I investigate whether low ability analysts disclose longer-term estimates to provide more information, aiming to increase their market impact. However, given that the disclosure or not of long-term predictions is itself associated with the market response, I do not examine the change in informativeness, but the difference-in-differences, i.e. whether this disclosure can narrow the informativeness gap between low and high ability analysts. Examining reports where all forecasts are revised in the same direction, I provide evidence that the difference in informativeness between low and high ability analysts is the largest for reports with one-year horizons and gradually decreases when more longer-term predictions are included in the report until it becomes insignificant. Once again, I find asymmetric results dependent on the forecast revision direction, with a larger, monotonic decrease for upward revisions. However, this result can be explained by the higher difference between the two analyst categories' informativeness for upward revisions compared to downward revisions. Thus, when low skill analysts provide reports with more longer-term forecasts, the market responds favorably by reducing or even erasing the informativeness difference between them and high ability colleagues. This happens both for downward, but also for upward revisions where the informativeness deficit is larger.

This study contributes to the analyst literature and supplements research about the informativeness of long-term forecasts. This is the first paper, to my knowledge, that examines the association of the reports' horizon with informativeness and the short-

term market response to individual analyst long-term forecasts.[2] After examining a big array of different analyst report announcement scenarios, I provide evidence on how the market assesses different periods' forecasts in these announcements and segregates more and less important information. My findings expand the understanding of how investors use the forecast information from analyst reports as input in their empirical stock valuation models. They also discover a positive analyst bias in mixed news' disclosures that the market fails to identify.

2. Past literature and expectations

2.1. Stock price valuation models

According to finance theory, the price of a stock reflects the future proceeds that investors expect to have from a firm. However, it is not possible for investors to ex-ante know all future proceeds and, for this reason, various studies investigate if stock value can be predicted by market expectations for future firm performance. Investors and researchers use theoretical and empirical models of discounted future expectations of payoffs or profits to estimate the firm's intrinsic value (Feltham and Ohlson, 1995; Frankel and Lee, 1998; Francis et al., 2000; Ohlson and Juettner-Nauroth, 2005; Bach and Christensen, 2016).[3] Several empirical studies provide evidence that these models can predict firm value and future stock returns, while literature also shows that the earnings' estimates are superior predictors of value and returns than other accounting measures, such as dividends and cash flows. Frankel and Lee (1998) provide evidence that the firms' fundamental values are highly correlated with stock prices and can be predicted by a residual income model using analyst earnings forecasts of two annual periods and a long-term earnings growth figure. Ali, Hwang and Trombley (2003) find that analyst forecasts are related to future returns, because their association with fundamental values reveals market mispricing. Jung et al. (2019) and Sulaeman and

[2] Prior literature uses consensus estimates and tests long-term informativeness (Liu and Thomas, 2000; Chan et al., 2003; Copeland, Dolgoff and Moel, 2004). For example, Liu and Thomas (2000) use the consensus values from the IBES summary file that have one-year-ahead, two-year-ahead and long-term growth estimates available, whereas Copeland et al. (2004) use consensus forecasts from Zacks database. However, using consensus forecasts of different periods has a drawback. Predictions for two or more years ahead and long-term earnings growth forecasts are the consensus expectations of a subsample of analysts that might not be qualitatively the same as the full sample of analysts that discloses one-year-ahead estimates, because not all analysts include these forecasts in their reports.

[3] Lundholm and O´Keefe (2001) argue that although practitioners and researchers use various different empirical models to estimate equity value, all models are based on the underlying assumption that the stock price is the present value of expected future net dividends discounted at the cost of equity capital.

Wei (2019) also show that future earnings' estimates can identify mispriced stocks. Biddle, Bowen, and Wallace (1997) examine the association of four accounting components of firm performance with stock returns. They use cash flows from operations and three earnings-based measures, the firms' net income before extraordinary items, residual income and the economic value added. They find that all three earnings-based measures are more highly related with stock returns than cash flows. Penman and Sougiannis (1998) and Francis et al. (2000) compare models based on dividends, free cash flows and abnormal earnings. Both studies provide further evidence that earnings-based models are more successful in valuing stocks. Ho et al. (2017) compare the absolute pricing errors of a dividend model, two residual income valuation variants and the abnormal earnings growth model. They provide evidence that the abnormal earnings growth model, which was introduced by Ohlson and Juettner-Nauroth (2005), is better than the other three.[4]

2.2. The informativeness of one-period and multi-period analyst earnings forecasts

Given the extensive evidence about the ability of empirical models that use earnings' estimates to predict firm value and future stock returns and the superiority of those models compared to formulas using other accounting measures, the disclosure of analyst reports with earnings forecasts is informative for the market and investors use them to make trading decisions (Lys and Sohn, 1990; Clement, Hales and Xue, 2011; Loh and Stulz, 2018). Although finance theory indicates that stock prices are based on all future earnings up to infinity, analysts can only disclose earnings forecasts for a finite number of future periods and investors can only use available data.[5] For annual earnings forecasts, analyst reports comprise different amounts of estimates with some analysts only issuing one-year-ahead expectations, others disclosing figures for up to two years ahead and another part of analysts providing estimates for the following three or more years (Bradshaw et al., 2012; Jung et al., 2019). This means that all reports with earnings forecasts include one-year-ahead estimates, fewer comprise two-year-ahead figures and even fewer expectations about longer periods. For quarterly forecasts,

[4] Although valuation models that use earnings are found to be superior than alternatives using dividends and cash flows, there are mixed findings on which earnings based model is better. For example, Jorgensen, Lee and Yoo (2011) find that the residual income model is more accurate than the Ohlson and Juettner-Nauroth (2005) model in stock valuation.

[5] Analysts sometimes disclose a long-term growth forecast that provides an estimate value for infinity, but this prediction is rare.

there is a similar issue, because all of the analysts that issue quarterly data disclose their estimates for all the quarters of the current fiscal year, whereas fewer provide their expectations for the quarters of two or three years ahead.[6] Therefore, to estimate future returns and make trading decisions, investors should use these data to either create empirical models tailored to available information, instead using a theoretical model's infinite sum of future discounted proceeds, or extrapolate their own estimates for longer-term periods. So, investors have to choose among different analyst reports with various numbers of future periods' earnings disclosed and among distinct forecast periods within each report and the weight that each estimate has on their final decision reveal the importance that they assign to it in their empirical models.

To assess the importance of different periods' forecasts for investors, researchers compare the reports' informativeness. Literature provides evidence that that the use of multiple-period earnings provides a substantial model improvement compared to one-period models. Liu and Thomas (2000) provide evidence that using the earnings of multiple periods, instead of only one-year-ahead estimates, increases their models' explanatory power more than six times, with the R-square improving from a value smaller than 5% to over 30%. Copeland et al. (2004) examine the relation of changes in analyst expectations of one-year-ahead, two-year-ahead earnings and long-term earnings growth with stock returns. They find that all three estimates are positively associated with market-adjusted returns when they are regressed individually. In a multiple regression incorporating the forecasts of all three periods, the long-term earnings are the most important predictor, the two-year-ahead expectations are also significant, whereas the estimates for the current year are not.

On the contrary, there is evidence that forecasts with longer horizons are less accurate, more uncertain and have little predictive power. Bradshaw et al. (2012) find that the one-year-ahead estimates are more accurate predictors of earnings for two and three years ahead than the respective periods' analyst earnings expectations. Richardson et al. (2004) show that predictions are less accurate for longer horizons. Yeung (2009) provides results based on two measures, the analyst forecast dispersion and the square

[6] When analysts provide quarterly forecasts, they always issue estimates until the end of the fiscal year, regardless of the number of years included in their predictions. Therefore, for example, when they disclose estimates for the current year only, they include four quarterly estimates in the first fiscal quarter (i.e. for all quarters), three in the second (i.e. for fiscal quarters 2-4), two in the third and only one in the last.

root of the sum of the squares of individual analysts' annual forecast error, which indicate that long-horizon earnings are more uncertain than short-horizon earnings. Chan et al. (2003) provide evidence that analyst long-term earnings growth forecasts are related to firm growth in the short-term, but they are overly optimistic and have low additional predictive power over longer horizons.

2.3. Expectations for long-term earnings' disclosure informativeness

The conflicting findings of extant literature that multi-period earnings' models are better in predicting future stock returns than one-period models, but short-term forecasts are more accurate, certain and have higher predictive power than long-term estimates, create the question how does the market assess the analyst earnings expectations disclosed for different periods in the reports to make trading decisions. It is likely that investors do not judge one-year-ahead and long-term predictions independently, but that long-term forecasts complement the predictions for the current fiscal year in the investors' decision process. For this reason, I posit that it is important to understand how investors perceive the information about different future periods in analyst reports by comparing the informativeness of the reports in distinct scenarios.

The disclosure of long-term predictions provides additional information, but the lower accuracy and higher uncertainty for the longer periods' earnings affects the investors' decision on whether to trust estimated figures or not. I expect that long-term analyst forecasts will be very informative up to a specific horizon, but that predictions for longer annual periods than this benchmark will provide smaller or insignificant increases in the reports' informativeness. For this reason, reports with multi-period earnings estimates will be more informative than those providing expectations only for one-period, but the increase in informativeness will be smaller or none for every additional year provided. Furthermore, the market response to analyst research derives from revisions, not levels (Francis and Soffer, 1997), thus various studies find that forecast revisions are informative, predicting stock returns (Gleason and Lee, 2003; Barth and Hutton, 2004; Kecskés, Michaely and Womack, 2017; Loh and Stulz, 2018). However, the market response is asymmetrical to good and bad news (Ivković and Jegadeesh, 2004; Kadan, Madureira, Wang and Zach, 2009; Kothari, Shu, and Wysocki, 2009). For this reason, the study should also examine whether the association

between informativeness and the reports' horizon is different for upward and downward forecast revisions.

3. Data and empirical models

3.1. Data

I download all NYSE/NASDAQ/AMEX analyst annual earnings forecasts for the years 2004-2018 from I/B/E/S. These predictions include estimates up to the maximum forecast period, which is ten years ahead.[7] The data starts from the year 2004 which is the first year after the Global Analyst Research Settlement of April 28, 2003. I exclude the period before 2004, because the Settlement addressed conflicts of interest between analyst research and investment banking, affecting analyst research quality and, thus, creating qualitative differences between the forecasts issued before the regulation and those published after the regulation.

To identify the number of annual forecast periods in a report, I use the forecast announcement date. When analysts disclose earnings predictions for several years, I/B/E/S records for each period's estimate in distinct observations with the analyst's code, the firm's identifier, the report's announcement date and the forecast's fiscal year end date. The first three categories are common for the all estimates that are in the same report, but the last is distinct for predictions of different fiscal years' earnings. Thus, I use the opposite procedure to reconstruct the report from the I/B/E/S observations.[8] For multivariate tests, I drop FY5 or longer estimates, because these forecasts are very scarce, with less than 4% of reports disclosing a five-year-ahead prediction, keeping the exact values for FY1 to FY4 forecasts.

[7] I/B/E/S comprises two more categories of annual earnings' horizons. The first category is named "fiscal year without an actual" with no observations in the examined period. The second includes analyst predictions for a period which is vaguely defined as "larger than 10 years in the future". From 7,157 observations in this category in my initial dataset, approximately 95% of observations have a fiscal year end between the current year, compared to the forecast announcement, and five years in the future. Thus, their inclusion in this category is a data error. The vast majority of the remaining 5% have a fiscal year end which is prior to the current fiscal year, thus, either the forecast announcement date or the fiscal year end date are wrong. Only 5 observations have a fiscal year end larger than 10 years in the future, with three of them forecasting the 11th year and two of them the 12th. However, given the large amount of errors in this category, there is a high likelihood that these five observations may also have erroneous horizons and, for this reason, I exclude all data from this category.

[8] In the reconstruction process, I create new variables with each period's value in the observation of the one-year-ahead forecast and drop all other observations that belong to the same report. In this way, each observation corresponds to one report.

Following prior literature that examines analyst informativeness, I exclude: i) anonymous analysts, ii) penny stocks and iii) forecasts that are likely to be responding to firm news (Loh and Stulz, 2011, 2018; Green et al., 2014). Data observations from anonymous analysts are likely to correspond to several different analysts and, thus, forecast revisions cannot be calculated. The second criterion is imposed to assure that my results are not driven by small stocks and it excludes all shares that have a closing price of less than one dollar at the last trading day before the forecast announcement. The last criterion is applied in three steps. First, I exclude the forecasts that are announced in the three-day window [-1, +1] around the firm's quarterly earnings announcements. I obtain the firm announcement dates from the Compustat quarterly fundamentals file. The three-day window is measured in trading days, which are identified with the data from the Center for Research in Security Prices (CRSP). Second, I remove estimates that are disclosed in the three-day window around management guidance dates, using the dates found in the I/B/E/S Guidance file. Third, days where more than one analyst issues a forecast are dropped from the sample.

I/B/E/S, Compustat and CRSP provide further data for the empirical models. Analyst and forecast characteristics, such as analyst experience and forecast horizon are found or calculated from I/B/E/S. Compustat is the source for firm characteristics, such as the book-to-market ratio. Firms with negative book value are excluded from the sample. CRSP provides stock prices which are used for market related variables, such as the stock's momentum.

3.2. Measure of returns

Following prior literature, I use a two-day Cumulative buy-and-hold Abnormal Return (CAR [0, +1]) over a benchmark portfolio with the same characteristics to assess the market response to the examined forecasts of an analyst report (Loh and Stulz, 2011, 2018; Green et al., 2014). The benchmark portfolio is created using the procedure developed by Daniel, Grinblatt, Titman and Wermers (1997), which is based on three characteristics, the firm's market capitalization, the book-to-market ratio and stock's prior year return. Firms are ranked based on each characteristic and split in quintiles, creating 125 portfolios (thereafter DGTW portfolios) with firms of similar size, book-to-market and momentum. To ensure that the portfolios have a similar number of firms, first the sample is split in 5 market capitalization groups and, then, each group is divided in 5 book-to-market quintiles within the size group, resulting in 25 subgroups. Finally,

firms within the 25 subgroups are ranked in 5 momentum quintiles, creating the 125 DGTW portfolios. The two-day CAR for stock i is defined as:

$$CAR_i = \prod_{t=0}^{1}(1 + R_{it}) - \prod_{t=0}^{1}\left(1 + R_{it}^{DGTW}\right) \quad (1)$$

where R_{it} is the daily stock return of firm i on day t, for t = 0 and 1, and R_{it}^{DGTW} is the buy-and-hold return of the benchmark portfolio with similar characteristics. If the analyst report is disclosed before 16:30 on a trading day, then Day 0 is the day of the announcement. If it is issued after that time or during a market holiday, then Day 0 is the first trading day after the announcement day. Day 1 is the first trading day after Day 0.

3.3. Empirical model for informativeness

I use a multivariate model to examine the association between the report's informativeness and horizon:

$$CAR_i = \alpha + \sum_{j=1}^{3}\beta_j Reports'\ Horizon\ level_k + \sum_{l=1}^{n}\beta_l Controls + \varepsilon_i \quad (2)$$

Where CAR_i is the two-day [0, +1] buy-and-hold abnormal stock return of firm i, $Reports'\ Horizon\ level_k$ are indicator variables that take the value 1 when the reports' horizon is equal to k years, where k is 2, 3 and "at least 4". All reports' horizon values, but those in the last variable, are examined separately in the model, because, according to the expectations presented above, I expect a non-linear relation between the reports' informativeness and horizon that can be of any form. However, the last indicator variable includes all reports with a horizon of 4 or more years, because the frequency of these observations is low and I do not expect that the disclosure of reports with 5 or more years will be associated in a different way with informativeness than the 4-year-horizon reports. When all *Reports' Horizon level*$_k$ indicator variables are zero, then the abnormal return corresponds to the smallest possible horizon value. For this reason, the CAR value shows the abnormal return for reports with one-year horizons in all specification that it is not required that for the FY2 or longer-term forecasts to be revised in a specific direction. For specifications that require FY2 to be revised upwards or downwards, but there is no prerequisite for FY3 or longer-term estimates, the

abnormal return shows the value of two-year-horizon reports. For longer-term restrictions the CAR shows the return for respective horizon value.

The model incorporates a vector of variables controlling for factors that are related to the analyst informativeness, the market response to analyst research and analyst research quality in general. Controls comprise analyst, forecast, broker and firm characteristics. *Forecast Horizon* controls for analysts' tendency to issue optimistic FY1 expectations at the start of the fiscal year, with those predictions becoming less optimistic during the 12-month period, until they reach a slightly pessimistic value the last month before the earnings announcement (Richardson et al., 2004; Bradshaw, Lee and Peterson, 2016). It is defined as the natural logarithm of the difference in calendar days between the firm's annual earnings announcement date and the date of forecast announcement. *Relative Accuracy* controls for the analyst's ability (Hong and Kubik, 2003; Ertimur et al., 2011). It measures the analyst's average relative accuracy for the whole portfolio of firms covered in year t-1, with each individual firm accuracy compared to the mean accuracy of all analysts covering the same firm. I include *Firm Experience (Total Experience)*, which is the analyst's firm specific (total) experience for firm i in quarter q, because analyst experience is associated to forecast quality (Clement, 1999; Ljungqvist, Marston, Starks, Wei and Yan, 2007; Harford, Jiang, Wang and Xie, 2019; Lourie, 2019). It is calculated as the logarithm of the number of quarters that the analyst covers the firm (is present in I/B/E/S) until quarter q. *Broker Size* is a proxy of analyst resources (Lim, 2001; Hilary and Hsu, 2013; Lourie, 2019; Gibbons et al., 2021) and is the natural logarithm of the brokerage firm size. The brokerage firm size is the number of analysts working for the same employer as analyst y in year t. *Companies* and *Industries* are proxies for the analyst workload (Clement and Tse, 2005; Ke and Yu, 2006; Hilary and Hsu, 2013). They are defined as the natural logarithm of the number of firms and industries, respectively, covered by analyst k in year t.[9] *Analyst Following* is a proxy for analyst competition and is the natural logarithm of the number of analysts disclosing at least one earnings forecast for firm k during year t (Frankel et al., 2006; Kirk, Reppenhagen, and Tucker, 2014; Harford et al., 2019). *Market Value* controls for the size of the firm and is the natural logarithm of the product of the common shares outstanding and the stock price of the firm (Hong and Kacperczyk, 2010; Merkley, Michaely and Pacelli, 2017). Return volatility, momentum

[9] Industries are classified based on the first two digits of the SIC code from CRSP database.

and the book-to-market ratio are associated with informativeness (Green et al, 2014; Merkley et al., 2017). *Return Volatility* is defined as the standard deviation of the stock return in year t-1. $Momentum_{21}$ is the buy-and-hold return of the stock during the preceding 21 trading days and shows the stock price momentum for the last month, whereas $Momentum_{21\text{-}252}$ presents the same for the last year, excluding the last month, using trading days [-252, -21] (Green et al, 2014). *Book-to-Market* is the natural logarithm of the ratio of common equity divided by the product of common shares outstanding multiplied with the firm stock price. The firm's profitability is another factor that is associated with analyst research (Hong and Kacperczyk, 2010; Kirk et al., 2014; Gibbons et al., 2021). To control for profitability, I use *ROA* (return on assets), which is the ratio of the net income divided by the total assets, and *Loss*, which is an indicator variable where the value 1 is assigned if the net income is negative and 0 otherwise.

I winsorize all continuous variables at the 1st and 99th percentiles to reduce outliers that are likely to be created by erroneous data. I also standardize all continuous control variables to have a mean zero and variance one. With this transformation, the intercept value of the empirical model in eq. (2) indicates the buy-and-hold abnormal return for a stock when all characteristics expressed by continuous variables are equal to the mean value and characteristics measured with indicator variables are zero. Therefore, the intercept shows the average market response for these firms.

4. Empirical Results

4.1. Long-term earnings forecasts' disclosure frequency

Before examining long-term forecast informativeness, I present the reports' horizon frequency, in other words, how frequently analysts announce reports that include forecasts for one, two, three, etc. years ahead. Table 1 presents the number, the percentage and cumulative percentage of reports for each horizon category in the final sample. Reports with a horizon of six or more years are merged into one category, because they are only 0.30% of the sample. I observe that the vast majority of analyst reports include predictions for up to three years into the future with a total of 93.57% of reports comprising the analyst's expectations for the following one, two or three fiscal periods. The most common option for analysts is to disclose forecasts for two years, with 48.55%, almost half of the reports, including FY1 and FY2 estimates.

Another 26.56% of reports provide a prediction for FY3, whereas less than 18.5% of reports include only FY1 estimates. From the remaining 6.43%, reports with a horizon of four and five years are significantly more likely than a those with predictions for 6 or more years. Only 0.3% of analyst disclosures provide predictions for periods exceeding the five years, while it is more likely for an analyst that issues FY4 expectations to also disclose FY5 predictions (3.48%) than to stop at the four-year-ahead figure (2.65%).

The frequencies in Table 1 indicate that the usual analyst report comprises two estimates, for one and two years ahead. Nevertheless, there are several cases where the analysts only provide predictions for only one period or, on the contrary, for an additional third year. Disclosing expectations for four or more years is rare. Results indicate that the FY2 forecast is a benchmark and the sharp decrease in frequency for additional disclosures is consistent with prior literature's findings of decreased accuracy and increased uncertainty in longer horizons. For the following tests I will use four reports' horizon categories. The three basic categories are reports with horizons of one, two and three years, given that they are the vast majority of the sample, show that these are the basic analyst disclosure decisions and investors normally choose to trade based on those. Thus, it is important to understand how the market reacts to reports with these horizons. On the contrary, the relative scarcity of estimates for four years ahead or more, shows that predictions for such long-term forecasts are avoided by analysts, probably due to the high uncertainty that exists for these very long-term periods. Investors may view these forecasts as less credible and, for this reason, I merge these categories into one for the remainder of the study.

4.2. The average market response of reports with different horizons

After presenting statistics of the frequency of long-term forecasts, I examine the market response to reports with different horizons. Before proceeding with multivariate model results, I find the average market response for each reports' horizon and for various scenarios of upward and downward revisions of FY1 and long-term forecasts. Throughout the study, I use the mean two-day Cumulative buy-and-hold Abnormal Return during the analyst report announcement day and the following (CAR [0, +1]) over the DGTW portfolio of firms with similar size, book-to-market ratio and momentum, as explained in the previous section. The Table also presents frequencies

of upward and downward revisions. Panel A presents results for the full sample and separately for reports where the one-year-ahead forecast (FY1) is revised upwards or downwards. It also shows findings for finer cuts of the data, further dividing subsamples based on the reports' horizon. Panel B shows the average market response when a revision of an FY1 forecast is matched (contrasted) by a revision of the same (opposite) sign of a long-term forecast.

In the first row of Table 2, Panel A, the results for the full sample are presented, regardless of the reports' horizon, while in the following four rows the sample is divided based this variable. Columns (1), (4) and (5) of the Table present abnormal returns. Column (1) shows the average CAR [0, +1] of all reports that are in the specific row category, whereas in columns (4) and (5) each row category subsample is also split in those reports where the FY1 expectations for the firm are revised upwards and downwards, respectively, compared to the previous forecast from the same analyst. Columns (3) and (4) present the percentage frequency for upward and downward revisions, respectively. Analyst reports with FY1 reiterations, i.e. where the forecast value remains stable, are infrequent, less than 2%, and are not tabulated for brevity. As I observe in the first column of the first row, the mean report has a market impact of -0.02%, showing that the mean announcement bears negative news for the company. Nevertheless, the economic impact is very small, because a 100-dollar stock is expected to lose two cents' value in two trading days. Columns (2) and (3) provide further evidence that the mean report is associated with slightly negative expectations by showing that more than 53% of the reports include FY1 downward revisions of previous predictions and less than 46% of announcements issuing an upward revision of the FY1 estimate. This finding is consistent with analyst literature that finds that the mean FY1 forecast is optimistic at the start of the fiscal year and it is revised downwards in the duration of the year, a process described as the walk-down of analyst forecasts (Richardson et al., 2004; Ke and Yu, 2006; Bradshaw et al., 2016). Columns (4) and (5) indicate that the mean positive FY1 revision is associated with a stock price increase of 0.37%, whereas negative news about the current year's earnings are related to a return of -0.33%, both being statistically significant in the 1% level. In total, the difference between an upward and a downward revision is 0.70% of the stock price. The next four rows show the results for reports with horizon of one, two, three and four or more years respectively. I observe in column (1) that reports with a maximum forecast horizon of

up to 2 years have a negative mean market response, but reports with a horizon of 4 years or more are received by the market with a positive average stock return. For disclosures equal to 3 years the CAR is negative, but statistically equal to zero. These results provide preliminary evidence that the reports' horizon is associated with abnormal returns, indicating that reports that the inclusion of forecasts for 3 or more annual periods are associated with better news. Columns (2) and (3) provide further support for the positive relation between the nature of news in a report and the issuance of longer-term analyst predictions by showing that the frequency of positive (negative) FY1 revisions is higher (lower) for reports with maximum forecast horizons of 4 years or more. When the *Maxfy* is up to three years the likelihood of upward FY1 revisions is less than 46.1% and that of downward revisions is over 53%, but when the report includes analyst expectations for 4 years or more, upward FY1 revisions are more likely (48%) and downward are less probable (51%) compared to the other three categories. In columns (4) and (5), I observe that the market response is similar for reports with only one-year-ahead earnings estimates for positive and negative FY1 revisions. When the maximum forecast horizon is 2 years, the two-day buy-and-hold abnormal return for upward revisions is 0.02% larger in absolute terms than that of downward revisions, for 3 years it becomes 0.03%, but for 4 or more years the difference is 0.10%. This is another piece of evidence that the analyst's decision to disclose forecasts for longer periods is related to more favorable news about the expected future firm performance. Furthermore, figures in these columns indicate that the market response difference between upward and downward FY1 revisions is 0.58% (=0.30% - (-0.29%)) in the case of reports including only current year's earnings estimates, while this increases to 0.84% for reports with a maximum forecast horizon of 2 years. This provides evidence that the inclusion of a FY2 forecast is informative for the market. However, when the horizon is 3 years or longer the difference between the two categories is decreased, indicating that including predictions for more annual periods is not increasing the market response. The CAR for upward and downward revisions provides preliminary evidence that two-year-horizon reports are the most informative and show a non-linearity for the association between the reports' informativeness and horizon, but multivariate results will be more useful to make conclusions.

Panel B focuses on reports with predictions for at least two future periods and shows the frequency and the two-day CAR when the revisions of long-term forecasts are of

the same and opposite sign compared to the FY1 estimate revision. Similar to Panel A, in Panel B forecast reiterations of any future period are not presented for brevity. The combinations of FY1 with FY2 revisions are presented in the first row, the ones with FY3 in the second and those with FY4 in the third. Column (1) presents the frequency of long-term predictions', i.e. FY2, FY3 or FY4, upward revisions and column (2) that of downward revisions when the FY1 estimate is revised upwards. Columns (3) and (4) show the respective upward and downward long-term estimates' value changes when the FY1 expectations are revised downwards. The same structure is used for CARs in columns (5) – (8).

In Panel B, columns (1) – (4), I observe that there is a positive relation between the sign of the FY1 revisions and those of the long-tern forecasts. This co-movement is more likely in the case of FY2 estimates with a value of nearly 81% for upward and over 84% for downward revisions. The likelihood is monotonically decreased for longer periods with FY4 predictions being approximately only twice as likely to be revised in the same direction as the FY1 forecast than in the opposite. These results suggest that firm earnings are an autoregressive time series. Columns (5) – (8) show the CAR [0, +1] for the twelve cases where the upwards or downwards FY1 forecast revisions are combined with the same or opposite sign changes of one of the FY2, FY3 or FY4 estimates. Columns (5) and (8) present the matching revisions, where the FY1 and the long-term predictions are both changed upwards and downwards, respectively. The market response is positive and statistically significant at the 1% for all six cases. More importantly, the CAR ranges between 0.37% and 0.49%, in absolute terms, with all figures being larger than the 0.29% value of the mean positive FY1 revision in the case of reports with a one-year horizon, presented in Panel A. This shows that when the report comprises a second forecast period with a same sign revision, then the market impact is stronger compared to reports that disclose only expectations about the current year's earnings. Columns (6) and (7) present the results when the FY2-FY4 predictions are revised in the opposite direction than that of FY1. I observe that when the FY2 forecast is revised in the opposite direction than that of the FY1 value, then the CAR follows the sign of the FY2 revision. When other long-term forecasts values' changes are combined with FY1 revisions in the opposite direction, the mean forecast also follows the long-term estimates' changes sign if they are revised upwards, but it is statistically zero when they are changed downwards. In all cases of columns (6) and

(7), when the CAR is statistically significant, the market response is smaller in absolute terms than the 0.29% of the reports with only one forecast, with values between 0.05% and 0.13%. Thus, results suggest that the long-term expectation changes are more important for the market than those of the current year and that the effect of FY3 and FY4 value changes is asymmetrical with more positive market responses.

To sum up the results of Table 2, the findings in the two Panels indicate that: i) the reports with two-year horizons are the most informative, ii) the disclosure of forecasts for three or more years ahead is associated with more favorable abnormal returns to the report announcement for the firm, iii) when reports include long-term forecasts that are revised in the same direction as the one-year-ahead estimate, the market response is larger compared to reports that include only one-year-ahead forecasts, in other words, the disclosure of long-term earnings estimates increases informativeness, and iv) when long-term predictions are revised in the opposite direction than the FY1 expectations, the market response is more likely to follow the sign of the long-term revision. Multivariate results will provide more evidence about how the reports' horizon and each future periods' estimates are associated with informativeness.

4.3. Informativeness and the reports' horizon

Table 3 presents the multivariate results for the association between the report's informativeness and the reports´ horizon. Column (1) presents results for the full sample, while columns (2) to (9) for subsamples where one or more of the forecasts included in the reports are revised in a specific direction. Column (2) shows the CAR for reports where the FY1 value is revised upwards, whereas columns (3), (4) and (5) gradually increase the inclusion criteria, presenting reports where all forecasts up to FY2, FY3 and FY4, respectively, are revised upwards. Columns (6) – (9) show downward revisions and follow a similar structure, with column (6) presenting results where the FY1 is revised downwards and columns (7), (8) and (9) where the news are unfavorable for the following two, three or four annual fiscal periods, respectively. In all 9 columns the intercept expresses the mean CAR [0, +1] for firms where all continuous variables are equal to the mean value and indicator variables equal to 0, because all continuous variables in the empirical model are standardized to have a mean 0 and standard deviation 1. The intercept in each column shows the abnormal return for analyst reports with the smallest possible reports' horizon. Therefore, in columns (1),

(2) and (6), the intercept indicates the market response for reports with a one-year horizon, columns (3) and (7) with a two-year horizon, and so on. Given that column (1) includes both upward and downward revisions, consistent with prior research (Green et al., 2014), the CAR [0, +1] values are multiplied by -1 for the observations where the FY1 is revised downwards, whereas no adjustment is made in the other columns, because they examine revisions in one direction.

In column (1) of Table 3, I observe that the mean analyst announcement creates a two-day abnormal return of 0.30% when the report includes only a forecast of the current year's earnings, in other words, when the report's horizon is 1 year. For horizons equal to 2 annual periods, the market response is 0.12% larger, with a value of 0.42% (= 0.30% + 0.12%), whereas the differences between those including 3 or more periods' forecasts and the one-year-horizon reports are also significant and positive, but smaller than that of the reports with predictions for two years. F-tests of equality for the coefficients (not tabulated) indicate that the difference between the coefficients of horizons equal to 2 and 3 is statistically significant at the 1% level and the same result is found when values 2 and at least 4 are compared. On the contrary, the coefficients are statistically equal for values 3 and at least 4. Therefore, results in column (1) show that reports which provide long-term predictions are related to higher informativeness than those with one-year horizons, corroborating my expectations of a positive association between the reports' informativeness and horizon. Although the finding that the informativeness of the reports that comprise three-year-ahead or longer earnings estimates is smaller than in the case of two-year horizons supports my prediction that this association is not linear, it does not corroborate the expectation about monotonicity. The observed informativeness decrease suggests that when the news is clearly positive or negative for the firm's future financial performance, the FY1 and FY2 forecasts provide all needed information to investors and the disclosure of three-year-ahead or longer earnings expectations is unnecessary. Therefore, analysts may disclose three-year-ahead and longer forecasts when the news provided by first two periods' estimates is not clear enough and investors need more information to assess firm performance. The examination of different scenarios of upward and downward revisions can provide more evidence about this.

In columns (2) to (5), the mean two-day buy-and-hold abnormal returns for upward revisions is presented. All four columns have indicator variables for all possible reports'

horizons, except for the smallest possible year. Therefore, the intercept value shows the market response for reports with a horizon equal to the smallest possible period based on the criteria in each column, i.e., when FY1, FY1-FY2, FY1-FY3 and FY1-FY4 are, respectively, revised upwards. For this reason, the intercept in the second column where the FY1 forecasts' value is positively changed, presents the abnormal return for one-year-horizon reports, in the third column where both FY1 and FY2 predictions are revised upwards, for reports with two-year horizons and so on. I observe, in columns (2) and (3), that the market response of one-year-horizon reports is 0.31%, whereas this of reports with a horizon of two years is 0.57%, a value that is 0.26% larger and almost the double. In columns (4) and (5), where the intercept corresponds to the cases where all FY1-FY3 and FY1-FY4 are revised upwards, respectively, the results show that the abnormal return is 0.49% and 0.53%, larger than reports with only one annual prediction, but smaller than that of those with two. Thus, the intercepts in columns (2) – (5) show that the two-year-horizon reports are the most informative, similar to the findings in column (1). Hence, given that they present the market response when all disclosed estimates are revised upwards, these results suggest that when the news is clearly favorable for the firm, the investors have full information with two-year reports. The coefficients of the reports' horizon levels in columns (2) - (4) show the difference in informativeness if the analyst discloses more forecasts, regardless of the revision sign of these additional estimates, and they paint a similar picture to that of the intercepts in columns (2) - (5). They indicate that the provision of two or more periods' predictions is informative compared to the one-year-horizon reports, but, on the contrary, when at least two periods' earnings expectations are positively changed, then the inclusion of more estimates does not change the market response significantly. Findings in columns (2) - (5) provide further evidence, similar to that of column (1), about the positive and non-linear association between the reports' informativeness and horizon.

The market response for downward revisions is presented in the last four columns of Table 3. In columns (6) and (7), I observe that when all disclosed forecasts are revised downwards, the abnormal return for reports with one-year horizons is -0.29%, whereas for those including exactly two annual estimates it is -0.56%, almost the double. In columns (8) and (9), the market response is between the above two figures, with -0.51% for three-year-horizon reports and -0.46% when all predictions up to FY4 are

downwards revised. This suggests that when the news is unfavorable, the provision of long-term expectations increases informativeness, but the disclosure of three-year-ahead or longer predictions does not increase the market response at higher level than that of reports with two-year horizons. These results corroborate prior findings, showing that also for downward revisions, reports with horizons of three or more years are associated with firm news that are not clearly negative. Interestingly, the comparison between abnormal returns for upward and downward revisions, reveals an asymmetry in market responses for some reports' horizons. Although the coefficient of the two-year-horizon reports in column (6) is -0.13%, similar in size to the 0.14% of column (2), those of the three and four-year-horizon reports in columns (6) and (7) are asymmetrical to the respective coefficients in (2) and (3). When the FY1 forecast is revised downwards, the reports with horizons of three or more years have an equally negative market response to those including only current years' earnings, whereas for upward revisions the returns are larger for the former. Moreover, when both FY1 and FY2 values are changed downwards, the supply of information for three or more years ahead can mitigate the negative market response, contrary to the insignificant return to the respective disclosures for upward FY1 and FY2 estimates' changes. These results suggest that the analysts are more likely to announce favorable news for the firm with their three-year-ahead or longer predictions than unfavorable.

As a total, Table 3 provides evidence that reports with two-year horizons, in other words those that include predictions exactly for the following two annual fiscal periods, are the most informative and that FY3 or longer estimate disclosures are not increasing the market response when the news is clearly positive or negative. On the contrary, when the news transfers a mixed message regarding firm future performance, forecasts for three or more years ahead can offer valuable information that influences investors' decisions. Results also suggest that the analysts mainly issue three-year-ahead and longer estimates when the news is favorable, creating an asymmetrical market response for FY3 and longer forecast announcements. This asymmetry indicates that these disclosures are positively biased and that investors fail to identify the bias. Comparing the informativeness of reports where all forecasts are revised in the same direction provides significant information about the investors' empirical model, but I should also examine the reports where forecasts are revised in opposite directions to obtain a fuller view.

4.4. Contrasting revisions in reports

In Table 4, I present the results of reports that include both forecasts that are revised upwards and downwards. Several scenarios of these reports with contrasting revisions are examined and the results are shown in two Panels. Panel A comprises the cases where the FY2 prediction is revised in the opposite direction than that of FY1, i.e., when the analyst expects that the good or bad news in current year's earnings will be counterbalanced immediately, at least partly, by the revision in next year´s profits. Panel B shows the cases where at least the FY2 forecast is revised in the same direction as FY1, but there is some other long-term estimates' value adjustment that contrasts these changes. Hence, this Panel exhibits the market response when the analyst provides news indicating that the expected firm performance will last for at least one more year before being counterbalanced.

The first three columns of Panel A present scenarios where upward revisions of FY1 forecasts are followed by downward long-term expectations' changes. In column (1), FY1 is revised upwards and FY2 downwards, column (2) also requires FY3 to be disclosed and revised in the same direction as FY2 and column (3) includes a downward revision of FY4 as a prerequisite. Columns (4) – (6) are similar to the first three, but with the opposite revision signs for all future periods' estimates. In these six columns, where FY2 and longer-term predictions' revisions counterbalance those of the FY1 estimate, I observe that the market response always either follows the sign of the long-term forecast changes or is insignificant. The four significant coefficients show abnormal returns that are between 0.13% and 0.28% in absolute terms. Thus, the market responses in all six cases are smaller than the respective values of Table 3, which is expected given that Table 4 presents analyst report announcement scenarios where the news are not clearly positive or negative. These results show when the firm performance is expected to change in one direction for the current fiscal year, but this variation is counterbalanced by the revision in expectations of the following years' earnings, investors take into account the current year's earnings change, but value more the information of the long-term predictions. Moreover, the market responses in all cases, except for column (3), increase when more longer-term predictions corroborate the revision sign of the FY2 estimate. This suggests that when the news for the following two fiscal periods give a mixed message regarding firm future performance, then the FY3 and longer-term forecast disclosures are informative. Finally, there is a

market response asymmetry observed in the six columns. When long-term forecasts are revised upwards the abnormal returns are always significant and positive, contrary to the cases of downward revisions with only one significant value in column (2) that is also smaller in absolute terms than the respective changes with opposite signs in column (5). These results provide additional evidence supporting the results presented in the previous Table about the association between FY3 and longer-term earnings' expectations disclosures and favorable market responses, but they show that this asymmetry exists also in two-year-horizon reports when the news are not clearly positive or negative.

In Panel B of Table 4, which shows the results for contrasting revisions with a more distant news' counterbalancing, the structure is similar to that of Panel A. Columns (1) – (3) show upward revisions in the shorter-term combined with decrease in longer-term expectations, whereas the last three columns show the opposite scenarios. The intercepts are statistically significant in two of the six columns. The two significant intercepts indicate that when FY1 and FY2 forecasts are revised upwards, but longer-term expectations in the opposite direction, then the market responds positively. Therefore, when the firm performance is expected to change in one direction for at least two fiscal years, but the forecast revisions are counterbalanced by the predictions of more longer-term periods, investors are more likely to avoid trading, but when they do trade, they follow the predictions' changes of the shorter-term forecasts. This finding does not contradict that of Panel A, but pinpoints the importance of FY2 forecasts for investors, which is found in both Panels, with the 12 columns showing that when the abnormal return is statistically significant, it always follows the sign of the FY2 revision. Moreover, in Panel B, the two significant coefficients are both being positive, whereas the respective changes with opposite signs in columns (4) and (5) are insignificant, which shows that the same asymmetric effect exists in more distant news' counterbalancing, as in preceding results. This provides more evidence that when reports disclose FY3 or longer-term estimates, the market is more likely to respond with a positive CAR.

To summarize the results of Table 4, the two Panels provide evidence that investors value the FY2 forecast revisions more than those of any other future periods' predictions and that when the news does not provide a clear message regarding future firm performance, then the FY3 and longer-term estimates are informative. It also

shows that when analysts revise their expectations upwards for some periods and downwards for others in the same report, the market is more likely to respond favorably for the firm, not only when FY3 and longer-term predictions are disclosed, but also for reports with two-year horizons. This suggests that contrasting revisions are associated with positive news regardless of the reports' horizon. These findings complement those of Table 3, providing further evidence for the importance of long-term forecasts when the news is mixed and their differences in the investors' empirical valuation model. It also corroborates this Table's conclusions regarding positively biased disclosures, but shows that this bias is also present in two-year-horizon reports with contrasting revisions.

4.5. Additional test: Analyst ability and informativeness

4.5.1. Expectations

The higher informativeness of multi-period models provides an incentive for analysts to disclose estimates for more future periods. Given the difficulty of longer-term predictions due to the increased uncertainty compared to shorter horizons, it would be expected that more skilled analysts would be more likely to provide more long-term estimates. However, concurrent papers find that the probability of long-term earnings disclosure is larger for less skilled analysts (Balashov and Pisciotta, 2020; Gibbons et al., 2021). Furthermore, Ertimur et al. (2011) find that less reputed analysts are more likely to provide more detailed information about the firms' future earnings than analysts with high reputations, by disclosing information about the firm's revenues and expenses together with their earnings forecasts. They also find that the supply of this detailed information about the earnings' disaggregation in the two constituent parts is associated with higher informativeness for lower reputation analysts.

I posit that the market may perceive the disclosure of more information, as a signal of higher quality reports, not only in the case of disaggregated earnings in revenues and expenses, but also in that of earnings forecasts for a higher number of future periods. Thus, as analyst ability is positively associated with informativeness (Stickel, 1992; Park and Stice, 2000; Hilary and Hsu, 2013), less skilled analysts may include additional information in their reports, such as estimates for more periods, to indicate higher analyst effort or better knowledge of the specific firm, intending to make their reports appear to be of higher quality and increase their reduced informativeness. In

fact, several papers show that increased analyst effort is related to both more information and higher informativeness. Harford et al. (2019) find that analysts allocate more effort to firms that are more important to them. Their results indicate that their forecasts and recommendations are more frequent, accurate and informative when they are issued for firms that are of higher importance in the analysts' individual portfolio of firms covered. Gibbons et al. (2021) show that analysts strategically allocate their effort among the firms they cover and that they use the EDGAR database to acquire more knowledge about them. Those analysts that use the database in a higher extent, provide forecasts for more future periods and financial metrics, with higher accuracy and informativeness. Therefore, if analysts with lower ability are successful in their strategy to increase their reports' quality, then I expect the informativeness difference between low skill and high skill analysts to be smaller when more long-term forecasts are disclosed.[10]

4.5.2. Results

I examine the informativeness differences between analysts of high and low ability, using reports of different horizons that include only matching revisions, in other words, where all forecasts are revised in the same direction. I create indicator variables for low, medium and high ability levels from the continuous variable *Relative Accuracy* that measures the analysts' average relative accuracy for all firms covered in fiscal year t-1. I present the results in Table 5, but given that *Relative Accuracy* is a control variable in the empirical model that I use for the results of Table 3 (control variables are not tabulated), I discuss the findings of this Table first. *Relative Accuracy* is positively associated with informativeness in the full sample and in reports with a horizon of up to two years. For reports with horizons of three years or more, the difference is not statistically significant. These findings are consistent with my expectations that the difference between high and low skill analysts decrease when more long-term information is provided.

In all 9 columns of Table 5, the intercept values indicate the market response for the low ability analysts, whereas the differences of the other two categories with the low ability analysts is presented by the *Medium Ability* and *High Ability* indicator variables.

[10] It should be noted that this rationale does neither suppose or preclude that the actual quality of these reports will be higher, it is constructed only on the basis of the perceived quality by the market. The examination of the actual quality of these reports, is not one of the goals of this study.

The empirical model remains the same as in the previous Tables, apart from the *Relative Accuracy* which has been substituted by the new indicator variables. The structure of Table 5 is the same as that of Table 3, with column (1) presenting the results for the full sample, columns (2) – (5) those for upward revisions and columns (6) – (9) for downward revisions. In the first column, I observe that both the medium and high ability analysts provide more informative reports, consistent with prior literature. Columns (2) - (5) corroborate the expectations regarding the decrease in informativeness differential for the case of upward revisions. For revisions in one-year-horizon reports, the informativeness difference is 0.16%, for those with a horizon of two years the distance almost halves at 0.10%, while for longer horizons it becomes insignificant. This decrease in informativeness differential is also found for downward revisions, but is not that clear, as it can be seen in columns (6) – (9). For reports with a horizon of one, two and three years the difference is only significant at the 10% level and relatively stable, with values between 0.06% and 0.09%. It becomes insignificant only for reports with four-year horizons or longer. Nevertheless, the asymmetry between upward and downward revisions may also derive from the fact that low ability analysts are in a larger informativeness deficit when the revise their forecasts upwards. The informativeness difference between high and low ability analysts for one-year-horizon reports is 0.16% for upward revisions, the double than the value for downward revisions. The results of the three indicator variables for the Reports' Horizon are similar to those of Table 3, corroborating prior inferences. The interaction terms between the ability levels and different reports' horizons presented in the following rows of Table 5 are all statistically insignificant showing the absence of any further association between these variables.

The results of Table 5 indicate that low quality analysts can successfully mitigate or even eliminate the informativeness difference between them and their high ability peers by disclosing more information in the form of longer-term annual predictions. This strategy can be successful even in the case of favorable news for the company where the informational difference between high and low ability analysts is larger for one-year-horizon reports. Thus, results in Table 5 provide evidence supporting the hypothesis that analysts with low ability provide longer-term forecasts to decrease the difference in informativeness between them and high skill analysts.

5. Conclusions

I examine the association of the reports' horizon with informativeness, to find evidence of how investors use analyst forecasts of different annual periods in their empirical models to estimate firm value and future stock returns, allowing them to make trading decisions. I expect that long-term forecasts, predicting periods of two or more years ahead, will be useful for valuation, but that there is a point in the future where uncertainty makes prediction very uncertain and inaccurate and, thus, the addition of longer-term estimates will provide small or no increase in informativeness. Therefore, I predict a positive and non-linear association between the reports' horizon and informativeness and test my expectations in the full sample and under various scenarios of upward and/or downward forecast revisions.

Results show that reports with a two-year horizon are the most informative. When reports include only forecasts revised in the same direction, those with a two-year horizon have almost double the market response compared to reports with a horizon of only one year, whereas the ones with horizons of three years or more are in between these two. These findings suggest that when reports provide a clearly positive or negative message regarding the future firm performance, the market only requires the forecasts for the following two years to assess the company's value and longer-term information is redundant. However, when the news is mixed with different periods' estimates being revised in different directions in the same report, some upwards and others downwards, then three-year-ahead and longer-term predictions are informative. Furthermore, the market response always either follows the sign of the FY2 estimate or is statistically zero regardless of the reports' horizon. Therefore, the two-year-ahead forecasts are the most important for investors. I also find an asymmetry in the market responses. Results show that there is a higher likelihood of positive than negative abnormal returns when the news is mixed and when forecasts for three or more years ahead are disclosed, suggesting a positive analyst bias to which the market does not respond efficiently.

I examine whether analysts with lower ability can use the disclosure of longer-term forecasts to increase their reports' informativeness. Results show that reports with higher horizons are associated with gradually lower differences in informativeness between analysts with high and low skill until they become statistically insignificant. The difference and its decrease are more pronounced for upward than for downward revisions. Therefore, analysts with lower ability can cover the informativeness gap

between them and higher skill colleagues when they provide more long-term forecasts both when the news are unfavorable for the firm and in the opposite case where the difference is larger for one-year-horizon reports.

This study contributes to the understanding of the investors' empirical stock valuation models by providing evidence of how investors use analyst research to make trading decisions. It shows that investors weigh the information of two-year-ahead forecasts more than that of other periods' estimates in their empirical models supporting expectations that long-term forecasts are informative and that predictions for horizons beyond a point are less important due to higher uncertainty and lower accuracy. Results also indicate that investors adjust the weight of the three-year-ahead or longer estimates according to whether analyst forecasts provide a clear picture regarding future firm performance or not. My findings suggest that investors tailor theoretical valuation models to empirical counterparts based on available information and the uncertainty and accuracy that it is expected to have. Information that is assumed to be more uncertain or inaccurate due to longer horizon or lower analyst ability creates smaller market responses, which increase when analysts provide reports that investors view as of higher quality. This paper also contributes in the literature about analyst disclosure practices and market efficiency. Results show favorable market responses when analysts provide mixed news through contrasting revisions and in reports with predictions for three or more years ahead, suggesting positive analyst bias and market inefficiency in these announcements.

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Appendix: Variable definitions

Variable	*Definition*
Main variables	
CAR [0, +1]	The two-day buy-and-hold abnormal return over the DGTW benchmark portfolio, explained in detail in section 3.2.
Reports' Horizon	The report's horizon is the number of annual periods for which the analyst report provides earnings forecasts.
Forecast and Analyst variables	
Forecast Horizon	The natural logarithm of the difference in days between the forecast announcement date and the firm's earnings announcement date.
Relative Accuracy	The average relative accuracy for all firms followed by analyst i in fiscal year t-1. Relative accuracy is equal to minus 1 multiplied by the relative error, which is the difference between the analyst's accuracy for firm k minus the average accuracy for all analysts covering the same firm, divided by the latter.
Firm Experience	The natural logarithm of the total number of quarters for which an analyst has issued earnings forecasts for firm k until quarter q.
Total Experience	The natural logarithm of the total number of quarters for which an analyst has issued earnings forecasts for any firm until quarter q.
Broker Size	The natural logarithm of the brokerage firm size, which is the number of analysts working for the same employer as analyst i in calendar year t.
Companies	The natural logarithm of the number of firms covered by analyst i in calendar year t.
Industries	The natural logarithm of the number of different industries (based on the first two digits of SIC) covered by analyst i in calendar year t.
Firm and stock variables	
Analyst Following	The natural logarithm of the number of analysts issuing at least one annual earnings forecast in calendar year t about firm k.

Market Value	The natural logarithm of the product of the common shares outstanding multiplied by the stock price of the firm, both measured in quarter q-1.
Return Volatility	The standard deviation of the firm's stock return in year t-1.
$Momentum_{21}$	The buy-and-hold stock return during the last month (21 trading days) before the forecast announcement, defined as the closing stock price at day t-1 minus that of day t-22, scaled by the latter.
$Momentum_{21\text{-}252}$	The buy-and-hold stock return during the last year (252 trading days) before the forecast announcement excluding the last month, defined as the closing stock price at day t-22 minus that of day t-253, scaled by the latter.
Book-to-Market	The natural logarithm of the ratio of the firm's total common equity value divided by the product of the number of common shares outstanding times the firm's stock price on the last trading day of quarter q-1.
ROA	Return on assets. The ratio of the annual net income divided by the total assets on the last trading day of year t-1.
Loss	Indicator variable where the value 1 is assigned if the annual net income of year t-1 is negative and 0 otherwise.

Table 1: Reports' horizon frequencies

This table presents the reports' horizon frequencies of the final sample reports. The sample comprises annual earnings forecasts from 441,857 analyst reports which were disclosed from 2004 until 2018. The report's horizon is equal to the horizon of the longest-term earnings forecast, measured in years. For example, a report issued in the fiscal year 2015 that includes estimates for the years 2015-2017, will have a horizon equal to 3. Column (1) indicates the number of reports for each reports' horizon category, column (2) shows the percentage frequency and column (3) the cumulative percentage frequency of reports.

Panel A

Report's horizon	(1) Number of Reports	(2) % of Reports	(3) Cumulative % of Reports
1 year (current year)	81,548	18.46	18.46
2 years	214,528	48.55	67.01
3 years	117,375	26.56	93.57
4 years	11,692	2.65	96.22
5 years	15,367	3.48	99.70
6 years or more	1,347	0.30	100.00
Total	441,857	100.00	

Table 2: Mean Cumulative Abnormal Returns

Table 2 presents the mean Cumulative buy-and-hold Abnormal Returns (CAR) for the full sample and subsamples based on two criteria: the reports' horizon and the sign of the revision. The Cumulative Abnormal Returns are the two-day CAR [0, +1] over the buy-and-hold return of the DGTW portfolio of firms with similar size, book-to-market value and momentum. Panel A includes the CAR for all forecasts in column (1) and the subsamples when the analysts' FY1 expectations are revised upwards in column (4) and when they are revised downwards in column (5). The reiterations, i.e. the cases where the revised FY1 value is equal to the previous value, are not included for brevity. Columns (2) and (3) of Panel A comprise the frequency of upward and downward revisions, respectively. Panel B shows results for subsamples based on different scenarios of FY1 and long-term forecast revisions. It includes the frequencies of upward and downward FY2, FY3 and FY4 revisions, given the FY1 revision sign, in columns (1) to (4) and CAR in (5) to (8). Columns (1) to (2) and (5) to (6) present upward FY1 revisions, whereas the other four show FY1 downward revisions. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

Panel A

	(1)	(2)	(3)	(4)	(5)
	CAR [0, +1]	Frequency		CAR [0, +1]	
		FY1	FY1	FY1	FY1
Reports' horizon	All forecasts	Up	Down	Up	Down
Full sample	-0.02%***	45.56	53.09	0.37***	-0.33***
1 year	-0.01*	46.08	53.02	0.29***	-0.29***
2 years	-0.03***	45.13	53.17	0.43***	-0.41***
3 years	-0.01	45.41	53.53	0.32***	-0.29***
4 or more years	0.04**	48.03	50.85	0.33***	-0.23***

Panel B

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Frequency				CAR [0, +1]			
	FY1 Up		FY1 Down		FY1 Up		FY1 Down	
	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
Estimate	Up	Down	Up	Down	Up	Down	Up	Down
FY2	80.79	18.92	15.64	84.11	0.49***	-0.06***	0.13***	-0.48***
FY3	71.72	28.10	23.16	76.66	0.42***	-0.00	0.05**	-0.41***
FY4	66.10	33.67	27.90	71.90	0.45***	0.08	0.12**	-0.37***

Table 3: Report informativeness and horizon

Table 3 presents the association between the analyst report's informativeness, measured with the two-day Cumulative buy-and-hold Abnormal Returns (CAR [0, +1]) and its horizon, measured in years. Column (1) shows the results for full sample, columns (2) – (5) for the subsample of upward revisions and columns (6) – (9) for downward revisions. In column (1) that comprises both upward and downward revisions, the CAR [0, +1] values are multiplied by -1 when the FY1 is revised downwards. CAR [0, +1] is the two-day cumulative buy-and-hold abnormal return over the benchmark portfolio, which includes stocks of similar size, book-to-market ratio and momentum. The results for each reports' horizon value are presented separately, with the respective indicator variables in the model, but values of 4 or more years are merged in one variable. The constant value indicates the market response when the reports' horizon is equal to smallest possible value for firms where all continuous control variables are equal to the mean value and all indicators are zero. Thus, in columns (1), (2) and (6) the constant shows the mean abnormal return for firms with a horizon of one year, in (3) and (7) of two years, in (4) and (8) of three years and in (5) and (9) of four or more years. The control variables are forecast, analyst, broker and firm characteristics and a more detailed description of them is presented in the appendix. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full	FY1	FY1-FY2	FY1-FY3	FY1-FY4	FY1	FY1-FY2	FY1-FY3	FY1-FY4
	Sample	Revised upwards				Revised downwards			
VARIABLES	CAR 0 +1	CAR 0 +1	CAR 0 +1	CAR 0 +1	CAR 0 +1	CAR 0 +1	CAR 0 +1	CAR 0 +1	CAR 0 +1
Constant	0.30***	0.31***	0.57***	0.49***	0.53***	-0.29***	-0.56***	-0.51***	-0.46***
	(22.04)	(16.34)	(35.75)	(17.23)	(7.48)	(-14.11)	(-31.24)	(-16.72)	(-6.64)
Reports' Horizon = 2	0.12***	0.14***				-0.13***			
	(7.64)	(6.81)				(-5.95)			
Reports' Horizon = 3	0.05***	0.09***	-0.02			-0.03	0.12***		
	(2.70)	(3.80)	(-0.76)			(-1.10)	(4.95)		
Reports' Horizon >= 4	0.06**	0.11***	-0.00	-0.01		-0.01	0.15***	0.07	
	(2.16)	(3.15)	(-0.08)	(-0.26)		(-0.17)	(3.44)	(1.41)	
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	441,857	200,924	118,889	34,045	6,124	234,117	144,585	43,232	7,218
R-squared	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00

Table 4: Contrasting revisions

Table 4 shows the market response for several scenarios where forecasts of different annual horizons are revised in contrasting directions in the same report. CAR [0, +1] is the dependent variable, the two-day buy-and-hold abnormal return over the benchmark portfolio. Panel A presents the cases where the contrasting revision indicates an immediate news' counterbalancing with the FY2 value being revised in the opposite direction than that of the FY1 forecast. Panel B includes the cases where the news last for more periods and are counterbalanced in the more distant future, with at least the FY2 forecast being revised in the same direction as FY1 and the contrasting revision found in either FY3 or FY4. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

Panel A – Immediate news' counterbalancing

	(1)	(2)	(3)	(4)	(5)	(6)
	FY1	FY1	FY1	FY1	FY1	FY1
	Revised upwards			Revised downwards		
	FY2	FY2-FY3	FY2-FY4	FY2	FY2-FY3	FY2-FY4
	Revised downwards			Revised upwards		
	CAR	CAR	CAR	CAR	CAR	CAR
VARIABLES	[0, +1]	[0, +1]	[0, +1]	[0, +1]	[0, +1]	[0, +1]
Constant	-0.03	-0.13**	-0.04	0.14***	0.22***	0.28**
	(-0.80)	(-2.13)	(-0.24)	(4.07)	(3.87)	(2.07)
Reports' Horizon = 3	-0.03			0.01		
	(-0.56)			(0.14)		
Reports' Horizon >= 4	0.02	0.12		0.03	0.00	
	(0.32)	(1.27)		(0.38)	(0.05)	
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	27,848	9,394	1,766	26,880	8,364	1,489
R-squared	0.00	0.00	0.01	0.00	0.00	0.02

Panel B – More distant news' counterbalancing

	(1)	(2)	(3)	(4)	(5)	(6)
	FY1-FY2	FY1-FY2	FY1-FY3	FY1-FY2	FY1-FY2	FY1-FY3
	Revised upwards			Revised downwards		
	FY3	FY3-FY4	FY4	FY3	FY3-FY4	FY4
	Revised downwards			Revised upwards		
	CAR	CAR	CAR	CAR	CAR	CAR
VARIABLES	[0, +1]	[0, +1]	[0, +1]	[0, +1]	[0, +1]	[0, +1]
Constant	0.37***	0.51**	-0.09	-0.08	0.14	-0.05
	(3.77)	(2.08)	(-0.33)	(-0.96)	(0.70)	(-0.22)
Reports' Horizon >= 4	0.07			0.04		
	(0.53)			(0.30)		
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,869	779	590	4,322	703	559
R-squared	0.01	0.03	0.02	0.01	0.02	0.04

Table 5: Analyst ability

Table 5 presents the results about the market response differential between analysts with low, medium and high ability and how this varies for reports with different horizons. CAR [0, +1] is the dependent variable, the two-day buy-and-hold abnormal return over the benchmark portfolio. Column (1) includes the results for the full sample. Columns (2) – (5) show the findings for upward revisions. In column (2) the values for FY1 upward revisions are presented, in column (3) when both FY1 and FY2 are revised upwards, column (4) requires the same for FY1-FY3 and column (5) for FY1-FY4. Columns (6) – (9) comprise the downward revisions and they follow the same structure as columns (2) – (5). To present results for the interaction terms in one line, the variable Reports' Horizon is abbreviated to RH. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full Sample	FY1	FY1-FY2	FY1-FY3	FY1-FY4	FY1	FY1-FY2	FY1-FY3	FY1-FY4
		Revised upwards				Revised downwards			
VARIABLES	CAR 0 +1	CAR 0 +1	CAR 0 +1	CAR 0 +1	CAR 0 +1	CAR 0 +1	CAR 0 +1	CAR 0 +1	CAR 0 +1
Constant	0.24***	0.24***	0.51***	0.47***	0.60***	-0.23***	-0.54***	-0.46***	-0.44***
	(10.43)	(7.44)	(21.22)	(11.84)	(6.14)	(-6.82)	(-19.72)	(-10.99)	(-4.65)
Medium Ability	0.08**	0.06	0.07**	0.03	-0.19	-0.09**	-0.01	-0.05	-0.14
	(2.51)	(1.38)	(2.26)	(0.69)	(-1.63)	(-2.06)	(-0.39)	(-0.93)	(-1.12)
High Ability	0.11***	0.16***	0.10***	0.03	-0.01	-0.08*	-0.06*	-0.09*	0.04
	(3.60)	(3.60)	(3.20)	(0.63)	(-0.09)	(-1.67)	(-1.66)	(-1.69)	(0.36)
Reports' Horizon = 2	0.14***	0.17***				-0.15***			
	(5.28)	(4.57)				(-3.89)			
Reports' Horizon = 3	0.08***	0.13***	-0.00			-0.05	0.14***		
	(2.61)	(3.14)	(-0.10)			(-1.28)	(3.37)		
Reports' Horizon >= 4	0.09**	0.16***	0.03	0.01		-0.03	0.20***	0.09	
	(2.15)	(2.71)	(0.49)	(0.17)		(-0.46)	(2.76)	(1.14)	
Medium Ability * (RH = 2)	-0.04	-0.01				0.06			
	(-0.97)	(-0.11)				(1.03)			
Medium Ability * (RH = 3)	-0.05	-0.03	-0.01			0.08	-0.02		
	(-1.34)	(-0.52)	(-0.20)			(1.36)	(-0.30)		
Medium Ability * (RH >= 4)	-0.07	-0.11	-0.12	-0.09		0.03	-0.11	-0.10	

	(-1.10)	(-1.29)	(-1.33)	(-0.88)		(0.32)	(-1.09)	(-0.90)	
High Ability * (RH = 2)	-0.04	-0.07				-0.00			
	(-0.96)	(-1.38)				(-0.06)			
High Ability * (RH = 3)	-0.04	-0.08	-0.03			-0.00	-0.04		
	(-0.86)	(-1.47)	(-0.51)			(-0.01)	(-0.73)		
High Ability * (RH >= 4)	-0.05	-0.05	0.01	0.01		0.04	-0.04	0.03	
	(-0.80)	(-0.62)	(0.09)	(0.11)		(0.43)	(-0.42)	(0.24)	
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	441,857	200,924	118,889	34,045	6,124	234,117	144,585	43,232	7,218
R-squared	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01