Retail Investors and Analysts

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Abstract

In this paper we ask whether retail investors are responsive to analysts' revisions. We consider revisions in recommendations, price targets, and EPS forecasts, all of which predict returns. Revisions in recommendations and price targets portend greater retail trading in the direction of the revision. The effects are stronger for All-Star Analysts' revisions, and retail investors also respond to All-Star's revisions in EPS forecasts. Retail investors trade in anticipation of revisions in price targets and recommendations, consistent with analysts or brokers "tipping" some retail investors. Retail trades earn higher returns when aligned with analysts' revision. The results show that retail investors are one channel through which analysts' information gets into prices. Our findings also support the idea that spikes in retail trading reflect informed trading, some of which is informed by analysts.

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We study how retail investors respond to analysts' revisions in recommendations, price target-implied return forecasts, and EPS forecasts. Our paper aims to address unanswered questions in both the retail and analyst literatures. A growing literature on retail investors is largely concerned with individual investors' decision-making processes and investment performance (e.g., Barber and Odean (2013) and Boehmer, Jones, Zhang, and Zhang (2020)). Much of the literature on analysts is concerned with the relevance of the information that analysts produce and how this information gets impounded into prices. In a review of the analyst literature, Kothari, So, and Verdi (2016) conclude that "the specific mechanisms through which analysts influence asset prices, and expected returns in particular, are still not entirely clear". In this paper we produce several novel findings regarding how retail investors make decisions, the profitability of retail trades, and how analysts' information influences stock prices.

We estimate retail trading via the methodology developed in Boehmer, Jones, Zhang, and Zhang (2020), which identifies retail market orders in TAQ data. Using this measure, we find that retail trades are responsive to revisions in "analysts' actionables", i.e., recommendations and price targets.[1] These effects are significant even after excluding revisions that occur around earnings announcements and controlling for past daily returns at various horizons, return volatility, and turnover. When analysts increase a recommendation or price target-return forecast, there are significant increases in net retail buying. Net retail buying also declines following negative revisions in recommendations. Retail trading does not respond to reductions

[1] Like Engelberg, McLean, and Pontiff (2020), we use the word "analysts' actionables" to describe recommendations and price targets. Recommendations and price targets explicitly communicate the investment prospects of a firm. This is in contrast to an EPS forecast or other financial forecast, which does not explicitly communicate whether a stock is likely to outperform.

in price target-return forecasts, although reductions in return forecasts typically result in positive return forecasts, e.g., the return forecast is reduced from 30% to 20%.

With EPS forecast revisions, we find that overall, retail investors increase net buying following both positive and negative revisions, but do so more following negative revisions. This may in part be due to the fact that institutional investors are more responsive to EPS forecasts. EPS forecasts are of course different than recommendations and price targets, which explicitly give an investment recommendation. Increasing a price target return-forecast by 15%, or moving a recommendation from a buy to a strong buy, gives the investor a clear course of action. In contrast, increasing a quarterly EPS forecast from $0.15 to $0.20 does not explicitly communicate an investment action. Our findings suggest that when the investment recommendation is explicit, retail investors respond accordingly.

We then study whether the aforementioned effects are stronger with All-Star analysts. With recommendations, we find that the retail trading in response to a revision from an All-Star analyst is 2 to almost 5 times as strong as the response to a non-All-Star analyst. Retail investors also trade in the direction of EPS revisions if an All-Star analyst makes the revision. Overall, these findings support the idea that retail investors that follow analysts are informed investors who pay attention to not only analysts' revisions, but also to the quality of the analyst making the revision.

Next, we explore whether retail investors are "tipped" by analysts or otherwise anticipate changes in analysts' forecasts and recommendations. The incentives for either analysts or brokers working at the same firm as an analyst to tip retail investors are fairly clear. Investment banks often serve retail investors via full-service brokers. More retail trading and more retail

assets under management result in more revenues for these banks and thus higher pay for the brokers they employ. Independent or unaffiliated analysts sell their reports directly to retail investors, so there are incentives for tipping at these firms well. We find strong evidence of retail investors trading in anticipation of price target revisions. We find weaker, but still significant evidence with recommendation revisions. We do not find evidence with EPS forecast revisions.

We then examine the informativeness of analysts' revisions and retail trading. Like earlier studies, we find that both retail investors' trade imbalances and analysts' revisions predict stock returns in the intended direction.[2] With the revision variables, our results are completely out-of-sample relative to the earlier studies that document this predictability. McLean and Pontiff (2016) show that return-predictability for most predictors weakens out-of-sample, so it is important to document that revision variables predict returns in our sample. The return-predictability of retail trading and revisions are largely orthogonal to one another. This means that retail investors that buy shares following positive revisions can expect higher returns as compared to buying shares on regular days that do not follow revisions. We further find that revisions predict returns in subsamples limited to high levels of either retail buying or retail selling. Overall, our findings support the idea that retail trades that follow revisions are more informative and earn greater abnormal returns than retail trades that do not follow revisions.

Our paper builds on several literatures. A literature beginning with Womack (1996) has shown that revisions predict future stock returns. As we mention above, Kothari, So, and Verdi (2016) point out that there is still much to be learned about how analysts' information gets

[2] For evidence that analysts' revisions have return-predictability, see Womack (1996), Barber, Lehavy, McNichols, and Trueman (2001), Brav and Lehavy (2003), Gleason and Lee (2003), and Asquith, Mikhail, and Au (2005).

impounded into prices. We show that the information communicated in actionables, i.e., price targets and recommendations, is at least partly impounded into prices via retail investors. Schipper (1991), Bradshaw (2011), and Kothari et al. contend that analyst research is overly focused on EPS forecasts, and has not given enough attention to recommendations and price targets. Our paper studies all three analyst variables together and finds, consistent with this view, that for retail investors recommendations and price targets are more important. Moreover, we find that return-predictability stemming from revisions in price targets and recommendations is stronger than return-predictability stemming from EPS forecasts.

Many studies in the retail literature find that retail investors are overall uninformed, and that retail investors underperform (e.g., Odean (1999), Barber and Odean (2000), Grinblatt and Keloharju (2000), Hvidkjaer (2008), and Barber, Odean, and Zhu (2009a and 2009b), Barber and Odean (2013), and McLean, Pontiff, and Reilly (2020)). Our paper does not contradict this idea. Instead, our findings support the view that temporary spikes in retail trading are informative, even if the average retail trade is a poor one. We thus build on earlier studies, which find that retail trade imbalances are informative about stock returns over short horizons (e.g., Kaniel, Saar, and Titman (2008), Kaniel, Liu, Saar, and Titman (2012), Kelley and Tetlock (2012), Boehmer et al. (2020), McLean, Pontiff, and Reilly (2020)). We show that such informed retail trading is in some cases informed by analysts' revisions, and that retail traders earn higher expected returns when their trades are in response to revisions.

Our paper builds on the findings in Mikhail, Walther, and Willis (2007) and Malmendier and Shanthikumar (2007), who examine large and small trades and their profitability following changes in analysts' recommendations. These papers limit their analyses to anlaysts'

recommendations, and do not study price target revisions like we do. Both papers find that both large and small trades increase following positive recommendations. Both papers also conclude that small trades in response to recommendations are uninformed and lead to worse investment performance.

We find that retail trading following revisions is informed, whereas these Mikhail, Walther, and Willis (2007) and Malmendier and Shanthikumar (2007) find that small trades following recommendations are uninformed. If small trades during their sample periods do indeed capture retail trades, then what could explain this difference? Our sample is completely out of sample relative to both studies, as our ability to identify retail trades beings in 2006. Regulatory changes, including Reg FD, the Sarbanes-Oxley Act, and the Global Settlement, that were meant to reduce analysts' biases and level the playing field for retail investors, could also explain the difference. Our sample is completely after these regulatory changes, whereas both of the aforementioned studies have samples that are either completely or mostly before the regulatory changes.

Finally, our paper builds on the findings in Irvine, Lipson, and Puckett (2007), who find that institutional investors are "tipped" by sell-side analysts, as institutional buying increases prior to an analyst initiating a "buy" or "strong buy" recommendation. On the surface, their results suggest that retail investors should be trading in the opposite direction, i.e., if institutions buy more before a bullish recommendation, then retail investors must be buying less. Lipson et al use Plexus data, which represents a subset of institutions. Their sample also covers a 4-year sample period, which ends in 2002, before our sample begins. As we mention above, our sample is after the many regulatory changes, all of which were passed in 2002 or earlier, that were meant

to make things fairer for retail investors with respect to analysts. Irvine et al. also study coverage initiations, whereas we study revisions. We focus on revisions because they are more numerous than initiations, and we find in untabulated tests that the return-predictability stemming from initiations is insignificant during our sample.

1. Sample and Variables

1.1. Measuring Retail Trading

We estimate retail trading via the methodology developed in Boehmer, Jones, Zhang, and Zhang (2020), which identifies market orders originating from retail investors. Boehmer et. al. show that due to the rules of Regulation NMS (National Market System), one can identify retail orders based on the sub-penny pricing of the execution. Retail market buy orders are likely to be internalized and receive sub-penny price improvement such that the trade price falls slightly below a whole cent. Retail market sell orders are also likely to be internalized, and receive sub-penny price improvement such that the trade price falls slightly above the whole cent. Following Boehmer et al., we calculate the fraction of the penny associated with the transaction price: $Z_{it} \equiv 100 * \text{mod}(P_{it}, 0.01)$, where P_{it} is the transaction price in the stock. Thus, trades reported to FINRA TRF (exchange code 'D') with a Z_{it} in the range of (0.6, 1) are identified as buys by retail traders, while trades reported to FINRA TRF with a Z_{it} in the range of (0, 0.4) are identified as sells by retail traders. Like Boehmer et. al., we do not identify trades with Z_{it} in the range of (0.4,0.6) as retail trades, since some advanced order types, such as pegged orders, can result in transaction

prices at or near half pennies that do not involve retail traders.[3]

In order to construct our retail trading variable, we require that for every month during the relevant period, the stock must have at least one retail-initiated trade. This ensures that the stock was actively traded, and was not newly listed or temporarily delisted. The identification of retail trade relies on Regulation NMS, so our sample period begins in October 2006 and ends in 2019. We find the share of identified retail initiated trades begins to rise in October 2006. Boehmer et. al. (2020) validate this methodology using actual retail trade data from Kelley and Tetlock (2013) and with retail trades obtained from NASDAQ.

We construct two retail trading measures. The first is a trade imbalance measure, which is also used in Boehmer et al. This variable is net retail buys (retail buys – retail sells) scaled by total retail trading (retail buys + retail sells). We refer to this measure as *Retail Direction*, as it shows the direction in which retail traders trade, but not the magnitude relative to total trading. As an example, if buys are 10 and sells are 5, *Retail Direction* will equal 1/3. *Retail Direction* will also equal 1/3 if buys are 1,000 and sells are 500, or if buys are 1M and sells are 0.5M, and so on. *Retail Direction* therefore reflects the direction of the trading, but not the magnitude.

Our second measure aims to better reflect the magnitude of retail trading. This measure has the same numerator as *Retail Direction* (retail buys – retail sells), but the denominator is *total* trading volume, which reflects both institutions and retail investors. We refer to this variable as *Retail Magnitude*. As an example, assume retail investors buy 1,000 shares and sell 500, while

[3] To our knowledge, this retail measure is the only viable retail measure that can be constructed from commercially available data. Methods based on trade size are no longer viable since the proliferation of market fragmentation and algorithmic trading prevent the identification of the original order size.

total institutional trades equal 8,500 shares. In this case, *Retail Magnitude* will equal 0.05. If instead, total institutional trades were 18,500 shares, then *Retail Magnitude* would equal 0.025. In contrast, *Retail Direction* would be 1 in both cases. Hence, *Retail Magnitude* reflects the magnitude of net retail buying relative to total volume, whereas *Retail Direction* couches net retail buying in terms of total *retail* trading, but ignores whether these trade imbalances are large or small relative to the stock's total trading activity.

Panel A of Table 1 shows summary statistics for the two retail trading variables. Both variables are reported in percent (multiplied by 100). *Retail Direction* has a mean of 2.59%, a median of zero, and a standard deviation of 43%. Hence, on average, retail buys are about equal to retail sells during our sample period, however there is a good deal of variance in this variable. The 10^{th} and 90^{th} percentiles are -0.59 and 0.50, respectively. *Retail Magnitude* has a mean of -0.19% and a median of zero. Its standard deviation is 6.6%, and its 10^{th} and 90^{th} percentiles are -4.1% and 3.6%, respectively. *Retail Magnitude* is scaled by total trading volume, so we expect it to be several orders of magnitude smaller than *Retail Direction*, which is scaled by retail trading volume.

1.2. Analyst Variables

We obtain data on analysts' revisions for EPS forecasts, price targets, and recommendations from the IBES details database. We focus on revisions as we believe these to

be most salient to investors, and all three of the revision variables described here predict returns in the intended direction in our sample, and thus are useful and informative to investors.[4]

We measure revisions in EPS forecasts by subtracting the old value from the new value, and scaling this difference by the stock price measured the day before the new value is announced. We measure recommendation revisions by simply the old recommendation from the new recommendation. We code recommendations such that a strong buy = 5 and a strong sell =1. For price targets, we first compute the implied return, by scaling the 12-month price target by the previous day's closing stock price. We then compute the change in implied return, and use that as the revision variable.

We provide summary statistics for our revision variables in Panel B of Table 1. The EPS Forecast revisions variable is reported in percent. It averages -0.44%, so the average EPS forecast revision is a reduction in the EPS forecast. This variable has a standard deviation of 3.75%, and the 10^{th} and 90^{th} percentiles are -1.3% and 0.71%, respectively.

The recommendations revisions average -0.058, or pretty close to zero. The median recommendation revision is zero. The 10^{th} and 90^{th} percentiles are -2 and 1, e.g., a recommendation falling from 5 to 3, or a recommendation increasing from 4 to 5. The standard deviation is 1.048.

The price target-revision variable has average and median values that are very close to zero. The 10^{th} and 90^{th} percentiles are -16.7% and 17.3%, which are sizeable changes, i.e., the 12-

[4] In untabulated results we find that initiations, or first-time recommendations, price targets, and EPS forecasts, do not predict returns in our sample.

month return forecast increased or declined by about 17%. The standard deviation for this variable is 17.8%, so it varies a good deal.

2. Main Results

In this section of the paper we discuss our main findings. Section 2.1 provides a discussion of some sorts, which are reported in Figure 1. Section 2.2 describes our tests that relate retail trading to analysts' revisions. These results are reported in Tables 3 and 4. We then ask whether retail investors respond more strongly to All-Star analysts' revisions. These findings are discussed in Section 2.3 and reported in Table 5. Section 2.4 discusses tipping and our tests of whether retail investors trade ahead of revisions, which are reported in Table 6. Section 2.5 discusses how revisions and retail trading related to future stock returns. We also explore whether retail trading in response to revisions predicts returns more strongly. These results are reported in Tables 7 and 8.

2.1. Univariate Results

We report results from univariate sorts in Figure 1. Figure 1.A was made using the *Retail Direction* variable, while Figure 1.B was made using the *Retail Magnitude* variable. In each figure, we display the average value of the retail trading variables, sorted into 3 groups. The three groups we form include: days when there was a revision in the 90th percentile or higher for the revision variable (*Up*), days when there was a revision in the 10th percentile or lower for the revision variable (*Down*), and days with no revision. Before taking the averages within each group, we demean each firm-day observation the firm's mean. We also exclude observations for which

there was an earnings announcement over any of the three previous days, so that we can more cleanly relate trading to the revision.[5] Including earnings announcements does not change our findings.

The Figures make several points very clear. First, retail investors' trading is highly responsive to recommendation revisions. Retail investors buy more following positive recommendation revisions and sell more following negative recommendation revisions. Recommendations are the most salient and perhaps widely-followed analyst actionable, i.e., a recommendation clearly tells investors what to do, so it makes sense that retail investors would be most responsive to these revisions. Moreover, recommendation revisions predict returns in the intended direction, so it is wise for retail investors to trade this way.

Retail investors also respond positively to price target revisions; however, this is only the case for positive changes. For positive price target revisions, there is a large increase in retail net buying, even larger than that for positive recommendation revisions. However, for negative revisions, retail investors also increase net buying, although they do so less so than with positive revisions. Later, we will show in regressions that the effect around negative revisions is insignificant. Note that a negative price target revision does not necessarily imply that investors should sell the stock. As an example, if the 12-month return forecast falls from 30% to 20%, this does not clearly imply that investors should sell.

Finally, the figures show that retail investors buy more shares in response to EPS forecast revisions, regardless of the direction of the revision. In fact, investors buy more following negative revisions than positive ones, although in our later tests we will show that this effect

[5] Kaniel, Saar, and Titman (2008) show that retail trading increases following earnings announcements.

reverses in the case of All-Star analysts. Note that an EPS revision is not a clear investment signal, e.g., decreasing and EPS forecast from $0.20 to $0.15 is not the same thing as recommending that the stock should be sold.

Overall, the results suggest that retail investors pay attention to analysts, and in general buy more following analysts' positive revisions. This result is stronger with actionables, i.e., recommendations and price target-forecasts, where analysts are clearly telling investors how to trade. With EPS forecasts, which offer no such clear instruction, there is perhaps some confusion, with net retail buying increasing regardless of the direction of the revision. This could reflect the fact that institutions trade more heavily following EPS revisions, and retail investors, unsure of what do, provide liquidity.

2.2. Retail Trading in Response to Revisions: Revision-Level Regressions

In this section of the paper we discuss revision-level regressions. The unit of observation is an analysts' revision, and we regress daily retail trading on the revision variables and controls. Hence, these regressions ask whether across revisions, retail net buying increases with the positivity of the revision. We continue to exclude revisions that had an earnings announcement on the same day, or in the 2 days prior, as in such cases both the analysts and the retail investors may be responding to the earnings announcement. Including revisions that follow earnings announcements makes our results stronger. We estimate regressions for revisions in EPS, recommendations, and price targets separately. In the subsequent tables, we put all three types of revisions into a single regression and report similar findings.

The regressions reported in Table 2 include firm and time fixed effects. The standard errors are clustered on firm and time. We regress day *t* retail trading on revisions reported on day *t-1*, along with the day *t-1* stock return, lagged weekly return, lagged monthly return, lagged 6-month return, day *t-1* return squared, lagged weekly return squared, lagged daily return variance over the last month, last month's turnover, and market capitalization. The lagged returns and volatility measures are meant to control for events that could impact both the revision variables and retail trading.

The first two columns report the results from regressions in which EPS revisions are the independent revisions variable. In the first column, *Retail Direction* is the dependent variable. In the second column, *Retail Magnitude* is the dependent variable. Recall that *Retail Direction* is equal to retail net buying (retail buys – retail sells) scaled by retail trading volume, while *Retail Magnitude* is equal to retail net buying scaled by total trading volume. In both specifications, the EPS revision coefficients are negative and significant, showing that retail net buying increases more following a *decrease* in the EPS forecast.

Columns 3 and 4 report the results for price target revisions. The results here are very strong, and show that retail net buying increases significantly following increases in price targets. In the *Retail Direction* regression, the revision coefficient is 0.019 (*t*-statistic = 10.06), while in the *Retail Magnitude* regression, the coefficient is 0.033 (*t*-statistic = 6.52). Moving from the 10^{th} to 90^{th} percentile of the price target-return forecast revision variable yields an increase of 0.656% in *Retail Direction*. Moving from the 10^{th} to 90^{th} percentile of the return forecast revision yields an increase of 1.14% in *Retail Magnitude*. *Retail Direction* has a standard deviation of 43%, while

Retail Magnitude has a standard deviation of 6.6%, so the effect is much larger in economic terms for *Retail Magnitude*.

What does it mean if *Retail Magnitude* moves more than *Retail Direction*? It reflects the fact that the amount or magnitude of retail trading increased along with the directional change in trading. As an example, consider a stock for which on day *t*, retail buys equal 20 and retail sells equal 10. Now assume that on day *t+1*, buys increase to 210 and sells to 100. Assume institutional trading equals 1,000 shares traded on both days. *Retail Direction*, which scales by retail trading volume, would increase slightly from 0.33 to 0.35. In contrast *Retail Magnitude*, which scales by total volume, would increase from 0.009 to 0.840, a much larger increase, especially in percentage terms. Because it scales by retail volume, *Retail Direction* does not reflect how the magnitude of the retail trading increases.

In the final two columns we report the results for revisions in recommendations. The results here are also very strong, and show that retail investors increase their net buying in a stock if an analyst strengthens their recommendation. In the *Retail Direction* regression, the coefficient is 0.005 (t-statistic = 9.35). Thus, if a recommendation increases by 1 (e.g., from buy to strong buy), then *Retail Direction* increases by 0.5%. In the *Retail Magnitude* regression, the coefficient is 0.006 (t-statistic = 4.39), showing a 0.6% increase in *Retail Magnitude*. *Retail Direction* has a standard deviation of 43%, while *Retail Magnitude* has a standard deviation of 6.6%, so here again the effect is much larger in economic terms for *Retail Magnitude*, representing about 10% of a standard deviation. If we were to move from the 10^{th} to 90^{th} percentile of the recommendation revision variable (from -2 to 1), then the regression coefficient

suggests an increase of 1.8% in *Retail Magnitude*, or more than one-quarter of a standard deviation.

The control variables also reveal some interesting facts about retail trading First, we see that retail traders are contrarian. The coefficients for returns measured over the last week, month, and 6-months are all negative and statistically significant. The return measured over the last day is positive and significant, likely reflecting the fact that revisions that are more bullish, as measured by stock price reactions, receive even greater retail buying. Retail investors also buy more of larger stocks and more of stocks with higher turnover. These results are consistent with the findings reported in Boehmer et al. (2020).

Taken in their entirety, the results in Table 2 show that retail investors are responsive and informed with respect to revisions in analysts' actionables. When analysts increase price-target return forecasts or recommendations, retail investors buy more shares. With earnings forecasts, the results are the opposite. When EPS forecasts increase, retail investors buy fewer shares. This of course suggests that institutions are buying more shares. Overall, the findings suggest that retail investors are responsive to analysts' actionables, which clearly suggest a course of action, whereas institutions are more responsive to EPS forecasts.

2.2.1 Retail Trading in Response to Revisions: Daily Specifications

In this section of the paper we further explore the effects of revisions on retail trading, but make two major changes relative to the specifications described in the last section. First, we make the unit of observation firm-day, rather than revision. Most firm-day observations do not have revisions, in which case the revision variable is assigned a value of zero. Some firm-days

have multiple revisions of the same type (e.g., EPS forecast), and in such cases we take a simple average. Second, we include all of the revision variables in the same regression. We continue to include the same control variables that we use in the previous tables. We also continue to exclude observations for which EPS was reported during any of the 3 previous days. Finally, we include of a lagged value, day *t-2*, of the retail trading variable value. This is done to capture the fact that retail trading may be persistent. We choose day *t-2* so that the variable value does not reflect the announcement of the revision, which occurs on day *t-1*.

We report the results from these specifications in Table 3. The results are largely the same as those in Table 2, which estimates at the revision-level. With respect to EPS forecast revisions, the response of retail trading is still negative. That is, when analysts raise lower EPS forecasts, retail investors buy more of the stock. As we explain earlier, this could reflect the fact that institutions respond more strongly to EPS revisions, pushing prices up and perhaps encouraging retail investors to provide liquidity and sell their shares.

The recommendation and price target revision variables both continue to be associated with positive and significant reactions from retail traders. When analysts' revisions signal a more favorable outlook via recommendations or price targets, retail investors respond in kind by purchasing more shares. These effects are seen both with *Retail Direction* and with *Retail Magnitude*. Overall, the results continue to be consistent with the idea that revisions in analysts' actionables inform retail trading.

2.2.1 Retail Trading in Response to Revisions: Daily Specifications and Large Revision Dummies

In this section of the paper we replace our continuous revision variables with dummy variables. For each revision variable we create an *Up* dummy that is equal to 1 if there is a revision at or above the 90th percentile of the distribution of the revision variable, and zero otherwise. We also create a *Down* dummy that is equal to 1 if there is a revision at or below the 10th percentile for a revision variable, and zero otherwise. In some cases, analysts simply reaffirm their prior forecasts and there is no change. In such cases, both dummies are equal to zero. We continue to use the firm-day sample that we used in the previous table, so most observations have values of zero for both the *Up* and *Down* dummies, as for most firms on most days there are no revisions. We also continue to exclude observations for which EPS was reported during any of the 3 previous days. The sample and variables here mirror those used to create Figure 1.

The results in Table 4 largely confirm the findings in the earlier tables and those in Figure 1 that were discussed earlier. Retail buying is significantly higher for all 3 types of revisions following positive revisions. However, negative revisions also lead to more retail buying in the case of EPS revisions. With price target revisions, we see the effect of a negative revision is insignificant in all specifications. For recommendations, the *Up* coefficients are always positive and significant and the *Down* coefficients are always negative and significant. Hence, as in the other tables, the results in Table 4 show that retail investors are responsive to analysts' actionables.

In regression 2 *Retail Direction* is the dependent variable and all of the controls are included. The coefficients for *EPS Up* and *EPS Down* are both positive and significant. The *Down* coefficient is larger, consistent with what is reported in Figure 1 and the previous tables. The *EPS Down* coefficient is 0.006 (*t*-statistic = 9.07), while the *EPS Up* coefficient is 0.003 (*t*-statistic =

4.37). The *F*-Statistic reported at the bottom of the table shows that *EPS Down* is significantly larger than *EPS Up*.

The *Target Up* coefficient in regression 2 is 0.011 (*t*-statistic = 5.65) in regression 2, while the *Target Down* coefficient is 0.002 (*t*-statistic = 1.09). The *F*-Statistic reported at the bottom of the table shows that the *Target Up* coefficient is significantly larger than the *Target Down* coefficient. Thus, as shown in the earlier tables, retail investors tend to be responsive to price target revisions. Recall that *Target Down* can still involve a positive price target-return forecast, e.g., the retune forecast could decline from 20% to 15%, but it is still a positive return forecast.

The coefficients in regression 2 again show that recommendations are where retail investors tend to pay the most attention. The *Rec. Up* and *Rec. Down* coefficients are both highly significant and signed such that retail investors are following the revisions. The *Rec. Up* coefficient is 0.008 (*t*-statistic = 5.61), while the *Rec. Down* coefficient is -0.006 (*t*-statistic = 4.65). The difference in *Retail Direction* following positive and negative recommendations revisions is therefore about 0.140, or about 1/3 of a standard deviation of *Retail Direction*.

Regressions 3 and 4 use *Retail Magnitude* as the dependent variable, and tell a similar story. For readability, we multiple all of the coefficient values by 100. In regression 4, which has the full set of control variables, the *EPS Up* coefficient is 0.015 (*t*-statistic =2.40) and the *EPS Down* coefficient is 0.040 (*t*-statistic = 6.36). So here again, retail investors buy more after all EPS revisions, yet do so more strongly after negative revisions.

The price target revision coefficients are both positive in regression 4, however only the *Target Up* coefficient is significant. The *Target Down* coefficient is 0.032 (*t*-statistic = 1.53), while the *Target Up* coefficient is 0.059 (*t*-statistic = 2.93), and the difference between the coefficients

is statistically significant. The coefficients for the recommendation revisions are 0.054 (*t*-statistic = 4.53) for the *Rec. Up* and -0.025 (*t*-statistic = 2.02) for the *Rec. Down*. The difference between the *Rec. Up* and *Rec. Down* coefficients is statistically significant and economically meaningful. The standard deviation for *Retail Magnitude* is 0.067. The coefficients are multiplied by 100 in regressions 3 and 4, so the difference between the *Rec. Up* and *Rec. Down* coefficients is about 0.008, or 11% of a standard deviation of *Retail Magnitude*.

The findings in Table 5 agree with the findings in the earlier tables, and thus confirm the finding that retail investors are responsive and informed with respect to revisions in analysts' actionables, especially recommendations, but not with EPS revisions. Our findings suggest that institutions may be more responsive to EPS revisions.

2.3 Retail Trading in Response to Revisions: The Effects of All-Star Analysts

In this section of the paper we ask whether retail investors behave differently following revisions of "All-Star" analysts. Clarke, Khorana, Patel, and Rau (2007) argue that analysts determined by *Institutional Investor* magazine to be "All-Stars" may be more adept than typical analysts. An All-Star analyst is defined as an analyst who was denoted by Institutional Investor as an All-Star or a runner-up in the prior November issue of the magazine. That is, if an analyst is denoted an All-Star in 2013, we code them as an All-Star in 2014. We have All-Star data for the years 2013-2017.

To test for the effects of All-Star status, we estimate basically the same revision-level regression as in Table 2, only we include a dummy variable equal to 1 if the analyst is an All-Star, and an interaction between the All-Star dummy and the revision variable. A positive and

significant coefficient for the interaction term shows that retail net buying increases more for positive revisions if the revising analyst is an All-Star.

We report the findings from these tests in Table 4. For the regressions reported in the first two columns, the revision variable is the EPS forecast. In both regressions, the revision-All-Star interaction coefficient is positive and significant, showing that retail investors have a more positive response to All-Star analysts' EPS revisions than to revisions issued by non-All-Stars. In both regressions, the EPS forecast revision variable is negative and significant. The overall effect is thus the revision-All-Star interaction coefficient + the revision coefficient. In both regressions, the interaction coefficient is greater than the revisions coefficient, showing that the overall effect with All-Star analysts is positive, i.e., retail investors buy more following a positive revision from an All-Star analyst. In contrast, the results also show that retail investors buy more following negative revisions from non-All-Star analysts, consistent with what we find in Tables 2 and 3.

The next two columns report the results for revisions in price targets. In both specifications, the All-Star interaction is insignificant. The price target revision coefficient is significant, consistent with Tables 2 and 3. Hence, retail investors trade in response to revisions in price targets, but do so equally for All-Stars and non-All-Stars alike.

The regressions in columns 5 and 6 report the results for revisions in recommendations. The results show that retail investors are significantly more responsive to revisions from All-Star analysts, especially in the case of *Retail Magnitude*. In both regressions, the revision variables and the revision-All-Star interactions are positive and significant. In the *Retail Direction* regression, both the revision and the All-Star interaction coefficients are 0.005. This shows that the effect of a revision on retail trading is twice as large if the issuing analyst is an All-Star. In the

Retail Magnitude regression, the revision coefficient is 0.005 and the All-Star interaction is 0.019, showing that if an All-Star analyst issues the revision, the effect is more than 4-times as large.

Overall, the results in Table 5 show that when analysts issue revisions in either recommendations or EPS forecasts, retail investors trade more in the direction of the revision if the analyst is an All-Star. With price targets, retail investors seem to respond to All-Stars and non-All-Stars equally.

2.4. "Tipping" or Trading in Anticipation of Revisions

In this section of the paper we ask whether retail investors trade ahead of analysts' revisions. This analysis is motivated by the findings in Irvine, Lipson, and Puckett (2007), who find that institutional investors are "tipped" by sell-side analysts, as institutional buying increases prior to an analyst initiating a "buy" or "strong buy" recommendation.

As we explain in the Introduction, the incentives for retail tipping are fairly straight forward. Investment banks often have large retail brokerage arms, and more retail trading and more retail assets under management result in more revenues for these firms and their brokers. Independent or unaffiliated analysts sell their reports directly to retail investors, so there is an incentive for tipping with these analysts as well.

We report the results from our tipping tests in Table 5. The dependent variable is one of the revision variables (EPS forecast, price target-return forecast, or recommendations), and we regress this on lagged values of either *Retail Direction* or *Retail Magnitude* for each of the previous 5 trading days. We include lagged daily stock returns and lagged daily returns squared for the same 5 trading days, market capitalization, and turnover as controls. The regressions all

have firm and time fixed effects, and standard errors that are clustered on firm and time. As in the other tables, we exclude revisions that follow an earnings announcement over any of the three previous days.

In the first two columns we report the results for EPS revisions. The retail trading coefficients are all insignificant in the regression that uses *Retail Direction*. In the regression reported in the second column the 1-day lag *Retail Magnitude* coefficient is negative and significant, however the other *Retail Magnitude* coefficients are insignificant. Overall, the evidence here does not support the idea that retail investors are tipped or otherwise anticipate EPS revisions.

Columns 3 and 4 report the results for revisions in price targets. The results here are very strong, and consistent with tipping or retail investors somehow anticipating price target revisions. In column 3, all five of the coefficients for lagged values of *Retail Direction* are positive and statistically significant. The coefficient for *Retail Direction* at the 1-day lag is 0.007 (*t*-statistic = 8.56), so a 1-standard deviation increase in *Retail Direction* portends a higher value of about 0.3% in the revision of price target-implied returns. If we add up the effects from all 5 *Retail Direction* coefficients, then the effect is about a 1.2% higher revision in price target-implied returns. Column 4 shows similar results for *Retail Magnitude*. All 5 of the coefficients for the lagged values are positive, and 4 are significant. The 1-day lag coefficient has a value of 0.076 (*t*-statistic = 5.60), which alone suggests about a 0.5% higher revision in price target-implied return.

Columns 5 and 6 report the results for recommendation revisions. We find evidence of retail investors anticipating such revisions with *Retail Direction*, but not *Retail Magnitude*. In column 5, the coefficients for lagged values of *Retail Direction* are all positive, and are significant

at the 1-day and 5-day lags. The coefficient for the 1-day lag suggests a 1.1% higher recommendation revision given a one standard deviation increase in *Retail Direction*.

Taken in their entirety, the findings in Table 6 are consistent with the idea that some retail investors are tipped or otherwise anticipate revisions in analysts' actionables, but not revisions in EPS forecasts. Alternatively, it could be that analyst recommendations are partially driven by retail trading. If analysts seek to observe and mirror retail trader sentiment when making their revisions, it may appear that retail traders anticipate revisions when in fact they are responsible for driving recommendations. While we cannot rule out this possibility, we find it less likely since we know of no anecdotal evidence that analysts respond to retail sentiment, and due to the difficult nature of observing retail trades during our sample period. Furthermore, this alternative explanation also applies (and is more plausible) for institutional trades, which as we explain above have been linked to tipping by Irvine, Lipson, and Puckett (2007).

2.5 Retail Trading, Analysts' Revisions, and Stock Returns

In this section of the paper we study how our analyst and retail trading variables relate to stock return predictability. Our results thus far show that retail investors follow revisions in actionables, and also follow EPS forecast revisions if the analyst making the revision is an All-Star. If such trading is "informed" or rational, then it needs to be the case that revisions predict returns in the intended direction. As we mention in the Introduction, previous studies show that all three of our revision variables predict returns in the intended direction. However, McLean and Pontiff (2016) show that return-predictability is typically lower out-of-sample, possibly because of both data mining and informed trading. We therefore begin by testing whether such revision-

predictability exists in our sample period. Boehmer et al. (2020) and McLean, Pontiff, and Reilly (2020) both show that retail trade imbalance measures (*Retail Direction*) predict returns in the intended direction. Our other retail trading variable, *Retail Magnitude*, however, has not been shown to predict stock returns, and we test whether it predicts returns here.

We report the results from our initial return-predictability regressions in Table 6. The dependent variable in each regression is stock returns measured over the subsequent 20 trading days. We multiply this variable by 100 so that the coefficients are easier to read. As in the earlier tables, we include controls for lagged returns, volatility, size, and turnover, and exclude observations with earnings announcements over the three previous days. The regressions have firm and time fixed effects and standard errors clustered on firm and time.

In the first regression, we include the three revision variables, but not the retail trading variables. The coefficients for each of the revision variables are positive and statistically significant. This means that when analysts become more bullish on a stock or raise its EPS forecast, returns over the month are significantly higher. This also shows that retail trading in the direction of the revisions, which we document in the previous tables for recommendations and price targets is informative. The revision variables' coefficients reflect increases in expected returns per standard deviation increase in the revision variable of 0.014%, 0.21%, and 0.22% for EPS forecasts, price target-return forecasts, and recommendations, respectively. Hence, although all three types of revisions result in statistically significant return predictability, revisions in price targets and recommendations produce return-predictability that is far more economically meaningful. The fact that retail investors follow revisions in actionables, but not EPS forecasts, further supports the idea of informed retail trading following analysts' revisions.

The regressions reported in the second and third columns report the results for the retail trading variables. Both retail trading variables produce return predictability that is statistically significant. In column 2, the coefficient for *Retail Direction* suggests an increase in expected returns of 0.14% per month per standard deviation increase, while in column 3 the coefficient for *Retail Magnitude* suggests and expected return increase of 0.08% per month per standard deviation increase. The mean value of monthly return is 0.79% in our sample, so with both retail trading variables the effects are economically meaningful.

The final two columns in Table 6 include each of the retail trading variables along with the revision variables. The results show that the effect of retail trading does not impact the effect of revisions, and vice versa. The coefficients for the retail trading variables are virtually the same in these specifications as compared to the specifications that did not include the revision variables. Similarly, the coefficients for the revision variables are essentially the same as those reported in the specifications that do not include the retail trading variables. This suggests retail trading in the direction of revisions is informative, i.e., a retail trader who buys shares following a positive revision earns a higher return than a retail trader who buys shares on a day with no revision.

2.5.1. The Informativeness of Retail Trading and Analysts Revisions

In this section we further explore whether retail trading that follows revisions is informative. We estimate regressions similar to those reported in Table 7, only we do so in subsamples based on retail trading. We consider subsamples with only positive or negative values of *Retail Direction* as well as subsamples based on the 10^{th} and 90^{th} percentiles of *Retail Direction*.

Creating subsamples based on the 10th and 90th percentiles of *Retail Magnitude* create similar findings, so for the sake of brevity we only report results based on *Retail Direction*.

We create our subsamples on day *t-1*, and measure returns from day *t* to day *t+20*. We measure the revision variables and other controls on day t-2, so retail investors had this information when they made their trades.

The results in Table 8 show that retail trading that conditions on revision is more informative. Analysts' revisions predict returns in the intended direction within each of the four subsamples. In the first two columns, which limit the samples to either positive or negative values of *Retail Direction*, all of the revision coefficients are statistically significant and signed in the intended direction. This shows that stocks which retail investors bought or sold have higher (lower) returns if analysts issued a positive (negative) revision.

In columns 3 and 4 the subsamples are limited to values of *Retail Direction* that are in either the 10th and 90th percentiles of *Retail Direction*. All of the revision variables are signed in the intended direction, and 2 of the 3 variables are significant in each regression. In the greater than 90th percentile subsample, the price target and recommendations coefficients are significant, whereas in the less than 10th percentile subsample, the EPS and recommendations coefficients are significant. Taken in their entirety, the results in Table 8 show that retail trading is significantly more informative when it follows analysts' revisions.

3. Conclusion

This paper studies whether and how retail investors respond to analysts' revisions in EPS forecasts, recommendations, and price targets. We produce several novel findings, which contribute to literatures on both retail investors and sell-side analysts.

We find that overall, retail investors follow revisions in analysts' actionables. That is, when analysts increase their recommendation or raise their price targets, retail investors buy more of the stock. With EPS forecasts, retail investors buy more following both positive and negative revisions, but the effect is stronger with negative revisions. This suggests that retail investors pay closer attention to analysts' actionables than to EPS forecasts. Actionables, i.e., recommendations and price targets, offer explicit guidance with respect to how to trade on the stock. EPS forecasts do not. The counter-trading with EPS forecast revisions on the part of retail investors could reflect an increase in institutional trading following EPS revisions.

We then ask whether these effects are stronger if an All-Star analyst makes the revision. With recommendations, this is very much the case. The response in retail trading following an All-Star's recommendation revision is 2x to almost 5x stronger as compared to a non-All-Star's revision. With EPS forecast revisions, we find that retail investors switch course, and trade in the direction of the revision. With price target revisions, we find no effect; retail investors respond similarly to revisions in price targets regardless if the analyst is an All-Star or not.

We find some evidence of tipping, or at least evidence of retail traders anticipating and thus trading ahead of revisions. We find strong evidence of retail investors trading in anticipation of price target revisions. We find weaker, but still significant evidence with recommendation revisions. We do not find evidence with EPS forecast revisions. As we mention earlier, there are

incentives for analysts to tip retail investors. Investment banks typically have retail brokerage arms that serve retail investors. Unaffiliated analysts sell their research directly to retail investors.

In the final part of our paper we study how analysts' revisions and retail trading relate to stock return-predictability. This analysis produces several interesting insights. All 3 types of revisions predict returns in our sample. The predictability of retail trading and revisions are largely orthogonal to one another. Revisions also predict returns in subsamples limited to high levels of either retail selling or retail buying. Thus, retail trades that follow revisions are more informative.

Overall, our findings are consistent with the idea that spikes in retail trading reflect informed trading, and at least some of these trades are informed by analysts' revisions. Our research also shows that one channel through which analysts information gets into prices is through retail investors.

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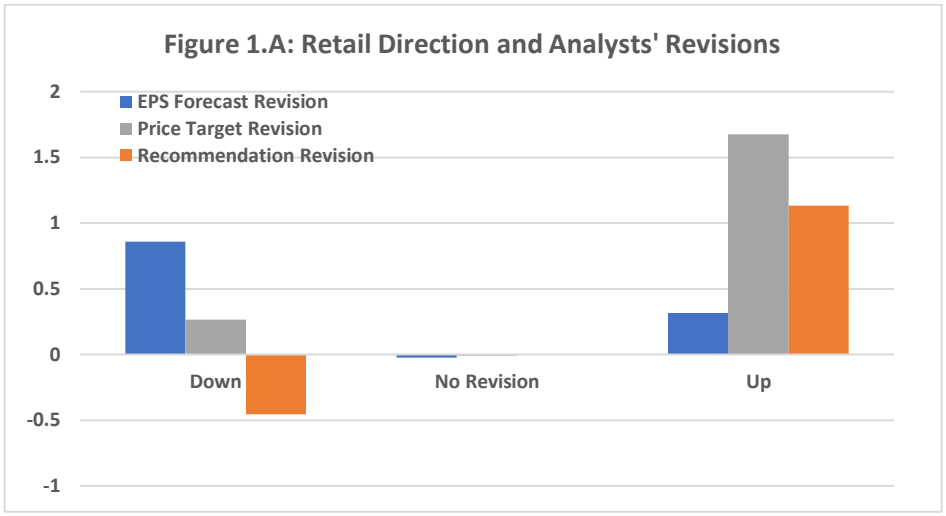
Figure 1: Retail Trading on and 0ff Days with Large Analysts' Revisions

This Figure displays average values for *Retail Direction* (Figure 1.A) and *Retail Magnitude* (Figure 1.B) on days following analysts' revisions. *Retail Direction* is equal to: (Retail Buy Volume – Retail Sell Volume) / (Retail Buy Volume + Retail Sell Volume). *Retail Magnitude* is equal to: (Retail Buy Volume – Retail Sell Volume) / Total Volume. We demean each observation by its firm-level mean. We consider revisions in EPS forecasts, price targets, and recommendations. "Up" reflects days at or above the 90th percentile for the revision variable, "Down" reflects days at or below the 10th percentile for the revision variable, and "No Revision" reflects days with no revision. The revisions are measured on day *t-1*, and the trading is measured on day *t*. We exclude observations with an earnings announcement on days *t-1*, *t-2*, or *t-3*.



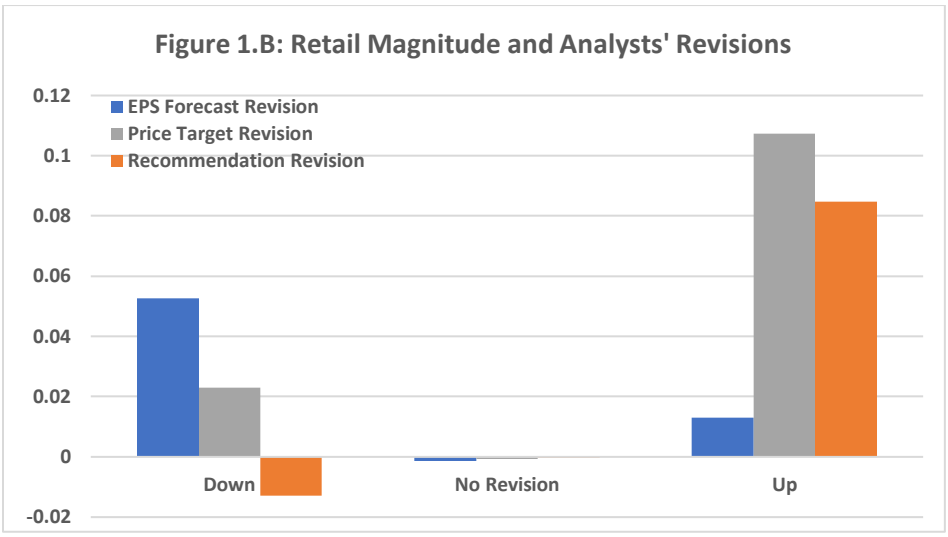


Table 1: Summary Statistics

This table presents summary statistics for the main variables used in this study. *Retail Direction* is equal to: (Retail Buy Volume – Retail Sell Volume) / (Retail Buy Volume + Retail Sell Volume). *Retail Magnitude* is equal to: (Retail Buy Volume – Retail Sell Volume) / Total Volume. *Daily*, *Weekly*, *Monthly*, and *6-Month* returns are the total stock returns measured over the stated period. *Variance* is the variance of daily returns measured over previous do days. *Daily Return*^{2} and *Weekly Return*^{2} are the daily and weekly stock returns squared. *Market Cap.* is price x shares outstanding, reported in millions. *Turnover* is the average daily turnover (shares traded / shares outstanding) over the last 20 days. The revision variables are measured at the analyst-level; they are not consensus variables. Each revision reflects a change for an individual analyst. *EPS Revision* is the new EPS forecast, - the most recent EPS forecast, scaled by the stock price measured on the day before the previous EPS forecast. *Price Target Revision* is the new 12-month price target scaled by yesterday's stock price minus the previous EPS forecast scaled by stock price the day before it was announced. *Recommendation Revision* is the new recommendation minus the previous recommendation. We exclude firms that don't have at least one revision during our sample period. The sample period begins in October 2006 and ends in December 2019.

Daily Variables	**Mean**	**Median**	**Min**	**Max**	**10th%ile**	**90th%ile**	**Std. Dev.**	**N**
Retail Direction	-0.0259	0.0000	-1.0000	1.0000	-0.5936	0.5005	0.4299	17,800,000
Retail Magnitude	-0.0019	0.0000	-0.3804	0.3843	-0.0413	0.0361	0.0665	17,800,000
Daily Return	0.0005	0.0000	-0.9652	11.5000	-0.0303	0.0300	0.0382	17,800,000
Weekly Return	0.0021	0.0008	-0.9854	21.8422	-0.0681	0.0685	0.0826	17,700,000
Monthly Return	0.0079	0.0050	-0.9989	36.3191	-0.1396	0.1442	0.1620	17,600,000
6-Month Return	0.0449	0.0205	-1.0000	4273.7240	-0.3186	0.3529	4.1281	16,700,000
Variance	0.0014	0.0005	0.0000	6.7284	0.0001	0.0027	0.0137	17,600,000
Daily Return^2	0.0015	0.0001	0.0000	132.2500	0.0000	0.0022	0.0607	17,800,000
Weekly Return^2	0.0068	0.0008	0.0000	477.0799	0.0000	0.0109	0.2128	17,700,000
Market Cap.	4,742,842	578,086	30	1,300,000,000	47,872	8,593,520	21,000,000	17,800,000
Turnover	0.0108	0.0058	0.0000	140.5812	0.0012	0.0190	0.1980	17,600,000
Revision Variables								
EPS Rev.	-0.0044	0.0000	-0.2800	0.1193	-0.0132	0.0072	0.0375	1,719,977
Price Target. Rev.	0.0020	-0.0008	-0.6362	0.6878	-0.1676	0.1729	0.1775	1,075,591
Rec. Rev.	-0.0581	0.0000	-4.0000	4.0000	-2.0000	1.0000	1.0482	414,115

Table 2: Retail Trading in Response to Revisions: Revision-Level Regressions

In this table we regress daily retail trading on lagged values of analysts' revisions and controls. The unit of observation is a revision. The revisions are lagged one day relative to the retail trading. The retail trading variables are *Retail Direction* and *Retail Magnitude*. *Retail Direction* is equal to: (Retail Buy Volume – Retail Sell Volume) / (Retail Buy Volume + Retail Sell Volume). *Retail Magnitude* is equal to: (Retail Buy Volume – Retail Sell Volume) / Total Volume. *EPS Revision* is the new EPS forecast minus the previous EPS forecast, scaled by the stock price measured on the day before the new EPS forecast. *Price Target Revision* is the new 12-month price target scaled by the day *t-1* stock price minus the previous price target scaled by its *t-1* stock price. *Recommendation Revision* is the new recommendation minus the previous recommendation. *Daily*, *Weekly*, *Monthly*, and *6-Month* returns are the total stock returns measured over the stated period. *Variance* is the variance of daily returns measured over previous do days. *Daily Return*^{2} and *Weekly Return*^{2} are the daily and weekly stock returns squared. *Market Cap.* is price x shares outstanding, reported in millions. *Turnover* is the average daily turnover (shares traded / shares outstanding) over the last 20 days. We exclude retail trading observations for which there is an earnings announcement over any of the three previous days. The regressions include firm and time fixed effects and the standard errors are clustered on firm and time. The sample period begins in October 2006 and ends in December 2019.

Table 2: (Continued)

	EPS Forecast Revisions		Price Target Revisions		Recommendation Revisions	
	Retail Direction	*Retail Magnitude*	*Retail Direction*	*Retail Magnitude*	*Retail Direction*	*Retail Magnitude*
Revision	-0.023	-0.142	0.019	0.033	0.005	0.006
	(2.26)**	(4.85)***	(10.06)***	(6.52)***	(9.35)***	(4.39)***
Daily Return	0.048	0.293	0.037	0.224	-0.023	0.045
	(4.61)***	(7.75)***	(3.90)***	(5.91)***	(1.99)**	(0.95)
Weekly Return	-0.079	-0.099	-0.086	-0.137	-0.105	-0.132
	(11.81)***	(4.65)***	(12.28)***	(6.14)***	(11.13)***	(4.72)***
Monthly Return	-0.078	-0.062	-0.062	-0.052	-0.073	-0.102
	(19.04)***	(4.25)***	(14.07)***	(3.47)***	(12.90)***	(6.20)***
6-Month Return	-0.011	-0.020	-0.006	-0.014	-0.007	-0.009
	(7.87)***	(4.12)***	(4.01)***	(2.49)**	(3.52)***	(1.38)
Variance	0.152	-0.395	0.394	0.023	0.354	-0.806
	(0.97)	(0.71)	(3.41)***	(0.05)	(3.27)***	(1.69)*
Daily Return^2	-0.001	0.027	-0.042	-0.046	-0.011	0.056
	(0.10)	(0.73)	(3.99)***	(0.82)	(1.24)	(1.43)
Weekly Return^2	0.046	0.068	0.014	0.046	0.016	0.080
	(3.88)***	(1.01)	(4.16)***	(2.45)**	(3.79)***	(3.93)***
Market Cap.	0.000	0.000	0.000	0.000	0.000	0.000
	(1.95)*	(2.24)**	(2.05)**	(2.89)***	(1.62)	(1.86)*
Turnover	0.310	1.965	0.164	1.434	-0.022	1.260
	(6.11)***	(5.18)***	(3.86)***	(5.20)***	(0.43)	(5.06)***
R^2	0.04	0.05	0.04	0.06	0.07	0.10
N	1,417,182	1,417,182	923,915	923,915	300,080	300,080

Table 3: Retail Trading in Response to Revisions: Daily Specifications

In this table we regress daily retail trading on lagged daily values of analysts' revisions and controls. The revisions are lagged one day relative to the trading. For days with no revisions, we set the revision value equal to zero. The retail trading variables are *Retail Direction* and *Retail Magnitude*. *Retail Direction* is equal to: (Retail Buy Volume – Retail Sell Volume) / (Retail Buy Volume + Retail Sell Volume). *Retail Magnitude* is equal to: (Retail Buy Volume – Retail Sell Volume) / Total Volume. We include lagged values of the retail trading variables in each regression. The lagged trading variables are measured at day *t-2*, so as not to coincide with the revision variables, which are measured on day *t-1*. *EPS Revision* is the new EPS forecast minus the previous EPS forecast, scaled by the stock price measured on the day before the new EPS forecast. *Price Target Revision* is the new 12-month price target scaled by the previous day's stock price minus the previous 12-month stock price forecast scaled by its previous day stock price. *Recommendation Revision* is the new recommendation minus the previous recommendation. *Daily*, *Weekly*, *Monthly*, and *6-Month* returns are the total stock returns measured over the stated period. *Variance* is the variance of daily returns measured over previous do days. *Daily Return*^{2} and *Weekly Return*^{2} are the daily and weekly stock returns squared. *Market Cap.* is price x shares outstanding, reported in millions. *Turnover* is the average daily turnover (shares traded / shares outstanding) over the last 20 days. We exclude firms that don't have at least one revision during our sample period. We exclude retail trading observations for which there is an earnings announcement over any of the three previous days. The regressions include firm and time fixed effects and the standard errors are clustered on firm and time. The sample period begins in October 2006 and ends in December 2019.

	Retail Direction	*Retail Direction*	*Retail Magnitude*	*Retail Magnitude*
EPS Revision	-0.003	-0.001	-0.000	-0.000
	(3.84)***	(1.81)*	(2.26)**	(0.96)
Price Tgt. Rev.	0.026	0.017	0.002	0.001
	(8.08)***	(4.95)***	(4.68)***	(2.06)**
Rec. Revision	0.005	0.005	0.000	0.000
	(7.37)***	(6.88)***	(5.24)***	(4.48)***
Lagged Retail	0.048	0.047	0.024	0.024
	(77.34)***	(76.06)***	(33.00)***	(32.46)***
Daily Return		-0.002		0.001
		(0.27)		(0.83)
Weekly Return		-0.091		-0.010
		(24.17)***		(22.11)***
Monthly Return		-0.044		-0.003
		(14.12)***		(10.62)***
6-Month Return		-0.000		-0.000
		(1.38)		(4.00)***
Variance		0.110		0.005
		(2.97)***		(2.32)**
Daily Return^2		0.004		0.000
		(0.95)		(0.30)
Weekly Return^2		0.014		0.002
		(3.99)***		(3.89)***
Market Cap.		0.000		0.000
		(2.63)***		(3.48)***
Turnover		0.001		0.000
		(1.07)		(1.40)
R^2	0.01	0.01	0.01	0.01
N	17,498,562	16,381,226	17,462,222	16,351,826

Table 4: Retail Trading in Response to Revisions: Daily Specifications and Revision Dummies

In this table we regress daily retail trading on lagged daily values of analysts' revisions and controls. The revisions are lagged one day relative to the trading. For days with no revisions, we set the revision value equal to zero. The retail trading variables are *Retail Direction* and *Retail Magnitude*. *Retail Direction* is equal to: (Retail Buy Volume – Retail Sell Volume) / (Retail Buy Volume + Retail Sell Volume). *Retail Magnitude* is equal to: (Retail Buy Volume – Retail Sell Volume) / Total Volume. We include lagged values of the retail trading variables in each regression. The lagged trading variables are measured at day *t-2*, so as not to coincide with the revision variables, which are measured on day *t-1*. Up EPS (Down EPS) is equal to 1 if there is an EPS revision in the 90^{th} (10^{th}) percentile and zero otherwise. Up Target (Down Target) is equal to 1 if there is an price target revision in the 90^{th} (10^{th}) percentile and zero otherwise. Up Rec. (Down Rec.) is equal to 1 if *Recommendation Revision* is positive (negative) and zero otherwise. *Daily*, *Weekly*, *Monthly*, and *6-Month* returns are the total stock returns measured over the stated period. *Variance* is the variance of daily returns measured over previous do days. *Daily Return*^{2} and *Weekly Return*^{2} are the daily and weekly stock returns squared. *Market Cap.* is price x shares outstanding, reported in millions. *Turnover* is the average daily turnover (shares traded / shares outstanding) over the last 20 days. We exclude firms that don't have at least one revision during our sample period. We exclude retail trading observations for which there is an earnings announcement over any of the three previous days. The regressions include firm and time fixed effects and the standard errors are clustered on firm and time. The bottom row reports *p*-values from *F*-tests of whether the difference between the *Up* and *Down* coefficients are statistically significant. The coefficients in the *Retail Magnitude* regressions are multiplied by 100 for readability. The sample period begins in October 2006 and ends in December 2019.

Table 4: (Continued)

	Retail Direction	*Retail Direction*	*Retail Magnitude*	*Retail Magnitude*
EPS Up	0.002	0.003	0.011	0.017
	(2.99)***	(4.37)***	(1.87)*	(2.71)***
Target Up	0.014	0.011	0.092	0.059
	(7.32)***	(5.65)***	(4.69)***	(2.93)***
Rec. Up	0.008	0.008	0.057	0.054
	(6.05)***	(5.61)***	(5.04)***	(4.53)***
EPS Down	0.008	0.006	0.057	0.041
	(12.02)***	(9.07)***	(8.90)***	(6.10)***
Target Down	-0.001	0.002	0.000	0.032
	(0.40)	(1.09)	(0.01)	(1.53)
Rec. Down	-0.007	-0.006	-0.034	-0.025
	(5.08)***	(4.45)***	(2.87)***	(2.02)**
Lagged Retail	0.048	0.047	2.394	2.387
	(77.34)***	(76.06)***	(33.00)***	(32.46)***
Daily Return		-0.002		0.080
		(0.25)		(0.84)
Weekly Return		-0.091		-1.049
		(24.17)***		(22.11)***
Monthly Return		-0.044		-0.288
		(14.11)***		(10.61)***
6-Month Return		-0.000		-0.000
		(1.38)		(3.99)***
Variance		0.110		0.540
		(2.97)***		(2.32)**
Daily Return^2		0.004		0.023
		(0.93)		(0.30)
Weekly Return^2		0.014		0.159
		(3.99)***		(3.89)***
Market Cap.		0.000		0.000
		(2.62)***		(3.48)***
Turnover		0.001		0.014
		(1.07)		(1.40)
R^2	0.01	0.01	0.01	0.01
N	17,498,562	16,381,226	17,462,222	16,351,826
EPS: Up-Down	0.00	0.00	0.00	0.00
Target: Up-Down	0.00	0.00	0.00	0.00
Rec: Up-Down	0.00	0.00	0.00	0.00

Table 5: Retail Trading in Response to Revisions: The Effects of All-Star Analysts

In this table we regress daily retail trading on lagged values of analysts' revisions, revisions interacted with an All-Star Analyst dummy, and controls. The unit of observation is a revision. The revisions are lagged one day relative to the retail trading. The All-Star dummy equals 1 if the analyst was named an All-Star or runner up in the previous year, and zero otherwise. The retail trading variables are *Retail Direction* and *Retail Magnitude*. *Retail Direction* is equal to: (Retail Buy Volume – Retail Sell Volume) / (Retail Buy Volume + Retail Sell Volume). *Retail Magnitude* is equal to: (Retail Buy Volume – Retail Sell Volume) / Total Volume. *EPS Revision* is the new EPS forecast minus the previous EPS forecast, scaled by the stock price measured on the day before the new EPS forecast. *Price Target Revision* is the new 12-month price target scaled by the day *t-1* stock price minus the previous price target scaled by its *t-1* stock price. *Recommendation Revision* is the new recommendation minus the previous recommendation. *Daily*, *Weekly*, *Monthly*, and *6-Month* returns are the total stock returns measured over the stated period. *Variance* is the variance of daily returns measured over previous do days. *Daily Return*^{2} and *Weekly Return*^{2} are the daily and weekly stock returns squared. *Market Cap.* is price x shares outstanding, reported in millions. *Turnover* is the average daily turnover (shares traded / shares outstanding) over the last 20 days. We exclude retail trading observations for which there is an earnings announcement over any of the three previous days. The regressions include firm and time fixed effects and the standard errors are clustered on firm and time. The sample period begins in October 2006 and ends in December 2019.

Table 5: (Continued)

	EPS Forecast Revisions		Price Target Revisions		Recommendations Revisions	
	Retail Direction	*Retail Magnitude*	*Retail Direction*	*Retail Magnitude*	*Retail Direction*	*Retail Magnitude*
Revision	-0.028	-0.157	0.018	0.030	0.005	0.005
	(2.75)***	(5.55)***	(9.53)***	(6.12)***	(9.14)***	(4.08)***
*Revision * AS*	0.103	0.188	-0.004	0.012	0.005	0.019
	(2.13)**	(1.78)*	(0.46)	(0.51)	(1.96)**	(3.78)***
All-Star (AS)	-0.000	0.005	0.002	0.002	0.001	0.003
	(0.12)	(2.30)**	(1.31)	(1.10)	(0.34)	(0.68)
Daily Return	0.047	0.293	0.036	0.222	-0.023	0.044
	(4.55)***	(7.75)***	(3.80)***	(5.86)***	(2.02)**	(0.94)
Weekly Return	-0.080	-0.098	-0.088	-0.140	-0.105	-0.133
	(11.92)***	(4.60)***	(12.48)***	(6.25)***	(11.16)***	(4.74)***
Monthly Ret.	-0.078	-0.061	-0.062	-0.051	-0.073	-0.102
	(18.94)***	(4.20)***	(13.98)***	(3.35)***	(12.87)***	(6.19)***
6-Month Ret.	-0.011	-0.020	-0.006	-0.014	-0.007	-0.009
	(7.80)***	(4.07)***	(4.04)***	(2.49)**	(3.51)***	(1.37)
Variance	0.165	-0.348	0.405	-0.013	0.353	-0.809
	(1.05)	(0.62)	(3.48)***	(0.03)	(3.26)***	(1.69)*
Daily Return^2	-0.001	0.023	-0.041	-0.032	-0.011	0.056
	(0.15)	(0.63)	(3.64)***	(0.55)	(1.23)	(1.43)
Weekly Ret^2	0.046	0.069	0.014	0.049	0.016	0.080
	(3.88)***	(1.01)	(3.98)***	(2.46)**	(3.81)***	(3.94)***
Market Cap.	0.000	0.000	0.000	0.000	0.000	0.000
	(1.94)*	(2.21)**	(2.03)**	(2.90)***	(1.63)	(1.86)*
Turnover	0.309	1.958	0.164	1.442	-0.022	1.261
	(6.33)***	(5.15)***	(3.91)***	(5.19)***	(0.43)	(5.07)***
R^2	0.04	0.05	0.04	0.06	0.07	0.10
N	1,417,124	1,417,124	923,798	923,798	300,080	300,080

Table 6: "Tipping" or Trading in Anticipation of Revisions

The dependent variable in these regressions is one of the revision variables: EPS forecast, price target, or recommendations. We regress revisions on lagged values of either *Retail Direction* or *Retail Magnitude* for each of the previous 5 trading days. The retail trading variables are *Retail Direction* and *Retail Magnitude*. *Retail Direction* is equal to: (Retail Buy Volume – Retail Sell Volume) / (Retail Buy Volume + Retail Sell Volume). *Retail Magnitude* is equal to: (Retail Buy Volume – Retail Sell Volume) / Total Volume. We include lagged daily stock returns for each of the past 5 days, and lagged daily returns squared for each of the past 5 days, market capitalization, and turnover as controls. For the sake of brevity, we do not report the control variables' coefficients. *Daily*, *Weekly*, *Monthly*, and *6-Month* returns are the total stock returns measured over the stated period. *Variance* is the variance of daily returns measured over previous do days. *Daily Return*^{2} and *Weekly Return*^{2} are the daily and weekly stock returns squared. *Market Cap.* is price x shares outstanding, reported in millions. *Turnover* is the average daily turnover (shares traded / shares outstanding) over the last 20 days. The regressions have firm and time fixed effects, and standard errors that are clustered on firm and time. We exclude revisions that are on an earnings announcement day, or follow an earnings announcement over the previous 2 days. The regressions include firm and time fixed effects and the standard errors are clustered on firm and time. The sample period begins in October 2006 and ends in December 2019.

Table 6: (Continued)

	EPS Revision		Price Target Revision		Recommendation Revision	
	Retail Direction	*Retail Magnitude*	*Retail Direction*	*Retail Magnitude*	*Retail Direction*	*Retail Magnitude*
Retail Trading$_{t-1}$	102.228	-9,187.477	0.007	0.076	0.027	0.007
	(0.28)	(1.84)*	(8.56)***	(5.60)***	(3.97)***	(0.10)
Retail Trading$_{t-2}$	-26.400	-2,972.252	0.007	0.052	0.009	0.043
	(0.17)	(0.45)	(9.13)***	(4.11)***	(1.34)	(0.64)
Retail Trading$_{t-3}$	171.690	3,113.387	0.004	0.039	0.002	-0.062
	(0.84)	(0.85)	(5.98)***	(3.21)***	(0.28)	(0.94)
Retail Trading$_{t-4}$	73.106	-2,645.388	0.005	0.012	0.005	-0.035
	(0.34)	(0.37)	(6.51)***	(0.95)	(0.75)	(0.51)
Retail Trading$_{t-5}$	11.116	1,314.990	0.005	0.033	0.016	0.082
	(0.09)	(0.80)	(6.52)***	(2.64)***	(2.50)**	(1.18)
R^2	0.02	0.02	0.08	0.08	0.06	0.06
N	1,403,992	1,403,682	889,744	889,588	312,510	312,438

Table 7: Retail Trading, Analysts' Revisions, and Stock Returns

This table reports regression results of 20-day stock returns on lagged values of analysts' revisions, retail trading, and controls. Retail trading is measured on day *t-1*, while the revision variables are measured on day *t-2*. The control variables are all measured relative to day *t-2* as well. For days with no revisions, we set the revision value equal to zero. *Retail Direction* is equal to: (Retail Buy Volume – Retail Sell Volume) / (Retail Buy Volume + Retail Sell Volume). *Retail Magnitude* is equal to: (Retail Buy Volume – Retail Sell Volume) / Total Volume. *EPS Revision* is the new EPS forecast minus the previous EPS forecast, scaled by the stock price measured on the day before the new EPS forecast. *Price Target Revision* is the new 12-month price target scaled by the previous day's stock price minus the previous EPS forecast scaled by its previous day's stock price. *Recommendation Revision* is the new recommendation minus the previous recommendation. *Daily*, *Weekly*, *Monthly*, and *6-Month* returns are the total stock returns measured over the stated period. *Variance* is the variance of daily returns measured over previous do days. *Daily Return*^{2} and *Weekly Return*^{2} are the daily and weekly stock returns squared. *Market Cap.* is price x shares outstanding, reported in millions. *Turnover* is the average daily turnover (shares traded / shares outstanding) over the last 20 days. We exclude firms that don't have at least one revision during our sample period. We exclude observations with an earnings announcement over any of the three previous days. The regressions include firm and time fixed effects and the standard errors are clustered on firm and time. The sample period begins in October 2006 and ends in December 2019.

Retail Direction		0.330		0.330	
		(20.34)***		(20.34)***	
Retail Magnitude			1.253		1.253
			(11.44)***		(11.43)***
EPS Revision	0.372			0.372	0.372
	(5.79)***			(5.79)***	(5.79)***
Price Target Revision	1.182			1.176	1.178
	(4.60)***			(4.58)***	(4.60)***
Rec. Revision	0.213			0.211	0.211
	(7.03)***			(6.98)***	(6.97)***
Daily Return	-6.134	-6.076	-6.017	-6.134	-6.075
	(6.24)***	(6.20)***	(6.25)***	(6.25)***	(6.30)***
Weekly Return	-3.558	-3.527	-3.502	-3.528	-3.503
	(5.03)***	(4.99)***	(5.06)***	(5.00)***	(5.07)***
Monthly Ret.	-0.998	-0.985	-1.045	-0.983	-1.044
	(0.80)	(0.79)	(0.86)	(0.79)	(0.86)
6-Month Ret.	0.005	0.005	0.004	0.005	0.004
	(0.79)	(0.80)	(0.41)	(0.80)	(0.41)
Variance	12.125	12.086	12.229	12.086	12.228
	(2.14)**	(2.13)**	(2.18)**	(2.13)**	(2.17)**
Daily Return^2	0.285	0.273	0.260	0.284	0.271
	(0.92)	(0.89)	(0.85)	(0.92)	(0.89)
Weekly Ret^2	0.294	0.289	0.289	0.289	0.289
	(1.81)*	(1.79)*	(1.80)*	(1.79)*	(1.80)*
Market Cap.	-0.000	-0.000	-0.000	-0.000	-0.000
	(3.25)***	(3.25)***	(3.25)***	(3.25)***	(3.25)***
Turnover	-0.624	-0.625	-0.624	-0.625	-0.624
	(3.62)***	(3.62)***	(3.63)***	(3.62)***	(3.63)***
R^2	0.15	0.15	0.15	0.15	0.15
N	16,203,510	16,203,510	16,186,824	16,203,510	16,186,824

Table 8: Retail Trading and Stock Returns On and Off Revision Days

This table reports regression results of 20-day stock returns on analysts' revisions and controls within different subsamples that are based on values of *Retail Direction*. *Retail Direction* is measured on day *t-1* relative to the 20-day future stock return, which is measured on day *t*. The revision and control variables are measure on or relative to day *t-2*. *EPS Revision* is the new EPS forecast minus the previous EPS forecast, scaled by the stock price measured on the day before the new EPS forecast. *Price Target Revision* is the new 12-month price target scaled by the previous day's stock price minus the previous EPS forecast scaled by its previous day's stock price. *Recommendation Revision* is the new recommendation minus the previous recommendation. *Daily*, *Weekly*, *Monthly*, and *6-Month* returns are the total stock returns measured over the stated period. *Variance* is the variance of daily returns measured over previous do days. *Daily Return²* and *Weekly Return²* are the daily and weekly stock returns squared. *Market Cap.* is price x shares outstanding, reported in millions. *Turnover* is the average daily turnover (shares traded / shares outstanding) over the last 20 days. We exclude firms that don't have at least one revision during our sample period. We exclude observations with an earnings announcement over any of the three previous days. The regressions include firm and time fixed effects and the standard errors are clustered on firm and time. The sample period begins in October 2006 and ends in December 2019.

	Retail Direction>0	Retail Direction<0	Retail Direction>90$^{th\%ile}$	Retail Direction<10$^{th\%ile}$
EPS Revision	0.286	0.473	0.373	0.492
	(3.34)***	(6.95)***	(1.50)	(2.85)***
Price Target Revision	0.917	1.217	3.114	1.143
	(2.86)***	(4.57)***	(2.18)**	(1.20)
Rec. Revision	0.234	0.182	0.437	0.441
	(5.65)***	(5.00)***	(3.44)***	(3.96)***
Daily Return	-6.263	-5.170	-8.533	-7.248
	(7.42)***	(6.82)***	(4.24)***	(4.30)***
Weekly Return	-3.423	-3.053	-6.403	-5.857
	(6.58)***	(6.42)***	(3.81)***	(3.70)***
Monthly Ret.	-1.934	-1.832	-1.425	-1.610
	(3.46)***	(4.26)***	(0.62)	(0.94)
6-Month Ret.	-0.021	0.008	0.003	0.013
	(0.58)	(0.61)	(0.31)	(3.95)***
Variance	14.017	5.063	40.964	23.008
	(2.36)**	(1.58)	(7.91)***	(3.21)***
Daily Return²	0.013	0.776	2.998	-0.048
	(0.04)	(2.70)***	(0.72)	(0.16)
Weekly Ret²	0.055	0.454	3.079	2.798
	(0.84)	(3.26)***	(1.55)	(3.31)***
Market Cap.	-0.000	-0.000	-0.000	-0.000
	(3.06)***	(3.38)***	(1.99)**	(2.43)**
Turnover	-0.600	-0.581	-1.898	-6.608
	(3.69)***	(4.30)***	(1.06)	(2.05)**
R^2	0.15	0.16	0.14	0.14
N	7,148,654	7,849,057	1,676,913	1,676,036